THE HYDROGEN UTILITY PTY LTD
ACN 635 889 164

H2-HUB™ GLADSTONE

INITIAL ADVICE STATEMENT (IAS)

PREPARED FOR:

THE QUEENSLAND COORDINATOR-GENERAL

v1.5 – FINAL | SEPTEMBER 2021

THE HYDROGEN UTILITY™

ABOUT H2U

The Hydrogen Utility™ (H2U) is a specialist developer of hydrogen-energy infrastructures for sustainable mobility and renewable energy storage. H2U is based in Australia and operates throughout the Asia-Pacific.

IMPORTANT NOTICES

H2U Investments Pty Ltd, The Hydrogen Utility Pty Ltd and Gladstone Hydrogen Holdings Pty Ltd

This Document is issued by The Hydrogen Utility Pty Ltd - ACN 635 889 164 (H2U) and provides general information relating to The Hydrogen Utility™ (or H2U), or its related body corporate Gladstone Hydrogen Holdings Pty Ltd – ACN 635 892 152 (GHH) and H2U Investments Pty Ltd ACN 635 884 169 (H2I) being the group holding company for both H2U and GHH.

This Document is provided by H2U and GHH on the terms and conditions set out below and should be read in its entirety.

No Responsibility for Contents of Document

This Document contains forward-looking statements. All statements, other than statements of historical fact included in the Document are forward-looking statements. Forward-looking statements are H2U's current expectations and projections relating to its financial condition, results of operations, plans, objectives, future performance and business. These statements may include, without limitation, any statements preceded by, followed by, or including words such as "target", "believe", "expect", "aim", "intend", "may", "anticipate", "estimate", "plan", "project", "will", "can have", "likely", "should", "would", "could" and other words and terms of similar meaning or the negative thereof.

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DOCUMENT

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CONTENT

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Executive Summary

H2-Hub™ Gladstone

The **H2-Hub™ Gladstone** Project (hereinafter the **Project**) proposed by The Hydrogen Utility Pty Ltd (H2U) is an industrial-scale complex for the production of green hydrogen and green ammonia to be established at Yarwun, in the Gladstone State Development Area (SDA).

The Hydrogen Utility Pty Ltd, ACN 635 889 164 (H2U) is a related body corporate of Gladstone Hydrogen Holdings Pty Ltd, ACN 635 892 152, (GHH) the landowner and H2U Investments Pty Ltd, ACN 635 884 169 being the group parent company. H2U and GHH will develop and operate the H2-Hub™ Gladstone Project.

The Project will drive significant economic, social and environmental benefits to Queensland and provide economic growth at a time of critical need. The Project involves the staged-development of a greenfield manufacturing operation and associated product logistics infrastructure, that once fully established will result in the following **key economic outcomes**:

- **Direct Investment**, over $4.7 billion[1]; and
- **Direct Employment,** over 100 ongoing direct operational jobs.

Even larger investment and jobs creation will result when considering the following:

- **Renewable Energy Development**, with over 10 GW in additional renewable energy generation capacity required to be established in the Queensland region of the NEM to support the ongoing operation of the project;
- **Supply-chain and Industry Development**, the project a *world-first* industrial-scale deployment of green hydrogen infrastructure, will promote development in Queensland of an advanced industrial ecosystem for this new industry, and the creation of several hundred new supply-chain jobs.

Status and Key Milestones

On 27 February 2020 H2U secured the land for *H2-Hub™ Gladstone* under a Sale of Land contract between its subsidiary GHH and the Minister of Economic Development Queensland.

H2U is now engaged in active development of the Project aligned with the implementation strategy presented in Table 1 in the following page.

Initial Advice Statement (IAS)

This **Initial Advice Statement** (IAS) has been prepared to support H2U's application to the Queensland Coordinator-General (CG) for the Project to be declared a **Coordinated Project** under the provisions of Part 4, Division 2, Section 26(1) of the *State Development and Public Works Organisation Act* 1971 (SDPWO Act). The IAS is specifically to inform the Coordinator-General (CG) on the proposed development and:

- Enable the Coordinator-General to make a decision as to whether the Project meets the criteria for declaration as a coordinated project under Section 27 (2)(b) of the SDPWO Act;
- Assist the Coordinator-General to determine if the Project will require and Environmental Impact Statement (EIS) or an Impact Assessment Report (IAR) under Section 26 of the SDPWO Act
- Assist the Office of the Coordinator-General, advisory agencies and other stakeholders to determine the Terms of Reference (ToR) if an EIS is to be developed for the Project; and
- Inform stakeholders and the general public about the definition, scope, value and key environmental issues to be investigated through an EIS process for the proposed development.

[1] All monetary figures presented in this Initial Advice Statement (IAS), unless otherwise noted refer to Australian Dollars.

TABLE 1. *H2-HUB™ GLADSTONE* | IMPLEMENTATION ACTIVITIES AND TIMEFRAME

COMPLETED TO DATE	**Business Case**	Business Case and Due-diligence completed August 2019
	Customer Engagement	Engaged with prospective cornerstone customers for commercial-grade anhydrous ammonia (NH_3), and export market customers
	Site Acquisition	Executed contract for the sale of land with Minister for Economic Development Queensland (MEDQ), February 2020
	Port Access Arrangements	Negotiation of LoI with Gladstone Ports Corporation (GPCL) for establishment of Export Precinct
PROJECT DESIGN FY 2021	**Initial Advice Statement** (Mar – Sep 2021)	Submission to the Queensland Co-ordinator General to obtain a Coordinated Project Declaration under Part 4 Division 2 of the *State Development and Public Works Organisation Act* 1971 (SDPWO Act)
	Master Plan & Feasibility Study (Oct 2021 – Jun 2022)	Concept planning for *H2-Hub™ Gladstone* production and export precincts and associated infrastructure corridor
		Detailed feasibility for Activation Stage (COD target 2025)
	Funding Applications (Oct 2021 – Jun 2022)	Including Australian Renewable Energy Agency (ARENA), Clean Energy Finance Corporation (CEFC), and Northern Australia Infrastructure Facility (NAIF)
PROJECT DEVELOPMENT FY 2022 – FY 2023	**Environmental Impact Statement** (Jul 2022 – Jun 2023)	Development and submission of Environmental Impact Statement (EIS)
	FEED Study (Sep 2022 – Jun 2023)	Detailed engineering for Activation Stage (COD target 2025)
	Contracts and Approvals (Jan 2022 – Jun 2023)	Power Purchase Agreement (PPA), Product Offtake Agreement (POA), and Transmission Connection Agreement (TCA)
		Development Approval (DA), EPA Licence, WorkSafe Licence
	Project Finance (Jul 2022 – Jun 2023)	Equity and debt finance, target Final Investment Decision (FID) Jun 2023
PROJECT ACTIVATION FY 2024 – FY 2025	**Procurement** (Jul – Dec 2023)	EPC/EPCM contract, engineering and other service contracts
		Major equipment supply contracts and purchase orders (POs)
	Site and Facilities (July 2023 – Jun 2024)	Site Preparation, buildings and utilities connections
	Installation & Commissioning (Jun 2024 – Dec 2025)	Equipment installation and testing
		Plant commissioning and hand-over to operations.
PROJECT EXPANSION FY 2028 – FY 2030	**Finance, Procurement, Installation & Commissioning**	As described above

1 INTRODUCTION

Section 1. **Introduction**

1.1 Background

Project Description

The **H2-Hub™ Gladstone** Project (hereinafter the **Project**) proposed by The Hydrogen Utility Pty Ltd (H2U) in conjunction with Gladstone Hydrogen Holdings Pty Ltd (GHH) is an industrial-scale complex for the production of green hydrogen and green ammonia to be established at Yarwun, in the Gladstone State Development Area (SDA).

The Project will integrate renewable energy from the Queensland region of the National Electricity Market (NEM), sourced via a transmission-level Virtual Power Plant (VPP) scheme, to generate the following products:

- **green hydrogen**, by means of Water Electrolysis powered by renewable energy;
- green nitrogen, by means of Cryogenic Air Separation powered by renewable energy; and
- **green ammonia**, by means of Haber-Bosch Synthesis using green hydrogen, and nitrogen.

The Project will be established as a **staged development** with its construction and commissioning schedule designed to meet the needs of the following markets:

- in the **near-term**, providing import replacement options to domestic customers (**Activation Stage**); and
- in the **medium-term**, leveraging existing port facilities to export green hydrogen and green ammonia to North Asian economies, including Japan, South Korea and Singapore (**Expansion Stage**).

The Project will be developed to include the following infrastructure:

- a **Production Precinct (Yarwun),** a multi-bay industrial complex for the production of green hydrogen and ammonia, to be located at Yarwun in the Gladstone SDA;
- an **Export Precinct (Fisherman's' Landing),** to be established at Fisherman's Landing Wharf, co-located with existing ammonia storage and import facilities; and
- a **Product Logistics and Infrastructure Corridor**, leveraging existing infrastructure, and service corridors to link Production and Export Precincts.

H2-Hub™ Gladstone is planned for a modular, staged-development approach, with up to eight (8) process trains, each with 600 tonnes per day (tpd) in ammonia production and 370 MW in electrolysis plant capacity, the first four (4) process trains will be established as part of the Activation Stage, and the other four (4) process trains to be established later as part of the Expansion Stage.

With up to 4,800 tonnes per day in ammonia production capacity (8x600 tpd), the Project will be one of the largest ammonia complexes worldwide. With up to 2.96 GW in electrolyser capacity (8x370 MW), it will introduce significant additional load in the Queensland Region of the National Electricity Market, and potentially underpin further development of renewable energy resources in Central and North Queensland.

Status and Key Milestones

On 27 February 2020 H2U secured the land for *H2-Hub™ Gladstone* under a Sale of Land contract between the its subsidiary GHH and Minister of Economic Development Queensland.

H2U is now engaged in active development of the Project aligned with the implementation strategy presented in Table 2 in the following page.

TABLE 2. *H2-HUB™ GLADSTONE* | IMPLEMENTATION ACTIVITIES AND TIMEFRAME

COMPLETED TO DATE	**Business Case**	Business Case and Due-diligence completed August 2019
	Customer Engagement	Engaged with prospective cornerstone customers for commercial-grade anhydrous ammonia (NH_3), and export market customers
	Site Acquisition	Executed contract for the sale of land with Minister for Economic Development Queensland (MEDQ), February 2020
	Port Access Arrangements	Negotiation of LoI with Gladstone Ports Corporation (GPCL) for establishment of Export Precinct
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PROJECT EXPANSION FY 2028 – FY 2030	**Finance, Procurement, Installation & Commissioning**	As described above

1.2 Purpose and Scope of the IAS

Purpose

This **Initial Advice Statement** (IAS) has been prepared to support H2U's application to the Queensland Coordinator-General (CG) for the Project to be declared a **Coordinated Project** under the provisions of Part 4, Division 2, Section 26(1) of the *State Development and Public Works Organisation Act* 1971 (SDPWO Act). The IAS is specifically to inform the Coordinator-General (CG) on the proposed development and:

- Enable the Coordinator-General to make a decision as to whether the Project meets the criteria for declaration as a coordinated project under Section 27 (2)(b) of the SDPWO Act;
- Assist the Coordinator-General to determine if the Project will require and Environmental Impact Statement (EIS) or an Impact Assessment Report (IAR) under Section 26 of the SDPWO Act
- Assist the Office of the Coordinator-General, advisory agencies and other stakeholders to determine the Terms of Reference (ToR) if an EIS is to be developed for the Project; and
- Inform stakeholders and the general public about the definition, scope, value and key environmental issues to be investigated through an EIS process for the proposed development.

Scope

This IAS has been prepared to cover the entire scope of the Project, including the Production Precinct (highlighted in the aerial map presented in Figure 1), and Product Logistics and Infrastructure Corridor – both located in the Yarwun region of the Gladstone SDA – and the Export Precinct – located in the Fisherman's Landing precinct of the Port of Gladstone. The Production Precinct

FIGURE 1. H2-HUB™ GLADSTONE (PRODUCTION PRECINCT) | LAND PARCELS (1:25,000)

Justification for being declared a Coordinated Project

H2U is seeking a declaration for a co-ordinated project under Section 27(2)(b) of the SDPWO Act and confirms the Project will:

- require complex State or Commonwealth **government approval requirements**;
- be of **strategic significance** to the locality, region or the State;
- have **significant environmental effects**; or
- have **significant infrastructure requirements**.

Approval Requirements

The Project will require co-ordination of input and approvals from multiple agencies, across Local, State, and Commonwealth Governments, and market regulatory bodies, including:

- Gladstone Regional Council (GRC)
- Queensland Department of Resources (DR);
- Queensland Department of Environment and Science (DES);
- Queensland Department of Agriculture and Fisheries (DAF);
- Queensland Department of Transport and Main Roads (DTMR);
- Workplace Health and Safety, Queensland (WorkSafe Qld);
- Electrical Safety Office, Queensland (ESO Qld);
- Commonwealth Department of Agriculture, Water and the Environment (DAWE);
- Australian Energy Regulator (AER);
- Australian Energy Market Commission (AEMC); and
- Australian Energy Market Operator (AEMO).

The Project will in particular involve the production, handling and storage of above-threshold quantities of Hydrogen (H_2) and Ammonia (NH_3), two chemicals listed in Schedule 15 of the *Work Health and Safety Regulation* 2011, and will therefore be classified as a Major Hazard Facility (MHF).

Strategic Significance

The Project will drive significant economic, social and environmental benefits to Queensland and provide economic growth at a time of critical need. The Project involves in particular staged-development of a greenfield manufacturing operation and associated product logistics infrastructure, that once fully established will result in the following **key economic outcomes**:

- **Direct Investment**, over $3.4 billion[2]; and
- **Direct Employment,** over 100 ongoing direct operational jobs.

Even larger investment and jobs creation will result when considering the following:

- **Renewable Energy Development**, with over 10 GW in additional renewable energy generation capacity required to be established in the Queensland region of the NEM to support the ongoing operation of the project;
- **Supply-chain and Industry Development**, the project a *world-first* industrial-scale deployment of green hydrogen infrastructure, will promote development in Queensland of an advanced industrial ecosystem for this new industry, and the creation of several hundred new supply-chain jobs.

The benefits of the Project are listed in Table 3 in the following page.

[2] All monetary figures presented in this Initial Advice Statement (IAS), unless otherwise noted refer to Australian Dollars.

TABLE 3. H2-HUB™ GLADSTONE | STRATEGIC SIGNIFICANCE OF THE PROJECT

ECONOMIC SIGNIFICANCE	**Investment Attraction**	**Direct Investment –** the Project, once fully built will result in over $4.7 billion in capital expenditure
		Foreign Investment Attraction – the Project will attract direct foreign investment, including in the areas of manufacturing, infrastructure development, and logistics
	Export Development	**New Export Income –** provide significant export income once fully developed and operational
		Market Development – drive ongoing international market relationships in a new industry sector
		Infrastructure Revenue Diversification – transition existing port infrastructure to new revenue stream associated with new *future-proof* green energy products
	Economic Development	**Resilience, Competitiveness and Sustainability –** strengthen the resilience and sustainability of the supply chain for a variety of Queensland-based industries, by substituting imports of critical production inputs with locally-produced 'green' chemical products.
		Industry and Supply-Chain Development – attract new technical capabilities and supply chain opportunities to Queensland to support construction and ongoing operation of the proposed project, and future hydrogen infrastructure initiatives.
		Regional Development – support local and regional businesses through various contractual arrangements form supply of goods and trade services to accommodation and support services.
	Infrastructure Development	**Renewable Energy Development –** support ongoing development of the renewable energy industry in the Queensland Region of the National Electricity Market (NEM) through operation of new GW-scale power loads.
		Grid Resilience and Reliability – the flexible load operation, and fast response of the proposed GW-scale electrolysis plant enables greater grid stability and reliability even under increased penetration of renewables. The proposed electrolysis plant introduces in the system a load that can be as flexible as the renewable supply is intermittent and that can be therefore ramped-up or ramped-down to improve the demand-supply balance and relieve grid congestion.
		Dispatchable Power Generation – the project includes fast-response power generation assets, powered by green hydrogen stored on site, that will be used to assist the network during times of low-renewable generation output, during peak pricing and emergency periods to support the ongoing stability and reliability of network operations.

TABLE 3. H2-HUB™ GLADSTONE | STRATEGIC SIGNIFICANCE OF THE PROJECT, CONTINUED

SOCIAL SIGNIFICANCE	**Employment Opportunities**	**Construction Jobs** – provide local and regional employment in excess of 290 ongoing FTE construction jobs over an eight-year staged construction period. The staged approach delivers a 'continuous-build' program, resulting in stability of employment, suited to the community development of a regional population centre such as Gladstone.
		Ongoing Direct Operational Jobs – direct employment of up to 100 full-time equivalent (FTE) employees in the ongoing operation of the plant, at its full capacity.
		Ongoing Indirect Supply Chain Jobs – indirect employment is estimated at nearly 1,400 FTEs during the construction phase, and nearly 500 FTEs during the operation phase by applying the Type I multiplier (Indirect Employment) of 4.8, as reported in the 2018-19 Input/Output economic modelling report commissioned by the Queensland Resources Council (QRC 2019).
	Skills, Training and Workforce Development	Aligned with the objectives of the Queensland Hydrogen Industry Strategy 2019-2024 (DSDMIP 2019a), the Project will contribute to the development of an industrial ecosystem for this new sector, including multiple skills, training and workforce development opportunities, including: • Offering diversified employment opportunity from workers with transferable industry skills, for example from LNG industry • Supporting the development of new training, certification, and employment opportunities at vocational, trade, professional, engineering and management levels • Creating new world-class training, certification, and professional development programs, at the TAFE and University-level opportunities • Create opportunities for excellence in research and development (R&D) and technology innovation in Queensland
	Community Leadership	An opportunity to support community confidence and global recognition as a global leader in a new industry sector.
	Amenity Value	Engage the traditional owners and local community to consult on how to improve the amenity of the site with is currently degraded
ENVIRONMENTAL SIGNIFICANCE	**Deep Decarbonisation**	Drive significant carbon emission reductions for both local industries but also contribute to the global emissions reduction though exporting.
	Reduced Environmental Risk	**Fire and Hazard Management –** Fire management and the management of the introduced fauna and invasive weed species will reduce the risks to the neighbouring conservation areas.
		Ecosystem Restoration - The buffer areas around the site will be managed to reinstate the local ecosystems free of introduced species.

Environmental Effects

The Project will be established in the Yarwun area of the Gladstone State Development Area (SDA), in the area designated as **Medium-High Impact and Port Related Industry Precinct**. The Office of the Coordinator-General has the necessary processes for efficiently and effectively evaluating potential environmental effects, and proposed impact mitigation measures, of the H2-Hub™ Gladstone project.

The Project will involve the production, handling and storage of above-threshold quantities of Hydrogen (H_2) and Ammonia (NH_3), two chemicals listed in Schedule 15 of the *Work Health and Safety Regulation* 2011 and will therefore be classified as a Major Hazard Facility (MHF).

The **possible environmental effects** of the Project include:

- accidental ammonia releases,
- wastewater discharges, and
- nitrogen oxides (NOx) emissions from power generation assets.

These effects and the environmental management measures adopted to minimize their impact are described further in this IAS submission, under Sections 6. Potential Project Impacts, and 7. Environmental Management. Whilst the resulting environmental impacts are not expected to be significant, H2U notes the following:

- the north-eastern section of Lot 2 on Plan SP293584 is included in, and the south-eastern section of Lot 2 on Plan SP293584 is adjacent to a wetland of high ecological significance, as shown on the map of Queensland wetland environmental values or wetland protection area shown on the map of Great Barrier Reef wetland protection areas;
- the south-eastern section of Lot 2 on Plan SP293584 is located within less than 1-km distance of land parcels located within the **Great Barrier Reef World Heritage Area (GBRWHA)**.

This will require the project to ensure that there is minimal impact on both the environmental and heritage values of the GBRWHA, requiring careful management and mitigation of potential risks from the Project across its entire lifecycle, from the planning and design stage through to construction, commissioning, and operations, and ultimately end-of-life decommissioning and remediation activities.

Infrastructure Requirements

The Project is expected to have significant infrastructure requirements including:

- **Power infrastructure** – establishing a new substation connecting the site to the 275 kV transmission network, via the two transmission lines running through the property on the transmission easement designated as Lot A on SP165453;
- **Pipeline infrastructure**, to export products from the Production Precinct to Customer Sites, the Export Precinct at Fisherman's Landing and the Wide Bay gas transmission terminal using existing infrastructure easements on the **Materials Transportation and Services Corridor Precinct** in the Gladstone SDA;
- **Road and Rail infrastructure**, requiring access for loading and transport of containerised products from the Production Precinct via the existing facilities on Reid Rd; and
- **Water and Waste Water Infrastructure**, requiring access to water supply and wastewater discharge to the regional water treatment facilities.

2 THE PROPONENT

Section 2. **The Proponent**

2.1 The Hydrogen Utility™

The Hydrogen Utility Pty Ltd, ACN 635 889 164 (H2U) is a related body corporate of Gladstone Hydrogen Holdings Pty Ltd, ACN 635 892 152, (GHH) and H2U Investments Pty Ltd, ACN 635 884 169 (H2I) being the group parent company. H2U and GHH will develop and operate the H2-Hub™ Gladstone Project.

The Hydrogen Utility™ (H2U) is an independently-owned specialist developer of green hydrogen infrastructure projects. H2U is based in Australia with a vision to operate throughout the Asia-Pacific. H2U focuses its infrastructure development initiatives on the opportunity to value-add renewable energy, and integrating it in the production of green hydrogen, for a variety of uses, including as a:

- as a **fuel** for zero-emissions applications in energy, mobility, and industry; and
- as a **feedstock** and the building block for the manufacturing of green chemicals, primarily ammonia.

Values

H2U adopts the UN Sustainable Development Goals (SDG) as the basis of its Corporate and Social Responsibility (CSR) policies, as well as the guiding principles along which it focuses its business activities.

FIGURE 2. UN SUSTAINABLE DEVELOPMENT GOALS

Contribution to the Environment

H2U's mission is to drive deep decarbonisation in the global energy industrial, chemicals, and mobility markets and therefore we aim to bring direct, long-lasting impacts on the following SDGs:

- **Affordable and Clean Energy (SDG7);**
- **Industry, Innovation and Infrastructure (SDG9);**
- **Sustainable Cities and Communities (SDG11);**
- **Responsible Consumption/Production (SDG12);**
- **Climate Action (SDG13).**

Synthetic ammonia is a building block in all nitrogenous fertilisers, and the basis of the 'green revolution' in agriculture, a key element in the global toolbox towards achieving **Zero Hunger (SDG2).**

By producing green ammonia from renewable energy, air and water, H2U will strive to help the global fertilizer industry bring new significance to the green in green revolution: one where the creation of synthetic fertilizers to feed the world does not come at the expense of other environments being mined for

fossil fuel extraction, and without the release of greenhouse gases and criteria pollutants at the point of production.

Contribution to Society

Green hydrogen brings the opportunity to create new, highly-skilled jobs across a wide spectrum of technical, environmental and business disciplines.

Much like for renewable energy, green hydrogen jobs will be created predominantly in regional communities, where green hydrogen infrastructure projects are more likely to develop as a function of renewable energy, and market access. The opportunity to bring **Decent Work and Economic Growth (SDG8)** and promote in these communities' opportunities for **Quality Education (SDG4)** is one of H2U's strongest motivations and one that we are particularly proud to deliver in partnership with indigenous and traditional owners, striving to **Reduce Inequality (SDG 10)**, and work towards the goal of **No Poverty (SDG1).**

Water Policy

The impact on **Clean Water and Sanitation (SDG6)** is an important consideration in the production of green hydrogen. H2U's policy in this area is on sourcing water for our operations from secondary sources, such as wastewater, seawater, or high-salinity bore water.

We aim to be *at all times* a net contributor to clean water resources in the communities in which we operate, by either investing in water treatment plants sized in excess of our own requirements, or by acting as an enabling cornerstone off-taker to third-party infrastructure, including desalination or water recycling plants.

Gender Equality and Diversity Policy

In the area of **Gender Equality (SDG5)**, H2U has a clear goal of operating as an equal opportunity workplace. For a business, as well as for society as a whole, diversity – of gender, heritage, beliefs – is key to effective collaboration and sound decision-making.

Integrity Policy

As a strong believer in the centrality of **Peace, Justice and Strong Institutions (SDG16)** supports the United Nations' Universal Declaration of Human Rights. Operating in a competitive, open and fair marketplace is key to delivering enduring value to customers, shareholders, and society.

H2U is a signatory of the Declaration Against Corruption promoted by Transparency International, and supports the United Nations' Convention Against Corruption (UNCAC).

2.1.2 Organization

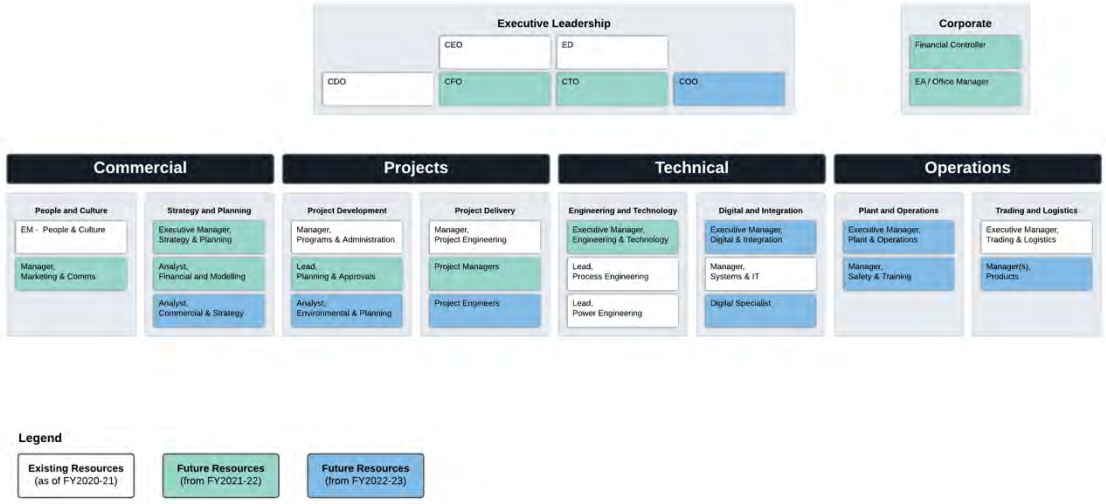
The H2U business has adopted a lean and agile structure, where the Leadership Team supports and provides oversight to four functional areas:

- **Commercial Area,** including People and Culture, and Strategy and Planning;
- **Projects Area,** including Project Development and Project Delivery;
- **Technical Area,** including Engineering and Technology, and Digital and Integration; and
- **Operations Area,** including Plant and Operations, and Trading and Logistics.

This structure is highly attuned to H2U's *build-own-operate* business model and its near-term focus on development and implementation of the H2-Hub™ Gladstone project.

The **Near-term Corporate Development Plan, 2021-23** – presented in Figure 3 below – proposes H2U progressively hire new resources to expand its structure and its business operations.

FIGURE 3. H2U GROUP | NEAR-TERM CORPORATE DEVELOPMENT PLAN



This structure is highly attuned to H2U's *build-own-operate* business model and its near-term focus on development and implementation of its portfolio of industrial-scale **H2-Hub™** projects.

Corporate-level management functions – including finance, resourcing, commercial strategy and engineering – will support the needs of project-level origination and delivery functions with strategic input and oversight in the areas of due diligence, project acquisition, project design, project approvals, project finance, and procurement.

Key Resources

The **H2U Leadership and Management Team** includes a team of highly experienced executives with deep domain expertise in hydrogen and energy markets, and a proven track record in the following key areas:

- Planning and implementation of strategic infrastructure deployment programs;
- Commercialization and business development;
- Leadership and management of strategic market development initiatives;
- Origination and management of technology joint ventures and partnerships; and
- Development and delivery of utility-scale infrastructure projects.

H2U has assembled a team of highly experienced executives, key advisors and discipline leads to support the scale-up of its corporate operations, and growth of the business.

The key resources of the business are listed in Table 4 in the following page, including:

- **Key Executives**
- **Key Advisors**
- **Discipline Leads**, and
- **Corporate Advisors**

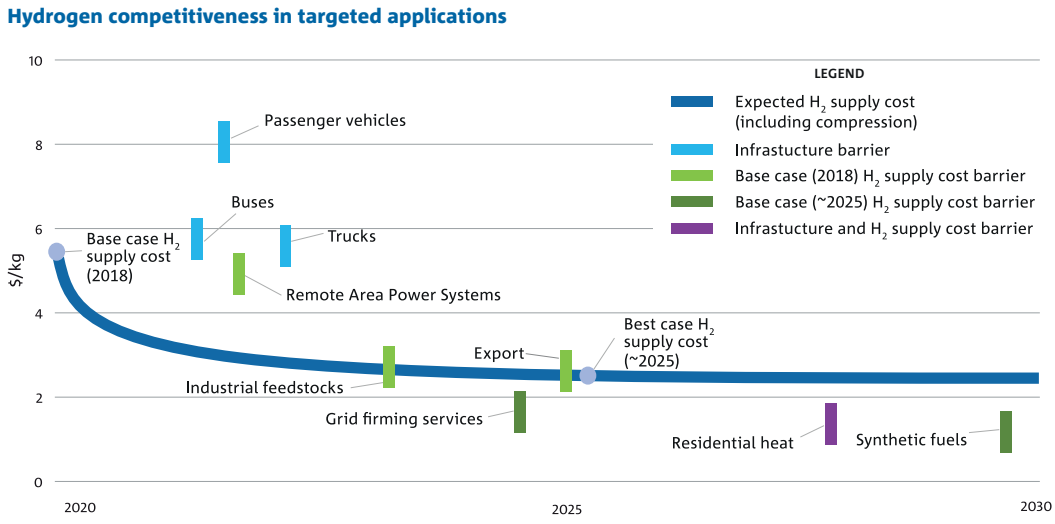
TABLE 4. H2U | KEY RESOURCES

LEADERSHIP and MANAGEMENT	**Attilio PIGNERI** Founder and CEO – Hydrogen Industry Lead
	Tristram TRAVERS Executive Director – Commercial and Strategy
	Sam CRAFTER Executive Manager Operations and Finance
	Jan RIECHE Executive Manager, People and Culture
KEY ADVISORS and DISCIPLINE LEADS	**Air Vice-Marshal John BLACKBURN AO (Ret'd.)** Shareholder – Policy Advisor
	Alex TRAJKOV Executive Manager, Trading and Logistics – Safety Lead
	Alan ZORKOT Power Engineering Lead
	Antonio VENDITTO Project Management Lead
	Sylvia EDIFOR Process Engineering Lead
CORPORATE ADVISORS	**Legal Advisory** White & Case LLP
	Environmental and Planning WSP Australia
	Accounting and Tax Advisory Pitcher Partners

Commercialization Focus – Green Ammonia

Cost reduction trends associated with renewable energy generation and electrolysis technology combine to deliver a **sustained cost reduction trajectory** for green hydrogen, such as the one presented in Figure 4 to the right-hand side, developed by the Commonwealth Scientific and Industrial Research Organization (CSIRO) within the scope of the *National Hydrogen Roadmap* (CSIRO 2018). The cost curve developed by CSIRO illustrates the versatility of green hydrogen, with each of the vertical tiles in the diagram representing the point of cost parity against a wide variety of potential market applications – from mobility, to power generation, as a feedstock for manufacturing of industrial chemicals and as the basis for future export applications.

FIGURE 4. MARKET OUTLOOK | GREEN HYDROGEN COST CURVE[3]



H2U focuses its market-entry strategy and near-term commercialization efforts on the import substitution market for ammonia across Australia and New Zealand. This strategy provides key advantages in terms of an **Immediately Addressable Domestic Market**, and **Export Market Readiness**

Immediately Addressable Domestic Market

As net importers of ammonia both Australia and New Zealand offer an immediately addressable domestic market with established customers, clear market prices and supply chain infrastructure. The sharp increase in domestic gas prices observed in the last five years across both Australia and New Zealand makes incumbent ammonia manufacturing operations based on natural gas marginal against imported ammonia.

Export Market Readiness

Industrial-scale production of green ammonia represents a unique springboard to achieve the scale, technology, capability and ultimately price requirements of the future export market.

Strategically positioning its early market production facilities in port-based locations H2U can activate the sites by addressing domestic market requirements with a view to later expand production capacity to cater for the growth in the future export market.

[3] SOURCE: CSIRO, 2018. *National Hydrogen Roadmap*

2.2 Relevant History, partnerships and project experience

Corporate History

The H2U Group of companies was incorporated in August 2019 having been incubated in another entity.

The business has been structured to enable H2U manage a project development portfolio and secured Mitsubishi Heavy Industries, Ltd. of Japan (MHI) as a cornerstone investor in H2U Investments Pty Ltd, the parent or holding entity of the H2U Group.

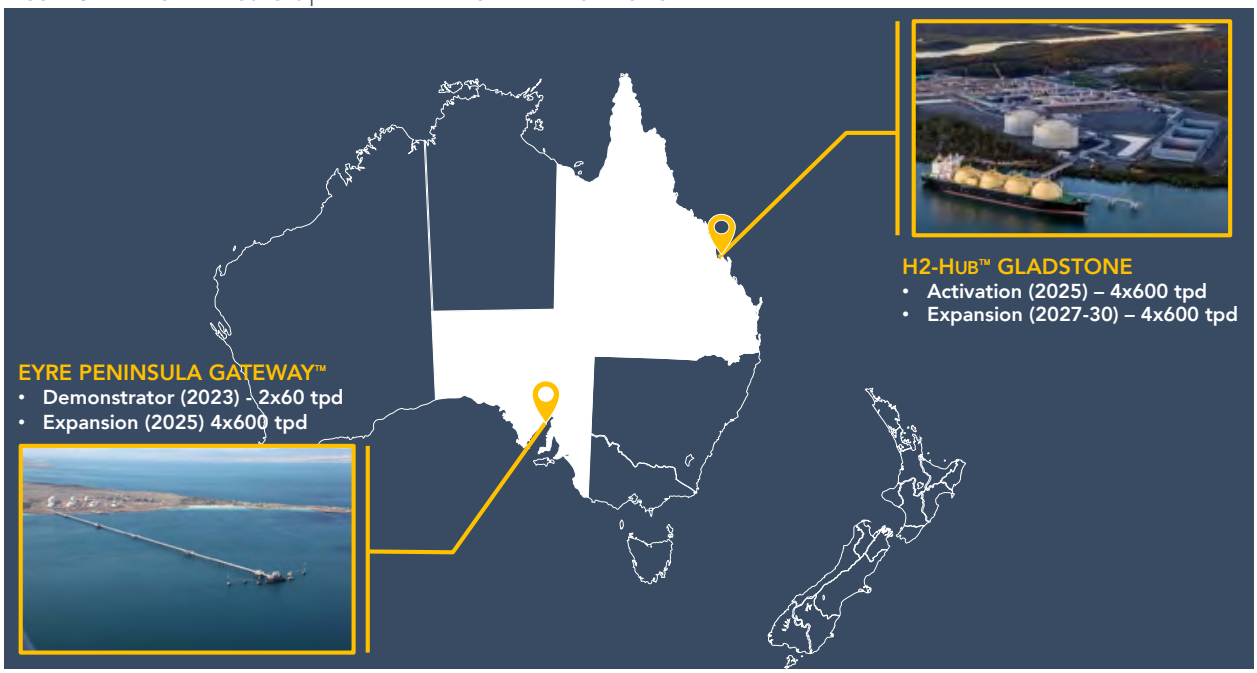
The Hydrogen Utility Pty Ltd (H2U), a wholly owned subsidiary of H2U Investments, is the corporate operation and development entity for the H2U Group. Asset and operating entities including Gladstone Hydrogen Holdings Pty Ltd have been and will be established for each project as special-purpose vehicles (SPVs).

Our mission is to support and accelerate deep decarbonisation in the industrial, chemicals, energy and mobility markets.

Project Portfolio

H2U has established a pipeline of high-quality, scalable, industrial green hydrogen infrastructure development opportunities. Near- to medium-term projects (2020-25) in H2U's portfolio include its **Eyre Peninsula Gateway™** project, and **H2-Hub™ Gladstone**, presented in Figure 5 below.

FIGURE 5. H2-HUB™ PROJECTS | NEAR- AND MEDIUM-TERM PORTFOLIO



The **Eyre Peninsula Gateway™** project is planned to be established on the Eyre Peninsula, South Australia in two stages. Initially through the Green H2/NH3 Supply Chain Demonstrator (**Demonstrator Stage**), a commercial scale facility designed to meet existing domestic industrial use for ammonia in the region, and to support export market development activities.

Developed as a commercial project, the Demonstrator is intended to refine the operating protocols and demonstrate the bankability of a new asset class, and therefore act as the enabling, *Gateway Project* for

H2U's further pipeline of larger development projects, including the Export Stage expansion. The facility can later be expanded to host a larger green hydrogen/ammonia production complex (**Export Stage**).

The **H2-Hub™ Gladstone** project is an industrial-scale green hydrogen/ammonia production complex – integrating up to eight industrial scale process trains, planned to be established in the Yarwun region of the Gladstone State Development Area (SDA) on land secured by H2U under a Sale of Land Agreement between its subsidiary GHH and the Queensland Minister for Economic Development (MEDQ).

The concurrent development of the two projects delivers economies of scale and market growth capacity, whilst ensuring supply security for its customers should one site have production restrictions for any reason. The Export Stage of the Eyre Peninsula Gateway™ and the Activation and Expansion Stages of H2-Hub™ Gladstone are developed targeting the future requirements of the export market. The two projects share a modular development approach, based on a common process train design, and scalable development sites, enabling flexibility of investment and the ability to rapidly activate expansion capacity to meet growth in export market demand

Partnerships

Through the experience of its Eyre Peninsula Gateway™ project, H2U has established and consolidated strategic partnerships in the following key areas:

- **Market Access and Value Chain Relations,** with particular focus on the North Asian markets;
- **Technology Integration and Engineering,** supporting H2U's infrastructure deployments; and
- **Plant and Infrastructure Operations,** with a focus on supporting the operation of H2U's green hydrogen infrastructure assets, including its production plants and logistics infrastructure.

H2U has recently announced a strategic investment and technology partnership with Mitsubishi Heavy Industries (MHI), with MHI having secured a cornerstone equity position in H2U Investments, the holding entity of the H2U Group[4].

Principal Consultants

The Front-End Engineering and Design (FEED) for the H2Hub™ Gladstone Project will be undertaken by a specialist tier one contractor with internal management and strategic operations partners providing owner's engineer support services.

[4] https://www.mhi.com/news/201126.html

2.3 Contact Details

All enquiries in relation to this Initial Advice Statement should be directed to the following H2U representatives:

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3 NATURE OF THE PROPOSAL

Section 3. **Nature of the Proposal**

3.1 Scope of the Project

The proposed **H2-Hub™ Gladstone** Project is an industrial-scale complex for the production of green hydrogen and green ammonia to be established at Yarwun, in the Gladstone State Development Area (SDA), and integrating the following infrastructure:

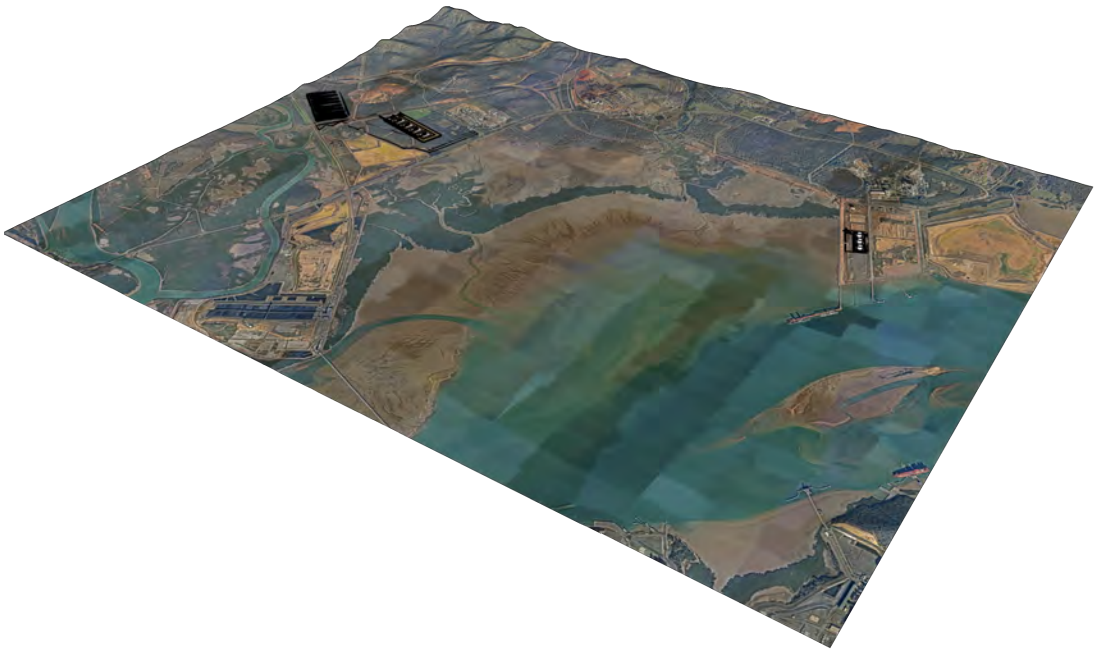
- a **Production Precinct (Yarwun),** a multi-bay industrial complex for the production of green hydrogen and ammonia, to be located in the Yarwun region of the Gladstone SDA;
- an **Export Precinct (Fisherman's Landing),** to be established at Fisherman's Landing Wharf, co-located with existing ammonia storage and import facilities; and
- a **Product Logistics and Infrastructure Corridor**, leveraging existing infrastructure, and service corridors to link Production and Export Precincts.

This IAS has been prepared to cover the entire scope of the Project, including the Production Precinct and Product Logistics and Infrastructure Corridor - located in the Yarwun region of the Gladstone SDA – and the Export Precinct – located in the Fisherman's Landing precinct of the Port of Gladstone.

Development Master Plan

A high-level **Development Master Plan** is presented in Figure 6 below and Table 5 in the following page.

FIGURE 6. *H2-HUB™ GLADSTONE* | DEVELOPMENT MASTER PLAN



H2-Hub™ Gladstone will be established as a **staged development** with its construction and commissioning schedule designed to meet the needs of the following markets:

- in the **near-term**, providing import replacement options to domestic customers (**Activation Stage**);
- in the **medium-term**, leveraging existing port facilities to export green hydrogen and green ammonia to North Asian economies, including Japan, South Korea and Singapore (**Expansion Stage**).

The proposed staged-development approach is enabled by a **proprietary modular plant design** integrating 370 MW of electrolysis plant with 600 tonnes per day (tpd) of ammonia synthesis capacity.

With up to eight (8) process trains to be established, the Project once fully built will become one of the largest ammonia complexes worldwide, with close to 5,000 tpd in ammonia production capacity.

With up to 3 GW in planned electrolyser capacity, it will introduce significant additional load in the Queensland Region of the National Electricity Market, and potentially underpin further development of renewable energy resources in Central and North Queensland.

The Project will integrate renewable energy from the Queensland region of the National Electricity Market (NEM), sourced via a transmission-level Virtual Power Plant (VPP) scheme[5], to produce:

- **green hydrogen**, by means of Water Electrolysis powered by renewable energy;
- **green nitrogen and oxygen**, by means of Cryogenic Air Separation powered by renewable energy;
- **green ammonia**, by means of Haber-Bosch Synthesis using green hydrogen, and nitrogen;
- **green power,** generated on-site by gas turbine generators operating on 100% green hydrogen;
- **substitute natural gas,** by means of Methanation using green hydrogen produced on-site, and carbon dioxide recovered from nearby industrial sites.

TABLE 5. H2-HUB™ GLADSTONE | DEVELOPMENT MASTER PLAN[6]

PRODUCTION PRECINCT	**ACTIVATION STAGE** (COD target Q4 2025)	**NH_3 Synthesis Plant:**	4x600 tpd (total 2,400 tpd)
		Electrolysis Plant:	4x370 MW_{AC} (total 1.48 GW_{AC})
		Air Separation Unit (ASU):	1x2,600 tpd (N_2)
		H_2 Power Generation (on-site):	2x40MW H2 OCGT+ HRSG (cogen)[7]
	EXPANSION STAGE (2027-35 timeframe)	**NH_3 Synthesis Plant:**	4x600 tpd (total 2,400 tpd)
		Electrolysis Plant:	4x370 MW_{AC} (total 1.48 GW_{AC})
		Air Separation Unit (ASU):	1x2,600 tpd (N_2)
		Methanation	up to 12 PJ/y SNG output
INFRASTRUCTURE CORRIDOR	**ACTIVATION STAGE**	**Site-wide Infrastructure:**	NH_3, H_2 pipelines
		Yarwun to Fisherman's Landing:	NH_3 pipeline
		Yarwun to Fisherman's Landing:	H_2 pipeline
EXPORT PRECINCT	**ACTIVATION STAGE**	**Bulk NH_3 Storage:**	3x50,000 t refrigerated tank
		H_2 Liquefaction and Storage	50 t/d liquefier 10,000 m^3 LH_2 tank
		Loading Facilities:	NH_3 Loading, LH_2 Loading
	EXPANSION STAGE	**H_2 Liquefaction and Storage**	50 t/d liquefier 10,000 m^3 LH_2 tank

[5] This is described further under Section 3.3 Project Need, Justification and Alternatives Considered
[6] Current as of 31 August 2021 and subject to outcome of Bankable Feasibility Study to be carried out in FY 2021-22
[7] Open-Cycle Gas Turbine (OCGT) with Heat Recovery Steam Generator (HRSG) for power and heat (steam) co-generation

3.2 Land-Use

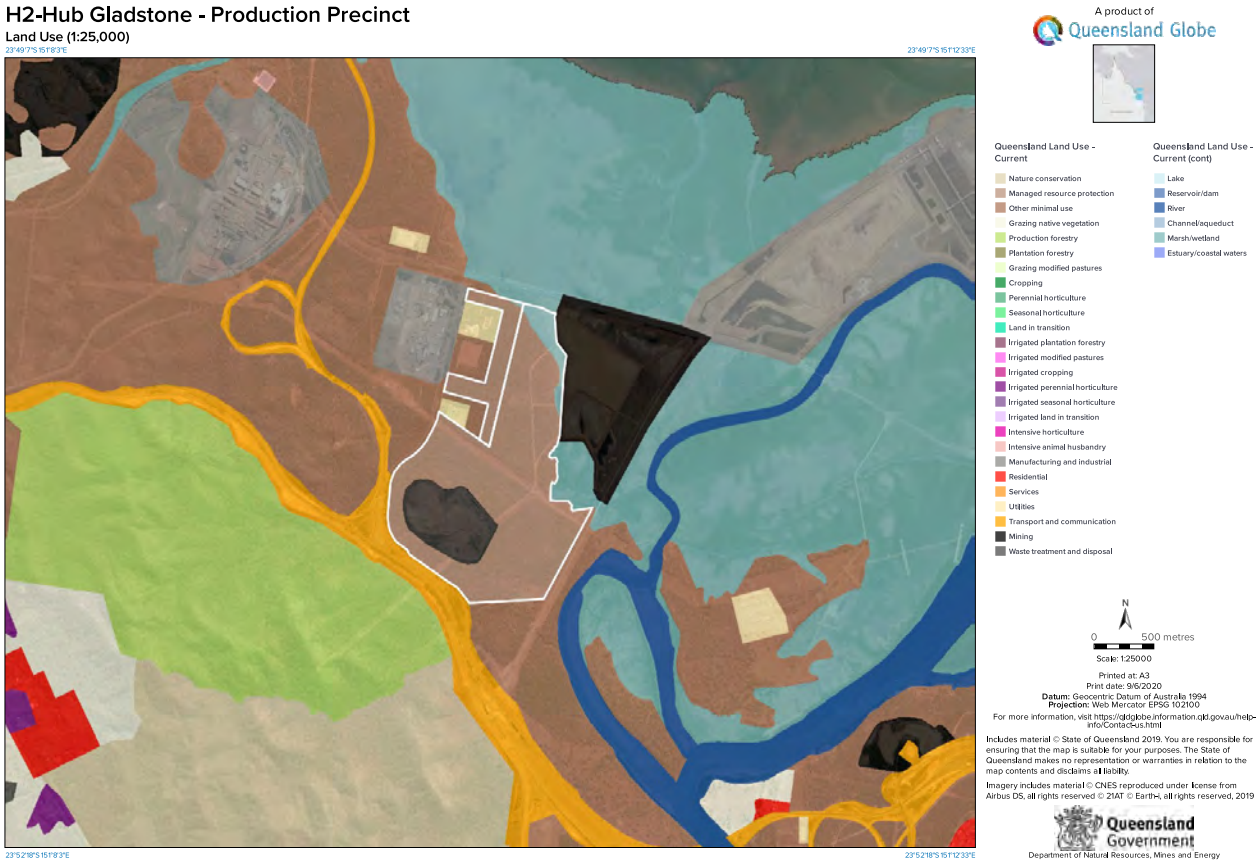
Current Land Use

The Land for the Production Precinct (existing titles Lot 2 on Plan SP293584, and Lot 11 on Plan SP239343) is currently unused.

Historical land-use activities, illustrated in the map presented in Figure 7 below, included:

- **Managed Resource Protection**, for the majority of the area under the two titles, except for:
- **Marsh/Wetland**, for the north-eastern section of the area under the two titles; and
- **Mining** (quarrying) for part of the south-western section of Lot 2, an area commonly known as the 'borrow pit'.

FIGURE 7. H2-HUB™ GLADSTONE | EXISTING LAND USE (1:25,000)



Intended Land Use

The Production Precinct of the Project will involve the establishment and operation of a chemical manufacturing complex for the production of green hydrogen and ammonia, and associated product logistics infrastructure, including for the delivery of products to the Fisherman's Landing Port Precinct.

Being located in the **Medium-High Impact and Port Related Industry Precinct** of the Gladstone SDA , the Project is therefore fully aligned with the **preferred development intent** indicated for this precinct in the Gladstone State Development Area Development Scheme (DSD 2015), as follows:

- **Chemical manufacturing**;
- **Storage of dangerous goods**, requiring separation from sensitive receptors; and

- **Export of materials**, requiring close proximity to port related infrastructure and services.

The areas to be dedicated to industrial operations – including plant and utilities – for the Production Precinct will be established over the areas of Lot 2 and Lot 11 will require a Material Change of Use under the Gladstone State Development Area development scheme.

3.3 Project Need, Justification and Alternatives Considered

Project Objectives

H2U's proposed **H2-Hub™ Gladstone** project is an industrial-scale green hydrogen and ammonia production complex planned to be established in the Gladstone State Development Area (SDA).

The **export-class project** comprises a multi-bay industrial complex for the production of green hydrogen and ammonia, to be built in stages for a total capacity of **up to 3 GW of electrolysis plant** and of **up to 5,000 tonnes per day green ammonia production**.

The staged **implementation strategy** of H2-Hub™ Gladstone takes advantage of the unique opportunities of the **existing industrial and port ecosystem** – including an established industrial customer base, and an existing ammonia import terminal – with its construction and commissioning schedule designed to meet the needs of the following markets:

- **Activation Stage (near-term),** providing existing domestic ammonia customers with the option for **import replacement** and **deep decarbonisation** through locally-produced green ammonia; and
- **Expansion Stage (medium-term),** leveraging existing port facilities to **export green hydrogen and green ammonia** to key North Asian economies, including Japan, South Korea, and Singapore.

Ammonia Import Replacement

Ammonia plays a critical role in the Australian economy, as the building block for the production of nitrogenous fertilizers and in the manufacturing of explosives, it underpins the operation of Australia's large Agricultural and Mining sectors.

Natural gas is used as the feedstock in all existing ammonia production facilities in Australia. In aggregate, ammonia production in the East Coast of Australia accounts for ~70 petajoules (PJ) per year, or about 30 percent of industrial demand, according to a recent McKinsey report (Segorbe & Lambert 2017).

State of the art facilities require typically ~31 gigajoules[8] (GJ) of natural gas required per tonne of ammonia produced, with older plants using in excess of 40 GJ per tonne of ammonia produced (EC JRC 2007). As a result, the economics of ammonia are highly dependent on natural gas prices, with 80 percent of the total cost typically coming from the natural gas feedstock (Segorbe & Lambert 2017).

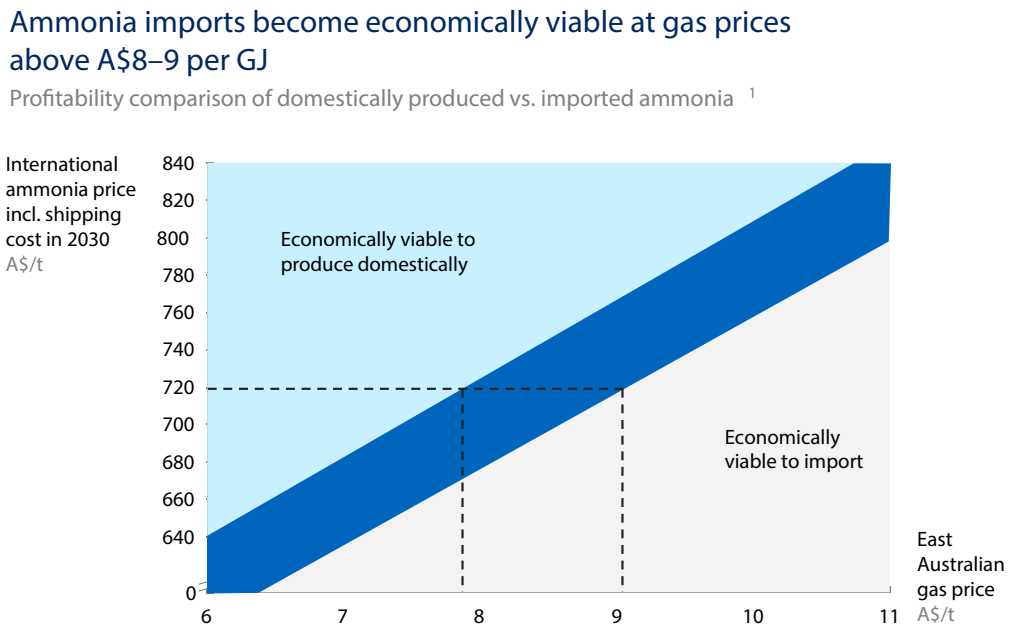
Recent increases in natural gas prices have reduced the profitability of East Australia's ammonia production *vis-à-vis* imported ammonia. Analysis presented in the McKinsey report cited earlier – illustrated in the diagram presented at Figure 8 in below – reported how, assuming a long-term ammonia import parity reference point of $690 per tonne: "Australia's ammonia producers start to lose international competitiveness at natural gas prices consistently above $8-9 per GJ".

In the three years since publication of the McKinsey report, East Australia's natural gas prices have escalated above the $9 per GJ threshold, whereas ammonia import parity prices have consistently remained below

[8] All energy content figures in this document are reported on a higher heating value, or HHV basis

$600 per tonne, thus further reducing the profitability of domestic ammonia production, particularly for older, less efficient plants operated in port-based locations, that are more directly exposed to price competition from imported ammonia.

FIGURE 8. AMMONIA PROFITABILITY | DOMESTICALLY PRODUCED VS. IMPORTED AMMONIA[9]



Deep Decarbonisation

Global initiatives to mitigate climate change – including the objective of limiting the rise of global temperature this century to well below 2 degrees Celsius above pre-industrial levels as enshrined in the *Paris Agreement* (UNFCCC 2015) – bring into focus the need for activating deep decarbonization pathways for the industrial, chemicals, energy and mobility sectors.

The rapid deployment of utility-scale renewable energy is now driving transformation of the electricity generation sector. The International Energy Agency (IEA), in the latest edition of its *World Energy Outlook* (WEO) series, predicts solar and wind to account for over half of all growth in electricity generation capacity to 2040 under the business-as-usual *Stated Policy* scenario, and nearly all growth under the *Sustainable Development* scenario (IEA 2019).

With decarbonisation of the electricity generation sector now underway there is increasing recognition that this trend alone will not be enough to meet the goals of the Paris Agreement, and that deep decarbonization initiatives will be required across the broader energy sector (Liebreich 2018). Green hydrogen, produced by means of water electrolysis powered by renewable energy, represents a 'bridge across' for renewable electricity generation to grow well beyond the needs of the electricity market and support rapid transformation across the energy economy.

[9] SOURCE: Segorbe, J. & Lambert, P., 2017. Meeting east Australia's gas supply challenge, McKinsey Australia, March 2017 (Segorbe & Lambert 2017), Exhibit 2, p.10.

A recent **Survey of New and Emerging Technologies** for emission reductions, presented in the discussion paper for the Australian Government's **Technology Investment Roadmap**, released in May 2020, estimates emissions abatement opportunities of up to 27 million tonnes of carbon dioxide equivalent (Mt_{CO2-e}) per year[10] in Australia could derive from implementation of green hydrogen across the 'Feedstocks' sector, including petroleum refining, chemicals, ammonia production, iron and steel production and cement (DISER 2020).

In the ammonia production sector alone, green hydrogen, used to replace hydrogen produced from fossil-fuels as the feedstock, could result in over 6 Mt_{CO2-e} abatement in direct (Scope 1) greenhouse gas emissions in Australia.

Similarly, green hydrogen could replace fossil-based hydrogen as the feedstock in the production of other industrial chemicals – for example methanol – and as the key processing input for the desulfurization of refined petroleum products, including to meet increasingly stringent fuel standards for automotive fuels, and to help the shipping industry meet new global regulations for low-sulphur bunker fuels being introduced by the International Maritime Organization (IMO) from January 1, 2020 (IMO 2019).

Green hydrogen is also promoted as a potential substitute for coke as the reducing agent in iron and steel production – as the basis of 'green steel' production methods – and as substitute for coke as the fuel in the manufacturing of cement.

In addition, through deployment of hydrogen- or ammonia-fuelled energy conversion technologies – such as fuel cells, gas turbines, and boilers – green hydrogen and green ammonia can be substituted for traditional fossil fuels to deliver fully decarbonized solutions in mobility, power and heat applications.

Emerging Markets for Green Hydrogen and Green Ammonia

Two key market applications are emerging for the establishment of a global green ammonia supply chain:

- **decarbonisation of thermal power generation in key North Asian economies**; and
- **decarbonisation of maritime shipping.**

Key North Asian markets, namely Japan, Korea, Singapore, and China all have policy trajectories to reduce their carbon intensity through the utilization of imported green hydrogen or green ammonia as substitutes for coal or natural gas in utility-scale thermal generation.

Japan, in particular aims to introduce imported green ammonia as a substitute fuel for its thermal power generation sector from as early as 2025. This critical value-chain application is projected by the Cabinet Office (CAO) and Institute of Energy Economic of Japan (IEEJ) to kickstart large scale green ammonia imports, with up to 2.7 million tonnes required by 2030 and up to 4.2 million tonnes by 2035 (Onoda 2019).

With green ammonia being the preferred option for green hydrogen imports to support decarbonisation of the energy sector in Japan, the H2-Hub™ Gladstone project could contribute to support Australia capture a potential value for hydrogen exports into the Japanese, and other key North Asian markets projected by ACIL ALLEN to grow to $13.43 billion by 2040 (ACIL ALLEN 2018).

In the shipping sector, the *Getting to Zero Coalition*, a global alliance launched by the Global Maritime Forum (GMF) and the World Economic Forum (WEF) in 2019 aims to introduce commercially viable zero-emissions ocean-going vessels by 2030. The Global Maritime Forum *Taking the Lead* report identifies

[10] considering direct (Scope 1) emissions.

hydrogen-based fuels, and in particular green ammonia as the key to achieve zero-emission operations in the shipping sector (GMF 2019).

Project Pre-feasibility Assessment

H2U has established the primary business case for the Project and completed due diligence activities in August 2019. On 27 February 2020, H2U has secured the proposed project site under a Contract for the Sale of Land between its subsidiary GHH and the Minister for Economic Development Queensland (MEDQ).

A detailed Pre-feasibility Assessment carried out in support of this IAS during Q3-Q4 2020, has informed establishment of the **Design Basis** and **Implementation Strategy** for the Project, reported further in this Document under Sections 3.4 to 3.6, and estimated the **Key Economic Performances** for the Activation and Expansion Stages of the Project, as reported in Table 6 below.

TABLE 6. H2-HUB™ GLADSTONE | KEY ECONOMIC PERFORMANCES

	ACTIVATION STAGE	EXPANSION STAGE
Operation Start[11]	Q4 2025 (target)	2027-30
Operating Lifetime	40+	40+
Capital Expenditure (CAPEX)	$2.53b[12]	$2.18b[13]
Operating Expenditure (OPEX)	$ 0.35b/y	$ 0.29b/y
Internal Rate of Return (IRR)	11.0%	13.9%
Net Present Value (NPV)	$1.07b	$2.03b

The **Total Capital Expenditure**, including capital expenditure for both Activation and Expansion Stage, Product Logistics, and Port-related Infrastructure is estimated at over $4.7 billion.

Consideration of Government Policy and Strategy Alignment

The Project aligns with key State and Commonwealth policies and strategies aimed at promoting the establishment of a hydrogen industry, transforming of the national electricity market, achieving reductions in greenhouse gas emissions, and developing new skilled employment, including:

- **Queensland Hydrogen Industry Strategy 2019-2024**, launched in May 2019 by the Queensland Premier the Hon. Annastacia Palaszczuk MP and the then Minister for State Development, Manufacturing, Infrastructure, and Planning, the Hon Cameron Dick MP, affirming the Government's commitment to developing a sustainable hydrogen industry, and outlining the Vision that "by 2030, Queensland is at the forefront of green hydrogen production in Australia, supplying an established domestic market and export partners with a safe, sustainable and reliable supply of hydrogen". The Strategy also noted "a Queensland hydrogen industry has the potential to deliver significant economic, employment, energy security and environmental benefits for Queensland and Australia" (DSDMIP 2019b);
- **Australia's National Hydrogen Strategy**, developed by the Hydrogen Working Group, chaired by Australia's Chief Scientist, Dr Alan Finkel AO, and formally adopted by the COAG Energy Council

[11] Commercial Operation Date (COD)
[12] AACE Class 5 CAPEX Estimate, including Production Precinct (Activation Stage), Product and Logistics Corridor, and Export Precinct
[13] AACE Class 5 CAPEX Estimate, including Production Precinct (Expansion Stage)

in November 2019, to support the Vision for a "clean, innovative, safe, and competitive hydrogen industry that benefits all Australians and is a major global player by 2030" (DISER 2019). A key element of the Strategy, is the **creation of Hydrogen Hubs** – clusters of large-scale demand located at ports, in cities, regional or remote areas, providing the industry its springboard to scale;

- **Integrated System Plan (ISP)**, established by the Australian Energy Market Operator (AEMO) as part of the suite of energy market reforms to be implemented under the coordination of the Energy Security Board (ESB), (AEMO 2019); and
- **Technology Investment Roadmap**, being established by the Commonwealth Department for Industry, Science, Energy and Resources as the basis of Australia's Long Term Emissions Reduction Strategy (DISER 2020).

Preferred Option and Alternatives to the Project

In approaching development of the proposed H2-Hub™ Gladstone project, H2U has focused on the following key elements:

- **Strategic Port-based Location**,
- **Green Ammonia Production**
- **Renewable Energy Integration**
- **Grid Integration and Support**

Strategic Port-based Location

Gladstone presents unique opportunities for the proposed development. The **existing industrial and port ecosystem** provides H2U the opportunity to leverage multiple value chain critical to the success of the proposed initiative, including:

- skilled workforce and supply chain;
- established customer base;
- existing ammonia import terminal infrastructure;
- renewable energy generation;
- electricity transmission infrastructure; and
- industry-oriented development scheme

Whilst alternative sites in Queensland and other states present valid alternatives, the convergence of these key factors makes the Gladstone SDA as a prime candidate for the establishment of industrial-scale developments such as the proposed H2-Hub™ Gladstone.

The proposed project site offers furthermore the opportunity to establish a scalable development, capable of meeting the needs of the near-term ammonia import replacement market and supporting the establishment of the green ammonia export market in the medium- and long-term.

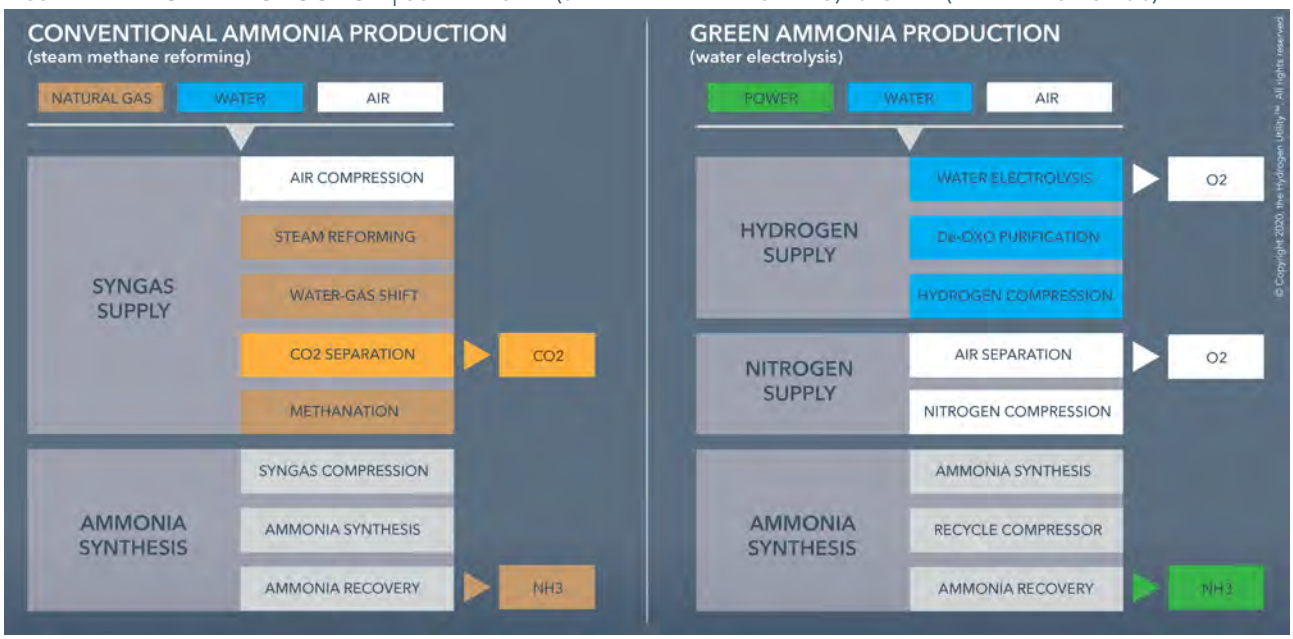
Green Ammonia Production

H2U adopts three proven processes to produce hydrogen and ammonia, integrating the following mature industrial technologies:

- **Water Electrolysis**, using electricity for the generation of hydrogen (H_2) from water;
- **Cryogenic Air Separation**, using electricity to extract Nitrogen (N_2) from the air; and
- **Haber-Bosch Synthesis**, the production of ammonia from hydrogen and nitrogen feedstocks.

The diagram in Figure 9 below provides a comparative overview of the key processing steps in conventional and green ammonia production.

FIGURE 9. AMMONIA PRODUCTION | CONVENTIONAL (STEAM METHANE REFORMING) VS. GREEN (WATER ELECTROLYSIS)



Most of ammonia production today is based on thermal processing of fossil fuel feedstocks, such as coal and natural gas, with the latter being the dominant feedstock for production of ammonia on a global basis.

This 'conventional' method integrates Haber-Bosch ammonia synthesis with capital-intensive steam methane reformers (SMR) as the front-end of the production process, according to the process reactions listed below:

Steam Reforming $CH_4 + H_2O + Heat \longrightarrow CO + 3H_2$
Water-gas Shift $CO + H_2O \longrightarrow CO_2 + H_2 + Heat$
Ammonia Synthesis $N_2 + 3H_2 \longrightarrow 2NH_3 + Heat$

In this process configuration, natural gas – comprised mostly of methane (CH_4) – is first processed with steam (H_2O) In these processes to yield an intermediate synthesis gas mixture (or *syngas*) mostly comprised of hydrogen and carbon monoxide (CO). The syngas is then upgraded with the addition of further steam to increase its hydrogen content and convert residual carbon monoxide to carbon dioxide (CO_2) via the *water-gas shift reaction*.

Finally, the syngas is purified to remove CO_2 and the remaining mixture of hydrogen and nitrogen is fed to the Haber-Bosch reactor for the synthesis of ammonia (NH_3).

The economics for this method are highly dependent on scale, with the benchmark for world-scale production plants under this configuration now in excess of 3,500 tonnes per day (Haldor-Topsøe 2019).

H2U is a ***pure-play* green hydrogen infrastructure developer**, with its infrastructure projects for the production of hydrogen and ammonia based exclusively on utilization on the production of green hydrogen from renewable energy resources.

Electricity from solar or wind is used to generate the key inputs in the process for the synthesis of ammonia (NH_3) via Haber-Bosch processes: hydrogen (H_2) produced by means of Water Electrolysis, and nitrogen (N_2) produced by means of Air Separation, according to the key reactions and concept schematic below:

Water Electrolysis	$Power + H_2O \longrightarrow H_2 + 0.5O_2$
Cryogenic Air Separation	$Power + Air \longrightarrow 0.78N_2 + 0.21O_2 + \cdots$
Ammonia Synthesis	$N_2 + 3H_2 \longrightarrow 2NH_3 + Heat$

The commercialization of industrial-scale green ammonia production is a concept of particular significance in the context of the global initiatives to mitigate climate change, including the global objective of limiting the global temperature rise to well below two degrees Celsius above pre-industrial levels, as enshrined in the *Paris Agreement* (UNFCCC 2015). In Australia, the cost-competitiveness of green *vis-à-vis* conventional ammonia is also boosted by the rising costs of natural gas associated with LNG exports from the East Coast.

While steam methane reforming represents today over 80% of existing ammonia production, the use of water electrolysis and air separation to generate the two feedstock gases – hydrogen and nitrogen – in the production of ammonia via Haber-Bosch synthesis, is a well-established method of ammonia production, traditionally deployed in locations with *base-load* renewable energy such as hydroelectric or geothermal. The renewed focus on electrolysis-based ammonia production is driven by the significant reductions in the levelized cost of electricity (LCoE) from reductions in the cost of renewable generation and electrolysis systems.

Domestic ammonia production based on natural gas reforming is severely impacted by the sharp increase in natural gas prices observed on the East Coast. The impact is particularly severe for older ammonia production plants where high natural gas prices enforced following the expiry of long-term supply contracts combine with other key factors impacting the ongoing viability of operating these facilities, including lower plant efficiency, limited expansion/repowering opportunities, and Increased operation and maintenance costs. At current natural gas prices ammonia imports are more viable than new build gas-based ammonia production facility.

Other alternative ammonia production methods, including for example those using gasification of coal to generate the syngas feedstock for ammonia synthesis, present significant drawbacks with even higher emission levels, technical complexity and scalability issues than for conventional ammonia production, and adding to the challenge of financing green-field developments for long-lived assets with significant environmental and climate liability.

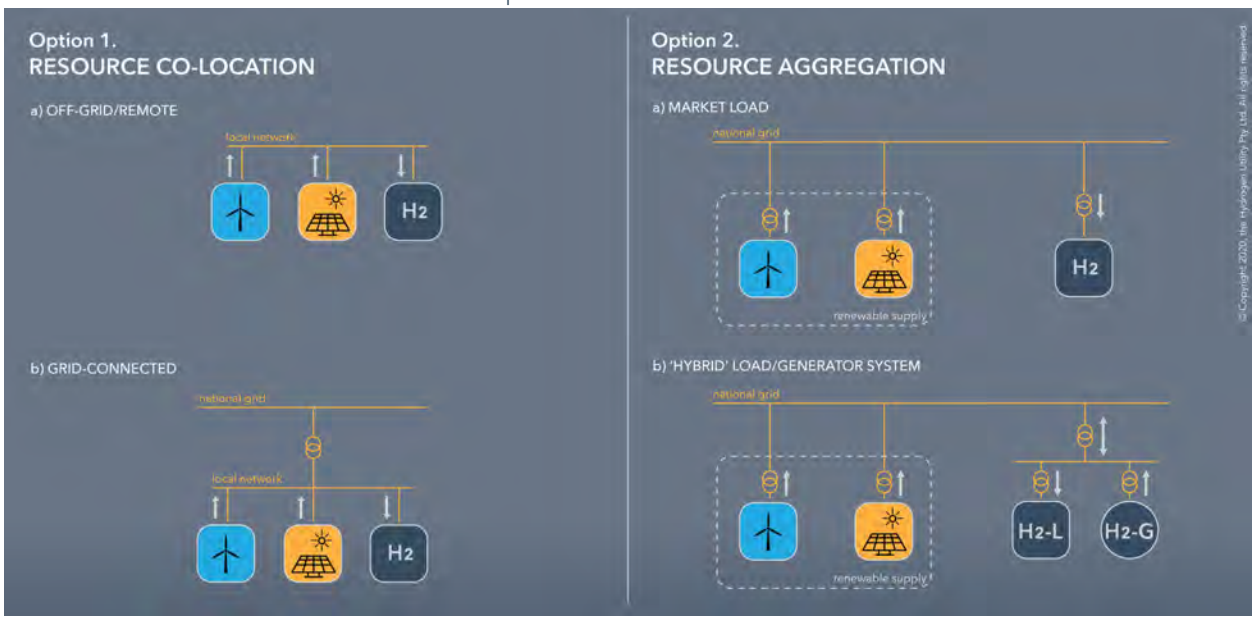
Renewable Energy Integration

Whilst the technologies are not new, the innovation is in their integration with intermittent renewable energy and particularly in leveraging the flexibility of the electrolyser load to balance this intermittency.

Electrolysis, as an inherently modular technology, provides also significant scale benefits for distributed ammonia production, with electrolysis-based systems capable of achieving the *world-class* benchmark for capital costs per unit output at significantly lower scale.

The innovation brought by H2U is to integrate green hydrogen and ammonia production at scale with intermittent renewable energy through virtual power plant (VPP) schemes. The success of the grid interaction lies with the protocols around the interaction of the dispatchable loads with the renewable energy generators and the grid operators.

FIGURE 10. GREEN HYDROGEN PRODUCTION | RENEWABLE ENERGY AND GRID INTEGRATION STRATEGIES



The objective for H2U is in particular to achieve the right balance between the two main cost drivers of green hydrogen production, namely the unit cost of energy (in dollars per MWh) of the renewable energy used for the electrolysers; and the utilization rate or *capacity factor* (in %) of the electrolysis plant from the available power supply. H2U plans to achieve this by means of plant configuration strategies and an innovative transmission-level virtual power plant scheme designed to integrate and leverage the **three key elements** discussed below:

- **'Real-time' Renewable Energy Integration,** H2U's renewable energy integration concept matches the intermittency of renewable energy supply with the advanced load flexibility and fast-response characteristics of electrolysis plants. Under this scheme, variations in the power generation profile of the contracted renewable supply base can be balanced in 'real-time' by ramping-up or ramping down the load of the electrolysis plant.
- **Enhanced Plant Dispatchability,** plant dispatchability is enhanced by 'de-coupling' the operational requirements of the power-intensive *front-end* processing units (electrolysis and ASU), and the *back-end* ammonia synthesis reactor. The key to this approach is to integrate and manage buffer storage capacity for both hydrogen (H_2) and nitrogen (N_2). This allows the ammonia synthesis reactor to run near continuously whilst the electrolyser and ASU are dispatched to match the intermittent renewable supply.
- **Hydrogen-powered Generation,** the third element is the integration of *fast-response* hydrogen power generation to provide on-site generation and grid export capability during times of low generation from renewable resources. The net result is a 'hybrid' system with bi-directional power flow capabilities (Option 2.b in the schematic presented in the diagram in Figure 10 in the previous page) with the electrolyser importing power from the grid, and the generator exporting power to the grid, similar to the case of energy storage systems (ESS).

Grid Integration and Support

Since establishment of the Energy Security Board (ESB), and following recommendations from the Finkel Review, the Australian Energy Market Operator (AEMO) has undertaken work towards the establishment of an Integrated System Plan (ISP), prioritizing development of transmission capacity along highly prospective areas for development of new-build solar and wind generation as Renewable Energy Zones (AEMO 2019).

Alongside with investment in transmission infrastructure, aimed at augmenting the transmission capacity available to deliver energy generated in the Renewable Energy Zones (REZs) to load centres, the ISP emphasizes the role of emerging technical and market innovations – including in consumer-owned distributed energy resources (DER), demand-response (DR), and virtual power plants (VPPs) – in improving the *dispatchability* of intermittent renewable resources, e.g. improving the way flexible power demand can be used to balance an increasingly intermittent power supply, improve the utilization of current transmission assets, and help optimize investment in new transmission infrastructure.

The role of industrial-scale electrolyser loads in this transition is paramount, not only they offer all the elements of dispatchability required to support this transition, their widespread implementation as part of a wholesale de-carbonisation of heavy industry, including in the manufacturing of chemicals, and in particular in the production of ammonia, will also contribute to *re-industrialized* national electricity markets with the introduction of entirely new loads.

Much like in the past, where industrial power loads – aluminium smelters in particular – have represented the growth in 'base' load underpinning the addition of new base-load generation and the overall functioning of the grid, industrial-scale electrolysers – which can be as flexible as the renewable energy supply is intermittent – will in the future underpin the ongoing growth of the grid and its transition towards 100% renewables.

H2U has developed the VPP scheme through the *Eyre Peninsula Gateway* project, and has successfully engaged with renewable energy suppliers, transmission network operators and AEMO.

Following a workshop held in March 2019 with the AEMO leadership, H2U and AEMO have initiated the exploration of options for leveraging the Eyre Peninsula Gateway Project to run a 'utility-scale' proof-of-concept demand-response trial campaign, to assist AEMO develop appropriate procedures to integrate this new class of assets into the National Grid, and to initiate modelling of these resources within the scope of future issues of the Integrated System Plan (ISP).

H2U's proposed hydrogen infrastructure facilities will in particular contribute to improving the reliability of electricity supply, and the integration of existing and proposed renewable generation assets through the following elements:

- **Enhanced Load Flexibility**, as a new, fully-dispatchable load the electrolysis plant in the proposed Supply Chain Demonstrator can integrate otherwise constrained output from the existing wind farms;
- **Fast Frequency Response**, the electrolysis plant has response characteristics suitable to provide fast-frequency response (FFR) in the form of synthetic inertia; and
- **Network Support Services**, where the proposed hydrogen powered generation assets can use hydrogen from the buffer storage capacity installed between the electrolysis plant and ammonia synthesis reactor to deliver emergency power generation, and to participate directly in the spot market.

3.4 Components, developments, activities and infrastructure that constitute the project to be declared coordinated

The proposed scope of **H2-Hub™ Gladstone**, presented in this Section includes the following elements:

- **Process Plant facilities – Green Hydrogen and Ammonia Production**
- **Product Utilization and Marketing facilities**

Design Basis

The **Design Basis** for the Project, reported in Table 7 in the following page, has been established by H2U as part of a **modularised process train concept** – integrating a 600 tonnes per day (tpd) industrial-scale ammonia synthesis loop, with 370 MW electrolysis plant – that has been adopted by H2U as the standardised building block of its H2-Hub™ development projects, including H2-Hub™ Gladstone.

H2-Hub™ Gladstone will integrate up to eight (8) modularised process trains, deployed to meet the requirements of the near-term import replacement, and medium-term export markets, as follows:

- Activation Stage (near term), up to 4x600 tpd NH3 modules and 1.5 GW electrolysis plant; and
- Expansion Stage (medium term), up to additional 4x600 tpd NH3 modules, and 1.5 GW electrolysis.

TABLE 7. H2-HUB™ GLADSTONE | DESIGN BASIS[14]

Module 1. **H2 Supply**	**Electrolysis Plant**	**Alkaline Water Electrolysis Plant** (8x 77,600 Nm^3/h, 8x370 MW_{AC})
	H2 compression	**Centrifugal Compressors** (8x 80,000 Nm^3/h)
	H2 Storage	**HP H2 Pipeline + Buffer H2 Storage** (site-wide, 10.1 MPa)
Module 2. **N2 Supply**	**Air Separation Unit**	**Cryogenic LIN/LOX/LAR ASU** (2x 2,600 t_{N2}/d)
	N2 Compression	**LIN cryo-pumps** (LIN cryo-pumps + vaporizers)
Module 3. **NH3 Production**	**NH3 Production**	**NH3 Synthesis Loop** (8x 600 tpd)
Module A. **H2 Utilisation and Marketing**	**H2 Power Generation**	**H2 Gas Turbines** (100% H2) (2x40MWe 100% H2 OCGT[15] + 80t/h HRSG[16])
Module B. **NH3 Utilisation and Marketing**	**NH3 Storage**	**Bulk Refrigerated NH3 Storage** 3x50,000 t
	NH3 Loading Terminal	**wharf and Loading Facilities** up to 80,000 DWT vessels
Module C. **N2 Utilization/Marketing**	**N2 Storage**	**Bulk LIN Storage** 2x12,000 t
Module D. **O2 Utilization/Marketing**	**O2 Storage**	**Bulk LOX Storage** 2x12,000 t
Module E. **CO2 Recovery and Utilization**	**CO2 Recovery and Utilization**	**Methanation Plant** (Capacity tbc[17])

[14] current as of 31 August 2021 and subject to outcome of Bankable Feasibility Study to be carried out in FY 2021-22
[15] open-cycle gas turbine
[16] heat recovery steam generator
[17] subject to Master Plan and Feasibility Study activities to be carried out in FY 2020-21

3.5 External Infrastructure requirements

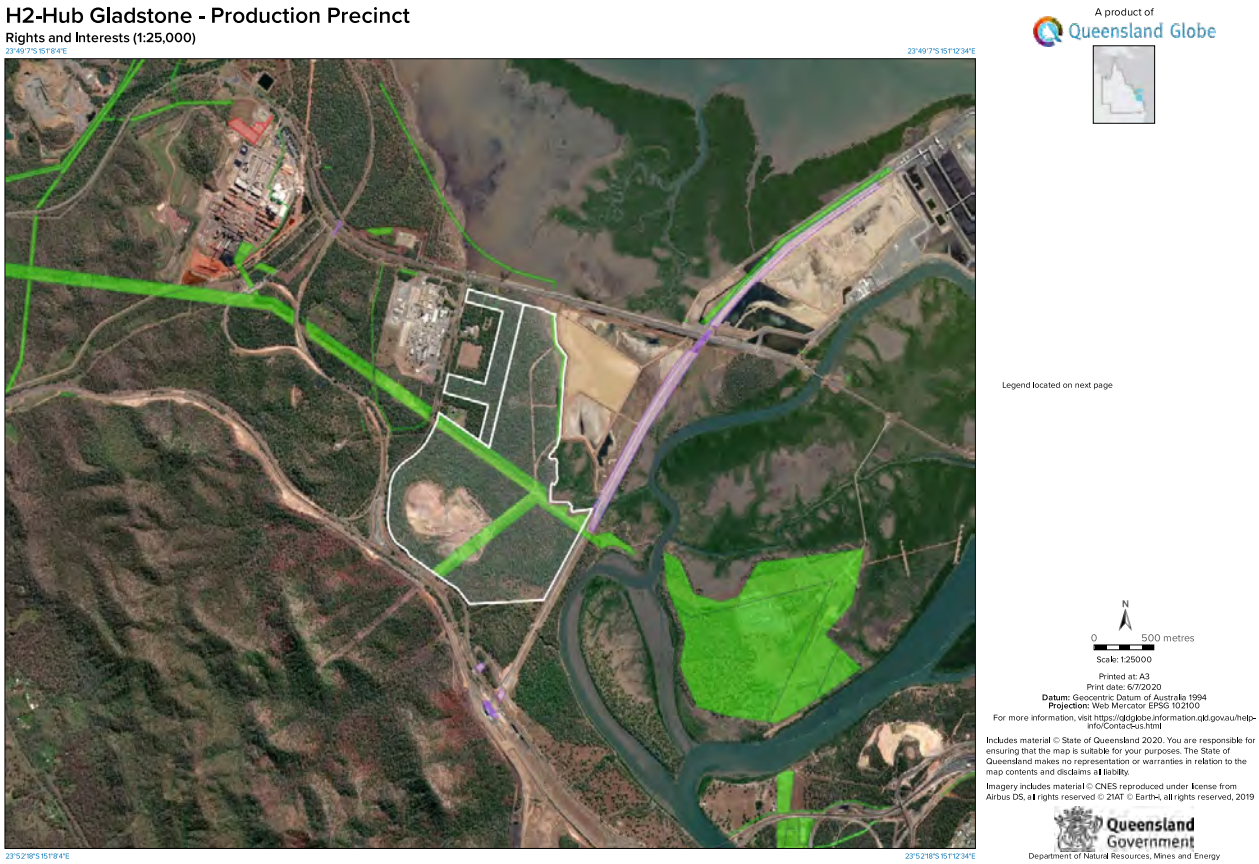
Power Infrastructure

The Project will require connection to the Queensland Region of the National Electricity Market (NEM) via:

- Direct connection to available exits at the existing Calliope 275 kV substation; or
- New 275 kV substation to be established on site, connecting to the existing Bouldercombe to Calliope River, and Mt Larcom to Calliope River 275 kV transmission lines intersecting the site through the property on the transmission easement designated as Lot A on SP16545, shown below.

H2U will evaluate these options with PowerLink during CY 2021 as part of the Connection Application.

FIGURE 11. H2-HUB™ GLADSTONE | PRODUCTION PRECINCT, RIGHTS AND INTERESTS (1:25,000)



Water Infrastructure

Water Supply Requirements

Water supply requirements for the proposed H2-Hub™ Gladstone development are as follows:

- Activation Stage (near term), up to four (4) giga-litres (Gl) per year; and
- Expansion Stage (medium term), up to additional four (4) Gl per year.

Of the total water supply requirements, ~40% is required as the feedstock for water production via water electrolysis, requiring treatment via a dedicated reverse osmosis (RO) water treatment plant.

Water Supply Options

The site has direct access to both raw water from the Gladstone Area Water Board (GAWB) and treated water from the Gladstone Regional Council, as follows:

- Raw Water (Awoonga Dam), raw water supply from Awoonga Dam on the Boyne River via an allocation of 78 GL per annum by virtue of a Resource Operations Licence to GAWB, pursuant to the *Water Resource (Boyne River Basin* Plan) 2000, delivered via pipeline connection; and
- Treated Water (Yarwun Water Treatment Plant), located on Reid Road on the north-western boundary of the site, operated by Gladstone Regional Council (GRC) with a capacity of up to 5 ML/d

H2U will engage with the Gladstone Area Water Board and seek to negotiate the purchase of water or wastewater from either the neighbouring waste-water treatment plant and/or water treatment plants. Both these facilities share a common boundary with the project to reduce the need for water pipeline easement.

FIGURE 12. GLADSTONE AREA WATER BOARD | DELIVERY NETWORK

Pipeline Infrastructure

FIGURE 13. H2-HUB™ GLADSTONE | PRODUCTION PRECINCT, PIPELINE INFRASTRUCTURE (1:25,000)

Natural Gas Pipelines

The Project has direct access to the following pipeline infrastructure:

- Jemena Queensland Gas Pipeline, running on the northern boundary of the site, along Hanson Rd, and with a lateral in the northern section of Reid Rd; and
- Australian Gas Networks (AGN) Wide Bay Pipeline, with the Wide Bay Terminal located ~2km to the north-west of the site, north of the Rio Tinto's Alumina Refinery site.

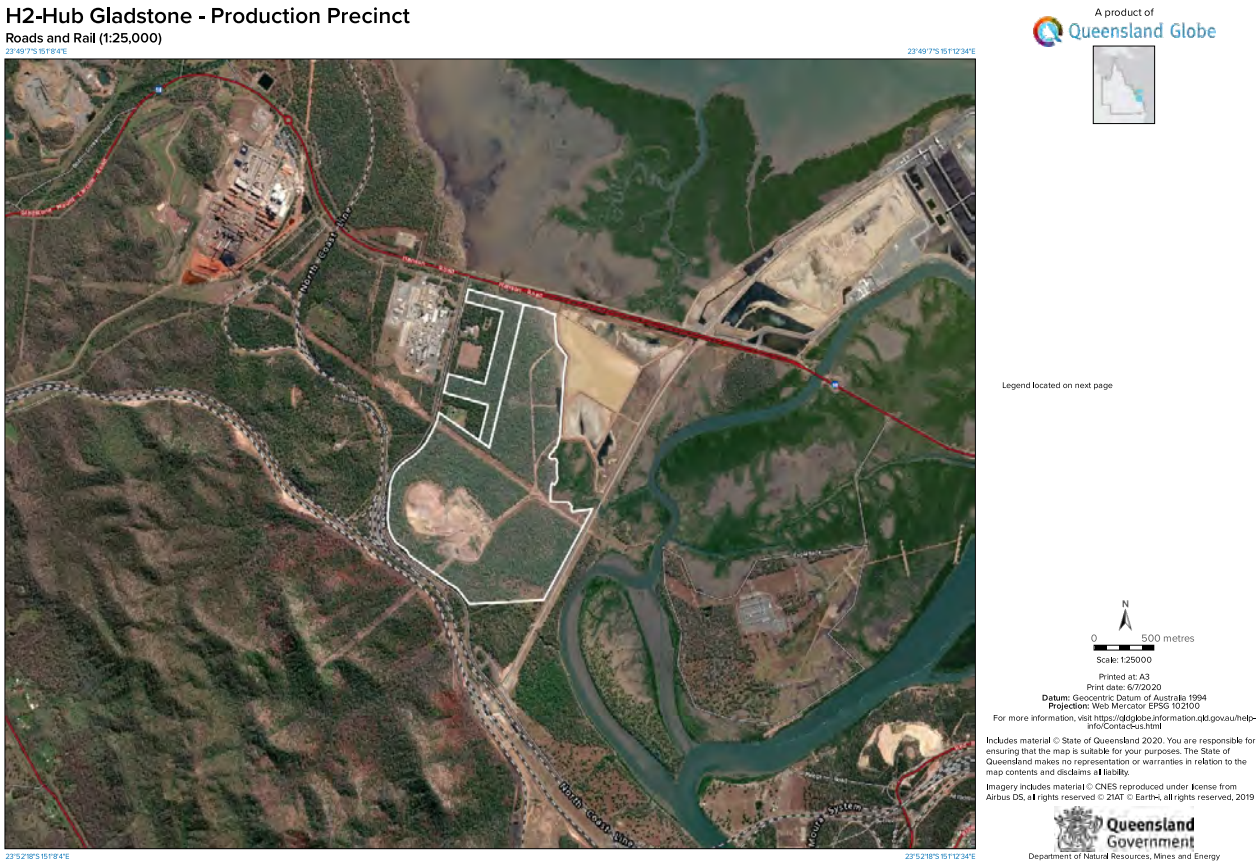
Product Delivery Pipelines

As part of Masterplan and Feasibility Study activities planned for FY 2022 H2U will seek to negotiate a usage agreement for the existing ammonia pipeline running from the adjacent chemical complex to the Fisherman's Landing Wharf and a Hydrogen pipeline via the Wide Bay Gas terminal on existing pipeline and infrastructure easements, a CO2 pipeline is also considered, connecting existing industrial emitters in the Fisherman's Landing and Yarwun precinct to the Production Precinct via existing pipeline easements.

Failing to secure a usage agreement H2U will seek to build a parallel ammonia pipeline on the existing easement corridor. Both options will require the relevant permits and easements for an under-road connection from the Project site to the current pipeline easements established within the **Materials Transportation and Services Corridor precinct** of the Gladstone SDA.

Road and Rail Access

FIGURE 14. H2-HUB™ GLADSTONE | PRODUCTION PRECINCT, ROAD AND RAIL ACCESS (1:25,000)



Road

The Project is bounded to the North by Hanson Road the main highway through the Gladstone State Development Area and to the West and Southern boundaries by Reid Road. Hanson Road, and the northern section of Reid Rd are designated Heavy Vehicle Routes suitable for operation of B-Double truck and trailer configurations up to 25m (B25) and Higher Mass Limits (HML) vehicles.

Access to the site will be via Reid Road which already services the Orica Yarwun complex and is unlikely to require any upgrades for the project. Reid Road is a local government-controlled road and appropriate entry and exit point will be designed and constructed in consultation with the relative authorities to facilitate any additional traffic and site access. All internal roads, entry and exit points will be developed to Australian Standards and to ensure runoff is properly captured and managed.

During the construction phase there will be additional heavy transport, particularly for the transport of pre-assembled modules which are most likely to be brought in through the Fisherman's Landing Wharf and transported by road to the site. During the operation phase, heavy traffic will be limited to off-site product deliveries via trucks, and additional light vehicle traffic, mostly from employees and contractors.

Rail

The North Coast Rail line runs along the Western Boundary of the site, H2U envisages that some product will be railed in ISO containers and will seek to develop a common user loading facility on land adjoining the rail corridor, in proximity of the existing multi-modal rail terminal adjoining the site on the SW corner.

3.6 Timeframes for the project

TABLE 8. *H2-HUB™ GLADSTONE* | IMPLEMENTATION ACTIVITIES AND TIMEFRAME

COMPLETED TO DATE	**Business Case**	Business Case and Due-diligence completed August 2019
	Customer Engagement	Engaged with prospective cornerstone customers for commercial-grade anhydrous ammonia (NH_3), and export market customers
	Site Acquisition	Executed contract for the sale of land with Minister for Economic Development Queensland (MEDQ), February 2020
	Port Access Arrangements	Negotiation of LoI with Gladstone Ports Corporation (GPCL) for establishment of Export Precinct
PROJECT DESIGN CY 2021	**Initial Advice Statement** (Mar – Sep 2021)	Submission to the Queensland Co-ordinator General to obtain a Coordinated Project Declaration under Part 4 Division 2 of the *State Development and Public Works Organisation Act* 1971 (SDPWO Act)
	Master Plan & Feasibility Study (Oct 2021 – Jun 2022)	Concept planning for *H2-Hub™ Gladstone* production and export precincts and associated infrastructure corridor
		Detailed feasibility for Activation Stage (COD target 2025)
	Funding Applications (Oct 2021 – Jun 2022)	Including Australian Renewable Energy Agency (ARENA), Clean Energy Finance Corporation (CEFC), and Northern Australia Infrastructure Facility (NAIF)
PROJECT DEVELOPMENT FY 2022 – FY 2023	**EIS** (Jul 2022 – Jun 2023)	Development and submission of Environmental Impact Statement (EIS)
	FEED Study (Sep 2022 – Jun 2023)	Detailed engineering for Activation Stage (COD target 2025)
	Contracts and Approvals (Jan 2022 – Jun 2023)	Power Purchase Agreement (PPA), Product Offtake Agreement (POA), and Transmission Connection Agreement (TCA)
		Development Approval (DA), EPA Licence, WorkSafe Licence
	Project Finance (Jul 2022 – Jun 2023)	Equity and debt finance, target Final Investment Decision (FID) Jun 2023
PROJECT ACTIVATION FY 2024 – FY 2025	**Procurement** (Jul – Dec 2023)	EPC/EPCM contract, engineering and other service contracts
		Major equipment supply contracts and purchase orders (POs)
	Site and Facilities (July 2023 – Jun 2024)	Site Preparation, buildings and utilities connections
	Installation & Commissioning (Jun 2024 – Dec 2025)	Equipment installation and testing
		Plant commissioning and hand-over to operations.
PROJECT EXPANSION FY 2028 – FY 2030	**Finance, Procurement, Installation & Commissioning**	As described above

3.7 Construction and operational processes

The Project will be established as a staged development as follows:

- **Activation Stage (near term),** including site development, shared utilities and infrastructure and installation, commissioning, and operation of up to four (4) modularised process trains; and
- **Expansion Stage (medium term),** including construction, commissioning and operations of product delivery infrastructure (to Fisherman's Landing Wharf), and installation, commissioning and operation of up to four (4) additional modularised process trains.

Construction Activities

Typical construction activities will be carried out in accordance with Implementation Plans, including Construction and Environmental Management Plans, including:

- Mobilisation of personnel and equipment to site for initial works;
- Vegetation clearing, including stripping top- and sub-soil from designated construction areas;
- Earthworks, including for sediment and erosion controls, stormwater drainage and bunding;
- Develop laydown areas and soil management areas;
- Build internal site roads and site access/egress;
- Erect temporary workshop, warehouse, and site office;
- Implement noise mitigation measures;
- Build concrete pads for process plant and utilities;
- Install utilities and connections;
- Install and commission process plants;
- Integration of product logistics infrastructure; and
- Demolition, decommissioning, and rehabilitation of temporary facilities.

Operation Activities

Typical operation activities include:

- Ramp-up plant operations;
- Operation and maintenance;
- Plant expansion and upgrading.

3.8 Workforce requirements during construction and operation

During peak construction of the project, the workforce for the Project is estimated as follows:

- **Activation Stage (near term),** up to 350 FTEs over a 24-30 months period in the engineering, construction, and services areas, for initial development of site, shared utilities and infrastructure, and installation and commissioning of up to four (4) modularised process trains; and
- **Expansion Stage (medium term),** up to 200 FTEs over a 18-24 months period in the engineering, construction and service areas installation and commissioning of up to four (4) additional modularised process trains.

3.9 Economic indicators

A detailed Business Case and Pre-feasibility study has been conducted by H2U for the Activation and Expansion Stage of the project, verifying commercial feasibility of the proposed development, as summarized in Table 9 below.

TABLE 9. *H2-HUB™ GLADSTONE* | KEY ECONOMIC INDICATORS

	ACTIVATION STAGE	EXPANSION STAGE
Operation Start[18]	Q4 2025 (target)	2027-35
Operating Lifetime	40+	40+
Capital Expenditure (CAPEX)	$2.53b[19]	$2.18b[20]
Operating Expenditure (OPEX)	$ 0.35b/y	$ 0.29b/y
Internal Rate of Return (IRR)	11.0%	13.9%
Net Present Value (NPV)	$1.07b	$2.03b
Construction Jobs	350 FTEs	200 FTEs
Operational Jobs	100 FTEs	+40 FTEs

3.10 Financing requirements and implications

The Project will be financed through a combination of:

1. Securing of strategic partnerships with off-takers for green ammonia, green hydrogen and co-products from the proposed H2-Hub™ Gladstone development;
2. Equity contributions from H2U Group and its shareholders; and
3. Debt finance, likely to the extent of 60% of total project costs.

[18] Commercial Operation Date (COD)
[19] AACE Class 5 CAPEX Estimate, including Production Precinct (Activation Stage), Product and Logistics Corridor, and Export Precinct
[20] AACE Class 5 CAPEX Estimate, including Production Precinct (Expansion Stage)

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4 LOCATION OF KEY PROJECT ELEMENTS

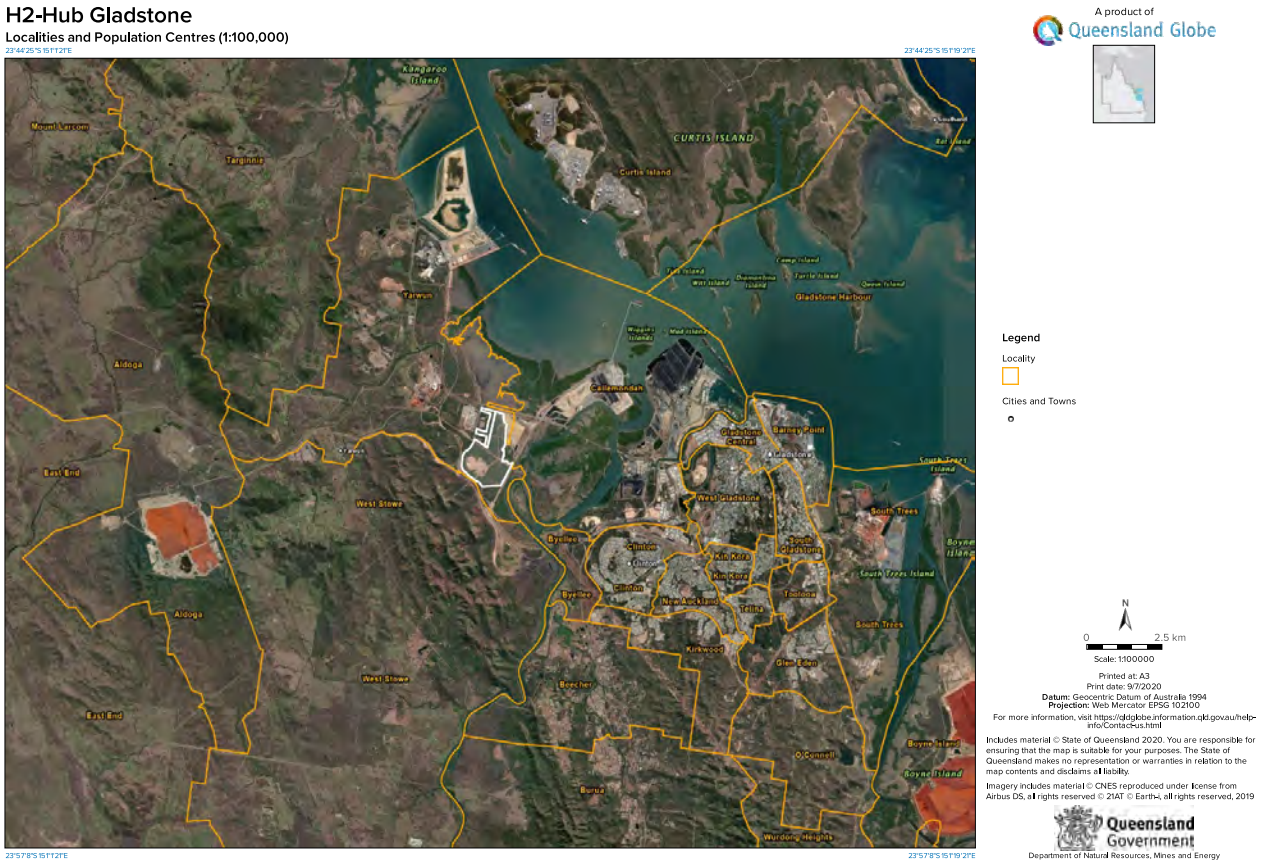
THE HYDROGEN UTILITY™

Section 4. **Location of Key Project Elements**

4.1 Location

The Production Precinct of the proposed H2-Hub™ Gladstone development will be established in the Yarwun locality, in a site within the Gladstone SDA, located approximately 8 km east of the city of Gladstone.

FIGURE 15. H2-HUB™ GLADSTONE | LOCALITIES AND POPULATION CENTRES (1:100,000)



Lot Plans

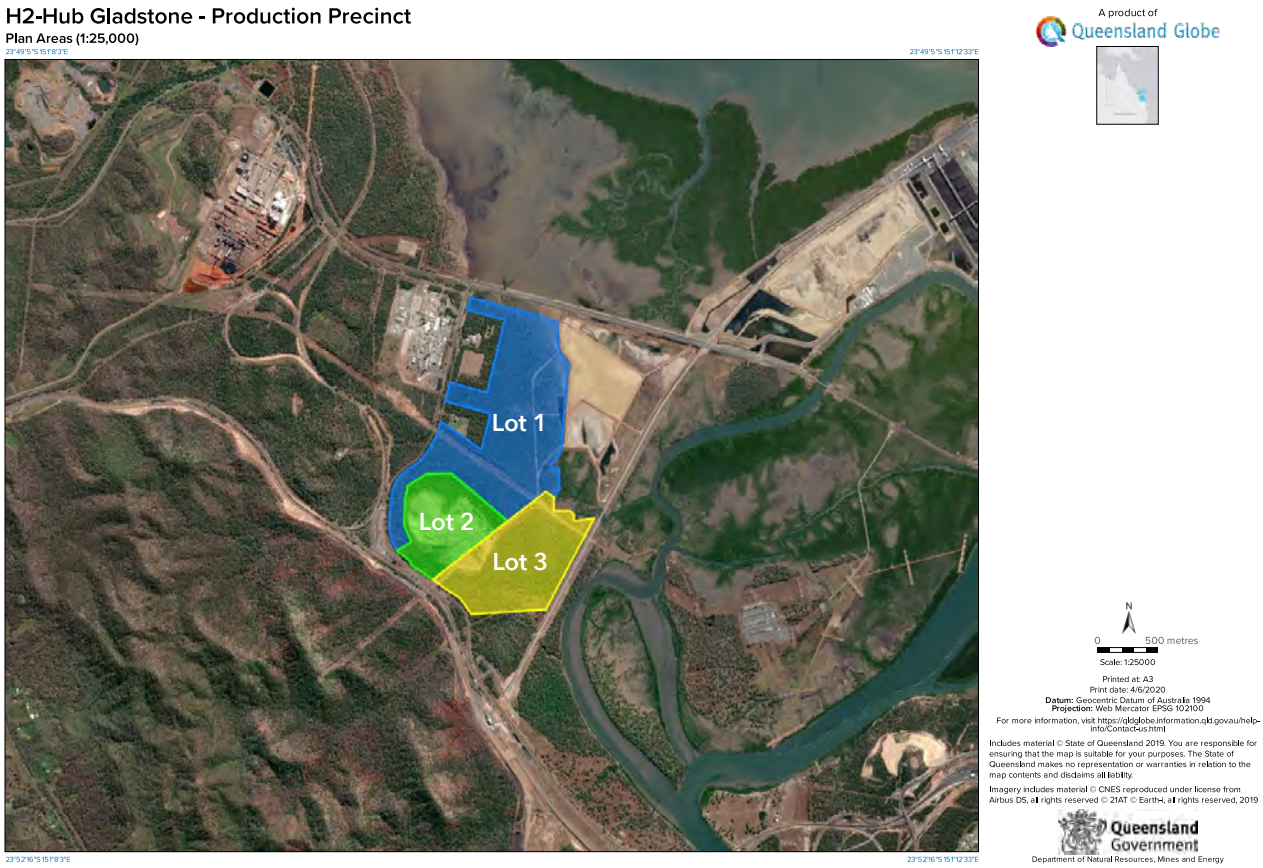
H2U proposes to establish the **Production Precinct** on land subject to survey and a new title being drawn on the following existing parcels of land:

- Lot 2 on Plan SP293584; and
- Lot 11 on Plan SP239343.

Under the **Sale of Land Agreement** between H2U subsidiary GHH and the Minister for Economic Development Queensland (MEDQ) the area will be re-organised in **three new titles**, illustrated in the Survey Plan presented in Figure 16 below, as follows:

- **(New) Lot 1 (109.9 ha),** including all of the area of the previously designated Lot 11, the northern section and transmission easements on the existing Lot 2, and an area extending along Reid Road on the south-western boundary of the site, and south-west of the transmission easement;
- **(New) Lot 2 (40.2 ha),** including the south-western section of the existing Lot 2, an area commonly known as the 'borrow pit' with direct access from Reid Rd; and
- **(New) Lot 3 (61.1 ha),** including the section of previously designated Lot 2 located south-east of the existing transmission easements.

FIGURE 16. H2-HUB™ GLADSTONE | PRODUCTION PRECINCT, PLAN AREAS (1:25,000)



4.2 Tenure

The land selected for the project is owned freehold by the Minister for Economic Development Queensland (MEDQ) and regulated by the Queensland Coordinator-General.

On 27 February 2020 H2U has secured the land for *H2-Hub™ Gladstone* under a Sale of Land contract between its subsidiary GHH and the Minister of Economic Development Queensland (Queensland Government 2020).

Under the Sale of Land Agreement H2U will initially purchase the new Lots 1 and 3, for a total estimated area of 171 ha, and have secured preferential rights to also acquire Lot 2 at a later date to support expansion of the Project to its full planned capacity.

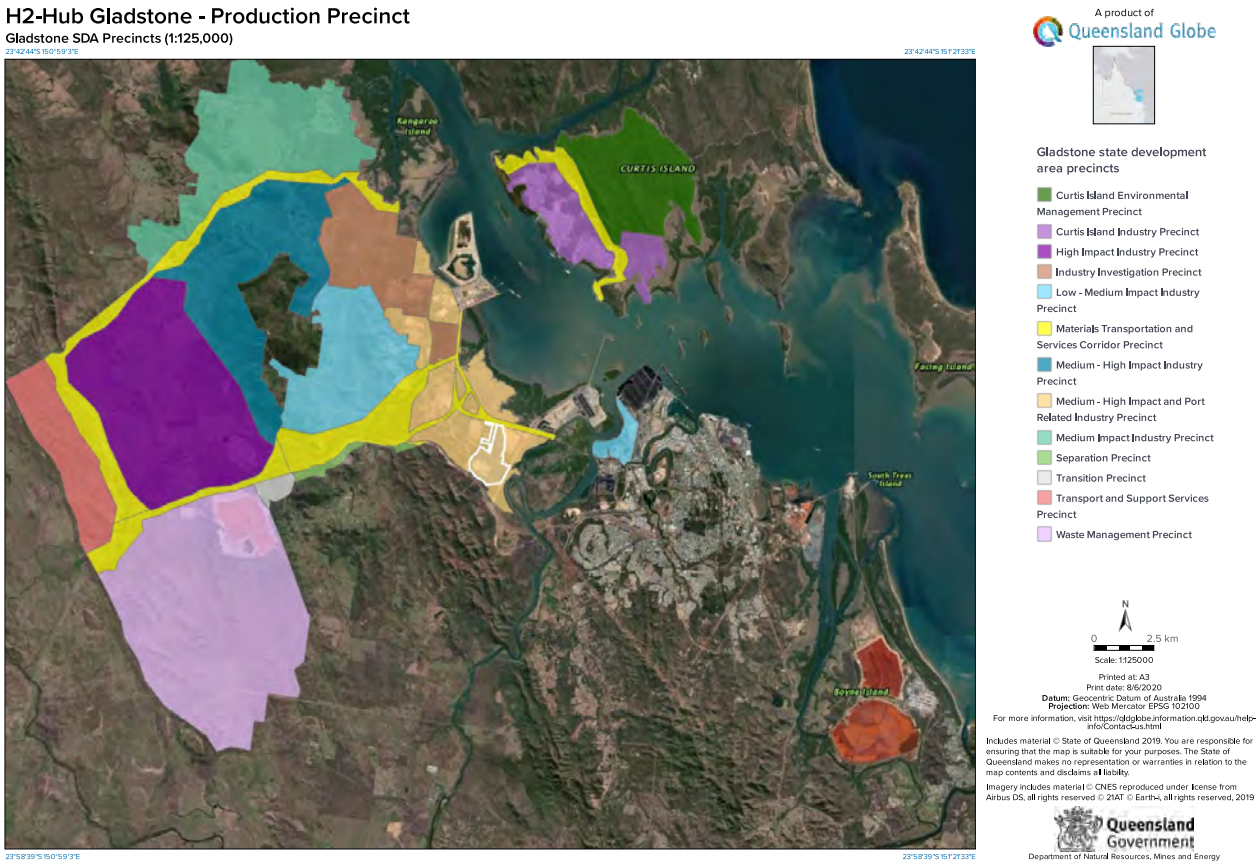
Development Scheme

The Production Precinct and Product Logistics and Infrastructure Corridor for the Project will be established within the **Gladstone State Development Area** (Gladstone SDA), in the following Precincts:

- **Production Precinct,** in the **Medium-High Impact and Port Related Industry Precinct**; and
- **Logistics and Infrastructure Corridor**, in the **Materials Transportation and Services Corridor Precinct**.

The Gladstone SDA declared in 1993 comprises 27,194 hectares of land adjacent to the Port of Gladstone, with connections to major rail networks and Australia's national highway.

FIGURE 17. GLADSTONE SDA | PRECINCTS (1:125,000)



The Gladstone SDA is dedicated for industrial development and materials transportation infrastructure, including the following uses:

- large-scale, large-footprint industrial development;
- industrial development requiring access to strategic port logistics and maritime facilities;
- port-related activities;
- industries to support major industrial development;
- materials transportation infrastructure and utility and service infrastructure; and
- gas transportation infrastructure and other compatible infrastructure.

Planning and Development within the Gladstone SDA is regulated by the **Gladstone State Development Area Development Scheme** (DSD 2015).

5 DESCRIPTION OF THE EXISTING ENVIRONMENT

Section 5. **Description of the Existing Environment**

5.1 Natural Environment

General

The proposed site within the Yarwun precinct of the Gladstone SDA is located to the south of Hanson Road (State Route 58) and is bounded by Reid Road to the west, Mt Miller Rd and the North-Coast Rail Line to the south, and the Overland Conveyor of the Wiggins Island Coal Export terminal (WICET) to the east.

The prevailing land uses within the broader project area are industry and agriculture. Several heavy industrial operations are located in close proximity to the site, including:

- Orica Yarwun multifunction manufacturing complex, located west of the site on Reid Rd;
- Rio Tinto Yarwun Alumina refinery, located 2km west of the site on Hanson Rd;
- Cement Australia Gladstone, located 5km north-west of the site on Landing Rd; and
- NRG Gladstone Power Station, located across the Calliope River, 5 km east of the site.

Climate

The region has a sub-tropical climate and experiences average annual rainfall of approximately 886.5 mm.

Long-term climate observations, reported for the Bureau of Meteorology (BoM) Gladstone Radar for the period 1957-2020, are presented in Figure 18 below, Figure 19, and Figure 20 in the following page.

- Temperature, monthly average maximum and minimum;
- Rainfall, monthly average and maximum; and
- Wind direction and wind speed, at 9am and 3pm.

FIGURE 18. GLADSTONE RADAR (039123) | AVERAGE MAXIMUM AND MINIMUM TEMPERATURES, 1991-2020

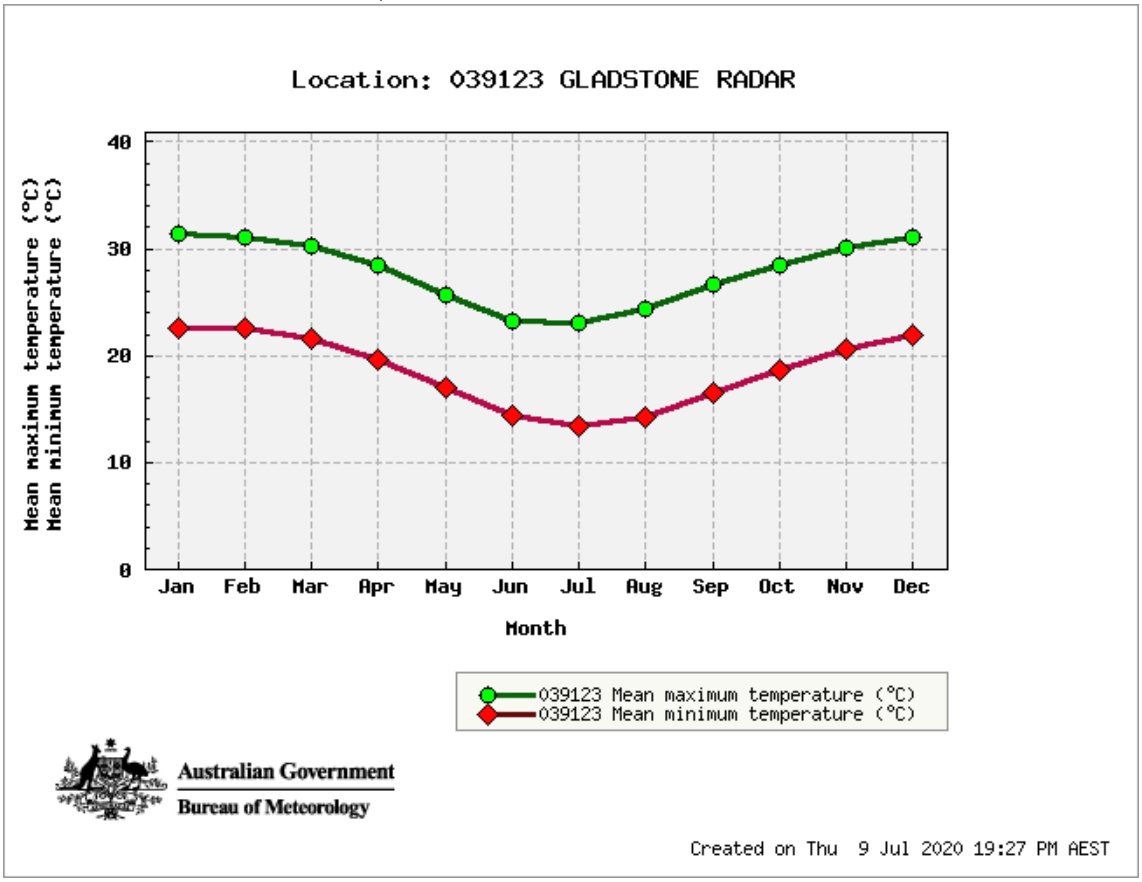


FIGURE 19. GLADSTONE RADAR (039123) | AVERAGE AND MAXIMUM RAINFALL, 1991-2020

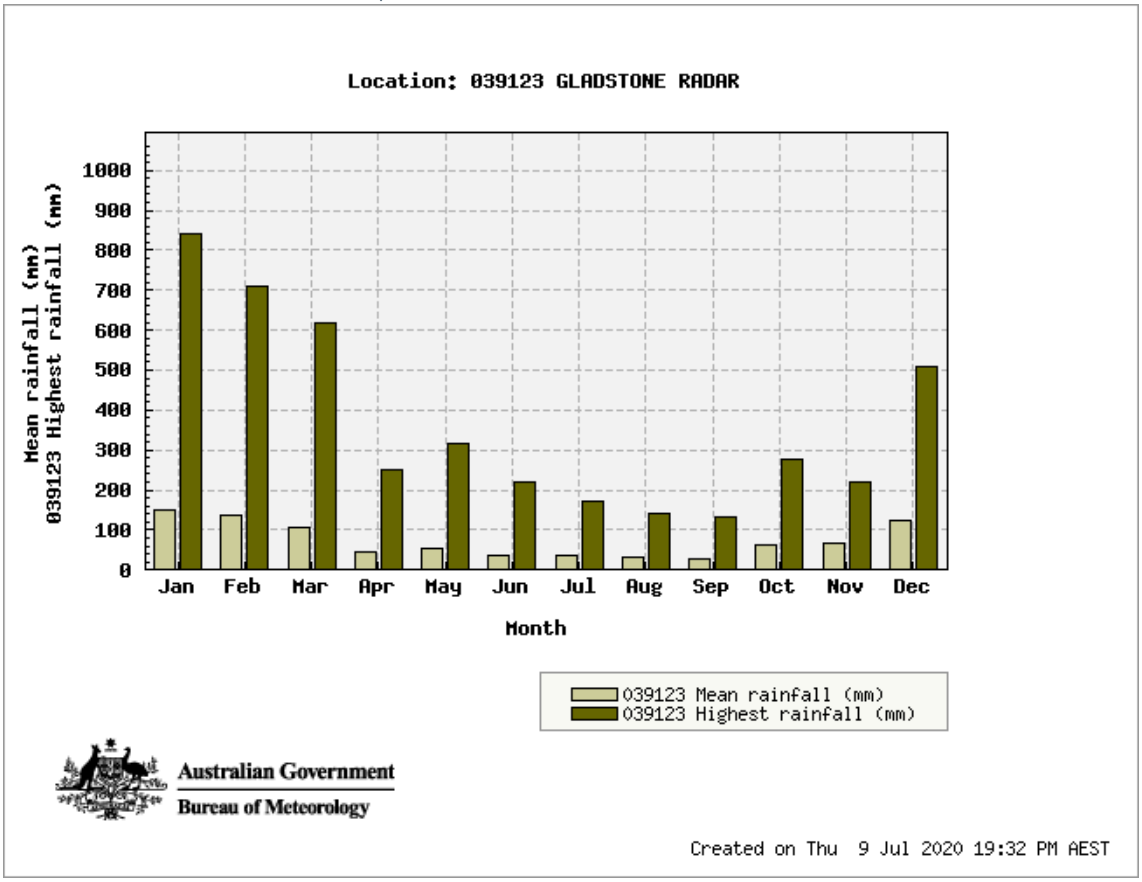
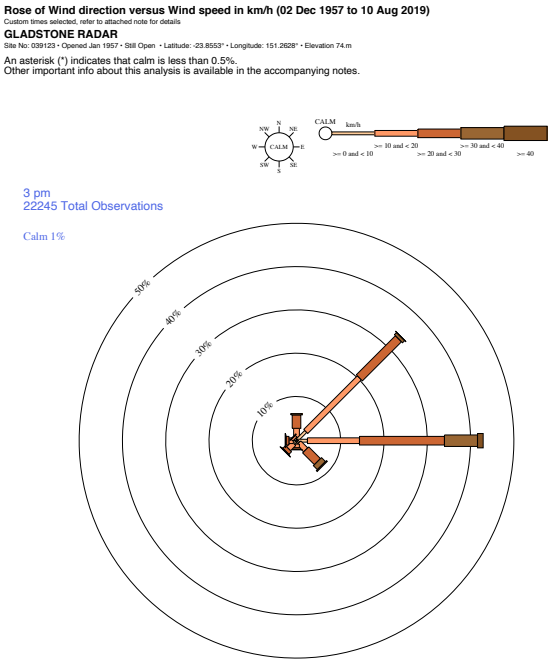
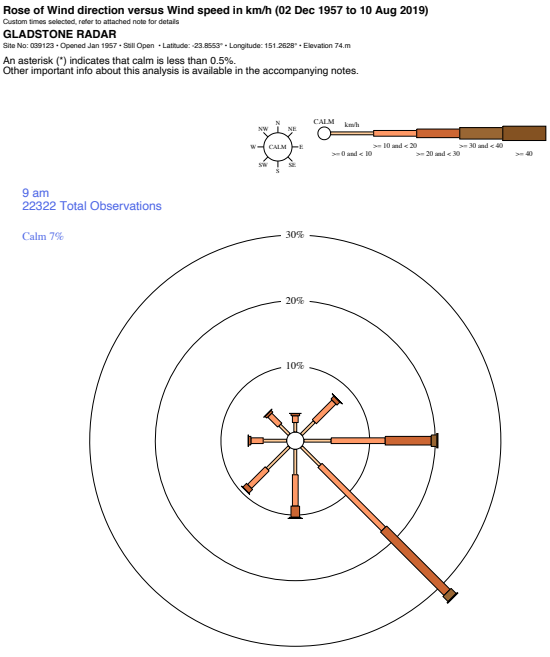


FIGURE 20. GLADSTONE RADAR (039123) | LONG-TERM WIND DIRECTION VS. WIND SPEED OBSERVATIONS, 1957-2019





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Prepared by the Bureau of Meteorology.
Contact us by phone on (03) 9669 4082, by fax on (03) 9669 4515, or by email on climatedata@bom.gov.au
We have taken all due care but cannot provide any warranty nor accept any liability for this information.
TCZANNUAL Page 1

Land

Topography

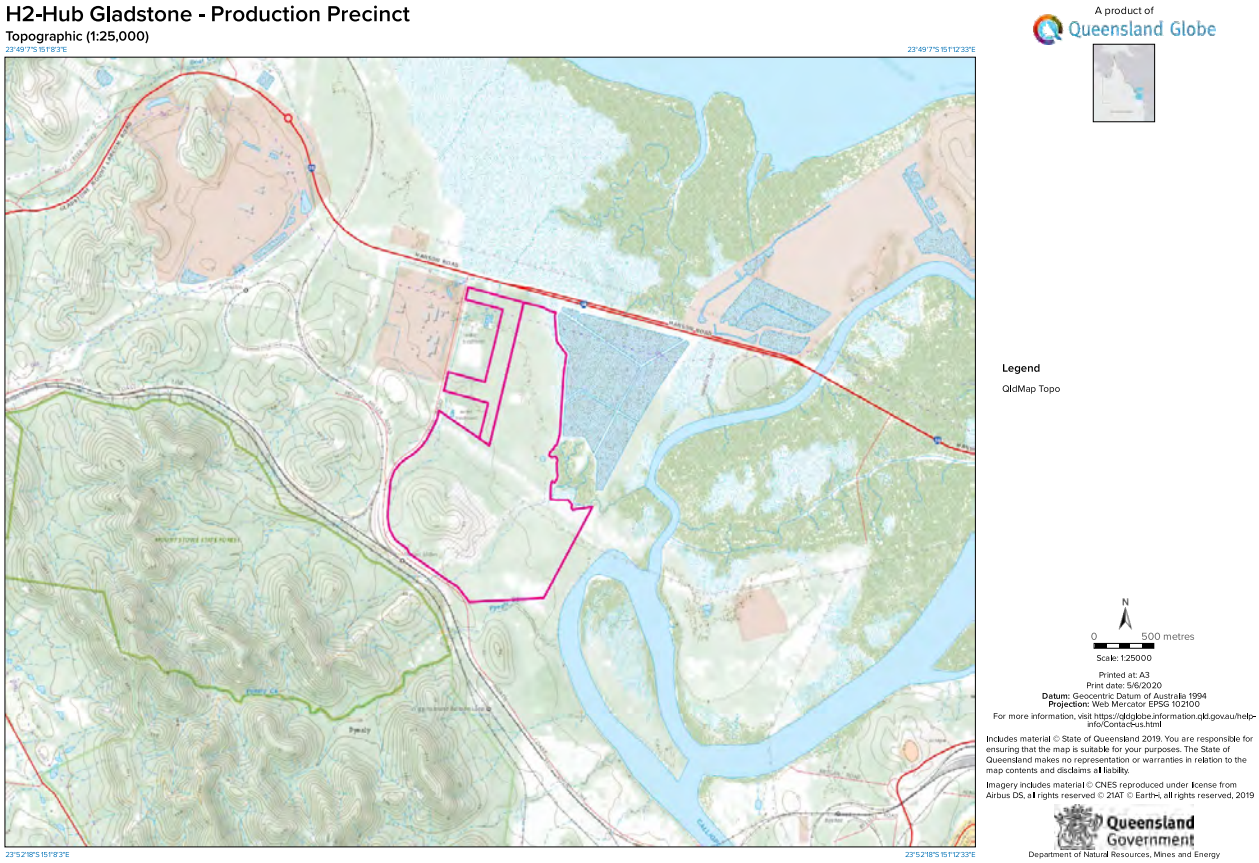
The topography of the area surrounding the project site is presented in Figure 21 below, and in the contour and detail survey for the site, presented in Figure 22 in the following page.

The highest area on the project site is a prominent hill in the south-west section of existing Lot 2 on Plan SP293584, known as the 'borrow pit'. This area, designated as the new Lot 2 (40.2 ha), will be initially retained by Economic Development Queensland (EDQ) as a common user source of clean fill. It raises from a reduced-level (RL) elevation of 33.0m AHD[21] on the south-western corner of the site to a maximum elevation of RL 66.0m AHD, to then drop to an elevation of RL 18.0m AHD.

The area designated as the new Lot 1 (109.9 ha) is generally flat, with a gentle slope to the north, north-east from an elevation of RL of 18.0m AHD on the south-western boundary with new Lot 2, to an elevation of RL 2.0m AHD on the north-eastern boundary of the site.

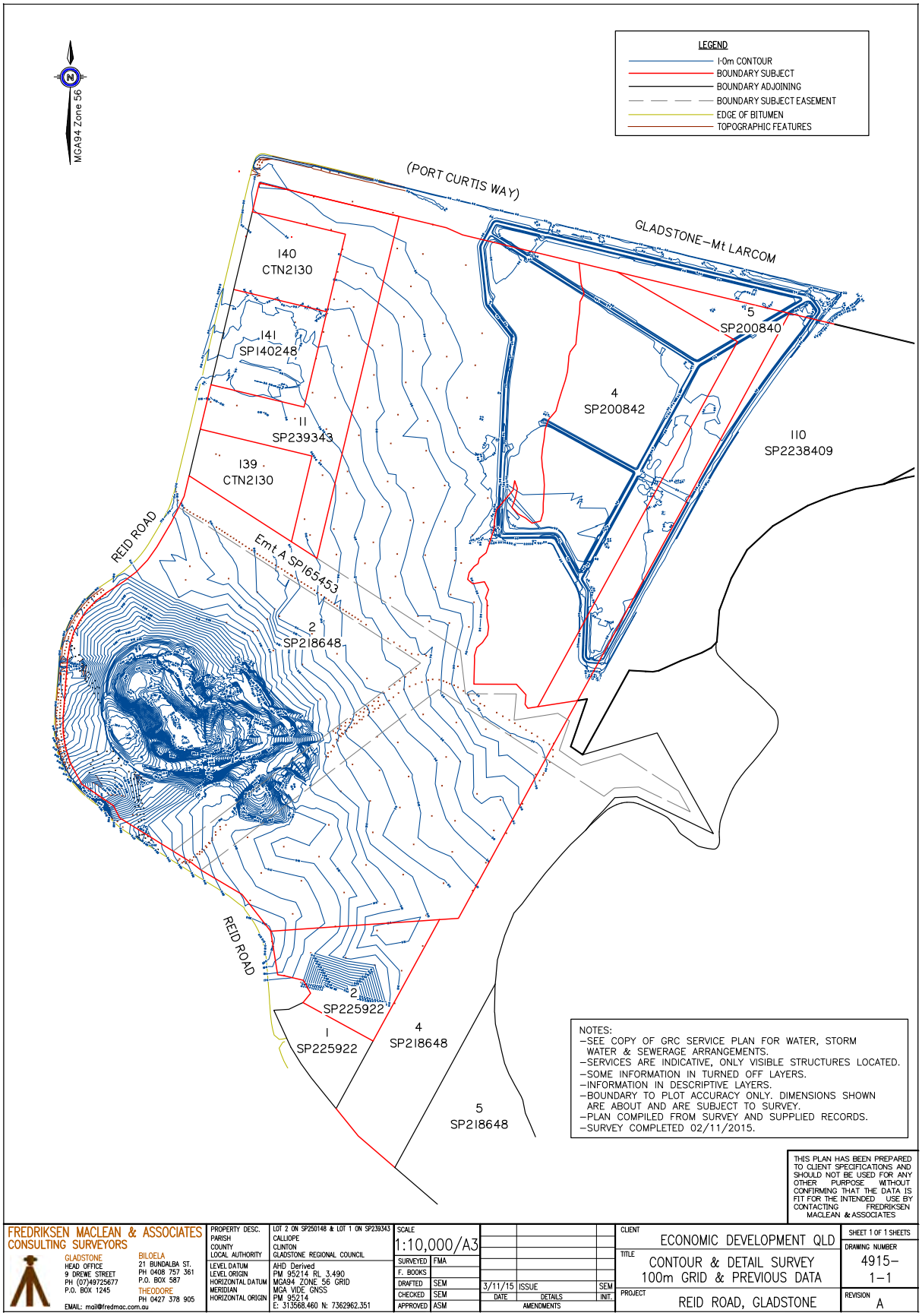
The area designated as new Lot 3 (61.1 ha) is generally flat, with a gentle slope to the north, north-east from an elevation of RL 20.0m AHD on the south-eastern boundary of the site, to an elevation of RL 4.0m AHD on the easternmost corner of the site.

FIGURE 21. H2-HUB™ GLADSTONE | PRODUCTION PRECINCT, TOPOGRAPHIC (1:25,000)



[21] All elevations measured to Australian Height Datum, or AHD.

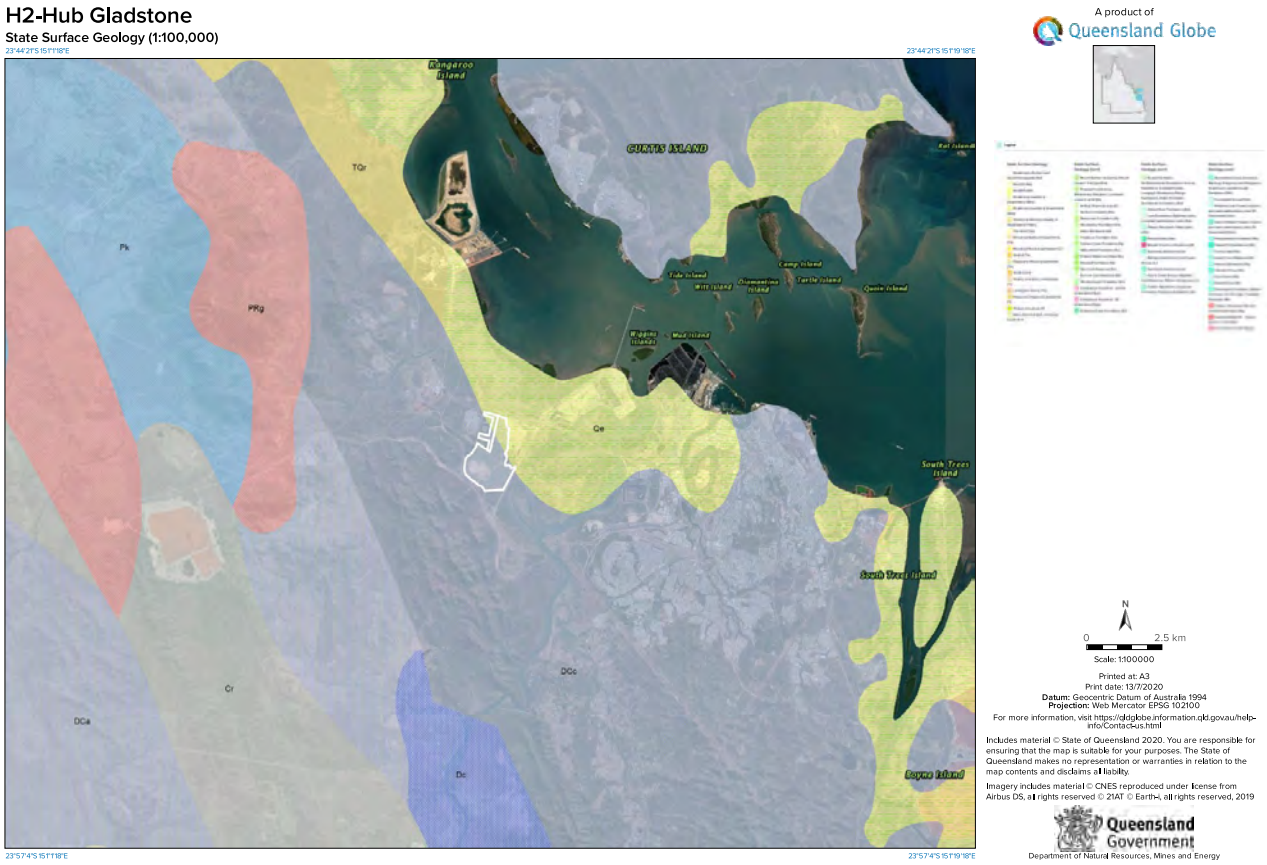
FIGURE 22. H2-HUB™ GLADSTONE | PRODUCTION PRECINCT, CONTOUR AND DETAIL SURVEY (1:10,000)



Geology

The surface geology of the site and the surrounding region is shown in the map presented in Figure 23 below.

FIGURE 23. H2-HUB™ GLADSTONE | PRODUCTION PRECINCT, SURFACE GEOLOGY (1:100,000)



The main geological units mapped across the site are as follows (AECOM 2016):

- Quaternary Residual Soils (Qrs) – found in the majority of locations across the site in the form of silty sand or sand, weathered from the underlying mudstones and cherts of the Doonside Formations. Colluvium transported from the hilly terrain at the south-west of the site may also present. Residual soils are generally less than 3 m thick.
- Quaternary Coastal Sediments (Qhe) – found beneath the low-lying tidal flats and mangrove swamps located at north-eastern boundary of the site near the WICET reclamation area. Sediments generally comprise soft silt or clay (estuarine mud) and often with a high organic content on the mangrove flats.
- Doonside Formation (DCcd) – located beneath the undulating and hilly terrain to the southern side of the site and generally consists of chert, mudstone, minor tuff, altered basalt and arenite.

A fault extends from the north-west corner to the south-east corner of the site.

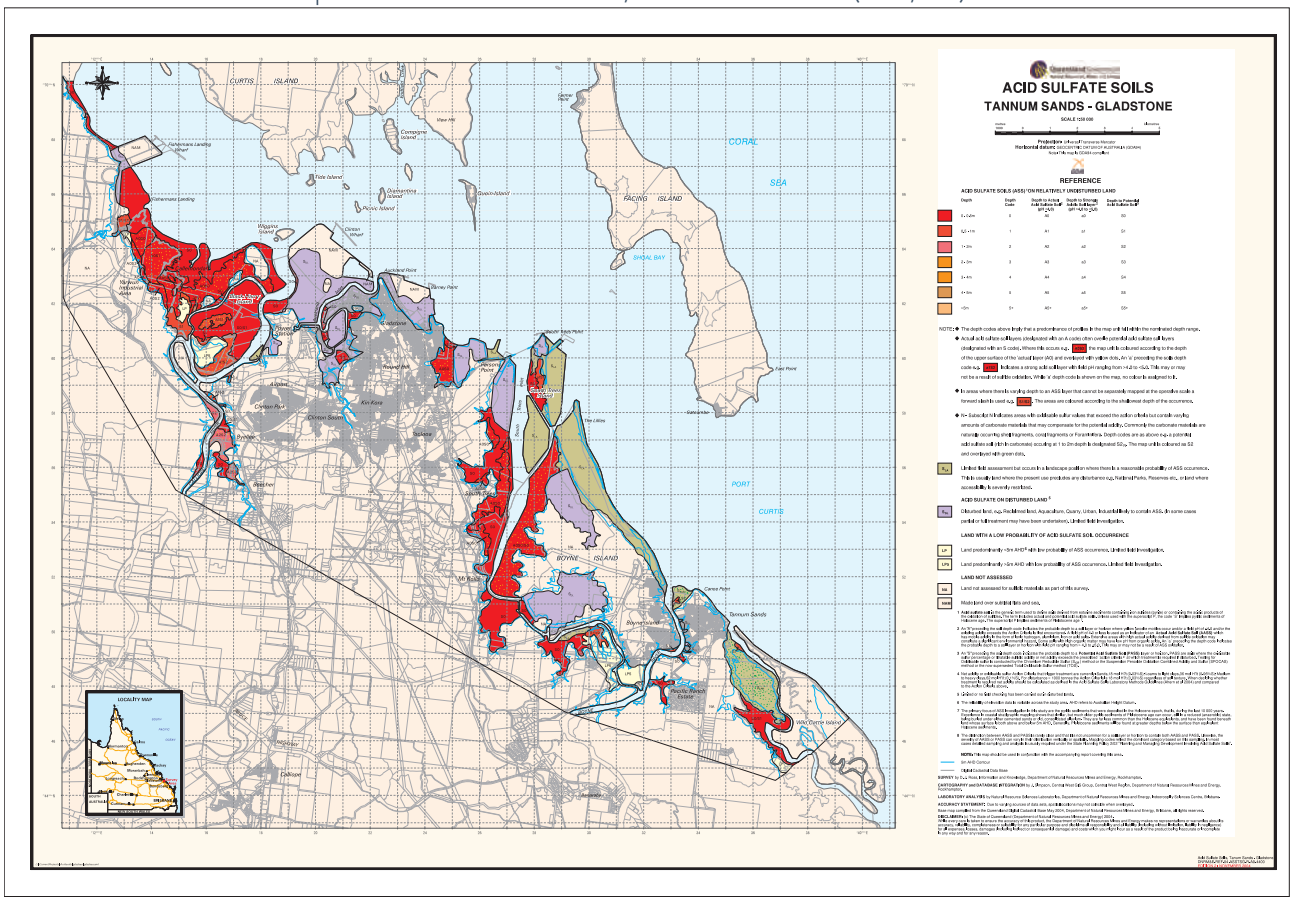
Soils

The major soils found in the site are red, structured gradational clay loams and uniform clays; shallow, bleached sandy and loamy surface and red duplex soils.

The site is included in the map of **Acid Sulfate Soils** in the Tannum Sands to Gladstone area of Central Queensland, published by the Department for Natural Resources, Mines and Energy (DNRME 2004), and presented in Figure 24 below.

The map, based on a survey of sulfidic materials for land with elevations below RL 5.0m AHD, identified actual acid sulfate soils on relatively undisturbed land on the north-east section of the site, at an actual depth of RL 2.0 m AHD, with potential acid sulfate soils below this layer, hence the depth code designation of AOS2 for this area. The remainder of the site, with an elevation above RL 5.0m AHD was not included. A later investigation of acid sulfate soils on the site was undertaken in 2006 by URS as part of the studies supporting the Environmental Impact Statement for the Gladstone Nickel project (Appendix F to the EIS).

FIGURE 24. ACID SULFATE SOILS | TANNUM SANDS TO GLADSTONE, CENTRAL QUEENSLAND (1:50,000)



Protected Areas

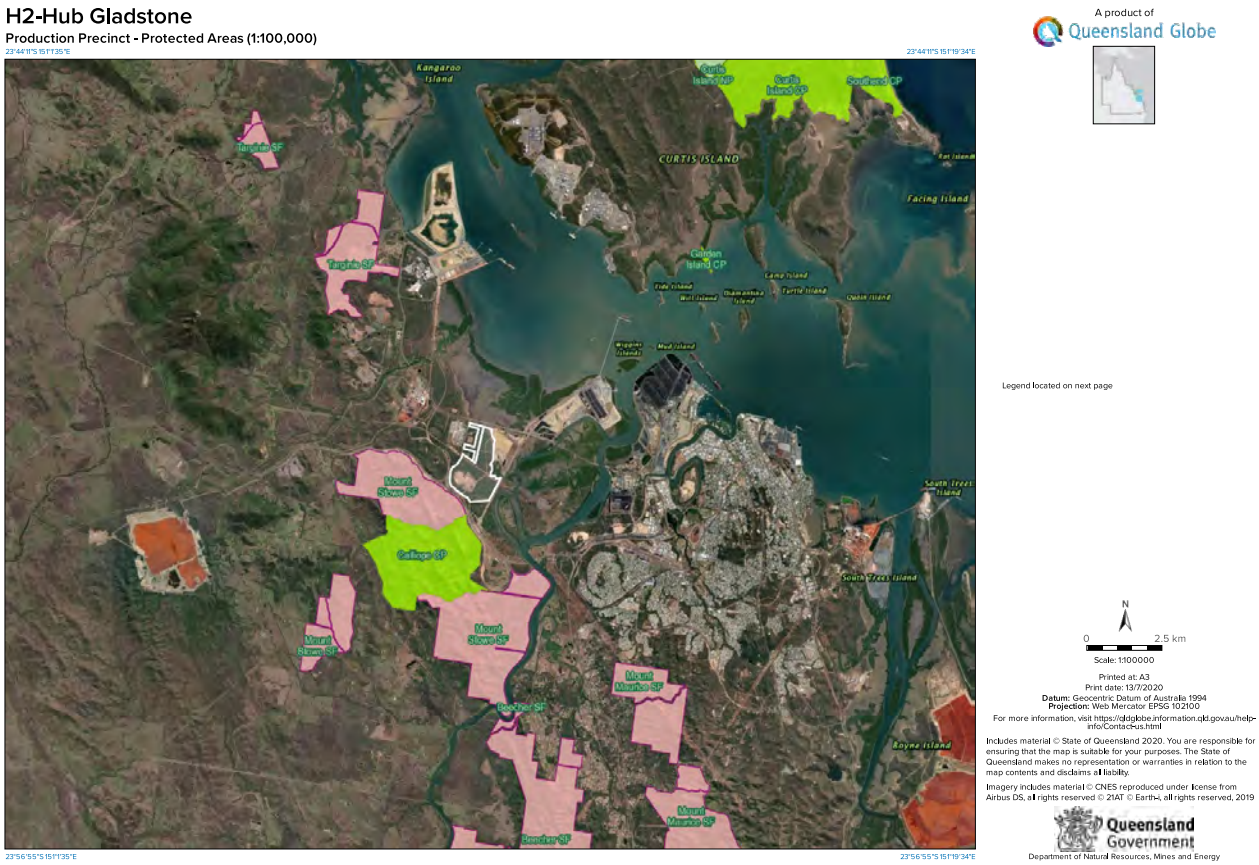
The map in Figure 25 in the following page illustrates the extent of protected areas in the region surrounding the proposed project site.

The two areas closest to the site are:

- Mount Stowe State Forest (SF), and
- Calliope Conservation Park (CP).

Both protected areas are located uphill from the site, across Reid Rd on the south boundary.

FIGURE 25. H2-HUB™ GLADSTONE | PRODUCTION PRECINCT, PROTECTED AREAS (1:100,000)



Water

The project site is located within the estuarine reaches of the Calliope River catchment, which discharges in Port Curtis Bay, which extends into the Great Barrier Reef World Heritage Area (GBRWHA).

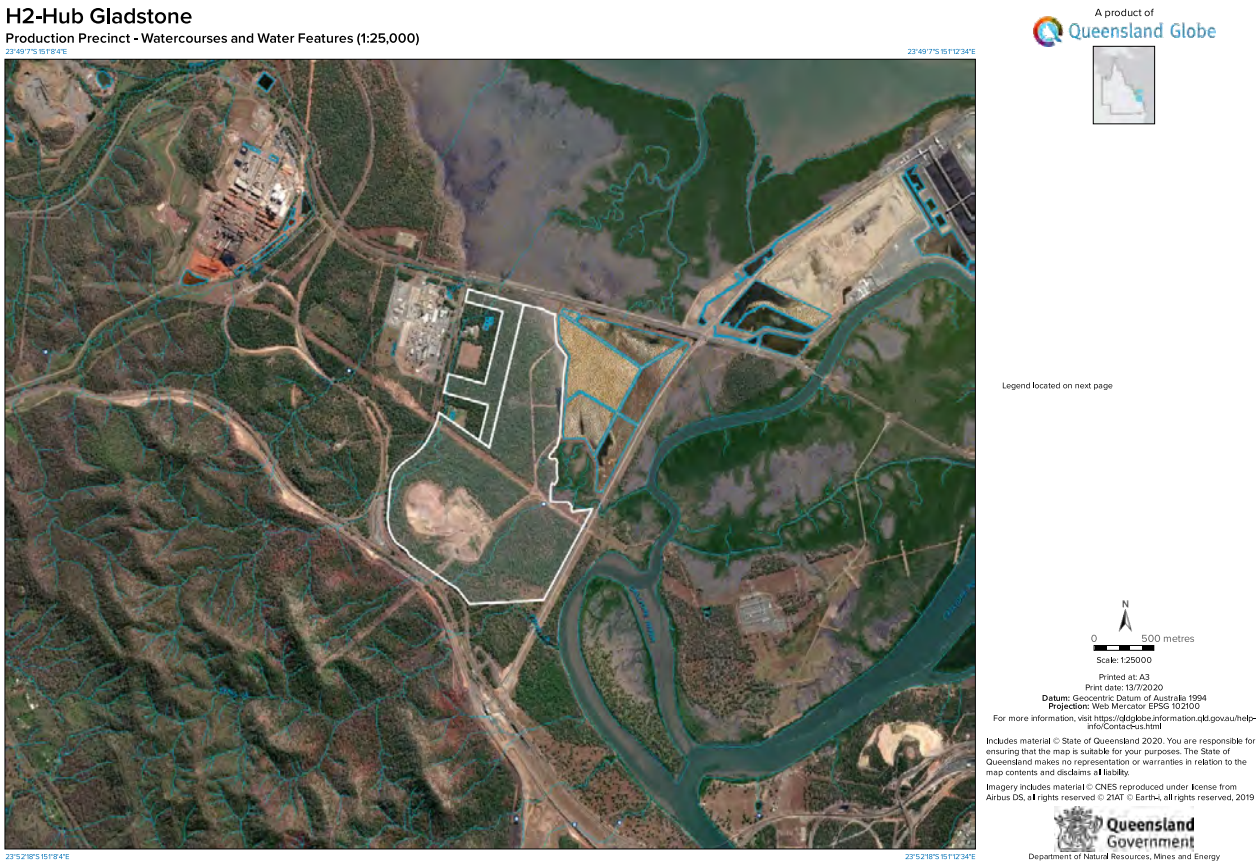
Watercourses and Water Features

A map of water courses and water features in the area surrounding the project site is presented in Figure 26 in the following page, including:

- Major watercourses: Calliope River, running to the south-east of the site
- Minor watercourses, include two larges open channels, as follows:
  - One running in a north direction along the western boundary of the site on Reid Rd, draining north under Hanson Rd, and
  - an ephemeral creek running in a north-east direction from the southern boundary of the site on Reid Rd, and ultimately draining east to the Calliope River.
- Settling Ponds: on the titles adjacent to the north-east section of the site managed for settlement of materials arising from port dredging operations.

Groundwater is expected to flow towards Calliope River in the east and north, with saltwater intrusion expected towards the river and the tidal flats located to the north.

FIGURE 26. H2-HUB™ GLADSTONE | PRODUCTION PRECINCT, WATERCOURSES AND WATER FEATURES (1:25,000)



Water Quality

Water conditions within the Calliope River catchment are influenced by a number of anthropogenic activities. Current water quality conditions within the Calliope River catchment are influenced by a number of anthropogenic activities including grazing, agriculture, industry and urban-based activities. The catchment is highly disturbed in some areas, particularly in the lower reaches where a number of industries exist and urbanisation has occurred. Given the land uses within the catchment and the associated level of disturbance, it is likely that the lower reaches of the river exhibit elevated levels of hydrocarbons, nutrients and sediments.

Gladstone is one of the most tested waterways in Australia, with long term monitoring program carried out by government and industry in the region. In 2011, the Queensland Government set up a program to investigate fish health in the Gladstone waterways, supported by a 12-months monitoring campaign.

The initial baseline report – *Port Curtis and Tributaries: Comparison of Current and Historical Water Quality*, was published by the Queensland Department of Environment and Resource Management in October 2011 (DERM 2011), followed by additional *updates* published reporting on the result of monitoring campaigns carried out on a monthly basis between September 2011 and September 2012. The *Eleventh Update* report, identified that upper reaches of the Calliope River, whilst within an acceptable range to support aquatic life, were some of the lowest dissolved Oxygen (DO) surveyed across all the sites in the monitoring program.

Air

The site is located within the Gladstone airshed. The region is a significant industrial centre with heavy industry moving to the area to take advantage of the port and transport infrastructure, energy supplies, close proximity to mineral resources and a skilled industrial workforce.

Sources and Emissions

Major industries include Queensland's largest coal-fired power station, two alumina refineries, three LNG export terminals, Australia's largest aluminium smelter and cement kiln, one of Queensland's major ports, a chemical manufacturing complex which is one of the largest producers of sodium cyanide in Australia, and various other engineering fabrication facilities.

Annual reporting data for key criteria pollutants, reported for 2018/19 under the National Pollutant Inventory[22] (NPI), are presented in

Table 10 in the following page, including for:

- Nitrogen Oxides (NO_x)
- Particulate Matter (including PM_{10} and $PM_{2.5}$)
- Sulfur Dioxide (SO)
- Total Volatile Organic Compounds (VOC_{TOTAL})

Air Quality

Air quality is a high public priority in an industrial city and Gladstone currently hosts real-time air monitoring stations managed by the Queensland Department of Environment and Science.

They record hourly emissions of carbon monoxide (CO), nitrogen oxides (NO_x), sulfur oxides (SOx), levels of ozone and particulate matter at multiple key locations including Gladstone.

The latest two reports Queensland air monitoring reports for 2017 and 2018 filled in accordance with its annual reporting requirements for under clause 18 of the National Environment Protection (Ambient Air Quality) Measure (AAQ NEPM), indicate that during those years Gladstone's air quality showed no exceedances of the AAQ NEPM standards for nitrogen dioxide, sulphur dioxide, carbon monoxide, ozone, or lead levels. There was some exceedance of the visibility-reducing particles, PM10 and PM2.5, mostly due to windblown dust and smoke from multiple bushfires burning in Central Queensland. Over the 12-month period ending December 2019, the EPP (Air) annual average PM10 standard was exceeded at the Fisherman's Landing site. This was predominantly due to activities taking place within the industrial area where the Fisherman's Landing monitoring site is located, in particular dust generated by vehicle movements on unsealed roads. The EPP (Air) annual average PM2.5 objective was also exceeded at the Clinton, Boat Creek and Fisherman's Landing monitoring sites over the 12-month period ending December 2019. This was a result of PM2.5 emissions from local sources such as industry, motor vehicles and aircraft, coupled with occasional added emissions from regional PM2.5 events such as dust storms and bushfire smoke.

Prevailing winds in the Gladstone area, predominantly from easterly directions will generally carry emissions from the Yarwun precinct away from the population centre of Gladstone.

[22] http://npi.gov.au

TABLE 10. GLADSTONE REGIONAL | AIR EMISSIONS, KEY POLLUTANTS 2018/19 REPORTING YEAR[23]

Nitrogen Oxides NO_x	**Total:** 55,000 t	**Electricity Generation**	35,000 t (63.6%)
		Basic Non-Ferrous Metal Manufacturing	10,000 t (18.2%)
		Oil and Gas Extraction	7,100 t (12.9%)
		Cement, Lime, Plaster and Concrete Manufacturing	2,500 t (4.5%)
		Basic Chemical manufacturing	340 t (1.0%)
Particulate Matter, 10.0 µm PM_{10}	**Total:** 4,300 t	**Basic Non-Ferrous Metal Manufacturing**	3,000 t (69.8%)
		Other Non-metallic Mineral Mining and Quarrying	330 t (7.7%)
		Oil and Gas Extraction	300 t (7.0%)
		Construction Material Mining	270 t (6.3%)
		Electricity Generation	190 t (4.4%)
Particulate Matter, 2.5 µm $PM_{2.5}$	**Total:** 600 t	**Basic Non-Ferrous Metal Manufacturing**	380 t (63.3%)
		Oil and Gas Extraction	130 t (21.7%)
		Electricity Generation	71 t (11.8%)
		Cement, Lime, Plaster and Concrete Manufacturing	11 t (1.8%)
		Construction Material Mining	4.2 t (0.7%)
Sulfur Dioxide SO_2	**Total:** 48,000 t	**Electricity Generation**	29,000 t (60.4%)
		Basic Non-Ferrous Metal Manufacturing	19,000 t (39.6%)
		Petroleum and Coal Product Manufacturing	110 t (0.2%)
		Oil and Gas Extraction	81 t (0.2%)
		Water Transport Support Services	4.1 t (0.0%)
Total Volatile Organic Compounds VOC_{TOTAL}	**Total:** 600 t	**Basic Non-Ferrous Metal Manufacturing**	270 t (45.0%)
		Electricity Generation	110 t (18.3%)
		Oil and Gas Extraction	100 t (16.7%)
		Mineral, Metal and Chemical Wholesaling	86 t (14.3%)
		Construction Material Mining	11 t (1.8%)

[23] SOURCE: National Pollutant Inventory, http://npi.gov.au

Ecosystems

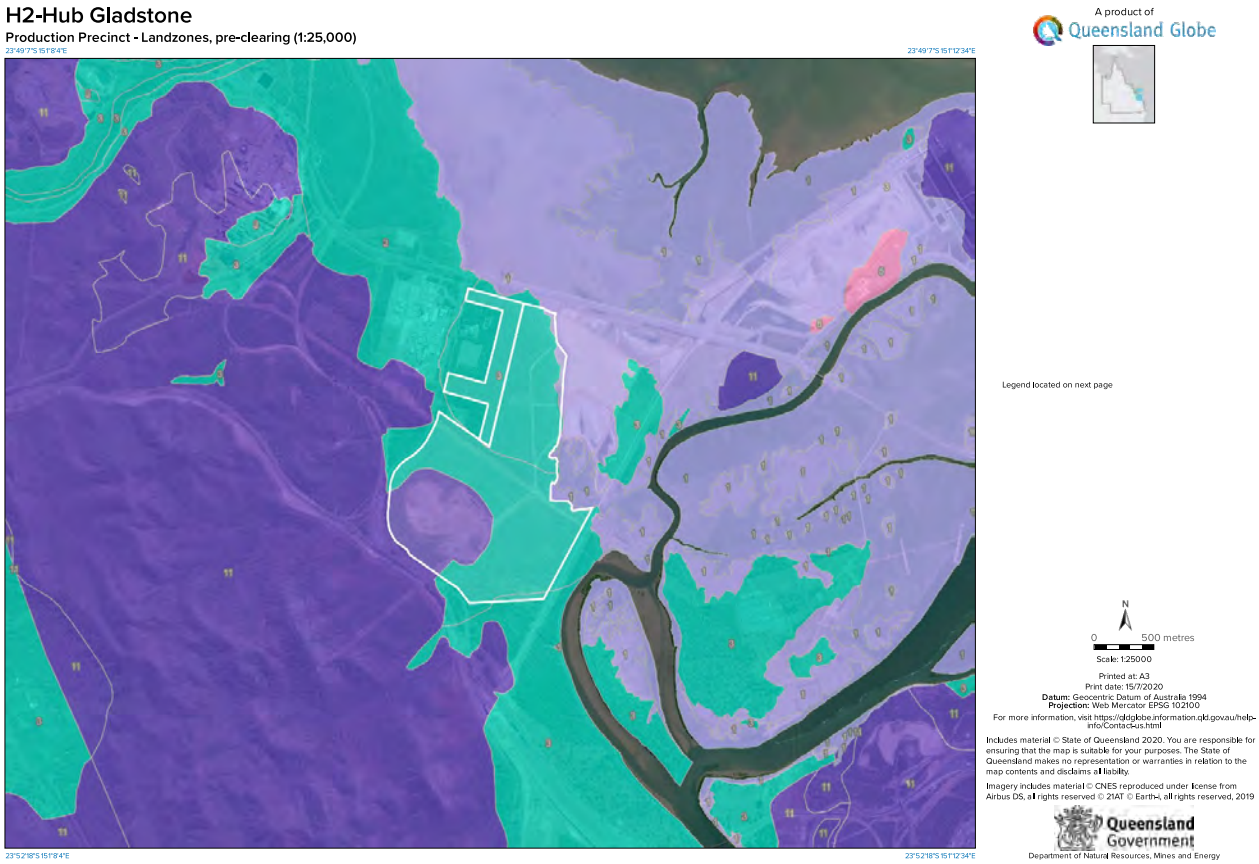
The project site is located within the South-East Queensland region, and Burnett-Curtis Hills subregion of the Interim Biogeographic Regionalisation for Australia (IBRA).

Landzones

The map presented in Figure 27 below illustrates the extent of the landzones (pre-clearing) for the project site, mapped against the Queensland Regional Ecosystem (RE) framework, and as described in the *Land Zones of Queensland* report, published by the Queensland Department of Science, Information, Technology, Innovation and the Arts {Wilson:2012vr}. These include:

- **Land Zone 1. Quaternary marine deposits,** subject to periodic tidal inundation covering limited areas of Lot 2 on SP 293584, along the north-eastern boundary of the site near the WICET reclamation area;
- **Land Zone 3. Recent quaternary alluvial systems**, including Cainozoic alluvial plains and piedmont fans covering the full extent of existing Lot 11 on SP 239343 and the majority of Lot 2 on SP 293584; and
- **Land Zone 11. Metamorphic rocks**, including Mesozoic/Proterozoic metamorphosed sediments and interbedded volcanics, covering the disturbed area on the south-western section of Lot 2 on SP 293584, including the WICET 'borrow-pit'.

FIGURE 27. H2-HUB™ GLADSTONE | PRODUCTION PRECINCT, LANDZONES, PRE-CLEARING (1:25,000)



Vegetation

The map presented in Figure 28 below illustrates the extent of the remnant (as of 2017) broad vegetation groups for the project site, mapped at 1:1million (BVG1M) against Queensland Regional Ecosystem (RE) mapping framework, and as described in *The Vegetation of Queensland* Version 4.0, published by the Queensland Department of Environment and Science {Neldner:2019wp}.

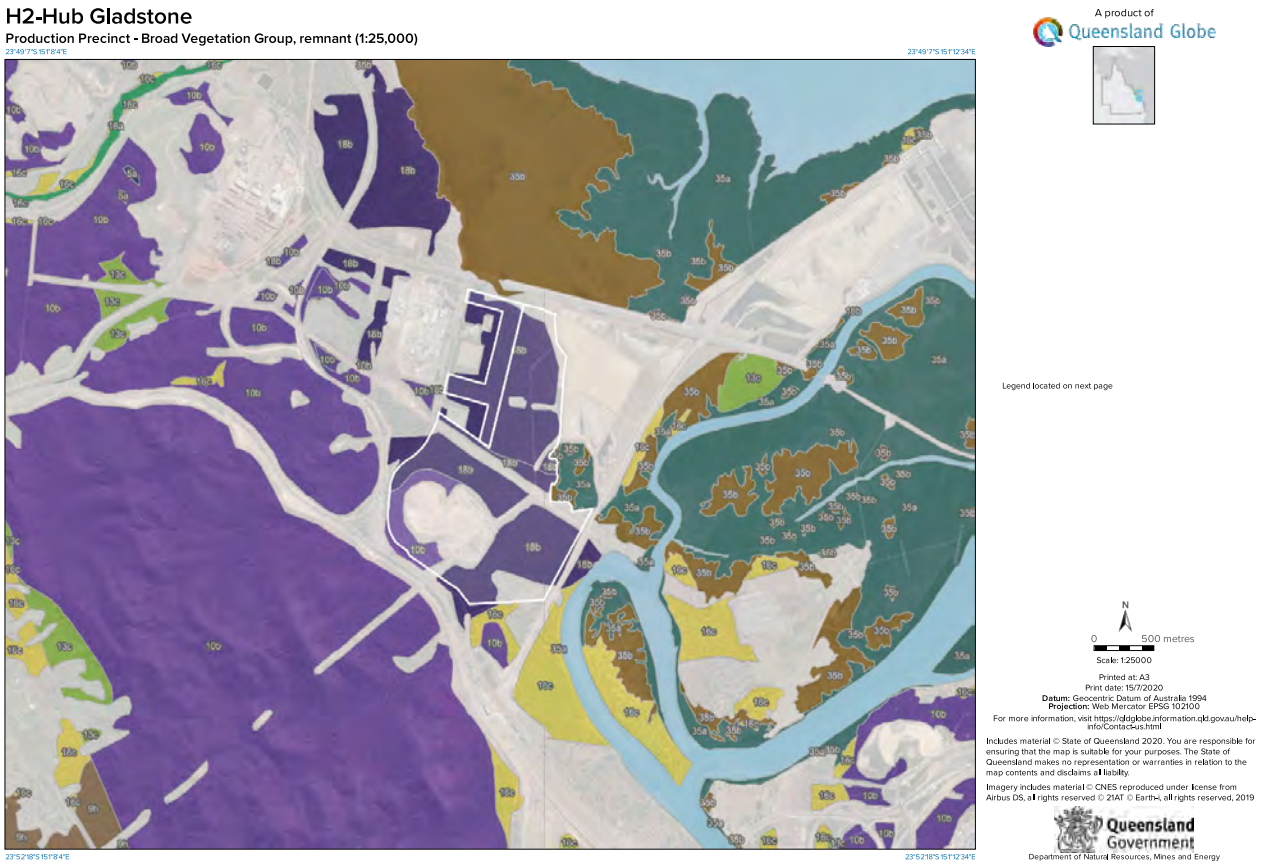
The **Dominant Vegetation Groups** occurring over the site are:

- **BVG1M:10b Moist open forests to woodlands dominated by Corymbia citriodora (spotted gum),** covering a limited area in the south-western section of Lot 2 on SP 293584, west of the WICET 'borrow-pit' and north of Mt Miller Rd; and
- **BVG1M:18b Woodlands dominated Eucalyptus crebra (narrow-leaved red ironbark),** frequently with *Corymbia* spp. or *Callitris* spp. on flat to undulating plains, covering the majority of the remnant vegetation on the site.

Non-dominant Vegetation Groups occurring within the project site include BVG1M:16c, and BVG1M:21a, these are not shown on the map.

The map illustrates furthermore the extent of **Non-remnant vegetation areas** (as of 2017) covering significant sections of Lot 2 on SP 293584, including the WICET 'borrow-pit; transmission infrastructure easements; and internal roads.

FIGURE 28. H2-HUB™ GLADSTONE | PRODUCTION PRECINCT, BROAD VEGETATION GROUPS, REMNANT (1:25,000)



Drainage and Flooding

The channel draining north enters the site to the southwest from an existing culvert under Mount Miller Rd and the North Coast Rail Line and continues north adjacent to the western boundary of the Site along Reid Rd for minor storms before draining west adjacent to Hanson Rd to a bank of existing culverts that drain to Port Curtis. During major storm events flood waters appear to be detained temporarily along Hanson Road and the bund walls adjacent to the site boundary, likely due to tailwater conditions in Port Curtis or local inlet conditions at the existing culverts. In major storm events some of the flow appears to also discharge to the east across the site towards Calliope Creek. A portion of the channel to the north of the project site is nominated as a *moderate risk waterway* by the Department of Fisheries Queensland, reflecting a moderate risk of affecting fish movement from waterway barrier works. Desktop assessment carried out by AECOM for Economic Development Queensland suggests a very low likelihood of this channel providing suitable fish habitat, mainly due to the downstream channel conditions and dry channel bed (AECOM 2016). The channel towards the southern end of the Site is difficult to define from Lidar and course survey grid data. The receiving catchment for the channel towards the southern end of the site predominantly extends to the southwest of the site. The channel enters the site towards the south and drains northeast to the Calliope River.

Basin level Flood Modelling for a flood with a 1% Annual Exceedance Probability (AEP) is presented in Figure 29 in the following page. The AECOM Report indicates that for this 1-in-100 years design event, approximately 35-45% of the site is at risk of flooding, however for most of the flooded area the water depth will be less than 15 cm (AECOM 2016).

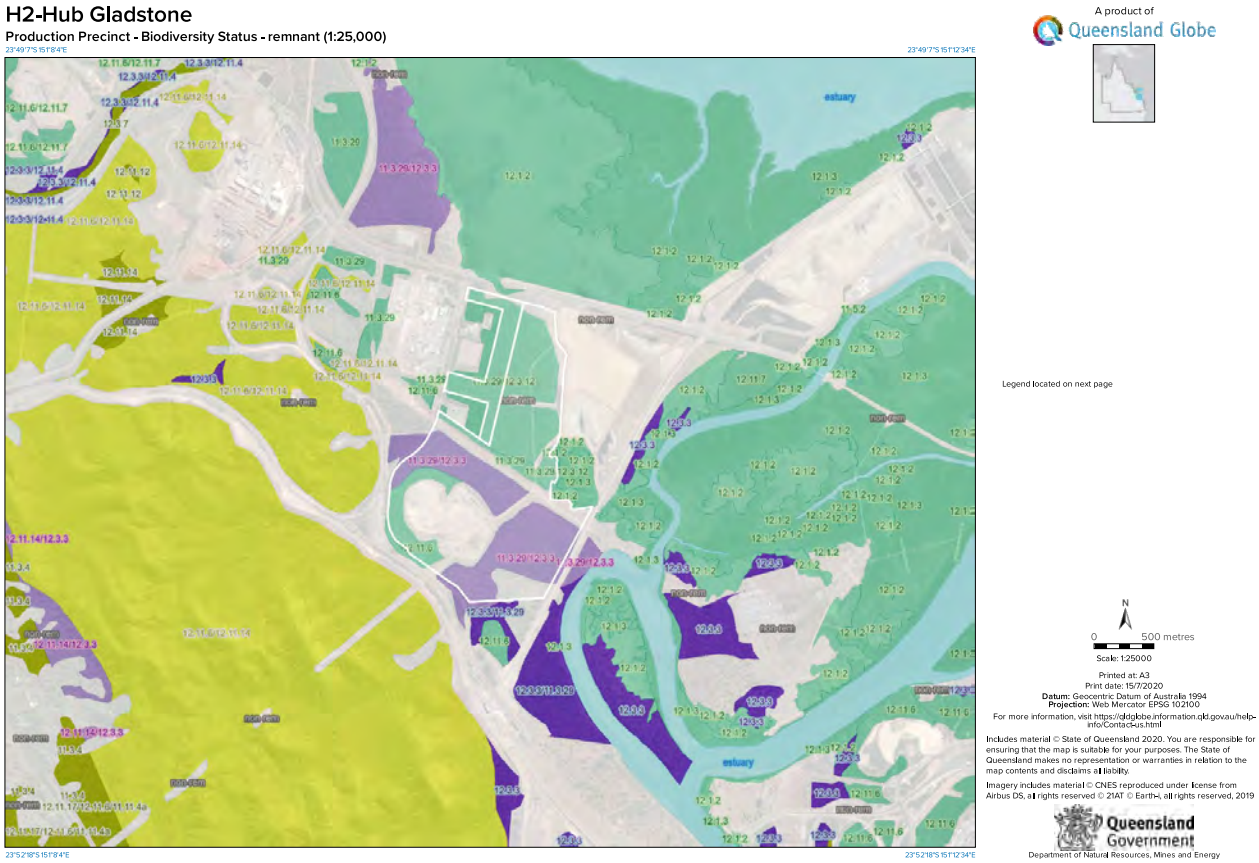
FIGURE 29. H2-HUB™ GLADSTONE | PRODUCTION PRECINCT, BASIN LEVEL FLOOD MODELLING (1:25,000)

Regional Ecosystems and Bio-diversity Status

The map presented in Figure 30 below illustrates the biodiversity status for the ecosystems found in the remnant areas of the project site. These include:

- **RE 11.3.29 (BVG1M:18b, Bio-diversity Status: no concern at present),** *Eucalyptus crebra*, *E. exserta*, *Corymbia dallachiana*, *C. intermedia* woodland usually with a low tree understorey of *Melaleuca viridiflora* and *M. nervosa*. Occurs on broad plains and fans formed from Quaternary alluvium. Usually associated with bleached sodic duplex soils.
- **RE 12.11.6 (BVG1M:10b, Bio-diversity Status: no concern at present),** open forest to woodland of *Corymbia citriodora* subsp. variegata generally with *Eucalyptus crebra*. Understorey grassy or shrubby. Occurs on Palaeozoic and older moderately to strongly deformed and metamorphosed sediments and interbedded volcanics;
- **RE 12.3.3 (BVG1M:16c, Bio-diversity Status: endangered),** *Eucalyptus tereticornis* woodland. *Eucalyptus crebra* and *E. moluccana* are sometimes present and may be relatively abundant in places, especially on edges of plains and higher level alluvium. Occurs on Quaternary alluvial plains, terraces and fans where rainfall is usually less than 1000mm/y.
- **RE 12.3.12 (BVG1M:21a, Bio-diversity Status: no concern at present),** *Melaleuca viridiflora* var. viridiflora, *Eucalyptus latisinensis* or *E. exserta* +/- *Melaleuca quinquenervia*, *Corymbia intermedia*, *E. tereticornis* woodland. Occurs on drainage lines along coastal lowlands.

FIGURE 30. H2-HUB™ GLADSTONE | PRODUCTION PRECINCT, BIO-DIVERSITY STATUS, REMNANT (1:25,000)



Flora and Fauna

The current vegetation is mostly remnant vegetation with some cleared areas. 100-m Wide cleared power transmission line easements cut through the property. All the existing vegetation on the site have been disturbed or modified to some degree by cattle grazing, thinning clearing or weed invasion.

A Protected Matters Search Tool (PMST) was conducted on the Project site with a 1 km buffer to determine whether matters protected by the EPBC Act are likely to occur in the study area. The PMST report identified 1 World Heritage Property and 1 National Heritage Place, 5 threatened ecological communities, 52 threatened species and 55 migratory species as having potential to occur in the study area.

Field surveys undertaken in 2006 on behalf of Gladstone Nickel Project (GNPL) for the area of the project site plus additional areas required for their project were detailed in their EIS. These studies identified a moderate floral diversity of 209 taxa 158 genera and 52 families, none of which were listed as threatened species under either the Qld Nature Conservation (wildlife) Regulations 1994 (QNC) or the EPBC Act and none of the flora species identified in the surveys have significance from a commercial or recreational perspective. Some of the species identified were those on the lower lying areas were outside H2-Hub™ Gladstone site. The survey also identified 46 exotic species (two of which rubber vine and lantana are listed as Weeds of National Significance).

No threatened flora species were detected during the vegetation field surveys conducted by GNPL as part of the Environmental Impact Statement developed for the project.

The south of the site is mixed open Eucalypt forest dominated by *Eucalyptus tereticornis* and *Lophostemon suaveolens* with an understory community varying from shrubby Melaleuca nervosa to open and grassy. The South West of the Site is bounded by the Mt Stowe State Forrest and Calliope Conservation Reserve with smaller areas of Eucalyptus crebra.

The GNPL fauna survey of recorded 93 native and 5 introduced vertebrate species. 3 amphibian, 12 reptile, 61 bird and 17 mammal species. The echidna (Tachyglossus aculeatus) was listed as Special Cultural Significance under the QNC Act. Specific surveys were conducted to target Koala species. but none were recorded.

The following species were identified at sample locations or habitats included in the H2U Project site as part of the field investigations undertaken for the Gladstone Nickel Refinery EIS:

- *Ninox strenua* (Powerful Owl) – vulnerable QNC Act – noted as foraging in the area in the EIS
- *Petauriodes volans* (Greater Glider) – vulnerable EPBC Act - noted as foraging in the area in the EIS.

H2-Hub™ Gladstone is located on only a part of the land area proposed for the Gladstone Nickel Refinery and the EIS field survey area, it is unknown at this stage if the Project will have a direct impact on these species.

The clearing of some of the site for the proposal may have an indirect impact on the species through the removal of potential habitat or foraging area. Field surveys will be conducted as part of the EIS will further assess the potential for impact on these species and any other EPBC or QNC listed species found on the site.

It should be noted that Charadrius mongolus (Lesser Sand Plover) – endangered EPBC Act – noted as uncommon in the EIS was recorded at sample site 1 on the salt marsh and marine clay plains, an area and habitat not included in, although adjacent to, the H2U site.

No other critically endangered, endangered or vulnerable species are expected to occur in the study area. Exotic species identified in the Gladstone Nickle EIS field studies include fox, feral cat, dingo/dog, rabbit, rodents, water rats and cane toad.

5.2 Social and economic environment

Gladstone is an industrial town with an economy dominated by industrial manufacturing, resources (mining and energy) and primary production.

The Australian Bureau of Statistics (ABS) estimated resident population (ERP) of Gladstone Regional Council area was 63,412 as of the 30th of June 2019. Unemployment in the Gladstone Regional Council Area has risen from 4% in 2014 to 8.3% in 2019 (ABS labour force surveys).

The 2016 census indicated 214% of the Gladstone workforce was classified as technicians or trades workers 12.9% as labourers, 13.6% professionals, 12.4% machine operators and drivers. This workforce demographic reflects the skills needs of H2-Hub™ Gladstone in operation and will meet much of the skills required for construction.

Considering the initial life of the proposed Project of approximately 50 years[24] and given that the Project is anticipated to require the employment of a significant number of workers who would reside and work in the region, it is anticipated that the project will provide long term employment, social stability and economic growth to the region.

Gladstone is the major service town for the proposed Project and with a residential population of over 60,000 people it is well serviced with transport (Road, Rail and Ports – air and sea); retail; education and training; health and recreation and first responder essential services including a 24-hour emergency hospital, mental health services, primary care medical centres, dental and a range of allied health services. The Town has a range of public and private schools catering for over 9,000 pupils from years K-12, along with a Central Queensland TAFE and University campus. The town hosts a number of recreational facilities including swimming pools, sports fields, golf courses, fitness centres and caters for a full range of sporting clubs from football codes, aquatic sports to motorsports.

Gladstone is an industrial town with an economy dominated by industrial manufacturing, resources (mining and energy) and primary production. Manufacturing is the largest employer in the City of Gladstone and the city provides the economic infrastructure, skills and predominant supply chains for major industrial manufacturing. The Port of Gladstone is Queensland's largest trading port based on trade throughput. The expansion of the Fisherman's Landing wharf area is intended to support increase port activity.

Over $40 b of manufacturing Investment occurred in Gladstone from 2000-2016, The rise in unemployment and house price declines since 2016 indicates an economy that would benefit from further investment and employment creation. These indicators are likely to decline further due to COVID 19 pandemic.

[24] Considering plant life of 35 years for individual process trains, and the staged development of the project with the initial four (4) process trains for the Activation Atage targeting commissioning in 2025, and the additional four (4) process trains for the Expansion Stage targeting commissioning between 2028 and 2030.

The socio-economic benefits of the Project at the Local, State and National levels are significant with substantial economic opportunities though export income and an investment of up to $3.4 billion, creating employment and supply opportunities for local workforce and businesses.

Accommodation and housing

The current unemployment figures indicate there is local employment capacity and it is expected the workforce will be accommodated in the local area. Additional construction skills will migrate to the area if required. A recent search of rental listings in Gladstone city identified over 240 properties for rent. The property values in Gladstone have dropped nearly 50% for units and 35% for houses since 2016, indicating a reasonable supply of existing housing in the region for both sale and rental.

Cultural heritage (indigenous and non-indigenous)

A search of the World Heritage List (WHL), National Heritage List (NHL), Commonwealth Heritage List (CHL) and non-statutory Register of the National Estate (RNE) indicates that there are no registered sites within the project area.

There is one Commonwealth Heritage Place within 2 km of the project area being The Great Barrier Reef World Heritage Area. While direct impacts to matters of national environmental significance (MNES) are unlikely, indirect impacts to the nearby World and National heritage listed Great Barrier Reef cannot be excluded based on current information.

There are no known historical cultural heritage places in the Project area, and little to no potential for additional items of European cultural heritage values to be present on the site. A Cultural Heritage Investigation as part of the EIS, will be undertaken to confirm these findings.

There are no known Indigenous Heritage places on the Project site. The cultural heritage assessment undertaken for the Gladstone Pacific Nickel Project did not identify any listed places under the Queensland Indigenous Cultural Heritage Database within the project site. It did however identify a range of places in the surrounding study area, including one located approximately 420m to the north-west of the project site (stone artefact scatter/possible hearth).

Noise

Major industry in the immediate area, including Rio Tinto Alumina Refinery, Orica, Cement Australia Fisherman's Landing Plant and other local industries all contribute to the local noise emissions. Hanson Road is a highly utilised road, with high volumes of industrial traffic, with particularly high volumes during industry shift changes. No sensitive receptors have been identified in the immediate area.

5.3 Built environment

The existing built environment of the Gladstone SDA comprises chemical manufacturing, minerals processing, three LNG liquefaction and export hubs, a coal fired power station, a waste oil refinery, a cement works and coal export terminals. These are all industrial scale intensive industries. The nearest residential properties are located 3.8 km to the south west and 5 km to the south east.

Adjoining the property, the Gladstone Area Water Board (GAWB) operates a separate treatment plant for potable water, and the Gladstone Regional Council operates a sewerage treatment plant.

Road and Rail infrastructure include the North Coast Rail line running immediately across from the south east boundary of the site. The site being bounded Hansson Road two lane dual carriageway state-controlled

highway and by Reid Road, and Mt Miller Road, both sealed roads under the control of the local government.

Two 275 kV powerlines dissect the proposed Project site coming from the 1.6 GW Gladstone Power Station, 4 km west of the site.

5.4 Traffic and Transport

The project site is bounded by Hanson Road to the north, Reid Road to the west and the North Coast Railway to the south. A highway turnoff and overtaking facility exists to provide access from Hanson Road to Reid Road.

The development will generate an increase in traffic to and from the site, during both construction and operational phases of the project. Hanson Road a dedicated main road controlled by the Department of Transport and Main Roads, would therefore be more heavily trafficked than at present. The impact of this on the road has not yet been determined. A traffic study will be undertaken as part of the EIS process.

Queensland Rail currently provides access to the Gladstone SDA via the main North Coast Rail with branch lines to both Fisherman's Landing and East End.

Existing industry near and within the Gladstone SDA is serviced by the Gladstone Ports Corporation's facility at Fisherman's Landing.

5.5 Land use and tenures

As previously described in section 4 and 5.1, the production facility is to be located on a new title to be issued subject to survey located Lot 11 on SP 239343 and Part Lot 2 on SP 293584. The entire project is located within the Gladstone SDA, 27,194 Ha of land dedicated for large and difficult to locate industrial and related developments. The Gladstone SDA is strategically located adjacent to the Port of Gladstone with connections to the major regional and national highways and railways.

The proposed project will implement an industrial development on land currently unused within an area zoned for industrial use. As the site for H2-Hub™ Gladstone is contained within the Gladstone SDA, there is expected to be minimal impact.

Key local and regional land uses and tenures

As described previously the project is proposed to lie entirely within the Gladstone SDA that has been specifically set aside by the Queensland Government for such industrial developments.

A number of significant industrial developments lie in close proximity to the proposed Project including chemical manufacturing, minerals processing, three LNG export hubs, a coal fired power station, a waste oil refinery, a cement works and coal export terminals.

Native title

Searches of the National Native Title Tribunal indicates there are no past or current native title claims over the Project Site which is held freehold. Advice obtained during the Sale of Land negotiations confirmed that Native Title has been wholly extinguished on both Lot 11 and Lot 2.

It is noted, however, that the Bailai (Byellee, Byelee), Gurang, Gooreng, Taribelang Bunda People (now represented by the Port Curtis Coral Coast Native Title Claimants (PCCCNTC) have been granted native

title over several parcels Crown Land in the Gladstone region, as a part of their successful 2001 claim (QCD2017/010).

H2U is committed to developing a long term relationship with the PCCCNTC people in identifying and managing any cultural heritage issues. H2U proposes to engage, and undertake a desktop assessment along with field assessments and develop a Cultural Heritage Management Plan (CHMP) with the PCCCNTC and traditional owners. An existing CHMP between the PCCCNTCs and the Minister of Economic Development covers the site and a wider area of the Gladstone SDA. It is envisaged a CHMP similar to that one would be developed between H2U and the PCCCNTCs. Although unlikely, should any previously unknown cultural heritage material be uncovered during construction H2U is committed to protecting the cultural heritage and the sensitive handling of any accidental discoveries on the site and implement mitigation measures as defined in the CHMP

5.6 Planning instruments, government policies

Commonwealth Government Policies

A number of Federal government policies and strategies may apply directly or indirectly to the proposed Project and will be reviewed in the EIS and development stages, these include:

National Hydrogen Strategy

The Council of Australian Governments (CoAG) Energy Council, National Hydrogen Strategy released in 20019 sets a vision for a clean, innovative, safe and competitive hydrogen industry that benefits all Australians. It aims to position our industry as a major player by 2030. The strategy outlines an adaptive approach that equips Australia to scale up quickly as the hydrogen market grows. It includes a set of nationally coordinated actions involving governments, industry and the community.

A key element of Australia's approach will be to create hydrogen hubs – clusters of large-scale demand. These may be at ports, in cities, or in regional or remote areas, and will provide the industry with its springboard to scale. Hubs will make the development of infrastructure more cost-effective, promote efficiencies from economies of scale, foster innovation, and promote synergies from sector coupling. These will be complemented and enhanced by other early steps to use hydrogen in transport, industry and gas distribution networks, and integrate hydrogen technologies into our electricity systems in a way that enhances reliability.

The proposed Project will be designed to deliver on the National Hydrogen Strategy.

Climate Change Policies

Australia is a signatory to United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement and the Doha Amendment to the Kyoto Protocol, reinforcing Australia's commitment to action on climate change. Australia has a suite of policies to reduce domestic emissions, support effective international efforts without compromising economic growth or driving up energy prices. The Government's climate change plan includes:

- Reducing emissions by 5 per cent below 2000 levels by 2020.
- Reducing emissions by 26 to 28 per cent below 2005 levels by 2030.
- Doubling Australia's renewable energy capacity to be achieved in 2020 which is driving innovation, creating jobs and providing a cleaner future
- Encouraging the uptake of renewables through the Renewable Energy Target to deliver over 23 per cent of Australia's electricity supply in 2020.

The proposed Project will support the Commonwealth Government s climate change policies and the aims of the Paris Agreement in reducing global emissions.

National Energy Productivity Plan

The National Energy Productivity Plan is a CoAG Energy Council agreed package of measures designed to improve Australia's energy productivity by 40% between 2015 and 2030. The COAG Energy Council recognised that improving energy productivity helps; businesses reduce their energy costs through innovation and modernising their infrastructure; and reduce Australia's greenhouse emissions. The proposed Project will be designed to support he National Energy Productivity Plan.

EPBC Act Environmental Offsets Policy

EPBC Act Environmental Offsets Policy, outlines the Australian Government's approach to the use of environmental offsets ('offsets') under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Offsets are measures that compensate for the residual impacts of an action on the environment, after avoidance and mitigation measures are taken.

Where appropriate, offsets are considered during the assessment phase of an environmental impact assessment under the EPBC Act. Offsets can help to achieve long-term environmental outcomes for matters protected under the EPBC Act, while providing flexibility for proponents seeking to undertake an action that will have residual impacts on those protected matters.

An EPBC referral has been submitted for the proposed action in conjunction with submission of this IAS.

Great Barrier Reef Intergovernmental Agreement

Great Barrier Reef Intergovernmental Agreement signed in 2015, reflects the shared vision for the future outlined in the Reef 2050 Plan and renews the Australian and Queensland governments' commitment to protecting the Great Barrier Reef World Heritage Area including its Outstanding Universal Value. The Agreement recognises that key pressures on the Reef—such as climate change impacts, catchment water quality and coastal development—cannot be effectively addressed by either government on their own.

The Reef 2050 Plan provides an overarching framework for protecting and managing the Great Barrier Reef until 2050 including from the impacts of climate change. The proposed Project will be designed to meet the objective of this agreement.

National Water Quality Management Strategy

The National Water Quality Management Strategy (NWQMS) aims to deliver a nationally consistent approach to water quality management and assist water resource managers to understand and protect (which could be maintain or improve) water quality so that it is 'fit for purpose'—that is, water that is suitable for the desired values and uses and the specific local conditions. The proposed Project will be designed to conform to this strategy.

Integrated System Plan (ISP)

The Australian Energy Market Operator (AEMO) Integrated System Plan (ISP) is a whole-of-system plan that provides an integrated roadmap for the efficient development of the National Electricity Market (NEM) over the next 20 years and beyond. Alongside with investment in transmission infrastructure, aimed at augmenting the transmission capacity available to deliver energy generated in the Renewable Energy Zones (REZs) to load centres, the ISP emphasizes the role of emerging technical and market innovations – including in consumer-owned distributed energy resources (DER), demand-response (DR), and virtual

power plants (VPPs) – in improving the dispatchability of intermittent renewable resources. The proposed Project will be designed to support the ISP.

National Clean Air Agreement

Australia's Environment Ministers established the National Clean Air Agreement, focuses on reducing air pollution and improving air quality through cooperation between industry and government while recognising the challenges facing Australia's air quality now and into the future. The agreement sets a framework to help governments identify and prioritise actions to address air quality issues that would benefit from national collaboration and that deliver health, environmental and economic outcomes for Australians. Given the minimal emissions from the proposed Project it should contribute to the aims of this agreement reducing mitigating the use of more polluting methods of production of ammonia.

Technology Investment Roadmap to Low Emissions

The Australian Government is developing a national Technology Investment Roadmap that will drive investment in low emissions technologies to strengthen our economy and support jobs and businesses. The initial draft Roadmap has been released for public submission and is intended to form the central policy for transition to low emissions. Whilst the Road Map is still in draft form the proposed Project should be designed to align to the Roadmap.

State Government Policies

It should be noted that a number of the Commonwealth Policies, Strategies and Plans noted above have bilateral agreement with the State Government in particular National Hydrogen Strategy, Great Barrier Reef Intergovernmental Agreement, Reef 2050 Plan, National Clean Air Agreement, and Priority Port of Gladstone Master Plan.

In addition, a number of State government policies and strategies may apply directly or indirectly to the proposed Project and will be reviewed in the EIS and development stages, these include:

Queensland Hydrogen Industry Strategy 2019–2024

Through the Queensland Hydrogen Industry Strategy released in May 2019 the Queensland Government has committed to developing a sustainable hydrogen industry. The Strategy recognises Queensland has a unique competitive advantage in the production of green hydrogen. With its close proximity to Asia, established infrastructure, manufacturing capabilities and renewable energy potential, Queensland is well-positioned to benefit from the global transition to a low-emission energy future.

The Strategy notes, the hydrogen industry holds significant potential for Queensland in employment, investment and overseas export. The Strategy identifies Gladstone, one of Queensland's industrial powerhouses, as a focus point for hydrogen development, providing existing industries, gas infrastructure, access to a deep-water export port and skilled local workers. Gladstone also has a strategically placed State Development Area, that through the powers of the Coordinator-General, gives the government the ability to facilitate large-scale industrial development.

The proposed Project brings this Strategy to life.

Gladstone State Development Area Development Scheme

State development areas (SDAs) are areas declared by regulation under the *State Development and Public Works Organisation Act 1971 (SDPWO Act)*. The Gladstone State Development Area (Gladstone SDA) was declared in 1993 prepared pursuant to sections 79 to 80 of the SDPWO Act.

Regulated by the Coordinator-General, the Gladstone SDA Scheme identifies, the strategic vision, overall objectives of the GSDA and the development intent for each precinct in the Gladstone SDA.

The proposed H2U Green hydrogen and Ammonia facility located within the Medium – High Impact and Port Related Industry Precinct of the Gladstone SDA. The preferred development intent for the Medium – High Impact and Port Related Industry Precinct being:

(a) This precinct is to accommodate medium and high impact industrial development such as mineral and resource refining and processing, chemical and industrial material manufacturing, metal product manufacturing and processing, engineering works, storage of dangerous goods that require large land parcels, are difficult to locate in conventional industrial estates outside the Gladstone SDA and require separation from sensitive receptors.
(b) Uses in this location have links to the port through the import or export of material and benefit from close proximity to port related infrastructure and services.
(c) Defined uses which are generally considered to meet the precinct intent include High Impact Industry, Medium Impact Industry, Special Industry and Warehouse.
(d) Linear infrastructure and other uses may also be supported where these require co-location with and do not compromise the uses generally considered to meet the precinct intent.
(e) Road access to the precinct will be via:
    i. existing intersection – Hanson Road/Reid Road
    ii. existing roundabout – Hanson Road/Rio Tinto Private Access and
    iii. Landing Road.

The proposed Project is consistent with the Gladstone SDA Scheme.

Powering Queensland Plan: an integrated energy strategy for the State

Released in June 2017, the **Powering Queensland Plan** sets out the Queensland Government's strategy to guide the state through the short-term and long-term challenges facing Australia's energy markets.

The plan addresses Queensland's current and future energy needs Australia's energy markets are facing significant challenges relating to electricity and gas prices, system security, gas availability, and energy and climate policy. These challenges are being driven by closure of ageing coal-fired generation and gas supply restrictions in southern states, a lack of investor confidence and an uncertain national policy.

The Powering Queensland Plan sets out the Government's strategy to guide the state through the short-term and long-term challenges occurring in the market. The plan aims to deliver stable energy prices, ensure long-term security of electricity supply, transition to a cleaner energy sector and create new investment and jobs. The proposed Project is consistent with the Powering Queensland Plan in supporting energy security and reliability and supporting deeper penetration of renewable energy into the States Power Network and deliver on the States commitment to 50% renewable energy by 2030.

The State Planning Policy SPP

The State Planning Policy expresses the Queensland Government's interests in, and policies for, a range of land use planning matters. It provides a policy framework for planning outcomes across Queensland by requiring that these state interests are delivered through local government planning schemes and regional plans.

The State Planning Policy identifies 17 State interests in Land Use Planning and development and categorises these into five themes relating to:

- Liveable communities and housing.
- Economic growth
- Environment and heritage.
- Safety and resilience to hazards.
- Infrastructure.

The State interests in the SPP likely to be relevant to this project.

- Housing supply and diversity
- Development and Construction
- Biodiversity
- Coastal Environment
- Cultural Heritage
- Water Quality
- Emissions and Hazardous activities
- Energy and water supply
- Infrastructure Integration
- Transport infrastructure.
- Strategic Ports

The Project is consistent with the State Planning Policy.

Central Queensland Regional Plan (CQRP)

The Central Queensland Regional Plan details a number of policies identifying the critical drivers of economic growth in the region. The CQDP covers the six local government areas of:

- Banana Shire Council
- Central Highlands Regional Council
- Gladstone Regional Council
- Livingstone Shire Council
- Rockhampton Regional Council
- Woorabinda Aboriginal Shire Council

The CQDP recognises the strong economic outlook for the key industry sectors and the key drivers for the plan are to:

- enable opportunities for economic growth to ensure our regions are resilient and prosperous
- protect areas of regionally significant agricultural production from incompatible resource activities while maximising opportunities for co-existence of resource and agricultural land uses
- safeguard the areas required for the growth of towns
- drive the region's economic diversity and opportunity
- identify infrastructure outcomes that will support economic growth
- facilitate tourism pursuits across the region
- avoid the introduction of additional, unnecessary regulation
- recognise and respect the role of local government to plan for their local area.

The proposed Project aligns with the CQRP.

Gladstone Ports Corporation Land Use Plan (GPCLUP)

All proposed development on port lands are subject to a development application process. The GPCLUP 2012 is one aspect of the legislative framework that is in place. All proposed developments on Port land will be assessed against the GPCLUP 2012 in accordance with the prescribed legislative process.

The LUP 2012 states the categories of development applicable for all development within Strategic Port Land of Gladstone Port. Development includes, but is not limited to, the establishment of a new use, construction of new buildings, increasing the extent of area used e.g. hardstand areas, changing the intensity or scale of an existing development by 10% or greater, and/or permitting any activity that results in an increase in traffic volume.

This land use plan has taken into consideration relevant State planning policies.

The provisions of the LUP 2012 operate in conjunction with the Queensland Coastal Plan, which is a statutory instrument under the Coastal Protection and Management Act 1995, and has the effect of a State Planning Policy under the SPA 2009, also has the effect of a State Planning Policy under the SPA 2009 and identifies areas within the Curtis Coast where specific management actions are required.

The proposed Project will be deigned to align with the GPCLUP.

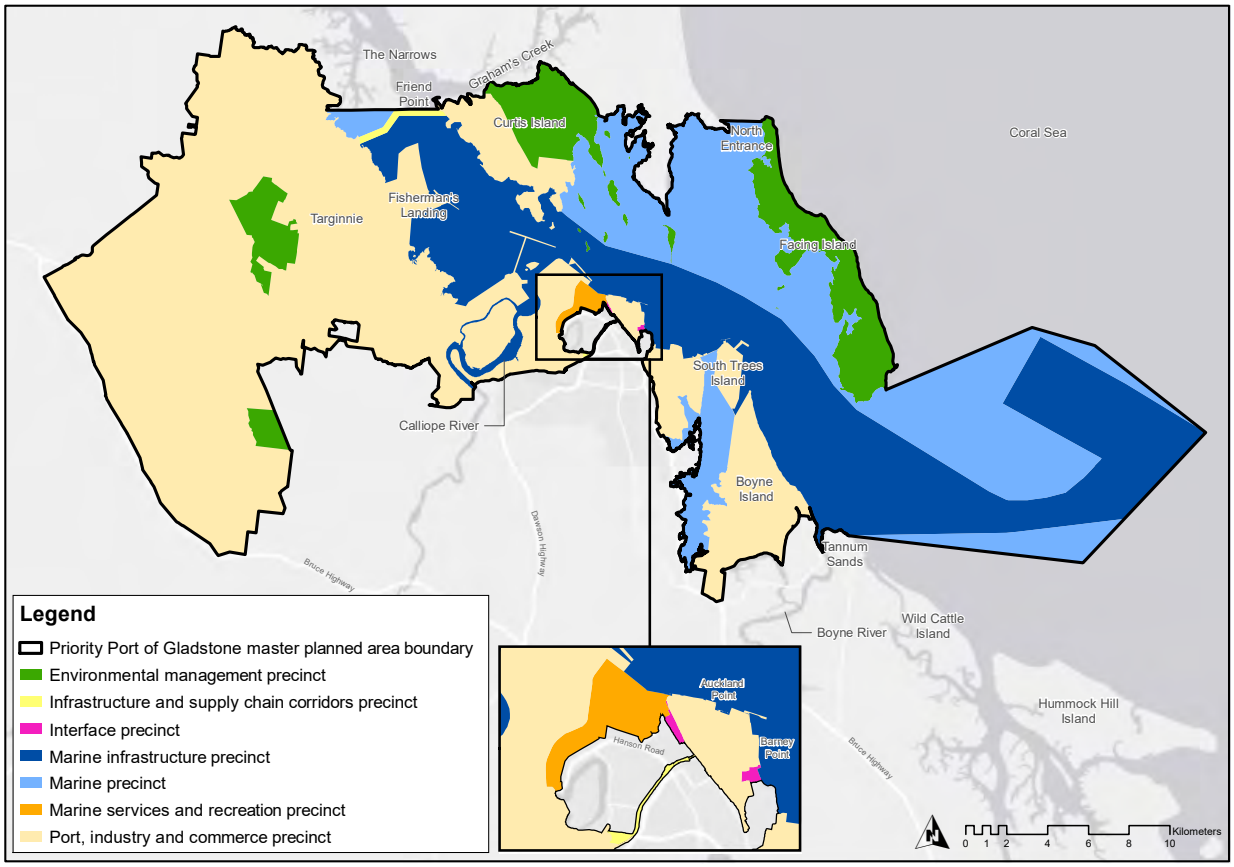
Priority Port of Gladstone Master Plan

The priority Port of Gladstone master plan includes a master planned area which encompasses a total area of about 73,000 hectares. The master planned area includes land and marine areas considered important for the efficient development and operation of the port. The inclusion of land and marine areas supports the management of potential impacts on the Outstanding Universal Value (OUV) of the Great Barrier Reef World Heritage Area (GBRWHA) and other environmental values that may occur as a result of port development and operations.

The master planned area, presented in Figure 31 below includes strategic port land under the *Transport Infrastructure Act 1994* controlled by Gladstone Ports Corporation and:

- 27,000 hectares of the Gladstone State Development Area
- 7000 hectares of land within the Gladstone Regional Council area
- Marine areas within port limits but outside State and Commonwealth marine parks.

FIGURE 31. PRIORITY PORT OF GLADSTONE MAP



Local Government Policies

Gladstone Regional Council Planning Scheme (GRCPS)

The proposed Project is wholly located within the Gladstone State Development Area (Gladstone SDA). Development that is not regulated by the Gladstone SDA development scheme may be regulated by other legislation and planning instruments, including the *Planning Act 2016* and the Gladstone Regional Council planning scheme (GRCPS). The GRCPS has been prepared in accordance with the Sustainable Planning Act 2009 (the SP Act) as a framework for managing development in a way that advances the purpose of the SP Act. The planning scheme sets out Gladstone Regional Council's intention for the future development in the planning scheme area to 2031.

Biodiversity Conservation Strategic Plan 2016 – 2025 (BCSP)

Gladstone Regional Council's Biodiversity Conservation Strategic Plan 2016 – 2025 may impact on the proposed Project, The Plan seeks to address potential risks to biodiversity with through increases in:

- demands on land, water and energy resources,
- land habitat loss and fragmentation
- air and water pollution,
- invasive weed species and introduced plant pathogens,
- traffic and anthropogenic disturbance
- introduced predators
- climate change impacts

The proposed Project will seek to align with the BCSP.

Local Government Infrastructure Plan (LGIP)

Whilst the proposed Project is wholly located within the Gladstone State Development Area (Gladstone SDA), the Local Government Infrastructure Plan (LGIP) adopted by Gladstone Regional Council in 2018 may have bearing on the development. The LGIP has been prepared in accordance with the requirements of the Sustainable Planning Act 2009 (repealed) and current Planning Act 2016.

The LGIP applies to the area covered by the Gladstone Regional Council Planning Scheme, with the intended purpose to:

- Integrate infrastructure planning with the land use planning identified in the Planning Scheme.
- Provide transparency regarding a local government's intentions for the provision of trunk infrastructure.
- Enable a local government to estimate the cost of infrastructure provision to assist its long term financial planning.
- Ensure that trunk infrastructure is planned and provided in an efficient and orderly manner.
- Provide a basis for the imposition of conditions about infrastructure on development approvals.

The proposed Project will seek to align with the LGIP.

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6 POTENTIAL PROJECT IMPACTS

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Section 6. **Potential Project Impacts**

The waters of Port Curtis and the Great Barrier Reef are approximately 2 km North East of the project site and the south eastern portion of the site is approximately 200 m from the Calliope River which is contained within the Great Barrier Reef World Heritage Area. The Great Barrier Reef is listed as a National Heritage Place and World Heritage Area. The EPBC Act protects the World Heritage values of the Great Barrier Reef World Heritage Area (GBRWHA) from actions which have, will have or are likely to have a significant impact on those values. The protection and management of World Heritage properties should ensure that their values at the time of inscription are sustained and enhanced over time. This is done primarily through the protection of a property's attributes of Outstanding Universal Value. Thus, the World Heritage values of the Great Barrier Reef World. Properties Impact Heritage Area are considered the same as the property's attributes of Outstanding Universal Value (OUV).

6.1 Natural Environment

Land

The site is located adjacent to Calliope River and Port Curtis Bay. If suitable control measures are not implemented during construction and operations, there is a risk of increasing sediment and other pollutant transportation to sensitive environmental areas, such as the GBRWHA. Sediments towards the lower areas of the site, adjacent to the Calliope River and wetlands/salt flats, are also potentially unconsolidated, and will require additional stabilisation works to be undertaken. It is anticipated that potential impacts will be managed through the implementation of an appropriate Construction Environmental Management Plan.

Acid sulfate soils (ASS) have been identified on relatively undisturbed land on the north-east section of the site, at an actual depth of RL 2.0 m AHD, with potential acid sulfate soils below this layer, hence the depth code designation of AOS2 for this area. The potential for exposing acid sulfate soils to the atmosphere during earthworks, may in turn produce sulphuric acid runoff and contaminate downstream waterways. An investigation will be undertaken to establish whether acid sulfate soils exist within the site and any predicted impacts will be addressed in terms of mitigation measures as necessary.

Water Quality

Construction and operational activities may have the potential to impact water quality through excessive sediment and pollutants if not managed and controlled appropriately. This could impact the GBRWHA through impacts on the water quality and runoff reaching the Calliope River and Port Curtis Bay. The introduction of paved areas is likely to increase the stormwater flows from the site. Mitigation and management measures will be designed into the project and Construction Environmental Management Plan to minimise any potential impact on water quality or the marine ecology.

Additional draw on the water supply from the Gladstone Area Water Boards (GAWB) during operation may impact the supply capacity of the water treatment plant long term however the onsite water treatment plant for the Project could ultimately supplement the Projects water needs by the use of effluent from the neighbouring GRC wastewater treatment plant. The Project's onsite water treatment plant could ultimately supplement the potable water needs of Gladstone in emergencies and the Project could supply additional Oxygen to the sewerage treatment plant for aerobic digestion. When operational, waste-water will be generated from the process water stream for the electrolysis plant, and from the cooling water streams for the electrolysis plant, ASU, and ammonia plants, the resulting wastewater streams will be diverted to a membrane-based bio-reactor for upgrading to class A water resources, and used as input to the site water treatment plant.

Air Quality

The proposed Project has the potential to impact air quality in the Gladstone airshed. Land clearing and considerable earthworks during construction, along with increased traffic movements, will increase the potential for air quality impacts through disturbance of dust and small particulates (PM10 or PM2.5). Dust generation will be addressed in the Construction Environmental Management Plan, and minimised during construction and operational phases using appropriate dust suppression and control techniques. Once the developed all trafficable areas will be hard surfaced to reduce the dust or small particulates disturbance.

During the Project operation there is the potential for release of ammonia and steam into the airshed. This most significant impact would be due to fugitive or accidental releases of ammonia. Appropriate capture and control measures for these process gases will be implemented in the detailed design phase for the plant. A waste heat recovery system will capture steam to drive some of the gas compressions stages of the Project.

The onsite hydrogen fuelled gas turbine for power generation has the potential to release small amounts of NO_x. The current design of the Gas turbine is rated to emit less than 100 ppm NOx and development work is being undertaken to reduce that level to below 25 ppm NO_x.

It is anticipated that potential impacts will be addressed in the Environmental Impact Statement and managed through the implementation of an appropriate Operation Environmental Management Plan and Ammonia Safety Plans.

Flora and Fauna

The extent of the vegetation and habitat impacts of the entire Gladstone SDA will be evaluated in detail through site monitoring activities to be carried out within the scope of the EIS. Much of the surrounding area of the Gladstone SDA native vegetation has already been cleared for other industrial projects and the areas of highest biological value, being the forests around Mt Larcom, Mt Stowe State Forrest and the Calliope Conservation Park will remain undisturbed by this development.

The construction of H2-Hub™ Gladstone will result in the removal of the majority of vegetation on the Project site. There is not likely to be any impact on threatened Regional Ecosystem communities, based on the field studies undertaken during the preparation of the Gladstone Nickel Refinery Project EIS.

No threatened flora species were detected during the vegetation field surveys and the vegetation present onsite is widespread and common to the region. A 60m vegetation buffer will be retained on the site perimeter and it is unlikely that the clearing activities will have a significant impact on the area's overall biological and habitat value. It is unlikely that the Project will result in the removal of any marine plants.

During the field investigations undertaken for the Gladstone Nickel Refinery EIS on sample sites or habitats included in the H2U site, two fauna species were identified as either endangered or vulnerable under the EPBC Act or the QNC Act. Being:

- *Ninox strenua* (Powerful Owl) – vulnerable QNC Act – noted as foraging in the area in the EIS
- *Petauriodes volans* (Greater Glider) – vulnerable EPBC Act noted as foraging in the area.

H2-Hub™ Gladstone is located on only a part of the land area proposed for the Gladstone Nickel Refinery and the EIS field survey area, it is unknown at this stage if the Project will have a direct impact on these species.

The clearing of some of the site for the proposal may have an indirect impact on the species through the removal of potential habitat or foraging areas. Further site assessments as part of the EIS will further assess the potential for impact on these species and any other EPBC or QNC listed species found on the site.

It should be noted that Charadrius mongolus (Lesser Sand Plover) – endangered EPBC Act – noted as uncommon in the EIS was recorded at a sample site on the salt marsh and marine clay plains, an area and habitat not included in although adjacent to the H2U site.

As noted in that EIS 'as the foraging habitat for the powerful owls at the site is a small component of a wider foraging area, which would include the adjacent Mount Stowe State Forest (SF) and the Calliope Conservation Park (CP), local populations are not likely to be significantly affected.

The GPNL EIS also noted some intertidal and supratidal communities that are likely outside of the construction area of H2-Hub™ Gladstone. Should there be a requirement to disturb these communities an application to clear these marine plants will be submitted in accordance with the requirements of Section 123 of the Fisheries Act 1994.

The management of invasive species, fire management planning and the management of connecting corridors between ecosystems could all potentially benefit the natural environment.

6.2 Amenity

The proposed Project is unlikely to have any significant impacts on the Great Barrier Reef National Heritage Place (GBRNHP) including its national heritage values. The Project may indirectly affect the following outstanding universal values, in particular in relation to scenic amenity.

The Project is proposed within the existing industrial estate of the Gladstone SDA, with a number of existing, large developments including Fisherman's Landing Wharf, Rio Tinto Yarwun alumina refinery, Orica Yarwun chemical complex, Gladstone Power Station and Wiggins Island Coal Terminal all of which have an existing impact on scenic amenity for the surrounding area.

Noise and Vibration

The proposed Project may contribute to increased noise levels during construction and operation due primarily to increase traffic movements to and from the site. Other construction activities in particular earthmoving also has the potential to increase the ambient noise levels.

These increases in noise level during both construction and operations are likely to be limited in intensity and duration and mitigate with appropriate management strategies, infrastructure design and the retention of vegetative buffers.

The potential for vibration impacts during both construction and operation are expected to be minimal, with no vibration impacts occurring as part of the operational phase.

Lighting

The potential for impacts due to night operations and security lighting are likely to be limited. Appropriate mitigation strategies to reduce light shed and visibility will be included in the project design, implementing targeted lighting and light cowling to reduce any impact.

Visual Aesthetics

The site is visible from Hanson Road and will be the first industrial landform visible when entering the Gladstone SDA from the South East, after the Gladstone Power Station. The potential to impact visual

aesthetics from Hanson Road is moderately high without designed screening. Mature vegetation exists onsite and has the potential, if retained in strategic locations, to act as partial screen and buffer for visually sensitive receptors.

The project will maintain or plant a suitable buffer along the Hanson Road boundary so that from the GBRNHP coastline looking South West to the Project site, most the buildings and infrastructure will not be visible. The vertical air separation unit is likely to be visible however this will be of clean lines and painted to minimise its visual impact.

6.3 Social environment

Potential beneficial and adverse impacts

A full Social Impact Assessment (SIA) will be undertaken as part the EIS. The likely social impacts of the project will be reviewed with community and stakeholder engagement the primary instrument to inform H2U of the primary social impacts.

It is expected there will be tensions between renewable energy and fossil fuel proponents accepting the two will coexist for some time. The project workforce development may impact local employment and employment tension, however given the increased unemployment over the last five years these tensions are likely to be positive. Workforce training needs could underpin the development of training facilities for a new industrial sector in hydrogen electrolysis.

The impact on housing and accommodation is anticipated to be beneficial given the increase vacancy rates and declining property values in Gladstone since 2016.

There may be social impacts due to increase road traffic and these impacts will be considered in the EIS and development approvals processes.

Cultural Heritage and Native Title

Social Impacts on traditional owners of the land will be investigated in the Community and Stakeholder Engagement to understand the cultural impacts on traditional owners and how these can be recognised.

There are no known Indigenous Heritage issues on the Project site and Native Title has been extinguished. It is noted, however, that the Bailai (Byellee, Byelee), Gurang, Gooreng Gooreng, Taribelang Bunda People (now represented by the Port Curtis Coral Coast Native Title Claimants (PCCCNTC) have been granted native title over several parcels Crown Land in the Gladstone region, as a part of their successful 2001 claim (QCD2017/010).

The Aboriginal Cultural Heritage Act (ACHA) 2003 requires a Cultural Heritage Management Plan (CHMP) if an EIS is required. An existing CHMP between the PCCCNTC and the Minister of Economic Development covers the site and a wider area of the Gladstone SDA. It is envisaged a CHMP similar to that one would be developed between H2U and the PCCCNTCs.

Although unlikely, should any previously unknown cultural heritage material be uncovered during construction H2U is committed to protecting the cultural heritage and the sensitive handling of any accidental discoveries on the site and implement mitigation measures as defined in the CHMP A pre-existing Cultural Heritage Management Plan (CHMP) has been developed between the (PCCCNTC) and the Department of State Development (DSD). AFE will develop a cultural heritage management plan in accordance with s87 of the Aboriginal Cultural Heritage Act 2003.

6.4 Economic effects

The economic impacts could be diverse as whilst H2-Hub™ Gladstone will generate additional direct and indirect employment it also has the potential to generate opportunities in a new sector for both upstream and downstream supply chain sectors.

Local procurement if well managed should provide local business and industry opportunities for increased business. The engagement of suppliers to forward plan the specific needs of the Project should ameliorate any potential supply shortages that could impact other business. The direct expenditure and the expenditure of its employees and contractors during construction and operational phases will provide increased trade to local service, hospitality and other industries.

The potential export of ammonia through the Port of Gladstone should provide increased port service revenues and the export revenue will filter to the state in increase tax revenue service fees and taxes.

The likely economic impacts include:

- Employment creation and decrease unemployment – current estimates indicate the direct employment created during planning and construction will be 350 FTEs for the Activation Stage and 200 FTEs for the Expansion Stages, and up to 140 ongoing FTEs during operations with an industry multiplier of 4.8 indirect jobs;
- Stabilising if not Increasing property and housing values in Gladstone due to employment retention;
- Up to $2b in capital injection into the regional economy through local input into construction.
- Supply chain revenues of up to $100m per year due to operational expenditure in the region during operations;
- Reduced economic impacts form climate change by reducing the carbon emissions both domestically and emissions in the export markets; and
- Drive further renewable energy development in Queensland resulting in grid stability and reliability along with reduced energy costs.

6.5 Built Environment

Traffic and Transport

The proposed project will generate an increase in traffic to and from the site, during both construction and operational phases of the project. Hanson Road and Reid Road would therefore be more heavily trafficked than at present. This could pose an increased risk of traffic incidents.

Construction traffic is likely to include the transport of prefabricated modules. These will be constructed offsite and shipped in. The movement of modularised equipment may disrupt traffic during transport however, the frequency and duration of this impact is considered minimal.

The impact of this on local roads has not yet been defined. A traffic study will be undertaken in consultation with the Department of Transport and Main Roads and the Gladstone Regional Council to evaluate the impact and mitigation measures, as part of the EIS process and used to inform the Traffic Management Plan for the Project.

Community Amenities

The most significant impact on community amenity would be noise, air quality and visual amenity described in 6.1 and 6.2 above. The project in operation is unlikely to produce emissions except steam. Where possible the steam will be harvested in waste heat recovery systems for use on site.

The other impact on the community is potentially concerns over the site safety and misinformation about the impacts of ammonia or of Hydrogen a combustible but non-poisonous gas. The impact of this could be mitigated by an effective and open community and stakeholder engagement and consultations.

6.6 Matters of National Environmental Significance under the EPBC Act

It is not anticipated the proposed action will have a significant impact on the Matters of National Environmental Significance (MNES) and appropriate measures will be enacted to ensure minimal impact. During the design stage of the Project comprehensive studies will be undertaken to map and survey the site to identify any species (flora or fauna) at risk and to ensure any disturbance is in line with the protections of the EPBC Act.

A referral will be submitted concurrently to this IAS to the Commonwealth Minister seeking a determination on whether the proposed actions are 'Controlled Actions'.

Additional management measures to reduce potential impacts on MNES such as the Great Barrier Reef WHA will include site and stormwater management.

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7 ENVIRONMENTAL MANAGEMENT AND MITIGATION MEASURES

THE HYDROGEN UTILITY™

Section 7. **Environmental Management and Mitigation Measures**

Management and mitigation measures will be determined during the Environmental Impact Statement and will be developed through consideration of the environmental management framework, environmental management plans and specific sub-plans for each of the following environmental aspects:

- Natural environment (flora, fauna, soils, water etc.);
- Built environment (e.g. Traffic Management Plan);
- Indigenous cultural heritage
- Non-Indigenous Cultural heritage
- Amenity
- Social/economic;
- Waste management
- Hazard, risk, health and safety

7.1 Natural Environment

Due to the early phase of project development, specific mitigation measures are not yet confirmed, rather will be developed through the environmental impact assessment process. This will result in a package of measures developed to avoid, minimise and compensate for impacts resulting from the Project, based on the significance of the impacts on Matters of National Environmental Significance (and other sensitive environmental values) identified by the assessment.

Where any aspects of the project are declared a controlled action under the EPBC Act, during the EIS process H2U will consider the expected impacts on relevant environmental values triggering the controlled action declaration.

Where these expected impacts will be considered to be unavoidable, then approvals may be conditional subject to H2U, as the Project developers providing, environmental offsets in accordance with the Queensland environmental offsets framework established under the Environmental Offsets Act 2014, Environmental Offsets Regulation 2014 and the Queensland Government Environmental Offsets Policy. In such cases H2U will develop a Biodiversity Offsets Plan to provide appropriate offsets for impacted Commonwealth (MNES) and State (MSES) biodiversity values.

Environmental management

The Project and associated activities should not directly impact on the GBRWHA. However, due to the close proximity of the Project to the tidal flats and that the site potentially drains into the GBRWHA via the Calliope River, the Project and infrastructure will be designed to reduce the watershed and any potential or indirect impacts on the GBRWHA, governed by a Great Barrier Reef Protection Plan to be developed during the development phase of the Project.

A detailed Ammonia Safety Plan and a Stormwater and Runoff Management Plan will be completed as part of the EIS which will evaluate the potential impacts and mitigation measures for the containment of chemical spills as well as the mitigating any impacts on stormwater, including erosion on the site and surrounds and ensure that mitigation is implemented to minimise and eliminate these impacts. It is not expected the Project will have a detrimental impact on Great Barrier Reef WHA.

Watershed from production areas will be contained and managed to reduce sediment and pollutant impacts on water quality. Chemical spills could they occur in the process plant areas which will be contained and prevented from reaching the stormwater system.

The site will be levelled to above the RL 5.0m AHD and lower-lying sections of the site will primarily be buffer land. If during detailed design, it is identified that construction activities are likely to intersect potential acid sulphate soil environments, a comprehensive acid sulfate soils management program will be implemented.

Further targeted flora and fauna surveys will be undertaken by H2U to determine whether any threatened species occurs within the Project site the extent to which they would be impacted. Whilst potential for significant impact is considered to be low it cannot be confirmed until further investigations have been completed. These will be completed as part of surveys and studies in the EIS.

Mitigation measures will be implemented to reduce direct or indirect impacts on MNES including undertaking pre-clearance ecology surveys of proposed disturbance areas to confirm the presence of any listed flora species and assess fauna habitats and identify presence of animal breeding places. A fauna spotter catcher will also be present prior to, and during, any clearing of native vegetation. This will ensure no fauna species are harmed during clearing, identified areas of significance are flagged and exclusion zones put in place, animal breeding places are to be avoided where possible.

If preclearance surveys identify animal breeding places such as hollow bearing trees these will be avoided to the greatest extent possible and fragmentation of habitat will be minimised through retaining tracts of remnant vegetation along the eastern, northern and southern site boundaries along with the drainage Easement to run through the site to maintain wildlife connectivity across the site and to the Calliope Conservation Park to the south-west of the site

Clearing of the site will be managed to minimise the clearing to retain wildlife corridors and buffer zones. These will be managed under ongoing management plans to minimise the impact of invasive species (flora or fauna) and manage fire risk and provide an improved habitat for fauna species.

Soil and site surveys will identify any contamination from previous activities, in particular industrial process trials conducted by Australian Magnesium Corporation, will be appropriately remediated and therefore improve the site amenity and reduce the environmental risk from any contamination.

Following detailed assessment and ecology surveys an EIS will be completed to identify the potential for significant impacts to occur in relation to flora and fauna, and remediation or mitigation needs. The Project design will be based around the EIS to ensure minimal environmental impacts.

Additional measures that will be undertaken to reduce impact of the proposed development include:

- bunded storage tanks and washdown areas
- capture and treatment of stormwater runoff
- Flora and Fauna Management Plan to maintain wildlife corridors and vegetative buffers, and
- Management plans outlining management measures for weeds, feral animals and fire management.

Decommissioning

It is not expected that this project site will require decommissioning prior to the end of its 50-year design life. The Project is unlikely to cause excessive soil contamination as apart from ammonia the process outputs and inputs to the project are non-noxious. A decommissioning strategy and closure plan will be developed as part of the plant operation management system when appropriate.

If the site required earlier decommissioning, the site would be rehabilitated and returned to a similar environment that existed prior to the construction of the plant, unless another industrial land use can be found for the site.

7.2 Built Environment

The Project will be a designated Major Hazardous Facility due to the production and storage of ammonia and Hydrogen. Whilst Hydrogen in not a noxious gas it is combustible and the impacts of both Hydrogen and Ammonia will require mitigation and management.

The ultimate philosophy for the mitigation of impacts is to design to mitigate, reduce or eliminate potential impact risks first then use management plans and other measure to manage the residual risk.

Infrastructure

Potential built environment impacts due to the Project will occur in both the construction and operational stages which will be addresses in a separate Construction Environmental Management Plan and an Operations Environmental Management Plan.

Construction Impact Management and Mitigation

The primary built environment impacts of the Project during construction are impacts on air quality; water quality and runoff; and noise. Their mitigation and management will be as follows:

- **Air Quality -** The Construction Environmental Management Plan will detail measures for dust suppression and to minimise the generation of PM10 and PM2.5 particulates using appropriate dust suppression and control techniques. Engineering controls will be used to ensure dust generation in construction is minimised and not likely to impact the environment. An Air Quality (Dust) Management Plan will be developed and implemented during construction and operations to meet air quality standards of the Environmental Protection Act (1994).
- **Water Quality -** An Erosion and Sediment Control Plan will be developed prior to construction to ensure that erosion and sediments runoff don't impact the water quality of the drainage lines running into Port Curtis Bay or the Calliope River. Accepted engineering methodologies to reduce the impacts of sediment and erosion during construction will be deployed.
- **Noise –** A Noise Management Plan will be developed to ensure noise levels during construction will be monitored and the timing of operations will be scheduled to minimise the impacts due to additional noise from the site.

Operational Impact Management and Mitigation

The primary built environment impacts from the Project in operation will be impacts from the ammonia and Hydrogen leakage, water and air quality, noise, lighting and visual amenity. Their mitigation and management will be as follows:

- **Gas leakage -** The nature of the facility will require extensive gas monitoring and leak detection systems for ammonia and Hydrogen to reduce the environmental, community amenity and safety risks. The gas leak detection systems, project design along with the Emergency and Accidental Spill Response Plan and the Ammonia Safety Plan will ensure the safety risk and environmental impacts of the Project are minimal. The safety design of the ammonia production plant will include aqueous reclamation of any released ammonia and emergency flares for any release needed beyond the capacity of the aqueous reclamation.

- **Water Quality –** The Project will be designed to ensure the risks to water and air quality are minimal. The site layout and design will be developed to capture stormwater and runoff from production areas, to be stored and treated in the water treatment site to be recycled for overall water plant efficiency. Impermeable bunding of liquid ammonia storage tanks will prevent the risk of ground leakage or contaminated runoff. The Stormwater and Runoff Management Plan; Water Quality Management Plan; Emergency and Accidental Spill Response Plan and the Ammonia Safety Plan will be developed during the development stage and they will all be used to manage elements of the residual risk to water quality not covered by the project design.
- **Air Quality** An Air Quality (dust) Management Plan along with engineering controls will be utilised to monitor confine and supress dust. All trafficable areas on site will be hard surfaced to reduce the dust generation or small particulates disturbance. In addition, the Emergency and Accidental Spill Response Plan and the Ammonia Safety Plan will reduce the air quality impacts of the Project. The boundary vegetative buffers will aid in dust and noise suppression.

Traffic and Transport

The proposed site location will be subjected to background noise from heavy vehicle and rail traffic as well as noise from industrial sources located in the area. Noise and vibration impacts associated with the project's construction and operation will be assessed and managed in accordance with the relevant noise management guidelines EM2371 – Planning for Noise Control. Off-site road traffic noise was assessed against the Department of Transport and Main Roads (DTMR) Road Traffic Noise Management Code of Practice (DTMR, 2007) criteria.

The impact of the Project on the local roads will be defined in a traffic study to be undertaken in consultation with the Department of Transport and Main Roads and the Gladstone Regional Council to evaluate the impact and mitigation measures, as part of the EIS process. The traffic study will inform the development of a Traffic Management Plan for the Project.

Community Amenity

The primary built environment impacts from the Project will be impacts due to visual amenity, lighting, noise and odour if an ammonia leakage was to occur. Their mitigation and management will be follows:

It is anticipated that visual amenity and light pollution impacts will be manageable in terms of control measures. Visual amenity will be studied as part of the EIS, including an assessment of the impacts of light pollution from the proposed project and the means to mitigate any impacts on the surrounding community and environment.

The Project's electrolysis plant has the largest footprint on the proposed site but it has no significant height. It will mostly appear as a large shed. The colour of the housing and roof of the electrolysis plant can be coloured to blend as closely to the environment as possible. The air separation unit at 45 m is expected to be the tallest structure on the site and may be visible from Gladstone. In comparison to the other industrial complexes in the Gladstone SDA the visual amenity impact is expected to be minimal.

The site is located in a dedicated heavy industry area and at some distance from sensitive receptors. It is anticipated that these impacts will be manageable in terms of control measures including;

- A comprehensive lighting design based on minimising the external impact
- Night operation and security lights redirected away from adjacent vegetation and minimised
- The use of cool shades and directional lighting;

Landholders in the immediate vicinity are the most likely impacted by the visual amenity, those landholders are other industrial complexes.

An assessment of noise impacts including low frequency noise impacts from the operations of compressors, turbines and other plant equipment will be conducted as part of the EIS. This will inform the development of a Noise Management Plan to ensure noise and vibration mitigation is managed in compliance with approvals and regulations.

These increases in noise level during both construction and operations are likely to be limited in intensity and duration and mitigate with appropriate management strategies, infrastructure design and the retention of vegetative buffers.

Odour generated from the site is expected to be minimal. It is not anticipated that under normal operations there will be odour emissions at levels that would impact nearby residents. Accidental releases of ammonia would be the only cause of an odour impact on nearby residents. To mitigate and manage this risk extensive ammonia leak detection and gas monitoring systems will alert the operators of the potential odour risk. The Emergency and Accidental Spill Response Plan and the Ammonia Safety Plan will provide the tools to effectively manage any leaks and mitigate the odour risk.

7.3 Cultural Heritage Management Plan (Indigenous)

The Aboriginal Cultural Heritage Act (ACHA) 2003 requires a Cultural Heritage Management Plan (CHMP) if an EIS is required. The Act specifies duty of care guidelines, which requires a land user to make an assessment of their particular land use activity and the likelihood that it will cause harm to Aboriginal cultural heritage.

An existing CHMP between the Port Curtis Coral Coast Native Title Claimants (PCCCNTC) and the Minister of Economic Development covers the site and a wider area of the Gladstone SDA.

H2U is committed to developing a long term relationship with the PCCCNTC people in identifying and managing any cultural heritage issues. H2U proposes to engage, the PCCCNTC to jointly undertake a cultural heritage survey along with field assessments and develop a Cultural Heritage Management Plan (CHMP) with the PCCCNTC as the traditional owners. It is envisaged a CHMP similar to the one that exists between the Minister and the PCCCNTC and will be developed under Part 7 of the Aboriginal Cultural Heritage Act 2003 (ACH Act).

7.4 Non-Indigenous cultural heritage management

The main non-indigenous heritage impacts would be on the Great Barrier Reef World Heritage Area. A Great Barrier Reef Heritage Protection Plan will be developed to manage any risks to the GBRWHA.

The are no other non-indigenous heritage issues expected on the site.

7.5 Greenhouse Gas Management Plan

The Project is unlikely to produce significant Scope 1 greenhouse gas (GHG) emissions in construction or operations. Equally as the project is designed on the basis of only contracting renewable energy, and does not include any extractive activity upstream, so its Scope 2 and Scope 3 GHG emissions are expected to be minimal.

As a company H2U offsets its travel emissions and is working with international shipping companies to develop green ammonia as a replacement to bunkering fuels, further reducing the transport impact on greenhouse gas emissions.

7.6 Waste Management Plan

The construction and operations of the Project will include the generation of general, commercial and industrial waste products.

These wastes may include:

- vegetation cleared from ground disturbance areas;
- regulated waste (hydrocarbon waste, detergents, solvents, batteries and tyres);
- scrap metal and off-cuts from maintenance activities and from construction;
- general waste (food scraps, paper, rags, cans and glass); and
- sewage effluent and sludge.

A Resource Recovery and Waste Management Plan will be developed during the EIS in accordance with *Waste Reduction and Recycling Act 2011* (WRR Act), to ensure all wastes generated during construction, operations and decommissioning are minimised and effectively managed with the hierarchy of aims being:

- to prevent waste generation through effective planning;
- to recover resources and reuse or recycle;
- utilise waste for energy generation; and
- Any residual waste will be disposed of in accordance with the regulatory requirements.

Water Recovery and Wastewater Management Plan will be developed in accordance with the Department of Energy and Water Supply (DEWS), Water quality guidelines for recycled water schemes (2008), during the EIS to ensure water is conserved and managed. It is anticipated that part of the process water supply could come from Class D recycled water from the neighbouring sewerage treatment plant.

7.7 Hazard and Risk, and Health and Safety

Hazard and Risk

As with any industrial chemical manufacturing process there will be a number of hazards and associated health and safety risks in both the construction and operations of the plants and associated pipeline infrastructure. A hazard is a source, or a situation with a potential for harm in terms of:

- Human injury or ill health;
- Damage to property;
- Damage to the environment; or
- A combination of these.

The project will involve the management of two controlled substances, hydrogen and ammonia, in quantities above the threshold quantities defined under Schedule 15 of of the *Work Health and Safety Regulation 2011*, and therefore will be declared as a Major Hazard Facility (MHF).

The key safety characteristics for hydrogen and ammonia are presented in Table 11 in the following page.

TABLE 11. HYDROGEN AND AMMONIA | KEY SAFETY CHARACTERISTICS[25]

HYDROGEN (H_2)	**Physical Hazards**	H220 – Flammable Gases, Category 1
		H280 – Gases under pressure: compressed gas
	Prevention	P210 – Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
	Response	P377 – Leaking gas fire: Do not extinguish unless leak can be stopped
		P381 – Eliminate all ignition sources if safe to do so.
	Storage	P403 – Store in a well-ventilated place
		P401 + P403 – Protect from sunlight. Store in a well-ventilated place.
AMMONIA (NH_3)	**Physical Hazards**	H221 – Flammable Gases, Category 2
		H280 – Gases under pressure: liquefied gas
	Health Hazards	H331 – Acute toxicity (inhalation: gas), Category 3
		H314 – Skin corrosion/irritation, Category 1B
		H318 – Serious eye damage/eye irritation, Category 1
	Environmental Hazards	H400 – Hazardous to aquatic environments – Acute Hazard, Category 1
	Prevention	P273 – Avoid release to the environment.
		P260 – Do not breathe gas, vapours.
		P280 – Wear protective gloves, protective clothing, eye protection, face protection.
		P210 – Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
	Response	P377 – Leaking gas fire: do not extinguish unless leak can be stopped
		P381 – Eliminate all ignition sources if safe to do so.
		P303+P361+P353+P315 – If on skin (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. Get immediate medical advice / attention.
		P304+P340+P315 – If inhaled: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get immediate medical advice / attention.
		P305+P351+P338+P315 – If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get immediate medical advice / attention.
	Storage	P403 – Store in a well-ventilated place
		P401 + P403 – Protect from sunlight. Store in a well-ventilated place.
	First aid measures	Inhalation Remove victim to uncontaminated area wearing self-contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.
		Skin contact Remove contaminated clothing. Drench affected area with water for at least 15 minutes.
		Eye contact Immediately flush eyes thoroughly with water for at least 15 minutes.
		Ingestion Ingestion is not considered a potential route of exposure.

[25] SOURCE: (Air Liquide 2016)

As an operator of a Major Hazard Facility H2U must develop a safety management system, safety assessment and safety case. Workplace Health and Safety Queensland major hazard team (a group of qualified inspectors) will undertake audits and assess the performance of H2U in meeting its obligations A full hazard risk assessment will be undertaken for the Project during the EIS and design stages to inform the development of a number of Hazard and safety risks including:

- Emergency and Accidental Spill Response Plan
- Ammonia Safety Plan
- Fire Response and Management Plan
- Bushfire Hazard Mitigation and Management Plan
- Hazard Reduction Plan
- Flood Management Plan

At various stages of the project, formal risk assessments will be conducted in line with the ISO standard ISO 31000:2018 Risk Management to ensure that effective risk management of all risks (including health and safety risks) occurs during both the construction and operation phases of the project.

Separation Distances

Separation distances for the proposed facility will be determined in accordance with established industry practice, Industrial Risk Insurers guidelines, and the NFPA 2. *Hydrogen Technologies Code* (NFPA 2019a) and NFPA 55. *Compressed Gases and Cryogenic Fluids Code* (NFPA 2019b).

H2U expects the following **minimum separation distances** to be adopted:

- Process units are offset 60m from property boundary / public roads
- Utility units are offset 30m from property boundary
- Process units are separated 15m from each other
- Utility units are spaced to suit operation and maintenance access
- Storage areas are separated 15m from other process and utility units;
- Adjacent storage units are separated 2 m from each other; and
- Release mitigation devices – such as flares or wet scrubbers – separated 50m from process units.

Workplace Health and Safety

The Work Health and Safety Act 2011 (WH&S Act) provides a regulatory framework for workplace health and safety that is consistent with national policy.

Under the Act businesses are responsible for providing a safe and healthy workplace. A Health and Safety Management System in accordance with the WH&S Act will be developed and implemented to cover all operations (on-site and off-site) associated with the development, construction and operations of the Project. This will include Workplace Health and Safety Plan and Safe Operating Procedures.

7.8 Environmental Management

During the design phase of the Project a rigorous environmental impact assessment will be undertaken to inform the EIS. Mitigation measures identified during the EIS will be inform the detailed design of the Project. From the EIS the necessary Environmental Management Plans will be developed for all significant aspects of the Project in consultation with relevant authorities and in accordance with legislative, policy and industry guidelines.

Environmental Management Plans and Risk Management Plans compliant with ISO 14001:2015 Environmental Management Systems (EMS) and ISO 31000:2018 Risk Management respectively will be developed to minimise the risk of potential impacts from the Project. These plans will outline the strategies to be implemented to minimise the potential impacts, the monitoring and reporting programs, and the corrective actions that will be taken if necessary.

The Environmental Management Plans prepared as part of the EIS will identify:

- the environmental protection objectives:
- measures to prevent or mitigate potential adverse impacts on the environment;
- environmental monitoring requirements to measure actual performance and effectiveness of control measures;
- Environmental auditing requirements and responsibilities to demonstrate implementation and compliance with agreed performance criteria;
- procedures for complaints and inquiries;
- roles and responsibilities in relation to environmental management, monitoring and corrective actions; and
- training and competence requirements for employees.

Construction and Commissioning

A Construction Environment Management Plan (CEMP), will implemented by H2U and its contractors during construction to mitigated or managed the potential environmental impacts. The CEMP will be developed to:

- Define the environmental outcomes, performance criteria and mitigation measures to meet relevant legislative requirements and stakeholder expectations;
- Identify and detail the environmental issues and potential environmental impacts associated with construction;
- Outline management plans, procedures and controls for each of the environmental issues associated with construction;
- Specify the environmental responsibilities of the Project management team, contractors and on-site workers;
- Ensure construction is undertaken in compliance with relevant environmental legislation and standards; and
- Define monitoring, reporting and auditing requirements for the construction phase.

Operations

A number of tools will be developed and implemented to ensure that management measures are considered at each stage of the project, including:

- Environmental management framework;
- Environmental management plans (design and planning (pre-construction, construction and operation); and
- Environmental, social and cultural values specific management plans (sub-plans).

Indicative sub-plans likely required to support environmental management of potential impacts are provided in Table 12 in the following page.

TABLE 12. ENVIRONMENTAL MANAGEMENT PLAN | IDENTIFIED SUB-PLAN REQUIREMENTS

NATURAL ENVIRONMENT	Construction Environmental Management Plan
	Operation Environmental Management Plan
	Flora and Fauna Management Plan
	Weed and Pest Management Plan
	Erosion and Sediment Control Plan
	Stormwater and Runoff Management Plan
	Water Quality Management Plan
	Vegetation Management Plan (including revegetation and rehabilitation)
	Soils Management Plan
	Great Barrier Reef Heritage Protection Plan
BUILT ENVIRONMENT	Traffic Management Plan
CULTURAL HERITAGE	Cultural Heritage Management Plan
AMENITY	Air quality (dust) Management Plan
	Noise Management plan
	Visual Amenity Plan
	Lighting Management Plan
SOCIAL and ECONOMIC	Social Impact Management Plan
	Local Procurement Strategy and Forward Procurement Plans
	Workforce Management and Development Plan
	Land Access Protocols
	Community and Stakeholder Engagement Plan
WASTE MANAGEMENT	Resource Recovery and Waste Management Plan
	Water Recovery and Wastewater Management Plan
HAZARD, RISK, HEALTH and SAFETY	Ammonia Safety Plan, including Emergency and Accidental Spill Response Plan
	Workplace Health and Safety Plan, including Hazard Reduction Plan
	Flood Management Plan
	Fire Response Management Plan, including Bushfire Hazard Mitigation and Response Plan

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8 APPROVALS REQUIRED FOR THE PROJECT

Section 8. **Approvals Required for the Project**

H2U has applied to the Queensland Coordinator-General to declare the proposed development as a Coordinated Project under part 4, Division 2 of the State Development and Public Works Organisations Act 1971 (Qld) (SDWPO Act).

H2U has to date held discussions with the Queenland Minister of State Development, the Department of State Development, Manufacturing, Infrastructure and Planning and the Coordinator-General's office. Subject to the Coordinator-General's decision, the Project will be assessed through the Environmental Impact Assessments and Development Approvals process under the SDWPO Act and in accordance with the final Coordinator-General's Terms of Reference for the Project.

A summary of the potential approvals required for the project at the Commonwealth and State level[26] is detailed in Table 13 below and Table 14 in the following pages.

TABLE 13. APPROVAL REQUIREMENTS | COMMONWEALTH

APPROVAL	LEGISLATION	AUTHORITY	APPROVAL TRIGGER	RELEVANCE	PROCESS
Commonwealth determination on controlled actions and approval for any action that may significantly impact on a matter of national environmental significance (MNES).	*Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)	Department of Agriculture, Water and Environment (DoAWE)	A controlled action referral to the DoAWE will be required for a determination as to whether the Project will be a controlled action due to potential impacts on MNES.	The Project is within the Great Barrier Reef World Heritage Area and could potentially impact on the Heritage amenity. The Sale of Land Agreement with the MEDQ requires a controlled action referral to be undertaken in line with an application for the Project to be considered a Coordinated Project.	EPBC referral has been submitted to the Commonwealth Minister for determination as to whether the action is a controlled action under the EPBC Act.
An Indigenous Land Use Agreement (ILUA) with Native Title claimants	*Native Title Act* 1993	National Native Title Tribunal (NNTT)	The Project may be located within an area subject to active Native Title claims and approved Indigenous Land Use Agreements.	National Native Title Tribunal desktop searches indicates that native Title has been extinguished but this may be contested in the future.	Review the requirements for an ILUA or CHMP in the EIS.
a Cultural Heritage Management Plan (CHMP) with Traditional Owners	(Qld) *Aboriginal Cultural Heritage Act* 2003	Dept of Aboriginal and Torres Strait Islander Partnerships (DASIP)			
Requirement to report greenhouse gas emissions.	*National Greenhouse and Energy Reporting Act* 2007	Greenhouse and Energy Data Officer	Corporations are required to register and report if they emit greenhouse gas, produce energy or consume energy at or above the annual thresholds specified in the Act.	No specific approval required.	Evaluate greenhouse emissions and identify works to be conducted as part of the GHG management plan for the IAS.

[26] Including any Local Government approvals required under State Legislation

TABLE 14. APPROVAL REQUIREMENTS | STATE

APPROVAL	LEGISLATION	AUTHORITY	APPROVAL TRIGGER	RELEVANCE	PROCESS
Co-ordinated project declaration and the Coordinator-General Evaluation Report	*State Development and Public Works Organisation Act 1971* (SDPWO Act)	Co-ordinator- General, Department of State Development, Tourism and Innovation (DSDTI)	Terms of Reference (ToR) for the Environmental Impact Statement (EIS)	To facilitate a coordinated approach to the EIS and development approvals.	The Initial Advice Statement (IAS) will be completed and submitted to the Coordinator-General
Material change of use (MCU)	*State Development and Public Works Organisation Act 1971* (SDPWO Act)	Coordinator-General	Development Scheme for the Gladstone SDA	A Material Change of Use is required for the project area to be classified as Special Industry.	Application for a material change of use will be made after the outcome of the EIS process is known.
Major Hazard Facility (MHF)	*Work Health and Safety Regulation 2011*	Hazardous Industries and Chemicals Branch (HICB) of Work Health and Safety Queensland	The use of premises for a major hazard facility or possible major hazard facility as defined under the Dangerous Goods Safety Management Act 2001.	Production, storage and usage of hazardous materials above the threshold limits requires a Major Hazard Facility (MHF) licence for the proposed development.	Application will be made after the outcome of the EIS process is known.
Environmentally relevant activities (ERAs)	*Environmental Protection Act 1994 (EP Act)*	Department of Environment and Science. (DES)	Industrial activities with the potential to release contaminants into the environment are considered ERA's under the EP Act.	Potential ERA's required on the Project include: ERA 7(1)(b) Chemical Manufacturing. ERA 8(1)(c) Chemical storage ERA 14(1) Electricity generation ERA 63 (1)(b) Sewage Treatment - pumping station ERA 64 (1) (a) Water Treatment – desalination more than 0.5 ML per day	All relevant ERA's. will be covered in the Environmental Impact Statement (EIS).
Survey licence	*Petroleum & Gas (Production and Safety) Act 2004.*	Minister for the Department of Natural Resources, Mines and Energy (DNRME).	Investigation and survey of an area's potential and suitability for the construction and operation of pipelines facilities/	A survey licence may be needed to access land to: investigate and survey its potential and suitability for the construction and operation of pipelines and identify possible pipeline routes and pipeline access routes.	This will be reviewed in the EIS and Project design stage.

TABLE 14. APPROVAL REQUIREMENTS | STATE, CONTINUED

APPROVAL	LEGISLATION	AUTHORITY	APPROVAL TRIGGER	RELEVANCE	PROCESS
Approval for Gas Pipeline Corridor (if required)	*Planning Act 2016*	Local Government or relevant Minister	Approval for the access and use of land held by the Local Government of a State Department for the pipeline corridor.	Pipeline corridor and routes need to be defined and access gained in order to transport ammonia and hydrogen to the Port and gas terminal injection points.	Pipeline corridor routes along with their environmental and social impacts to be investigated as part of EIS.
Development Approvals may be required for: • Material change of use • Operational works • Building works • Plumbing and • drainage works • Reconfiguring a lot • Major Hazard Facility	*Planning Act 2016*	Coordinator - General DSDTI Relevant local government authority Relevant referral and advice agencies (such as DES, DNRME, etc) Work Health and Safety Queensland	A development assessment by the Coordinator-General against the development scheme for the Gladstone State Development Area (SDA).	MCU approval for new infrastructure is required from the Coordinator- General. For the project area within the boundary of the Gladstone SDA.	List developments including offsite infrastructure, including connecting infrastructure within the Gladstone SDA , to be assessed by the Coordinator-General and infrastructure within strategic port land, to be assessed by the Gladstone Ports Corporation
An Indigenous Land Use Agreement (ILUA) with Native Title claimants.	*Native Title (Queensland) Act 1993*	National Native Title Tribunal (NNTT)	The Project may be located within an area subject to active Native Title claims and approved Indigenous Land Use Agreements.	National Native Title Tribunal desktop searches indicates that native Title has been extinguished but this may be contested in the future.	Review the requirements for an ILUA in the EIS. .
Cultural heritage management plan (CHMP)	*Aboriginal Cultural Heritage Act 2003*	Department of Aboriginal and Torres Strait Islander Partnerships (DASIP)	A CHMP is required to ensure that matters of Indigenous cultural heritage are protected and respected.	H2U seeks to maintain a productive relationship with traditional owners of the land on which the Project sits and ensure that their cultural heritage is respected and protected. H2U will work with the traditional owners to develop a CHMP to ensure heritage is protected. Works cannot commence until the Plan has been approved.	Cultural Heritage is described in the IAS and a CHMP will be developed as part of the EIS process.

TABLE 14. APPROVAL REQUIREMENTS | STATE, CONTINUED

APPROVAL	LEGISLATION	AUTHORITY	APPROVAL TRIGGER	RELEVANCE	PROCESS
Development permit (operational works) for waterway barrier works	*Fisheries Act 1994*	Department of Agriculture and Fisheries (DAF); and State Assessment and Referral Agency (SARA).	The establishment of a barrier across a waterway (including partial barrier) may affect fish passage through the waterway.	A portion of the channel to the north of the Site is nominated as a *moderate risk waterway* by the Department of Agriculture and Fisheries Queensland. This rating reflects a moderate risk of affecting fish movement from waterway barrier works. Desktop assessment of this waterway suggests a very low likelihood of this channel providing suitable fish habitat, mainly due to the downstream channel conditions and dry channel bed. This approval may be required for both on- and off-tenement operational works that are waterway barrier works.	Determine if water barrier works are likely for this project and to register a request with Fisheries Queensland to amend the waterway from amber (moderate risk) to green (low risk).
Protected animals' movement permit	*Nature Conservation Act 1992*	Department of Environment and Science. (DES)	Required if the Project will impact upon a protected animal species listed under the Act or subordinate regulations.	Required for site clearing if protected fauna identified during EIS	The requirements to be defined during the EIS.
Protected plants clearing permit and Clearing Permit of least concern Plants	*Nature Conservation Act 1992*	Department of Environment and Science. (DES)	Required if the Project will interfere with plant species listed under the Act or relevant subordinate regulations.	Required for site clearing if protected flora identified during EIS	The requirements to be defined during the EIS.
Wildlife movement permit	*Nature Conservation Act 1992*	Department of Environment and Science. (DES)	Required if the Project will impact upon native wildlife (other than protected wildlife) in an area that is identified under a conservation plan.	Required for site clearing if native fauna requires relocation during clearing.	The requirements to be defined during the EIS.
Development permit to clear native vegetation	*Vegetation Management Act 1999*	The Coordinator General	Clearing of native vegetation and high value regrowth, regional ecosystems and/ or essential habitat communities	Required for site clearing unless exemption applies	The requirements to be defined during the EIS.

TABLE 14. APPROVAL REQUIREMENTS | STATE, CONTINUED

APPROVAL	LEGISLATION	AUTHORITY	APPROVAL TRIGGER	RELEVANCE	PROCESS
Mapping of Assessable Remnant Vegetation	*Vegetation Management Act 1999*	Department of Natural Resources, Mines and Energy (DNRME)	Property map of assessable vegetation (PMAV).	All Project activities unless an exemption applies.	Terrestrial Ecology desktop and field study to determine offsets and whether EPBC referral is for a controlled action.
Water licence	*Water Act 2000*	Department of Natural Resources, Mines and Energy (DNRME)	Taking or interfering with water. Licensing of bores, taking water for groundwater monitoring, dewatering and compensatory water supply.	The project is not expected to extract groundwater however a water licence maybe required if sufficient volumes are not available from the neighbouring water treatment plant.	The requirements will be defined during the EIS.
Riverine protection permit	*Water Act 2000*	Department of Natural Resources, Mines and Energy (DNRME)	Destroy vegetation, excavate, or place fill within a watercourse, lake or spring.	Dependent on-site location, a riverine protection permit may be required for Project activities that involve works within a watercourse, lake or spring which occurs off tenement.	This may apply to stormwater easement works. The requirements will be defined during the EIS.
Gladstone Regional Council Planning Scheme	Planning Act 2016	Gladstone Regional Council	Council infrastructure policies provide for the triggers and are mandatory. Application to the Coordinator-General pursuant to the Development Scheme	Water, sewage, roads, infrastructure contributions not considered part of applications to the Coordinator-General under Gladstone SDA Development Scheme	Infrastructure required to support the project is described in the IAS.

9 COSTS AND BENEFITS SUMMARY

Section 9. **Costs and Benefits Summary**

9.1 Local, state and national economies

Once fully built, the project is estimated to result in up to $4.7b in direct expenditure – including up to $2.53b in the Activation Stage and up to $2.18b in the Expansion Stage and support indirect expenditure for a multiplier of up to 4.8.

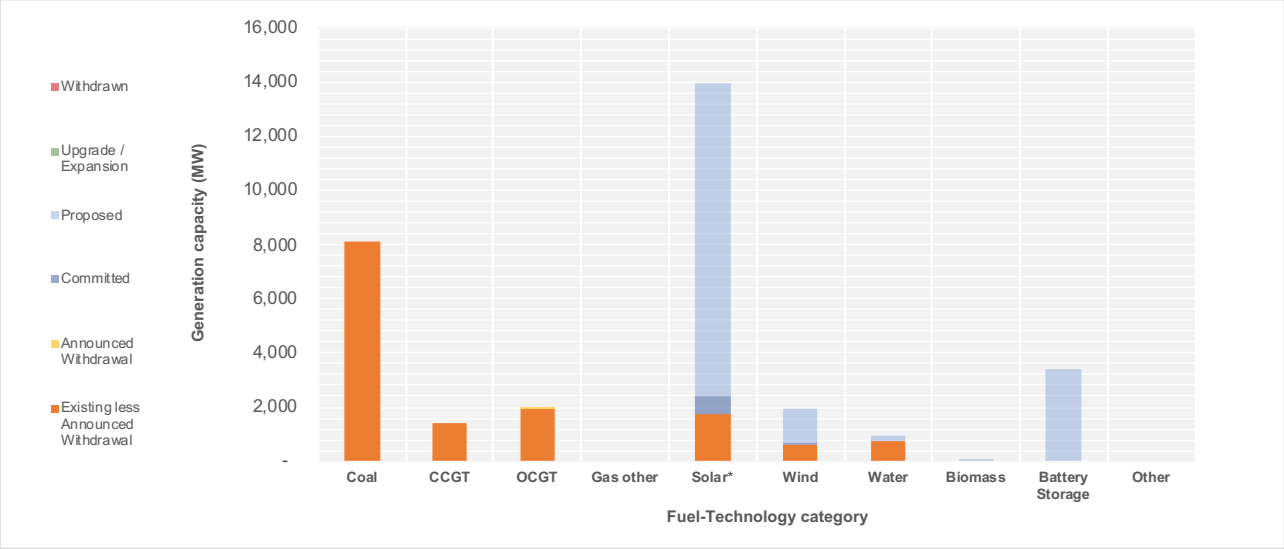
This estimate excludes the installation of nearly 10 GW in additional renewable energy generation capacity that will be integrated in the Queensland region of the National Electricity Market (NEM) to support the proposed 3GW electrolysis plant development for H2-Hub™ Gladstone. Assuming projected capital costs for large-scale solar PV and wind projects projected by CSIRO in the latest edition of the *GenCosts* report - $1.4m per MW, and $1.9m per MW, respectively[27] – resulting in additional expenditure of up to $15b.

An initial Expression of Interest (EoI) will be launched in Q2 2021 as part of the Masterplan and Feasibility Study activities for the Project to engage with proponents of suitable large-scale renewable energy developments in the Queensland Region of the NEM. Through this process, H2U aims to select suitable renewable energy supply for its proposed H2-Hub™ Gladstone project through a competitive market process, targeting nearly 10 GW of contracted renewable energy generation capacity, as follows:

- **Activation Stage**, 5 GW of contracted renewable energy generation capacity; and
- **Expansion Stage**, 5 GW of contracted renewable energy generation capacity.

H2-Hub™ Gladstone can therefore contribute to unlock the over 13.4 GW of committed or proposed new-build solar (12.1 GW) and wind (1.3 GW) projects reported as of November 2020 by the Australian Energy Market Operator (AEMO) reports for the Queensland Region of the NEM (QLD1), as presented in Figure 32 below.

FIGURE 32. QLD1 SCHEDULED AND SEMI-SCHEDULED GENERATION | EXISTING AND NEW DEVELOPMENTS BY FUEL[28]



9.2 Natural and social environments

Greenhouse Gas Reduction abatement

The project will result in globally-significant reductions in greenhouse gas emissions, including:

[27] SOURCE: CSIRO GenCost 2020-21 Consultation Draft, December 2020
[28] SOURCE: AEMO NEM Generation Information, November 2020

- ammonia sector emissions, with each tonne of green ammonia delivered by the project resulting in 1.8-2.2 tonnes of CO2-equivalent abated based on the GHG footprint of existing, conventional ammonia manufacturing facilities based on natural gas reforming;
- decarbonisation of power generation and industrial activities in key North Asian economies, including japan, Singapore and South Korea; and
- industrial-sector emissions, with the potential of CO2 recovery and utilization from existing industries in the Yarwun precinct, to generate up to 12 PJ of substitute natural gas from methanation of excess hydrogen produced by the proposed facility.

Social and Economic Benefits

The project will contribute to diversify and strengthen the economic and social ecosystems of the Gladstone region, the expected employment figures, are summarized in Table 15 below.

TABLE 15. *H2-HUB™ GLADSTONE* | SOCIAL AND ECONOMIC BENEFITS

	ACTIVATION STAGE	EXPANSION STAGE
Operation Start[29]	Q4 2025 (target)	2027-35
Operating Lifetime	40+	40+
Construction Jobs	350 FTEs	200 FTEs
Operational Jobs	100 FTEs	+40 FTEs

Up to $100m will be injected in the local and regional economy as part of the project ongoing expenditure.

[29] Commercial Operation Date (COD)

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10 COMMUNITY AND STAKEHOLDER ENGAGEMENT AND CONSULTATION

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Section 10. **Community and Stakeholder Engagement and Consultation**

10.1 Community Engagement

H2U and its parent entity H2I places immense value on effective engagement and consultation with local communities, traditional owners, government, landholders, businesses and other stakeholders impacted upon by industrial scale developments for the production of Hydrogen and Hydrogen derivatives. We recognise that such development has an impact and we affirm the right of affected stakeholders to stay informed, have their say and be meaningfully involved in the development assessment process. It is H2U's goal to establish a respectful and cooperative working relationship with individual stakeholders, stakeholder groups and the wider community.

H2U and its parent H2I aim to continuously refine and improve our community engagement and stakeholder management. We acknowledge there is a need to navigate through and make sense of an increasing abundance of information (as well as misinformation) relating to the production, transport and use of Hydrogen and Hydrogen derivative chemicals.

The Stakeholder Engagement and Consultation Plan proposed in this document will be improved, further developed, and informed by stakeholders in the region and the wider community as the project proceeds.

Our success and ongoing commercial development potential are critically determined by the stakeholders with whom we build relationships and, thus, we cannot emphasise enough our willingness for transparency and accountability in achieving the maximum social, environmental and economic gains through the development.

We therefore invite stakeholders to come forward, ask questions, submit requests, be open to negotiation and to suggest approaches that we may not have considered before, in accordance with the core principles of engagement presented in Table 16 in the following page.

To frame the Stakeholder Engagement Plan, initial early stage stakeholder engagements have been undertaken in Gladstone and Brisbane with:

- **Regional communities' leadership –** Local Members of Parliament,
- **Industry leaders -** Industry Consultation has been undertaken both on a one-on-one basis and at two invitation only industry forums held in Gladstone on 20 August 2018 and 21 August 2018, and both domestic and export customers, and
- **Government -** Consultations have occurred with the Department of State Development, Manufacturing, Infrastructure and Planning, the Coordinator-General's office, Gladstone Ports Corporation.

The Project has not encountered any adverse views in its Industry consultations.

There have been no consultations with the indigenous stakeholders to date but it is planned to engage Port Curtis Coral Coast Native Title Claimants (PCCCNTC) and develop a Cultural Heritage Management Plan (CHMP) for the site. There is a CHMP between the Minister Economic Development Queensland and the PCCCNTCs for the Gladstone SDA that covers the site. This provides an excellent basis for a specific CHMP between H2U and the PCCCNTCs covering the site and Project.

General public consultations on the proposed development will be undertaken in adherence to the requirements of the Gladstone State Development Area Development Scheme, including any additional requirements set out by the Coordinator-General.

TABLE 16. COMMUNITY AND STAKEHOLDER CONSULTATION | CORE PRINCIPLES OF ENGAGEMENT

Civil Discourse That Brings Community Together	•differences are good - we won't be better off if we ignore or disallow them •curiosity replaces judgements, assumptions or dismissals •we don't need to agree, but we do need to protect each other's right to think and feel differently explore reactions and comments that divide or marginalize others
Create an Inclusive Conversational Journey	•broad and deep engagement will reap broad and deep ideas •this is a conversation for ALL ages •offer many ways to participate that are interactive, collaborative and have people work together •encourage multiple and frequent participation
Expect, Explore & Understand Emotion	•emotion will be present - it will look and feel different for different people •take the time to understand it, identify what is generating it, motivating it and why it is happening •feelings 1st, facts 2nd - show genuine empathy and listen to what people think, feel and believe
Empower People With Knowledge	•use others from outside to provide information •gather all questions that people have and respond in a meaningful way to everyone •broadly share what is being heard - don't keep it to ourselves
Make This Look & Feel Different For Others	•be creative and allow for creativity •consider the experience people will have •reflect on past successes

Draft Stakeholder Engagement and Consultation Plan

H2U is currently developing a comprehensive Stakeholder Engagement and Consultation Plan for the proposed H2-Hub™ Gladstone project that will be finalised and refined during the early stages of the development and approvals process and extend right through to operations.

The draft Stakeholder Engagement and Consultation Plan and Phase 1 Engagement Strategies are summarized in Table 17 below and Table 18 in the following pages.

TABLE 17. H2-HUB™ GLADSTONE | DRAFT COMMUNITY AND STAKEHOLDER ENGAGEMENT PLAN

1. INTRODUCTION	A brief summary of the Project including: • background, what it aims to achieve and proposed timelines; • an outline of the Purpose of the document being a staged approach to stakeholder engagement and consultation for the H2-Hub™ Gladstone Green Hydrogen and Ammonia Project, Queensland; • how the document communicates the background, desired outcomes and approach to the Demonstrator project team and other internal stakeholders and outlines a draft plan for stakeholder engagement and communication.

2. PRINCIPLES	An outline of H2Us engagement and consultation philosophy and:
	• A brief introduction to Hydrogen in Australia and the Hydrogen journey;
	• H2Us goal of respectful community engagement, that is an integral component of program or project development. Good engagement is an ongoing process, and helps to build stronger communities;
	• H2Us values and relationship goals;
	• our guiding principles for staff being:
	  ○ Respect and acknowledgement
	  ○ Understanding the community and context
	  ○ Agree on engagement processes
	  ○ Be flexible and patient
	  ○ Build trust
	  ○ Extend knowledge
	  ○ Develop connections;
	• define H2U's engagement and consultations objectives to learn, inform, build consensus, promote community confidence, build meaningful relationships, be open and honest and to manage expectations;
	• defining our engagement approach;
	• defining our principles and outcome expectations for site visits from single person to community open days.

3. SAFETY and ENVIRONMENT	An outline of the community's concerns and understanding of Hydrogen including: • safety concerns; • water consumption; • power usage impacts; • hydrogen myths; • emotional triggers; and • key influencers.

TABLE 17. H2-HUB™ GLADSTONE | DRAFT COMMUNITY AND STAKEHOLDER ENGAGEMENT PLAN, CONTINUED

4. THE PROJECT	A detailed explanation of the Project including: • site background – where it is the various power and infrastructure connections, why it was selected, environmental impacts and complementary industries; • status of the project proposal; • the community benefits and value to the community; • employment, education and training opportunities for the community; • key knowledge and information about the project its products, markets, technologies, statistics and its processes.
5. PLANNING CONTEXT	An overview of the planning processes and development assessment processes including the stage gates and communicating where the project is at.
6. TRADITIONAL OWNERS	An outline of the engagement and consultation process with the traditional owners, respecting cultural heritage and respectful cultural recognition.
7. COMMUNITY PROFILE	An overview of the region and the Gladstone local government area detailing; • the core demographics, civic structures, and geography; • local planning schemes and development strategies; • community plans and civic infrastructure; • regional engagement frameworks; • regional industry interfaces.

8. ENGAGEMENT STRATEGY	A detailed engagement strategy and plans for the Project including;
	• its importance to the Project and the community;
	• the aims, goals and focus statement for the engagement and consultation strategy;
	• definition of who all the stakeholders are;
	• key messages for each stakeholder segment and the objectives of our engagement with each segment;
	• desired outcomes
	• effective engagement strategies for multiple time frames with detailed implementation plans and processes for Social Media, face to face participation, online engagement, surveys, community workshops, and engagement with community leadership, key influencers and media for
	  o Phase 1: Listen, learn and build relationships (0-3mth);
	  o Phase 2: Gather input, data & priorities and connect people to each other and the issue (3mths-12mths);
	  o Phase 3: Work together to create long-term decisions (12mths-2yrs/ongoing).

9. COMMUNICATION STRATEGY	This Communication strategy will help guide and support the public engagement goals through a variety of specific communications objectives and activities, striving for frequent, open and transparent communication with the public and project stakeholders and includes:
	• communication Strategy – focus, goals and key messages (for each Phase and Stakeholder Group);
	• communication activities and goals;
	• communication tools and materials;
	• communication schedules, protocols and records;
	• Issues and Media Management protocols;
	• Monitoring, Evaluation and Updating activities, detailing:
	  o Project management
	  o Project accountability
	  o Engagement performance
	  o Program development and improvement.

TABLE 18. H2-HUB™ GLADSTONE | COMMUNITY AND STAKEHOLDER ENGAGEMENT, PHASE 1 ENGAGEMENT STRATEGIES

PURPOSE	AUDIENCE/PARTICIPANTS	OBJECTIVE	ACTIVITY/DELIVERABLE	ROLE and RESPONSIBILITY
Planning Coordination and Preparation for an innovative, effective, meaningful process	H2U Project Team and H2U project members	To develop and implement the project management approach and schedule to support project implementation	Project initiation meeting Project Charter and Workplan Stakeholder identification and recording template Participant database Project management guidelines	All team members to participate
Actively Participate: Develop, implement and work with others to understand values and interests and create solutions and options	Key stakeholders (organisational representatives, community leaders), Senior management of Council and members of Council (Councillors, Mayor)	To engage key stakeholders and gather feedback on process and measures of success	Telephone: one on one interviews	Project Management Team to undertake with Executive support
Consult and gather Feedback: Listen, learn and understand issues, ideas and concerns	Broader Community at large and internal staff	To engage key stakeholders and gather feedback on process and measures of success	Online and through social media: survey	Project Management Team to undertake with Executive support
Consult and Gather Feedback: Listen, learn and understand issues, ideas and concerns	Traditional Owners and PCCCNTC Board	To understand the perspectives and environment in which the project and future consultation activities will take place	Telephone: one on one interviews	Executive to undertake with support from Project Management Team
Partnership: Work together as partners to make change happen through actions, capacity building and individual and organizational responsibilities and choice-making	Senior Management and members of Council	To understand the perspectives and environment in which the project and future consultation activities will take place	Face-to-face: Council and senior management half day workshop Face-to-face: PCCCNTC Board and senior management half day workshop	Executive to undertake with support from Project Management Team
Consult and Gather Feedback: Listen, learn and understand issues, ideas and concerns	Broader Community at large and internal staff	To engage key stakeholders and gather feedback on process and measures of success	Online and through social media: survey	Project Management Team to undertake with Executive support
Consult and Gather Feedback: Listen, learn and understand issues, ideas and concerns	Landowners (Host, transmission line, near neighbours)	To engage key stakeholders and gather feedback on process and measures of success	Telephone: one on one calls Kitchen Table: one on one meetings Group specific update gatherings e.g. BBQ's	Project Management Team to undertake with Executive support

TABLE 18. H2-HUB™ GLADSTONE | COMMUNITY AND STAKEHOLDER ENGAGEMENT, PHASE 1 ENGAGEMENT STRATEGIES, CONTINUED

PURPOSE	AUDIENCE/PARTICIPANTS	OBJECTIVE	ACTIVITY/DELIVERABLE	ROLE and RESPONSIBILITY
Consult and Gather Feedback: Listen, learn and understand issues, ideas and concerns	Broader community	To engage key stakeholders and gather feedback on process and measures of success	Telephone: one on one calls Kitchen Table: one on one meetings Community non-profit organisation meetings Display Library /Market Public Information Session (as required by Planning Authorities)	Project Management Team to undertake with Executive support
Partnership: Work together as partners to make change happen through actions, capacity building and individual and organisational responsibilities and choice-making	Senior Management and members of Council plus; other Renewable companies, Key industries, Industry bodies such as local Business Chamber, Australian Hydrogen Council, Smart Energy Council and other local industry groups and local RDA All stakeholders in community invited to participate	To understand the perspectives and environment in which the project and future consultation activities will take place To embark on a learning journey with the community to build a project that meets the needs and interests of all so as to create the most sustainable solutions. **Goals:** Develop trust and credibility Learn about the community.	Propose we coordinate in collaboration with complementary/ interested industry to explore domestic and export use of Hydrogen/ Ammonia. We discuss with Council their support for a community workshop (run as world café or something else suitable but participatory). This is a foundation and launching pad for going into the community. We learn from it; we connect with the community as a leader of the innovative initiative.	Project Management Team to undertake with Executive support
Planning, Coordination and Preparation for an innovative, effective, meaningful process	Media engagement- Broader community at large, all other key stakeholders	To embark on a learning journey with the community to build a project that meets the needs and interests of all so as to create the most sustainable solutions. We understand that initial public and media perceptions are critical to the wider success of any public consultation exercise. Cultivating understanding, interest and confidence at the outset of the engagement process is key to appropriately positioning the consultation as a positive, inclusive process that ultimately strengthens decision-making on issues that matter most to the public.	An initial media briefing to provide a quick orientation and education around the public engagement process with focus on the intention to implement a different approach, and the new objectives.	Project Management Team to undertake with Executive support

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11 DATA SOURCES AND REFERENCES

Section 11. **Data Sources and References**

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12 GLOSSARY AND ACRONYMS

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Section 12. **Glossary and Acronyms**

ACN	Australian Company Number
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
AWE	Alkaline Water Electrolysis
CAS Number	Chemical Abstract Service Registry Number
CG	Coordinator-General
CGH2	compressed gaseous hydrogen
CHMP	Cultural Heritage Management Plan
CSIRO	Commonwealth Scientific and Industrial Research Organization
CY	calendar year
DAF	Department of Agriculture and Fisheries (Queensland)
DAWE	Department of Agriculture, Water and the Environment (Commonwealth)
DES	Department of Environment and Science (Queensland)
DIWA	Directory of Important Wetlands in Australia
DNRME	Department of Natural Resources, Mines and Energy (Queensland)
DO	Dissolved Oxygen
DSDMIP	Department for State Development, Manufacturing, Infrastructure, and Planning (Queensland)
DTMR	Department of Transport and Main Roads (Queensland)
EIS	Environmental Impact Statement
ESO	Electrical Safety office, Queensland
FCEV	fuel cell electric vehicles
FEED	Front-end Engineering and Design
FTE	full-time equivalent
FY	fiscal year, financial year
GBRWHA	Great Barrier Reef World Heritage Area
GHH	Gladstone Hydrogen Holdings Pty Ltd
GHS	Globally Harmonized System of Classification and Labelling
GRC	Gladstone Regional Council
H2	hydrogen
H2I	H2U Investments Pty Ltd
H2U	The Hydrogen Utility™ or The Hydrogen Utility Pty Ltd
HHV	higher heating value
HRSG	heat recovery steam generator
IAS	Initial Advice Statement
LH2	liquid hydrogen
MEDQ	Minister for Economic Development Queensland
MHF	Major Hazard Facility
NEM	National Electricity Market
OCGT	open-cycle gas turbine
OEM	Original Equipment Manufacturer
QRC	Queensland Resources Council
R&D	research and development
SDA	State Development Area
SDG, SDGs	Sustainable Development Goal, Goals

SDPWO Act	*State Development and Public Works Organisation Act* 1971
t, tpd, tpy	(metric) tonne or tonnes, tonnes per day, tonnes per year
TAFE Qld	Technical and Further Education Queensland
ToR	Terms of Reference
TWE	Talent with Energy Pty Ltd
UN	United Nations
UNCAC	United Nations' Convention Against Corruption
VET	vocational and educational training
VPP	Virtual Power Plant
W, kW, MW, GW	watt, kilowatt, megawatt, gigawatt
WorkSafe Qld	Workplace, Health, and Safety, Queensland

H2U

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