Our Ref: QLD01C0001-LTS-AP-0010

Mr David Stolz
Assistant Coordinator-General
Planning and Service
(as delegate of the Coordinator-General)
Level 14, 1 William Street
Brisbane, QLD 4000

Attention: Ms Sally Chapman
sally.chapman@coordinatorgeneral.qld.gov.au

16 April 2024

Dear Sally,

Information Request Response – APC2023/007 – Change Application for an SDA Approval (APC2022/008) for a material change of use for a medium impact industry (Electrolyser Manufacturing Facility) in the Gladstone State Development Area (SDA)

I write on behalf of the Applicant, Fortescue, please find below a full response to the Information Request required for AP2023/007-SDA sent on 11 April 2024. To assist State Development with the continued assessment of the Change Application we have provided the following details:

No	Issue	Information Requested
Assessment criteria		
1	Amount of hydrogen and oxygen produced	It is noted that the testing process for the electrolysers will result in the production of additional hydrogen and oxygen. It is understood that the test benches will operate at a range between 18kg/hr to peak of 90kg/hr. This additional volume of material generated will be required to be accounted for in the total volume of material generated to determine and confirm the scale and intensity of the activity. **The proponent is requested to:** • confirm the additional volume of hydrogen and oxygen produced. • confirm if the activity will remain with the current ERA threshold.
Response item 1:		

The primary purpose of the 1 MW electrolyser FTS is to run each unit through a series of QA functional performance activities prior to packaging and dispatched for sale. All gas emissions associated with the testing activity will be managed as part of the overall site activity.

The testing process is expected to be variable and respond to market demands within the renewable energy sector. As testing rates will fluctuate, no capture and storage of hydrogen, oxygen or nitrogen gases from the FTS's is proposed.

FFI is still investigating the expected annual gas emissions released during the testing process to confirm if the activity will exceed the ERA threshold for:

Chemical* Manufacture ERA 7**

Threshold 5 manufacturing, in a year, the following quantities of organic chemicals (a) 200t to 1,000t

**** Chemical** means (b) a dangerous good under the dangerous goods code.*
***** Manufacturing** includes combining, processing and reacting.*

The total gross maximum amount of emissions/output from the four (4) functional test stations (FTS) assuming testing of a single (1) 1MW capacity electrolyser unit / stack per FTS per day (24hrs), 7 days a week, 365 days per annum is tabulated below.

Gas Emissions	Rate (per stn)	24hr period (per stn)	Total Emission 24hrs (4 stn)	Total Maximum Emission PA (4 stn x 24/7)**
Hydrogen (H2)	18 kg/hr	432kg	1,728kg	630.72 tpa
Oxygen (O2)	144 kg/hr	3,456kg	13,824kg	5,045.76 tpa
Nitrogen (N2)	7.5 kg/hr + 81 kg/hr*	220.5kg	882kg	321.93 tpa

****** 81 kg/hr of N2 of each test unit for single start-up purge and single shutdown purge for ~15 minutes.*
********4 FTS running 24 hours per day, 7 days a week is a gross maximum emission estimate and does not account for down time between the testing of different electrolysers.*

The FTSs have a 40barg operating "storage pressure" within the FTS itself for the gas/liquid separators to test the hydrogen product prior to "cold venting". The produced emissions including hydrogen, oxygen and nitrogen gases from electrolysis are released to the atmosphere. There is no compression or storage of produced gases downstream of the test unit gas/liquid separator.

As the Oxygen and Nitrogen emissions from the FTS will be "transported" (vented to atmosphere) at a pressure of less than 200kPa at 20^{o}C and will not be liquified or refrigerated liquified gas; they are not a dangerous good under the dangerous goods code (pursuit to Section 2.2.2.3 of the Code).

However, hydrogen is always considered a Class 2 designated dangerous good under the dangerous goods code, due to its ignitable qualities when mixed with air (pursuit to Section 2.2.2.1 of the Code).

While some FTS operational scenarios are below the 200 tpa threshold, due to the maximum emission capacity of the development, there is potential for the cold venting release of hydrogen from the combined use of the 4 test units to exceed this threshold in a year.

Once the FTS operational conditions have been confirmed, FFI will meet with DESI to discuss a development application for the prescribed ERA 7. These discussions will also consider the relationship with a current EA Development Application for ERA 7 (DESI Ref: A-EA-NEW-100477775) also on Lot 4 SP245936. This application involves the manufacture of 6,500 tons of hydrogen - threshold (6)(b) manufacturing, in a year, more than 1,000t but not more than 10,000t, under the EP Act and is directly associated with the recently approved MCU for Special Industry

(Hydrogen test train facility) within the GSDA. Notwithstanding, FFI will obtain all relevant ERA's prior to commencement of operations.

The electrolyser assembly plant already has an existing domestic sewerage waste water plant and approved irrigation area. This water treatment system has been established in accordance with the ERA 63.

This Substantial Change Development includes the establishment of a FTS building and balance of plant and will not result in any changes to the configuration, capacity or function of the existing approved Environmentally Relevant Activity (ERA 63 – Sewage Treatment) conditions of the Environmental Authority (P-EA-100269285) which has been established and will continue without alteration or change to the approved thresholds.

2	Wastewater source and additional waste stream	It is noted that section 3.4 of the planning report identifies hydrogen and brine as byproducts. Hydrogen will be released to atmosphere and brine 'produced by the testing will be directed to the reverse osmosis (RO); the RO reject water will be relocated offsite to a suitable disposal facility.' The source of the brine 'produced by testing' is unclear. It is understood that the water used in the operation of the electrolysers was already treated by the RO. The waste stream of the RO was understood to be referred to as 'brine' by the applicant. It is unclear if the 'brine' referred to in section 3.4 of the report is an additional waste stream not only for the testing facility but also for the operational phase of the electrolysers. **The proponent is requested to** confirm the source of the brine referred to in section 3.4 of the report. If this constitutes additional waste stream and; • confirm the additional volume of wastewater and its expected quality and confirm that it will not exceed the current wastewater treatment train's ability to adequately treat the wastewater. • with regard to the operational phase/portion of the activity, please confirm that this volume and expected concentration of contaminants has been accounted for in the existing application.

Response item 2:

Raw water from the GAWB mains supply will be put through an RO Water Treatment Plant (WTP) which will be located within the Balance of Plant (BOP) area adjoining the FTS building. During FTS operations (electrolyser testing), ultrapure demineralised water from the RO WTP will be pumped into each FTS at a rate of 1,420 L/hr. Of this, 220 L/hr is consumed in the production of H2, while 1200 L/hr is carried through the membrane to the cathode side. This water will then be collected (1200 L/hr) and pumped via a return loop to the raw water tank of the RO WTP.

The RO system has a high recovery and will have a recovery of 85% during normal operations i.e. 15% of the feed volume becomes a concentrated waste (not a brine). During initial ramp up and

commissioning activities, the volumes of waste produced will be far less and is expected to be around 5% of the feed water volumes when recovering process water is considered.

This water will be managed by disposing of it offsite (in accordance with the existing MCU approval APC2022/008 Condition 7.2) to a licenced facility or on-sold to another industrial water user within the wider Gladstone Area. As there is currently very limited established development within close proximity to the proposed development, no commercial agreements are currently in place to take RO WTP waste.

Accordingly, due to the direct expense in disposal of waste volumes to a licenced facility, electrolyser testing will be scheduled so as not to generate excessive costs until such time as a commercial agreement with a suitable recipient has been negotiated.

The process water balance has been designed to achieve a very high reuse of water re-use. wastewater treatment, Fortescue has designed a FTS process that will not generate any wastewater during normal mode of operations.

All process related wastewater from the assembly plant (water generated from wash-down of electrolysers) or the FTS units will be managed via collection and returning of this process affected water to the proposed RO WTP.

All wastewater or waste process affected water will be collected and managed separately from the on-site stormwater system. No releases of wastewater and or contaminants to any waters are proposed as part of the Substantial Change Application.

The electrolyser assembly plant has an operational Waste Management Plan (Doc Ref: QLD01-5620-EN-PLN-0001) which has been submitted to the Coordinator-General in accordance with the current approval. Accordingly, we request that this management plan be updated and submitted to the Coordinator-General prior to commencement of use (of the FTS) in accordance with the current approval APC2022/008 Condition 7.1.

3	Cumulative noise and vibration impacts	It is noted in section 6.1.5.2 – Noise and Vibration, the report states that a noise and vibration assessment has not been undertaken. This appears to be on the grounds that during operational periods, the activity will consist largely of office works and robotic manufacturing which, “do not emit unreasonable noise.” **The proponent is requested to provide** further information as to • how it was determined that the manufacturing process will not ‘emit unreasonable noise’. • as to what ‘unreasonable noise’ was determined to entail and how this was determined to impact the environmental values for the area and relevant acoustic quality objectives for sensitive receptors identified in the Environmental Protection (Noise) Policy 2019.

Response item 3:

Desktop Noise Assessment

To determine what unreasonable noise would be a Desktop Noise Assessment has been undertaken against the acoustic quality objectives for sensitive receptors identified in the Environmental Protection (Noise) Policy 2019. The results are below.

The Substantial Change Development will not impact or alter the established electrolyser assembly facility which is housed within a fully enclosed industrial warehouse. Noise source emissions from this approved and certified building are being managed in accordance with the sites operational management plan with the majority of plant items located within enclosures which are either partially closed or fully enclosed.

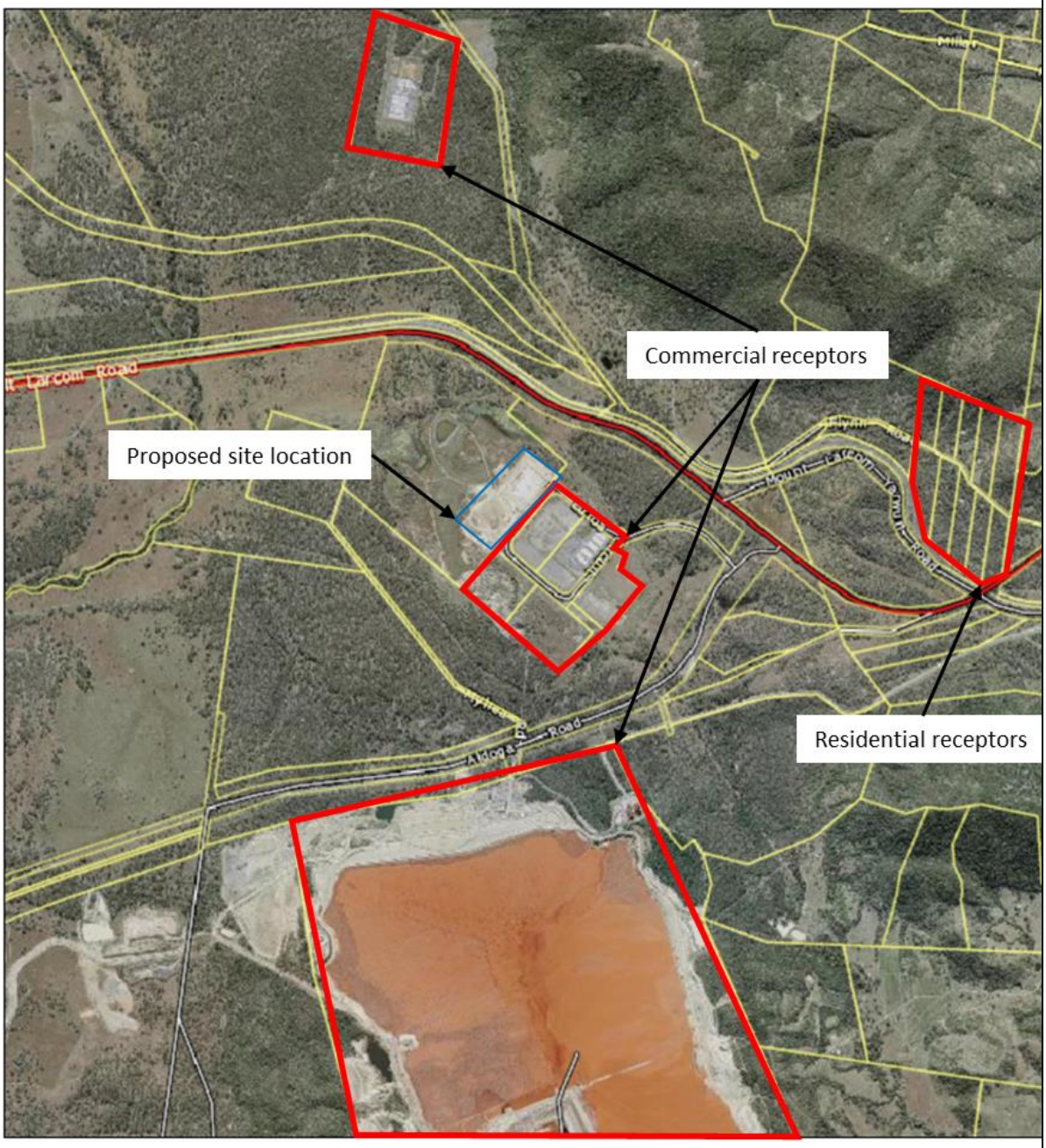
A high-level review of the equipment proposed for the site identified the air-cooled heat exchangers (ACHE) as the largest noise source. The expected noise of the fans was estimated to be 80dBA at 1m. By applying the inverse square law, the estimated noise level at the boundary (FTS is 75m from the boundary) is expected to be less than 50dBA. Given the Site location these noise volumes will not impact on sensitive uses and would be expected for any new use development in an industrial estate.

Environmental values

There are several ecological environmental receptors located within the 2.5km buffer zone, including an Of Concern Regional Ecosystem (E*ucalyptus tereticornis* and/or Eucalyptus spp. Woodland on alluvial plains (11.3.4)), essential wildlife habitat and several waterways.

The nearest sensitive residential receptor appears to be approximately 2.8km to the east of the site, however there are two commercial properties within the 2.5km buffer zone, including a power station to the north and the Yarwun bauxite processing plant and associated byproduct storage facilities immediately to the south.

Sensitive places



Sensitive places surrounding the proposed site location

Site description

The proposed industrial activity is located in the High Impact Industrial Precinct of the SDA. The Precinct is strategically located away from sensitive receptors. With the exception of vehicle access, operational activities will be carried out entirely within the proposed building or shielded areas which will reduce noise emissions externally from the site.

The immediate surround land is relatively flat, however steep elevations of up to 300m are located within 3km to the NE, E and SE of the site.

Site topography including contour mapping Lot 4 SP245936 + 2.5km.

Background noise levels

Demonstrating that the Project can operate without impacting on the noise amenity of the nearest sensitive receptors, uses, and zones has been undertaken by selecting noise monitoring locations representative of the emissions from the existing IPL site and the future FFI site and surrounding area, to obtain baseline data in order to predict the noise from construction and operational activities.

The monitoring sites were chosen as being representative of the future site location and the surrounding area. The locations of attended and unattended noise monitoring are shown in demonstrating that the Project can operate without impacting on the noise amenity of the nearest sensitive receptors, uses, and zones has been undertaken by selecting noise monitoring locations representative of the emissions from the existing IPL site and the future FFI site and surrounding area, to obtain baseline data in order to predict the noise from construction and operational activities.

Noise objectives and criteria

Queensland's Environmental Protection Act 1994 (EP Act) forms part of a legislative framework that regulates noise from domestic, commercial and industrial premises.

Environmental nuisance is defined in the EP Act as unreasonable interference or likely interference with an environmental value caused by, for example, noise. The Environmental Protection (Noise) Policy 2019 (Qld) (EPP Noise) identifies the environmental values of the acoustic environment to be protected and enhanced.

By identifying environmental values, the EPP Noise assists in informing whether environmental nuisance under the EP Act has been caused.

The EPP Noise identifies the environmental values of the acoustic environment to be enhanced or protected and to achieve the objective of the EP Act; that is, ecologically sustainable development.

The environmental values under the policy are:

- the qualities of the acoustic environment that are conducive to protecting the health and biodiversity of ecosystems; and

- the qualities of the acoustic environment that are conducive to human health and wellbeing, including by ensuring a suitable acoustic environment for individuals to do any of the following—
  - sleep;
  - study or learn;
  - be involved in recreation, including relaxation and conversation; and
- the qualities of the acoustic environment that are conducive to protecting the amenity of the community.

Under the policy, a 'sensitive receptor' means: "*An area or place where noise is measured*."

Under the policy, an 'acoustic quality objective' means: "*For a sensitive receptor, means the maximum level of noise that should be experienced in the acoustic environment of the sensitive receptor*."

Acoustic quality objectives for specific sensitive receptors under the policy are stipulated in Schedule 1 of the Environmental Protection (Noise) Policy. Those stipulated in Schedule 1 of the Noise EPP applicable to the Project are presented in Table x below.

Table 1 – Qld Environmental Protection (Noise) Policy 2019 acoustic quality objectives applicable to the Project

Receptor	Time of day	Acoustic quality objectives			Environmental value
		$dBL_{Aeq,1hr}$	$dBL_{A10,1hr}$	$dBL_{A1,1hr}$	
Residence (for outdoors)	Daytime and evening	50	55	65	Health and wellbeing
Residence (for indoors)	Daytime and evening	35	40	45	Health and wellbeing
	Night-time	30	35	40	Health and wellbeing, in relation to ability to sleep
Commercial or retail activity (for indoors)	When the activity is open for business	45	-	-	Health and wellbeing, in relation to the ability to converse

Note:

- Daytime means 7 a.m. to 6 p.m.
- Evening means 6 p.m. to 10 p.m.
- Night-time means 10 p.m. to 7 a.m.
- LAeq,1hr means an A-weighted sound pressure level of a continuous steady sound, adjusted for tonal character, that within a 1-hour period has the same mean square sound pressure of a sound that varies with time
- LA10,1hr means the A-weighted sound pressure level, adjusted for tonal character or impulsiveness, that is exceeded for 10% of a 1-hour period when measured using a fast-standardised response time.
- LA1,1hr means the A-weighted sound pressure level, adjusted for tonal character or impulsiveness, that is exceeded for 1% of a 1-hour period when measured using a fast-standardised response time.

Noise sources

Construction

The construction of the site is proposed to occur in three stages:

- Stage 1: site preparation;
- Stage 2 and 3: construction and installation of equipment and buildings; and
- Stage 4: commissioning.

The number of plant and equipment for each staging, with their associated sound power levels specified in Table 2 below. Plant selections are subject to change once a construction programme has been established by the site contractor. These construction scenarios represent a worst-case assessment based on the preliminary plant proposed for the build. A reassessment may be required if there are significant changes to the construction staging.

Table 2 – Source noise levels for proposed construction plant

Plant	Sound power level (dB) for Octave band centre frequency (Hz)							Total, dB(A)
	63	125	250	500	1k	2k	4k	
Dump truck	113	102	106	101	101	102	95	107
Excavator	109	108	108	111	110	107	104	114
Bulldozer	105	114	103	103	110	108	101	113
Loader	115	110	105	106	101	98	92	107
Bitumen trucks	108	97	94	98	99	97	92	103
Asphalt unit	98	106	107	100	105	96	94	104
Compactor	98	106	107	100	105	96	94	107
Scraper	105	114	103	103	110	108	101	113
Water truck	108	97	94	98	99	97	92	103
Curbing unit	106	105	100	100	99	97	90	104
Piling rig	108	107	101	102	101	101	92	106
Backhoe	114	108	106	105	109	111	110	117
Roller (smooth)	115	113	103	101	103	101	97	108
Concrete truck	108	97	94	98	99	97	92	103
Forklift	108	105	102	102	102	99	93	106
Flatbed truck	105	94	91	95	96	94	89	100
Mobile crane	108	107	101	102	101	101	92	106

Hiab truck	105	94	91	95	96	94	89	100
Generator	108	102	85	82	81	76	73	89
Telescopic crane	108	107	101	102	101	101	92	106
Hand tools	93	93	91	84	83	86	88	94

Note:

Plant sound power levels have been referenced from:

- British Standard BS5228-1:2009 + A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise; and
- Australian Standards AS2436-2010 Guide to noise and vibration control on construction, demolition and maintenance sites

Construction noise at the nearest commercial receiver and residential receptor has been predicted with all plant, in each construction stage, operating simultaneously (which would rarely be the case in practice); and assuming that all plant is located at the nearest site boundary closest to the receiver. This represents a worst-case, and therefore conservative, assessment scenario at the receivers.

The predicted noise levels for construction are shown in Table 3 below.

Operation

Table 3 – Source noise levels for proposed operational plant

Plant	Sound power level (dB) for Octave band centre frequency (Hz)									Total, dB(A)
	31.5	63	125	250	500	1k	2k	4k	8k	
Pumps (100kW, 1600-1800 rpm)	93	94	95	97	97	100	97	93	87	104
Pumps (75kW, 1600-1800 rpm)	93	94	95	97	97	100	97	93	87	103
Pumps (75kW, 3600 rpm)	90	91	92	94	94	97	94	90	84	100
Electrolyser pump	93	94	95	97	97	100	97	93	87	104
Cooling tower	108	111	111	108	105	101	98	95	87	107
Power transformer	80	89	92	87	87	79	72	64	52	86
Distribution transformer	80	89	92	87	87	79	72	64	52	86
Compressor	107	103	108	107	105	108	113	110	103	116
Transformer	80	89	82	87	87	79	72	64	52	86
Condensers	72	77	75	78	74	67	65	57	51	75

Note:

- Power and distribution transformers are only associated with the electrolyser unit substations.

Predicted noise emissions have been calculated for the FFI project site operating in isolation, and with the cumulative emissions from both the FFI and IPL sites, at the nearest commercial receiver and residential receptors. The noise predictions for the FFI site operating in isolation and cumulatively with IPL are detailed in Table 3 above. This represents the cumulative noise emissions for any given period where both sites are simultaneously in operation which is indicative of a worst-case scenario.

Noise impact assessment

Risk: Low

The proposed industrial activity is within the High Impact Industrial Precinct of the SDA. The impacts are not considered significant with regard to the magnitude of noise levels above the criteria.

Noise mitigation strategies

It is recommended strategies are considered and, where appropriate, outlined in a Construction Management Plan to mitigate potential impacts; such as:

- Install site hoardings or boundary barriers prior to construction activities commencing;
- Orient construction trucks and plant away from sensitive receivers as much as possible to minimise noise impacts;
- Strategically group plant together to minimise noise impacts from multiple directions;
- Manage on site vehicle speeds and avoid/minimise using broadband/audible reversing alarms;
- Strategically locate site ingress and egress points to minimise travel within the site. Maintain site paths to avoid unnecessary noise sources such as from vehicles striking potholes and loose items;
- Work within the nominated construction hours of work, including start up meetings and closure periods;
- Utilise lowest noise plant to complete construction works and implement low noise work practices;
- Locate site buildings, staff access areas and laydown yards to minimise disturbance to the community;
- Minimise the use of heavily frequented community areas;
- Utilise temporary enclosures works and/or works undertaken outside the typical construction hours to shield high noise generating activities;
- Ensure noise attenuation measures are implemented on fixed and mobile plant such as mufflers and silencers to minimise noise impacts;
- Turn off plant when not in use and avoid idling when possible;
- Keep out-of-use plant located away from sensitive receivers;
- Avoid heavy handling of materials and equipment to prevent sudden noise events; and

Undertake site inductions for all employees, contractors and subcontractors, with the induction including noise mitigation measures and management actions to be adopted by all site personnel.

4	Failed electrolyser units	It is noted the proposed development is anticipated to manufacture 2000, 1 MW PEM electrolysers, per year. Following assembly, each electrolyser is tested to confirm the electrolyser generates hydrogen at the specified output rate, and pressure, within the rated temperature, and with no system warnings or alarms tested prior to shipment. It is expected that some electrolyser units may 'fail' the testing process. **The proponent is requested to provide** further information as to the processes for disposing or recycling of failed electrolyser units.

Response item 4:

The GEM facility assembles imported components to manufacture each electrolyser which is valued at approximately $500,000.00. Any failures of componentry on a Stack during testing, will result in the return of the electrolyser stack to the assembly / manufacturing area for disassembly of the stack. All components not affected by the failure will be cleaned and reused. All components affected by a failure other than the Gasket can be reused or recycled either internally or by returning to the supplier.

Failures of purchased proprietary devises will be managed in accordance with each supply agreement that may include return of defective products to the source manufacturer. Where components are not returned or recycled, this material will be managed in accordance with the sites operational Waste Management Plan (Doc Ref: QLD01-5620-EN-PLN-0001).

Should you require additional information to support this notice please contact me directly on 0418 911 954 or michael.kilcullen@fortescue.com.

Yours sincerely

FORTESCUE

Michael Kilcullen (Apr 17, 2024 15:16 GMT+8)

Michael Kilcullen
Senior Manager Engineering Readiness
Fortescue Hydrogen Systems

Attachments:

1. Waste Management Plan