SGN Futures (H100) Limited
H100 Fife Production Facility
Fife Production Facility
Methil, Fife
KY8 3RA

Permit Application

PPC/A/5006668

Contents

1 Non-Technical Summary of Determination

The H100 facility will produce hydrogen by the electrolysis of water. The site is expected to produce sufficient hydrogen to meet the demand for 300 homes with the ability to expand to approximately 900 homes in the future.

Water supply - water is supplied from the Scottish Water mains supply.

Electricity for the electrolysis process is provided by a wind turbine, however a connection to the national grid is provided in case of failure of the wind turbine to provide an adequate supply. Due to the critical nature of the hydrogen supply (home heating and cooking), a further back-up supply is provided by a gas oil generator which is located on site and regulated as a Medium Combustion Plant.

Water emissions - trade and foul effluent from the facility will be discharged to Scottish Water sewer, with surface water being released into the Firth of Forth via a long outfall.

Air emissions – the hydrogen manufacturing process will release oxygen on a continuous basis and hydrogen and nitrogen during start-up and shutdown periods. When in use, the back-up gas oil generator will emit combustion products (nitrogen oxides and carbon monoxide).

Odour – the hydrogen manufacturing process itself is not expected to be odorous, however as the hydrogen is being transported to homes via a local hydrogen grid, it must be odorised so that leaks can be identified (as with natural gas). The injection of Odorant NB into the natural gas grid is standard practice within the UK and as such equipment and procedures for preventing and minimising odour are known and routinely used without odour issues.

Noise - the hydrogen manufacturing process equipment and gas oil generator are located in enclosures so should not cause noise nuisance. For safety reasons, in the rare occurrence that an emergency shutdown of the plant is required, hydrogen may need to be vented via the emergency vents. In this case there may be significant noise from the vents for a very short period (2-15 mins), but this is considered to be acceptable due to the short period of impact and the infrequent nature of the emission.

SEPA has assessed the application and considers that the proposal meets the requirements of the Pollution Prevention and Control (Scotland) Regulations 2012 and as such is minded to issue a permit.

Glossary of Terms

BAT - Best Available Techniques
BAT-AEL - Emission levels associated with the best available techniques
BREF – Best Available Techniques Reference Document
BAT-C – Best Available Technique Conclusions
CO – Coordinating Officer
CWW BATC - Commission Implementing Decision (EU) 2016/902 of 30 May 2016 establishing best available techniques (BAT) conclusions, under Directive 2010/75/EU of the European Parliament and of the Council, for common waste water and waste gas treatment/management systems in the chemical sector
EDP - Emergency Depressurisation
ELV – Emission Limit Value
H1 Risk Assessment Tool – is available at H1 Tool | ADMLC.
MCPD - Directive (EU) 2015/2193 of the European Parliament and of the Council of 25 November 2015 on the limitation of emissions of certain pollutants into the air from medium combustion plants
NGR – National Grid Reference
OTNOC - Other than Normal Operating Conditions
PC – Process Contribution
Relevant Hazardous Substances - hazardous substances that are capable of contaminating soil and groundwater based upon consideration of the chemical and physical properties of the substance.
STU - Stationary Technical Unit
SUDS – Sustainable Urban Drainage Systems
sVOC – semi-volatile organic compounds
VOC – volatile organic compounds

2 External Consultation and SEPA's response

Is Public Consultation Required? (if no delete rows below)		**Yes**
Advertisement Check:	**Date**	**Compliance with advertising requirements**
Edinburgh Gazette	**22/01/2024**	**Yes**
The Courier	**21/12/2023**	**Yes**
No of responses received	None.	
Summary of responses and how they were taken into account during the determination:		
Not applicable – no responses received.		
Summary of responses withheld from the public register on request and how they were taken into account during the determination:		
Not applicable – no responses received.		
Is PPC Statutory Consultation Required?		**Yes**
Food Standards Agency	Consultation request sent 06 Dec 2023 Response received 20 Dec 2023 "Food Standards Scotland considers it unlikely that there will be any unacceptable effects on the human food chain from the emissions from this installation."	
Health Board: NHS Fife	Consultation request sent 06 Dec 2023 Response received 08 January 2024 – "The proposal for the hydrogen production facility does not raise concerns from a human health or environmental perspective. However, the proposal does not detail any	

	plans for engagement with the local community to monitor wellbeing implications of the facility and trial. Details of community engagement plans would ideally be taken into account to provide assurance about the direct or indirect health implications of this project (and others).“
Local Authority: Fife Council	Consultation request sent 06 Dec 2023 - no response.
Scottish Water	Consultation request sent 06 Dec 2023 - no response, but it is noted that Scottish Water have provided agreement to both a mains water supply and a discharge consent to a trade effluent sewer.
Health and Safety Executive	Consultation request sent 06 Dec 2023 - no response.
NatureScot	Consultation request sent 06 Dec 2023 Response received 11 Dec 2023 – “We have no comment to make on this application.”

Discretionary Consultation required?	**No**
Enhanced SEPA Consultation required?	**No**
“Off site” consultation required	**No**
Transboundary Consultation required?	**No**
Is Public Participation Consultation Required?	**Yes**

STATEMENT ON THE PUBLIC PARTICIPATION PROCESS
The Pollution Prevention and Control (Public participation)(Scotland) Regulations 2005 requires that SEPA’s draft determination of this application be placed on SEPA’s website and public register and be subject to 28 days’ public consultation. The dates between which this consultation took place, the number of representations received and SEPA’s response to these are outlined below.

Date SEPA notified applicant of draft determination	03/04/2025
Date draft determination placed on SEPA’s Website	See SEPA consultation hub page
Details of any other ‘appropriate means’ used to advertise the draft.	Not applicable
Date public consultation on draft permit opened	See SEPA consultation hub page
Date public consultation on draft permit consultation closed	See SEPA consultation hub page
Number of representations received to the consultation	To be completed post consultation
Date final determination placed on the SEPA’s Website	To be completed once final determination completed.

Summary of responses and how they were taken into account during the determination:

To be completed post consultation

3 Administrative determinations

Determination of the Schedule 1 Activity

The application is for a facility to manufacture hydrogen, this is covered by Section 4.2 Inorganic Chemicals Part A (a) (i) “Producing inorganic chemicals including—inorganic substances, including those in gaseous form, such as …hydrogen…”

Determination of the Stationary Technical Unit to be permitted

The Stationary Technical Unit (or STU) comprises hydrogen production and storage and a gas oil generator for use on failure of both the wind turbine and national grid electric supplies.

Determination of Directly Associated Activities

The Directly Associated Activities or DAAs include:

- The energy centre
- Transformers and rectifiers
- Pressure reduction & metering
- Odorant Injection and storage

The H100 Facility will be powered by an offshore turbine, which is not considered to be part of the installation as (i) while the wind turbine will be used as the primary energy source for the H100 Facility the wind turbine does not solely provide electricity for the facility (it also provides electricity to the local electricity grid) and (ii) as this is situated 50m offshore it is not considered to comprise part of the installation as it is far enough away that the technical connection is broken.

On this basis the following will be inserted into Schedule 1 of the Permit as Table 1.

Stationary Technical Unit:
Water purification (up to 2.5 m^3/h).
Alkaline electrolysers with a combined hydrogen production capacity of 970 Nm^3/h.
Electrolyte storage.
Hydrogen scrubbing with water.
Hydrogen compression and compressed gas storage.
Stand-by generator for use in the event of failure of both the wind turbine and the electricity grid connection comprising of a diesel engine with a rated thermal input of 1.21 MWth, burning gas oil (diesel), operating for less than 500 hours per year (calculated as a rolling average over a period of 3 years) and emitting combustion products via a stack 2.62 m above ground level.
Activities:
The production of hydrogen by electrolysis of water as described in Schedule 1, Part 1, Chapter 4, Section 4.2(a)(i) of the Regulations.
New medium combustion plant with a rated thermal input of equal to or greater than 1 MW up to and including 20 MW.
Directly Associated Activities:
Directly Associated Activities carried out at the energy centre.
The provision of services to the stationary technical unit (including electricity import, transformers and rectifiers).
The processing and storage of gas for export (including pressure reduction, metering, odorant injection and storage).

Determination of Site Boundary

The site location is shown on the map below:

The PPC installation boundary is shown on green on the site plan attached as Appendix B to this document, this plan has been included in the permit as Appendix 1 – Plan of the Authorised Place.

4 Introduction and Background

4.1 Historical Background to the activity and variation

This is a new application.

4.2 Description of activity

The site is located on the eastern side of the town of Buckhaven on land east of Wellesley Road and south west of Links Drive, adjacent to the Fife coastline.

The H100 Fife Production Facility will comprise of hydrogen production, storage, pressure reduction, custody transfer metering, odorant injection, distribution and customer connections to serve domestic hydrogen meters and appliances. The H100 Facility is expected to consume up to 4.4 MW renewable electricity and produce sufficient hydrogen to meet the demand for 300 homes with the ability to expand to approximately 900 homes in the future.

4.3 Outline details of the Variation applied for

Not applicable – this is a new application.

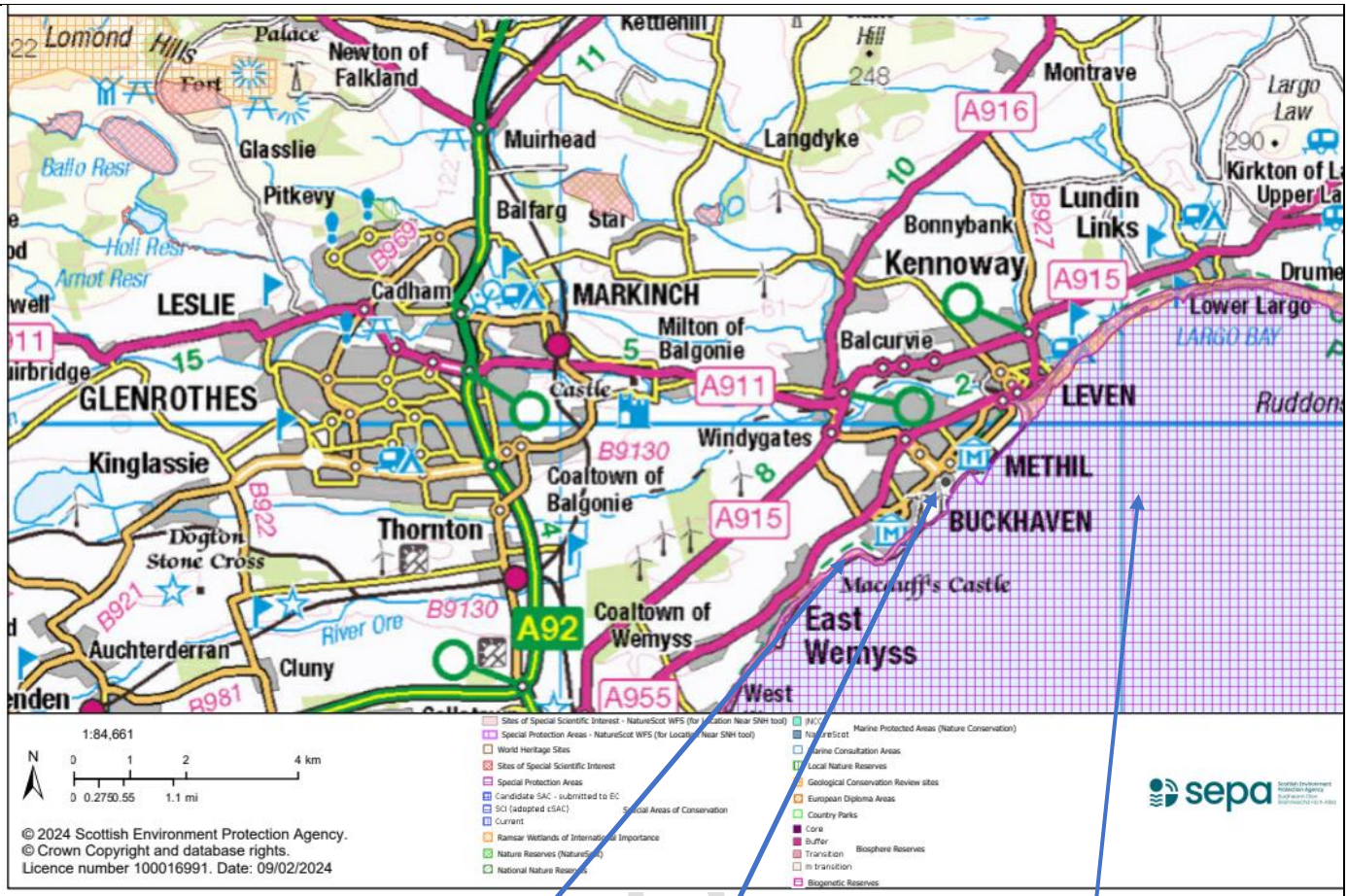
4.4 Guidance/directions issued to SEPA by the Scottish Ministers under Reg.60 or 61.

Not applicable.

4.5 Identification of important and sensitive receptors

The facility is located close to:

- The communities of Methil and Buckhaven
- Special Protection Area (SPA): Firth of Forth
- Special Protection Area (SPA): Outer Firth of Forth and St Andrews



5 Key Environmental Issues

5.1 Summary of significant environmental impacts

Due to the nature of the process, routine impacts from the facility should be limited to wastewater emitted to sewer, oxygen emitted to the air and noise from the process equipment (limited by it being in a designed enclosure). During start-up and shutdown, hydrogen and nitrogen will also be emitted to air. During failure of the electricity supply from both the wind turbine and the national grid connection, a diesel generator will operate, to maintain critical supplies of hydrogen to homes, which will emit nitrogen oxides and carbon monoxide

For safety reasons, in the rare occurrence that an emergency shutdown of the plant is required hydrogen may need to be vented via the emergency vents. In this case there may be significant noise from the vents for a very short period (2-15 mins), but this is considered to be acceptable due to the short period of impact and the infrequent nature of the emission (see section 5.4 Noise below).

5.2 Emissions to Air

Point Source emission to air:

The emission points from the facility are listed in the table below and locations are shown on the site plan in Appendix B:

Emission Point	Location	Operational Mode	Substances released
A1	Electroyser and electrolyte system oxygen vent	Normal operation	Oxygen
		Commissioning of new electrolyser membranes	Ammonia
A2	Electroyser and electrolyte system oxygen vent	Normal operation	Oxygen
		Commissioning of new electrolyser membranes	Ammonia
A3 & A4	Emergency Depressurisation (EDP) stacks	Emergency scenarios, maintenance, commissioning	Hydrogen
		Purging	Nitrogen
IA1	Electrolyser & electrolyte (train 1) hydrogen vent	Emergency scenarios, maintenance, commissioning	Hydrogen
		Purging	Nitrogen
IA2	Scrubber (train 1) H2 bypass vent	Emergency scenarios, maintenance, commissioning	Hydrogen
		Purging	Nitrogen
IA3	Gas holder (train 1) vent	Emergency scenarios, maintenance, commissioning	Hydrogen
		Purging	Nitrogen
IA4	Compressor (train 1) blow off	Emergency scenarios, maintenance, commissioning	Hydrogen
		Purging	Nitrogen
IA5	Downstream of compressor upstream of dryer (train 1)	Emergency scenarios, maintenance, commissioning	Hydrogen
		Purging	Nitrogen
IA6	Downstream of scrubber upstream of compressor (train 1)	Emergency scenarios, maintenance, commissioning	Hydrogen
		Purging	Nitrogen
IA7	Downstream of dryer (train 1)	Emergency scenarios, maintenance, commissioning	Hydrogen
		Purging	Nitrogen
IA8	Electrolyser & electrolyte system (train 2) hydrogen vent	Emergency scenarios, maintenance, commissioning	Hydrogen, Nitrogen
		Purging	Nitrogen
IA9	Scrubber (train 2) H2 bypass vent	Emergency scenarios, maintenance, commissioning	Hydrogen, Nitrogen
		Purging	Nitrogen
IA10	Gas holder (train 2) vent	Emergency scenarios, maintenance, commissioning	Hydrogen
		Purging	Nitrogen
IA11	Compressor (train 2) blow off	Emergency scenarios, maintenance, commissioning	Hydrogen
		Purging	Nitrogen
IA12	Downstream of compressor upstream of dryer (train 2)	Emergency scenarios, maintenance, commissioning	Hydrogen
		Purging	Nitrogen
IA13	Downstream of scrubber upstream of compressor (train 2)	Emergency scenarios, maintenance, commissioning	Hydrogen
		Purging	Nitrogen
IA14	Downstream of dryer (train 2)	Emergency scenarios, maintenance, commissioning	Hydrogen
		Purging	Nitrogen

IA15 & IA16	Filter skid	Emergency scenarios, maintenance, commissioning	Hydrogen
		Purging	Nitrogen
IA17, IA18, IA19, IA20 & IA21	Metering	Emergency scenarios, maintenance, commissioning	Hydrogen
		Purging	Nitrogen
IA22 & IA23	Pressure reduction skid	Emergency scenarios, maintenance, commissioning	Hydrogen
		Purging	Nitrogen
IA24	Odorant skid	Emergency scenarios, maintenance, commissioning	Hydrogen
		Emergency scenarios	Odorant
		Purging	Nitrogen
IA25	Diesel generator exhaust	Operation (only during periods where there is no electrical supply from the wind turbine or the national grid connection).	Nitrogen oxides, carbon monoxide.

Routine emissions:
There are only 2 routine point source emissions to air from the H100 Facility (A1 and A2), one for each electrolyser. Emissions will be oxygen, which is generated through the splitting of water into hydrogen and oxygen by electrolysis. Oxygen will be vented through a water seal and an open vent located 10m above the roof of the electrolyser building.

Due to the use of a water seal – this emission maybe wet and therefore visible. This is allowed within the permit by the use of the standard Condition 3.3.2: “Other than condensed water vapour, all releases to the air during normal operations must be free from visible emissions”.

There are no environmental assessment levels for oxygen in the H1 risk assessment tool and as oxygen and nitrogen are the main constituents of air, the releases would not cause any significant changes to the air quality in the local area. Oxygen will need to be released in a controlled manner in order to meet health and safety guidelines.

Non-routine emissions:
Emissions via emission points IA1 to IA24, A3 and A4 will be infrequent emissions of hydrogen and nitrogen.

Hydrogen will be released in the event of an emergency scenario, nitrogen will be released during purging operations (e.g. prior to and post maintenance or emergency scenarios).

The 2 emergency vents are shown on the site diagram as A3 and A4. Neither should operate routinely, frequency of operation being estimated as once every 7-14 years. For process safety reasons, to ensure that oxygen does not enter into the vent system the vent lines are continuously purged with nitrogen. This is normal practice to protect vent systems from this type of process hazard. A noise assessment has been undertaken (see section 5.4).

There are no environmental assessment levels for hydrogen, or nitrogen in the H1 risk assessment tool and as oxygen and nitrogen are the main constituents of air, the nitrogen releases would not cause any significant changes to the air quality in the local area. Hydrogen will need to be released in a controlled manner in order to meet health and safety guidelines and again is not expected to cause any significant changes to the air quality in the local area.

It is recognised by the applicant that hydrogen is an indirect greenhouse gas.

There are no specific emission limit values associated with emissions of oxygen, hydrogen or nitrogen. However, the Regulation 22 (i) states that "It is a condition of a permit for a Part A…installation…that the operator must use the best available techniques for preventing or, where that is not practicable, reducing emissions from an installation or mobile plant."

Further controls to minimise emissions of hydrogen and nitrogen are present in the restrictions on start-up and shut down via Conditions 3.1.1 and 3.1.2; i.e.

3.1.1 The number of start-ups and shut-downs should be kept to the minimum that is reasonably practicable.
3.1.2 All reasonable steps must be taken to minimise emissions during start up and shut-down.

Given the nature of the facility i.e. the commercial production of hydrogen for local energy supply, it is expected that the Operator will take all appropriate and reasonable measures to minimise venting of hydrogen in line with Regulation 22 (i). This is required by the standard permit condition 2.5.1:

2.5.1 The authorised activities must be undertaken in a manner that uses resources efficiently and minimises the production of waste.

Back-up generator
A back-up diesel generator has been specified for emergency use at the facility in the event that power was lost from both the wind turbine and the national grid simultaneously. The capacity of the generator proposed is 1.21 MWth and so will be regulated as a PPC Schedule 1B activity and required to meet the requirements of the Medium Combustion Plant Directive. The requirements of the Medium Combustion Plant have been incorporated into the permit through use of the standard Medium Combustion Plant conditions.

Air emissions assessment has been carried out in line with Air Emissions Risk Assessment for Environmental Permits | Scottish Environment Protection Agency (SEPA), for both the "running for testing" and "emergency running" scenarios, using the SCAIL model.

Running for testing scenario: As the generator is required to maintain supply of hydrogen to homes in the event of a failure of both the turbine and gird electricity supplies, it is proposed to test run it on a regular basis for a short period to ensure that it is working correctly and will work on demand.

The highest annual mean Process Contribution (PC) for the testing scenario was predicted at receptors on Wellesley Road (1, 3 and 4) and the PC was less than 1% of the Environmental Standard. Therefore the impacts are assessed as insignificant using the standard screening criteria and therefore no further assessment is required.

The hourly mean NO2 PCs for the testing scenario are shown in Table 4. The highest hourly mean PC again occurred at receptors on Wellesley Road and represents 0.2% of the hourly Environmental Standard. Therefore the impacts are below the screening threshold of 10% for short term impacts and can therefore be considered insignificant.

Emergency running scenario:
Although slightly higher than the testing scenario results, all Process Contributions remain less than 1% of the Environmental Standard and therefore can be considered insignificant.

The highest hourly mean PC occurred at receptors on Wellesley Road and represents 0.5% of the hourly Environmental Standard. Therefore the impacts are below the screening threshold of 10% for short term impacts and can therefore be considered insignificant.

A new combustion plant is defined by the MCPD as a combustion plant put into operation on or after 20 December 2018. Since the generator will be purchased new for this project and the fact that the simultaneous loss of power from the turbine and the grid is expected to be very infrequent, it is considered that the Article 6 Paragraph 8 exemption applies to this generator and so no ELVs will be set. This will be controlled through Condition 3.2.1:

3.2.1 The medium combustion plant must not operate more than 500 operating hours per year (calculated as a rolling average over a period of 3 years).
Monitoring of emissions is considered in section 5.9.

Fugitive emissions to air:

Regulation 22 (i) states that "It is a condition of a permit for a Part A…installation…that the operator must use the best available techniques for preventing or, where that is not practicable, reducing emissions from an installation or mobile plant."

As regards fugitive emissions the Operator must demonstrate that fugitive emissions are prevented or, where that is not practicable, reduced. This is required by the standard template conditions 3.10.1, 3.10.2, 3.10.3 and 3.10.4:

3.10.1 Measures must be taken to ensure that fugitive emissions or leaks of hydrogen are prevented.

3.10.2 The Operator shall prepare, implement and maintain a fugitive release inventory for all plant included within the Permitted Installation. The said inventory shall list the main sources of fugitive releases on each plant along with the techniques in place to prevent or minimise emissions from each source. Fugitive emissions shall be quantified (based on composition and mass in kilograms) for each source including the total for each production plant based on monitoring estimates on an annual basis. The fugitive release inventory shall be reported to SEPA on an annual basis, within 2 months of the end of the calendar year.

3.10.3 The Operator shall implement and maintain an on-going annual Leak Detection and Repair Programme (LDAR) designed to reduce fugitive emissions to air from the production plant. The repair programme shall use monitoring using best available techniques and the annual fugitive release inventory as the basis for targeting improvements.

3.10.4 The Operator shall record and report to SEPA the annual leak repair programme for the forthcoming calendar year along with a review of the previous year's repair programme identifying any improvements made, within 2 months of the end of the calendar year.

Odour:

The only potential odour source is the odorant system - like natural gas, hydrogen is colourless and odourless and therefore, in the same way as natural gas, an odorant must be added, to make it detectable, before entering the distribution system. The application explains that "The chosen odorant is Odorant NB which will comprise 78% tertiary butyl mercaptan and 22% dimethyl sulphide and will exhibit an odour that is detectable at minute concentrations so as to act as a natural warning system in the event of a natural gas leak, prior to dangerous levels being reached. Odorant NB will be continuously injected into the hydrogen at a target level of around 6 mg/Sm3 before it is routed to the distribution network."

The injection of Odorant NB into the natural gas grid is standard practice within the UK and as such equipment and procedures for preventing and minimising odour are known.

The ability to measure odorant flow and provide continuous monitoring, regular reports/logs and generate alarms in case of abnormal operating conditions, equipment malfunction or failure has been provided.

Measures to contain the odorant during delivery and storage, e.g. using a Dry Lok System with associated stainless-steel hoses fitted with quick connections, have been specified, along with a bunded area with sealed drainage.

Procedural measures/monitoring during the refilling of the storage tank have also been specified.
The standard template clearly sets out the requirements for odour control in conditions 3.3.1 and 3.3.3:

3.3.1 Measures must be taken to prevent, or where that is not practicable, minimise:
(a) odour;
(b) noise;
(c) dust;
arising from the authorised/permitted activities; and

3.3.3 Offensive odours from the authorised activities as perceived by a SEPA officer must not be emitted beyond the boundary of the authorised place.

BAT 20 of the CWW BAT-C, require the EMS to contain an odour management plan and so one does not need to be specified in the permit conditions.

5.3 Emissions to Water

Point Source Emissions to Surface Water and Sewer:

There are two point source emission points from the installation; one to the Scottish water sewer system (WW2) and one to surface water (SW1), in addition the process wastewater stream has a separate monitoring point (WW1). The emission points from the facility are listed in the table below and locations are shown on the site plan in Appendix B:

Emission point	NGR	Description
WW1	336594 698804	The monitoring point for process wastewater from the hydrogen production building which is subsequently discharged into the Scottish water sewer via WW2.
WW2	336590 698776	The discharge point from the installation for foul water (including the other foul water generated i.e. sinks, toilets and other general facilities) and which is subsequently discharged into the Scottish water sewer.
SW1	336565 698673	Emission point for the surface water drainage system (site roads, roofs and other hardstanding areas). Emissions are treated by filter drains, either collected by gullies and discharged to the top pipe of the dual filter drain or over the edge into the filter drain. Once filtered the surface water will be discharged to the sea via a sea outfall. Surface water which will collect in areas of the site outside of the installation boundary will also be discharged via the same sea outfall

The point at which the wastewater leaves the site via the foul sewer system is WW2. Once the water enters the sewerage system it will be diluted before undergoing treatment at a wastewater treatment facility before being discharged to the environment

Scottish Water issued formal consent for a discharge of trade effluent on 20th January 2023 based on the proposed wastewater quality. Under the formal consent Scottish Water will be monitoring discharges from the H100 Facility from WW1.

The consent for discharge to sewer is set and enforced by Scottish Water and therefore no discharge consent is required in this permit unless it is considered to be necessary to ensure that the relevant Emission levels associated with the Best Available Techniques (BAT-AELs) are achieved.

It is a requirement of BAT that the discharge and treatment of any effluent discharged to sewer is equivalent to the requirements of the Commission Implementing Decision (EU) 2016/902 of 30 May 2016 establishing best available techniques (BAT) conclusions, under Directive 2010/75/EU of the European Parliament and of the Council, for common waste water and waste gas treatment/management systems in the chemical sector [subsequently referred to as the CWW BATC]. The CWW BATC specify BAT-AELs which apply where emissions are above mass emission trigger limits.

The applicant has reviewed emissions against these trigger limits. This assessment shown in the table below uses maximum expected design figures:

	Trigger level (kg/yr)	Annual emission (kg/yr)	Does the annual emission exceed the trigger level?
Total organic carbon	3300	1686.3	No
Chemical oxygen demand	10000	5110	No
Total suspended solids	3500	1788.5	No
Total nitrogen	2500	1277.5	No
Total inorganic nitrogen	2000	1022	No
Total phosphorus	300	153.3	No
Adsorbable organically bound halogens	100	51.1	No
Chromium	2.5	1.3	No
Copper	5.0	2.6	No
Nickel	5.0	2.6	No
Zinc	30	15.3	No

As the emissions are below the trigger limits, the BAT-AELs do not apply. As the effluent is being treated by a licensed Scottish Water Treatment Works, the Scottish Water Consent and subsequent treatment can be taken to be BAT.

On this basis it is not proposed to set any ELVs for discharges leaving the installation at this time, but confirmation of ongoing compliance with the Scottish Water consent will be requested, to ensure that BAT is being implemented, through Condition 3.8.2 as follows:

3.8.2 The operator shall forward to SEPA the results of any effluent monitoring of discharges from WW2 undertaken by Scottish Water on an annual basis within 2 months of the end of the calendar year.

Surface water

The only externally bunded areas on the site will be the potassium hydroxide solution [also called lye solution] tank bund and the odorant area and therefore there is limited potential for contamination of surface water run off, especially given the infrequent use of the lye tank (detailed in Section 3.4.7). The surface water drainage from site roads, roofs and other hardstanding areas will be treated by filter drains, either collected by gullies and discharged to the top pipe of the dual filter drain or over the edge into the filter drain. Once filtered the surface water will be discharged to the sea via a sea outfall. Surface water

which will collect in areas outside of the installation boundary will also be discharged via the same sea outfall.

Under normal circumstances the surface water should not contain any contamination and as such no consent has been set, however an outcome-based condition (3.8.5) has been set to ensure that the emission does not cause a significant impact on the environment:

3.8.5 The authorised activities must not have a significant impact on the water environment as a result of:
(a) iridescence/sheen;
(b) discolouration;
(c) deposition of solids;
(d) increased foaming; and
(e) microbiological growth.

Additionally, Condition 3.8.7 requires that:

3.8.7 The discharges must not:
(a) be directly into groundwater;
(b) have a significant adverse impact on any water used for human consumption.

Emission points WW1, WW2 and SW1 are shown in the permit on Appendix 1 – Plan of the Authorised Place.

Point Source Emissions to Groundwater:

Not applicable – there are no point source emissions to Groundwater.

Fugitive Emissions to Water:

Not applicable – surface water is captured and discharged via SW1.

5.4 Noise

Normal operation:
The applicant has carried out a Noise Impact Assessment (NIA) in line with the SEPA Guidance – Noise and vibration management: environmental permits. The assessment utilises BS 4142:2014, a 3D noise prediction model and an environmental sound level survey has been undertaken to establish noise levels at the closest receptors.

The predicted noise emissions arising from normal operation of the H100 Facility were found to not exceed the background sound level (LA90, T). As noted in BS414215, where the rating level does not exceed background sound levels, this is an indication of the specific sound source having a low impact. By reference to the SEPA permit guidance, the level of noise impact results in “no noise or barely audible/detectable noise”. This level of noise means that no action is needed beyond basic appropriate measures/BAT.

The design of the H100 facility is in line with the techniques indicated in the CWG BAT-C BAT 22 (see Appendix A below).

The standard template clearly sets out the requirements for noise control in conditions 3.3.1 and 3.3.4:

3.3.1 Measures must be taken to prevent, or where that is not practicable, minimise:
(a) odour;
(b) noise;
(c) dust;
arising from the authorised/permitted activities.

3.3.4 Noise from the authorised activities, which has a significant impact on the environment, people or property, must not be emitted beyond the boundary of the authorised place.

BAT 22 of the CWW BAT-C, require the EMS to contain a noise management plan and so one does not need to be specified in the permit conditions.

Emergency vent stacks (emission points A3 & A4)
The applicant has also carried out a noise impact assessment to review noise emissions during use of the emergency depressurisation (EDP) stacks.

The stacks should only be used during commissioning and in emergency scenarios.

The BS 4142 assessment that has been undertaken using the results of noise modelling indicates that noise levels during this event could be up to 20-22 dB above the background sound level at night time and 11-13 dB above the back ground level during the day time, which is an indication of a significant adverse impact. The assessment considers that the “maximum noise level lasts for 2 minutes during the 15 minutes of the overall emergency release pressure event” and that “it is only predicted to activate once every 7-14 years”.

On the basis that although the noise levels from emergency venting are high as (i) the venting is for safety reasons, (ii) any significant noise will be for a very short period (2-15 mins) and (iii) the infrequent nature of the emission (once every 7-14 years) it is considered that the venting arrangements are acceptable.

It is considered that if the EDP venting is planned, for example commissioning, then both SEPA and the community should be advised of it in advance and that the event can be arranged to provide the least disruption. Therefore condition 3.6.2 has been placed in the permit to require advance warning of planned venting via the EDP stacks at least 7 days in advance:

3.6.2 SEPA must be notified in writing of any planned venting from the EDP stacks (emission points A3 and A4). The notification must be given at least 7 days before the planned venting event and must include:
(a) The reason why the planned venting is required;
(b) An estimate of the quantity of hydrogen to be vented;
(c) An estimate of the date, time and duration that the planned venting event will take place over.

In the case of an emergency event, advance warning may not be possible. In this case Condition 3.6.3 of the permit will require the venting will be treated as an environmental event under conditions 7.1 to 7.3 of the permit. This will require the operator to investigate, and report to SEPA, the cause of the venting and propose improvements to prevent recurrence.

3.6.3 Any venting events from the EDP stacks not notified under 3.6.2 must be treated as an event in terms of 7.1 through to and including 7.3.

5.5 Resource Utilisation

Water use

Water is the raw material for the manufacture of hydrogen using electrolyser technologies. The standard template already contains condition 2.5.1 that requires that water be used efficiently:

2.5.1 The authorised activities must be undertaken in a manner that uses resources efficiently and minimises the production of waste.

No further conditions are considered to be required.

Energy use and generation

The H100 Facility will be powered from electricity generated by the ORE Catapult's (OREC) Levenmouth Demonstration Turbine, situated 50m offshore. The turbine is considered to be outside of the installation boundary for the reasons explained in Section 2. The OREC wind turbine will be able to generate 7 MW of electricity. The H100 Facility and the wider site requires 4.4 MW of electricity supply to operate. Any electricity produced which is not used by the H100 facility and wider site will be distributed to the electricity grid. Electricity from the gird will only be used to power the site when there is insufficient electricity supply from the wind turbine.

The Operator is required to record and report electricity use by source as part of the resource efficiency requirements of Conditions 6.2. No further conditions are considered to be required.

Raw Materials Selection and Use

There are a limited number of raw materials, most of which are required due the technology chosen (alkaline electrolyser) - water, odorant NB, potassium hydroxide solution [also called lye solution], nitrogen, transformer oils and water purifier cleaning products. Therefore, alternatives are not possible.

5.6 Waste Management and Handling

Waste Minimisation

Waste produced by the facility will mostly consist of municipal type waste generated by staff working on the site and maintenance waste.

The municipal waste will be stored in a dedicated external storage area located outside of the installation boundary as it is shared with another building.

Maintenance waste will be stored in a suitable container within a bunded area and until removal offsite.

Condition 5.3 will be inserted into the permit to require a waste management plan to be developed which will ensure that wastes are handled, stored and disposed of properly:

5.3 Raw Materials, Waste Handling and Storage

5.3.1 Waste shall not be stored at the Permitted Installation for periods in excess of one year unless otherwise agreed in writing with SEPA.

5.3.2 The Operator shall prepare and thereafter maintain a register of the raw materials and wastes. The said register shall be updated at least every 6 months and shall contain the following records for each raw material or waste type:

a. A unique reference name or number for identification purposes;
b. A description of the activity that generated the waste stream, including an indication whether the activity is of a permanent or temporary nature;
c. Quantities of raw materials stored on-site or waste generated with reference to mass, volume or number of items;
d. Date on which storage of the raw material or waste commenced and date of removal of the waste from the Permitted Installation;
e. Location and method of on-site handling and storage of the raw material or waste; and
f. A description of the type of raw material or waste.

Waste Handling

See waste minimisation.

Waste Recovery or Disposal

See waste minimisation.

5.7 Management of the site

Environmental Management System

Scotia Gas Networks Limited have an Environmental Management System (EMS) which is compliant with ISO 14001.

The application indicates that the EMS will be in line with the requirements of BAT 1 of both the CWW and CWG BAT-C (see Appendix A below).

Standard conditions 2.2 Management Systems will be included as follows:

2.2.1 The Permitted Installation must be managed and operated in accordance with a written management system.
2.2.2 The written management system required by Condition 0 must be implemented immediately after Commissioning has concluded.
2.2.3 The written management system must be reviewed as required and at least once every 4 years. All reviews must be recorded, and the results of any review incorporated into the written management systems, and implemented, within a period of 3 months from the end of the review.

Accidents and their Consequences

The PPC Regulations contain a general principle that "— installations should be operated in such a way that … the necessary measures are taken to prevent accidents and limit their consequences."

Scotia Gas Networks Limited already have a Safety Management Framework which will be developed to include procedures for the H100 Facility. An Accident Risk Assessment has been undertaken as part of the application. The accident risk assessment identifies potential accidents at the facility, assesses their risks and identifies mitigation measures that will be incorporated into the design and operation of the H100 Facility. The assessment takes into account; the identification of the hazards with the potential to damage the environment; the assessment of the risks of potential environmental consequence; and the identification of the techniques necessary to reduce the risk.

The main accident risk from an environmental perspective is a release of potassium hydroxide solution from the storage tank, when in use. The containment arrangements will be inspected when the facility is brought into operation.

Additionally, the standard liquid storage condition 5.1.1 has been included as follows:

5.1.1 Containers used for the storage of liquids must stored within a bund / secondary containment system that must:
- a. hold at least:
  - (i) for a single container, 110% of its total capacity; or
  - (ii) for two or more containers the greater of:
    1) 110% of the capacity of the largest container; or
    2) 25% of the capacity of all containers together.
- b. catch all spills from the container(s) and related parts;
- c. be leak-proof;
- d. be located and/or protected, to prevent damage as far as reasonably practicable;
- e. be stored away from sources of heat; and
- f. have any spills and/or rainwater removed as soon as reasonably practicable.

BAT 1 of the CWG BAT-Cs require the EMS to contain an OTNOC management plan for emissions to air, so there is no need to specify one in permit conditions.

Additional requirements may be triggered by the Control of Major Accident Hazards (COMAH) Regulations 2015 if the quantity of hydrogen stored on site exceeded the lower tier threshold of 5 tonnes.

The standard condition in the "low-risk production of hydrogen by electrolysis of water" template is that "the volume of hydrogen stored at the installation at any one time must not exceed 2 tonnes" as there are no extra precautions that need to be put in place to allow the storge of 4.855 tonnes, Condition 5.2.1 has been changed to the following:

5.2.1 The volume of hydrogen stored at the installation at any one time must not exceed 4.855 tonnes.

Closure

There are no specific closure/decommissioning requirements arising at this time so the standard conditions will be inserted into the permit as follows:

2.4 Decommissioning

2.4.1 SEPA must be notified if there is a planned cessation of all, or any part of authorised activities for any period exceeding 12 months.

2.4.2 On final cessation of activities, measures must be taken to return to the installation to a satisfactory state.

5.8 Site Condition report

The authorised location is a brownfield site which was formerly used as a colliery. A site condition/baseline report was provided with the application.

There will be limited relevant hazardous substances present on site: odorant nb, potassium hydroxide solution, transformer oil.

The applicant has installed boreholes and it is undertaking monitoring. It is noted that due to the fact that there are no specific test method standards for odorant and potassium hydroxide surrogate monitoring has been agreed with SEPA (VOC, sVOC, sulphide, potassium and pH).

5.9 Monitoring

Air

Hydrogen production system – no monitoring required to be specified in the permit. The Operator may carry out monitoring for the purposes of efficient and safe operation.

Conditions 3.5.4 and 3.5.5 will be inserted into the permit requiring the Operator to report on mass emissions of hydrogen and oxygen to air so that the overall impact of the facility can be reviewed:

3.5.4 The Operator shall record and report the mass emission results for the parameters of the combined emissions specified in Table 4 using the method agreed in writing with SEPA (as summarised in Table 4). This information shall be reported in a format agreed in writing with SEPA.

3.5.5 Information used to estimate mass emissions in compliance with Condition 3.4.4 shall be recorded for each estimate.

Table 4 – Mass emissions to air

Substance/ Parameter	Combined Emissions Point	Method (Summary)	Mass Emissions Result to be recorded as:
Hydrogen	A3, A4, IA1, IA2, IA3, IA4, IA5, IA6, IA7, IA8, IA9, IA10, IA11, IA12, IA13, IA14, IA15, IA16, IA17, IA18, IA19, IA20, IA21, IA22, IA23 & IA24	Amount of hydrogen produced minus the sum of the metered amount of hydrogen exported and the amount of fugitive hydrogen emissions	kg
Oxygen	A1 & A2	Calculated from the amount of hydrogen produced	kg
Nitrogen	A3, A4, IA1, IA2, IA3, IA4, IA5, IA6, IA7, IA8, IA9, IA10, IA11, IA12, IA13, IA14, IA15, IA16, IA17, IA18, IA19, IA20, IA21, IA22, IA23 & IA24	Amount of nitrogen used for purging	kg
Nitrogen Oxides	IA25	Calculated from the number of hours running x test results	kg

Back-up generators

Monitoring frequencies for Nitrogen oxides and carbon monoxide have been set in line with Paragraph 2 of Part 1 to Annex III of the MCPD, in Table 3 of the permit.

Substance	Emission Point Reference Number (as shown on plan of the installation)	Operational mode	Monitoring frequency	Monitoring method
Nitrogen Oxides	IA25	Normal operation firing gas oil	At least once every: (a) 1500 hours of operation; or (b) 5 years.	BS EN 14792
Carbon Monoxide	IA25	Normal operation firing gas oil	At least once every: (a) 1500 hours of operation; or (b) 5 years.	BS EN 15058

Water

No monitoring required to be specified in the permit. The Operator may carry out monitoring for the purposes of efficient and safe operation.

Trade effluent will be sent to a Scottish Water sewer and monitoring will be specified by Scottish Water. Condition 3.8.2 will be inserted into the permit that requires that monitoring undertaken by Scottish Water be forwarded to SEPA so that the overall impact of the facility can be reviewed:

3.8.2 The operator shall forward to SEPA the results of any effluent monitoring undertaken by Scottish Water on an annual basis.

Soil and Groundwater

The standard soil and groundwater monitoring conditions are included as condition 4.2 of the permit.

Due to the limited relevant hazardous substances present on site: odorant nb, potassium hydroxide solution, transformer oil and the nature of the site it is considered that an appropriate monitoring period for groundwater is every 5 years and soil every 10 years – these have been incorporated into the standard conditions.

Waste

See section 5.6 above.

5.10 Consideration of BAT and compliance with BAT-Cs if appropriate

See appendix A.

To demonstrate that the facility is being designed and built in line with industry standards, the applicant has provided a list of the external standards and guidance documents that are being used for the design specification. In addition, SGN have their own internal specific specifications which were used in the design.

Main External Standards and Specifications
General mechanical standards
ASME B31.12 Hydrogen Piping and Pipelines
ASME B31.3 Process Piping
The Pressure Equipment (Safety) Regulations 2016
2014/68/EU: Pressure equipment directive
BS EN ISO 14122-1-4:2016, Safety of machinery - Permanent means of access to machinery
EIGA IGC 15/21: Gaseous hydrogen installations
API STD 6FA Standard for Fire Test of Valves
EN 1991 Eurocode 1. Actions on structures - General actions - Densities, self-weight, imposed loads for buildings
BS EN ISO 12944-2. Paints and varnishes. Corrosion protection of steel structures by protective paint systems. Classification of environments
IGEM/TD1 Supplement 1 Handling, transport and storage of steel pipe, bends and fittings.
IGEM/TD13 Pressure regulating installations for natural gas, Liquefied Petroleum Gas (LPG) and LPG/air
IGEM/TD13 Ed 2 Supplement 1 Pressure regulating installations for Hydrogen at pressures exceeding 7 bar
IGEM/SR/14 edition 2 Fixed volume storage for lighter than air gases
Water treatment
Machinery Directive 2006/42/EU
UKCA SI 2008 No 1597 The Supply of Machinery (Safety) Regulations 2008
CE Directive 2014/35/EU
UKCA SI 2016 No 1101 Electrical Equipment (Safety) Regulations 2016
CE Directive 2014/30/EU
UKCA SI 2016 No 1091 The Electromagnetic Compatibility Regulations 2016
Storage Vessels
PD 5500:2021: Specification for unfired fusion welded pressure vessels
EIGA IGC 15/21: Gaseous hydrogen installations
IGEM/SR/14 edition 2: Fixed volume storage for lighter than air gases
2014/68/EU: Pressure equipment directive
The Pressure Equipment (Safety) Regulations 2016
BS EN ISO 14122-1-4:2016, Safety of machinery - Permanent means of access to machinery
EN 1991: Actions on structures
Pressure reduction unit
ISO 9001 Quality management and quality assurance standards guidelines for selection and use
ISO 10474 Steel and steel products – inspection document
BS EN ISO 12944-2 Paints and varnishes – corrosion protection of steel structures by protective paint systems. Classification of environments
BS EN 10204 Metallic BS EN 60079-14 Explosive atmospheres - Electrical installations design, selection and erection products – Types of inspection documents
ASME B31.12 Hydrogen Piping and Pipelines
IGE/SR/23 Venting of natural gas
IGEM/TD/13 Pressure regulating installations for natural gas, Liquefied Petroleum Gas (LPG) and LPG/ai

IGEM/TD/13 Supplement 1 Pressure Regulating Installations for Hydrogen at Pressures Exceeding 7 Bar
T-PM-TMP-4 Management Procedure for Installation Pipework
Odorant injection
ISO 9001 Quality management and quality assurance standards guidelines for selection and use
ISO 10474 Steel and steel products – inspection documents
BS EN ISO 12944-2 Paints and varnishes – corrosion protection of steel structures by protective paint systems. Classification of environments
BS EN 10204 Metallic products – Types of inspection document
BS EN 60079-14 Explosive atmospheres - Electrical installations design, selection and erection
BS EN 1092 Flanges and their joints. Circular flanges for pipes, valves, fittings and accessories, PN designated - Steel flanges
BS EN 10216 Seamless steel tubes for pressure purposes. Technical delivery conditions
ASME B31.12 Hydrogen Piping and Pipelines
T-SP-PA-10 Specification for new and maintenance painting at works and site for above ground pipeline and plant installations
IGEM/SR/16 Odorant systems for gas transmission and distribution
T-PM-TMP-4 Management Procedure for Installation Pipework
Uninterruptable power supply
ISO 9001 Quality management and quality assurance standards guidelines for selection and use
T-SP-EL-17 Specification for UPS, Batteries and Charging Systems
IEEE-485 IEEE Recommended Practice for Sizing Lead-Acid Batteries for Stationary Applications
BS EN IEC 62485-2 Safety Requirements for Secondary Batteries and Battery Installations – Part 2: Stationary Batteries
BS EN IEC 60896-21 Stationary lead-acid batteries. Valve regulated types - methods of test
BS EN IEC 60896-22 Stationary lead-acid batteries. Valve regulated types - requirements

6 Other Legislation Considered

Nature Conservation (Scotland) Act 2004 & Conservation (Natural Habitats &c.) Regulations 1994

Is there any possibility that the proposal will have any impact on site designated under the above legislation?	**No**

The potential impact on Habitats sites was considered. It was noted that NatureScot were consulted on the application (see section 2) and responded that they had no comment to make on this application.

Air emissions:
In this application the only pollutants realised by the hydrogen production process to air are hydrogen, oxygen and nitrogen, none of these are the main pollutants of concern for a Habitats assessment. Modelling has been undertaken for the occasional running of the gas oil generator, which has not raised any concerns in regard to impact on habitats.

Water emissions
The only direct emission to water is surface water, this has been reviewed and the appropriate level of SUDs treatment has been provided.

Is there any other legislation that was considered during determination of the permit (for example installations that may be impacted by the requirements of legislation involving Animal By Products, Food Standards, Waste, WEEE regulations etc).	**No**

7 Environmental Impact Assessment and COMAH

How has any relevant information obtained or conclusion arrived at pursuant to Articles 5, 6 and 7 of Council Directive 85/337/EEC on the assessment of the effects certain public and private projects on the environment been taken into account?
Not applicable
How has any information contained within a safety report within the meaning of Regulation 7 (safety report) of the Control of Major Accident Hazards Regulations 1999 been taken into account?
Not applicable – the site does not exceed the qualifying thresholds in the Control of Major Accident Hazards Regulations

8 Details of the permit

Do you propose placing any non-standard conditions in the Permit?	**Yes**

Whilst the facility does not meet the criteria for the low-risk production of hydrogen from water using electrolysis, i.e.

- the installation is on-shore or up to 12 nautical miles (NM) off-shore;
- electricity for the production of hydrogen is sourced exclusively from renewable sources
- a maximum of 2 tonnes of hydrogen is stored at any one time;
- where water is abstracted from a surface water or groundwater source the abstraction is limited to 2000m^3 per day, and a SEPA water abstraction authorisation has been granted or an application has been submitted to us; or where the abstraction of water is from the public water supply infrastructure;
- any wastewater is discharged to sewer or soakaway, or tankered off-site;
- there are no emissions to air other than oxygen during normal operations.

It is proposed to use the “low-risk production of hydrogen by electrolysis of water” template and to add any specific standard or bespoke to cover any aspects that are missing.

Do you propose making changes to existing text, tables or diagrams within the permit?	**No**

Outline the changes required and provide justification below:

Proposed Condition Number:	Proposed Change:	Justification:
5.2.1	The volume of hydrogen stored at the installation at any one time must not exceed 4.855 tonnes	The standard condition is that “the volume of hydrogen stored at the installation at any one time must not exceed 2 tonnes” there are no extra precautions that need to be put in place to allow the storge of 4.855 tonnes.

9 Emission Limit Values or Equivalent Technical Parameters/Measures

Are you are dealing with either a permit application, or a permit variation which would involve a review of existing ELVs or equivalent technical parameters?	**No**

10 Peer Review	
Has the determination and draft permit been Peer Reviewed?	**Yes**

11 Final Determination

Issue a Permit – Based on the information available at the time of the determination SEPA is satisfied that

- The applicant will be the person who will have control over the operation of the installation/mobile plant,
- The applicant will ensure that the installation/mobile plant is operated so as to comply with the conditions of the Permit,
- That the operator is in a position to use all appropriate preventative measures against pollution, in particular through the application of best available techniques.
- That no significant pollution should be caused.

Appendix A – Compliance with relevant BAT Conclusions

1. Primary Activity

The primary activity at the installation is the production of hydrogen by electrolysis of water as described in Schedule 1, Part 1, Chapter 4, Section 4.2(a)(i) of the Regulations. This activity is covered by a number of BAT Conclusions (BATC).

The Large Volume Inorganic Chemicals BATCs have not yet been published but the following applicable BATCs have been published and are reviewed below:

Common waste gas management and treatment systems in the chemical sector

Common waste water and waste gas treatment/management systems in the chemical sector

2. Common waste gas management and treatment systems in the chemical sector BAT-C compliance assessment:

BATC	Description	Summary of BATC and discussion	Complies with BATC?
1	Environmental Management Systems (EMS)	**In order to improve the overall environmental performance, BAT is to elaborate and implement an environmental management system (EMS) that incorporates all of the listed features.** See section 5.7 of main document.	Yes
2	Inventory of air emissions	**In order to facilitate the reduction of emissions to air, BAT is to establish, maintain and regularly review (including when a substantial change occurs) an inventory of channelled and diffuse emissions to air, as part of the environmental management system (see BAT 1), that incorporates all of the listed features.** See section 5.2 of main document.	Yes
3	Other than Normal Operating Conditions (OTNOC).	**In order to reduce the frequency of the occurrence of OTNOC and to reduce emissions to air during OTNOC, BAT is to set up and implement a risk-based OTNOC management plan as part of the environmental management system (see BAT 1) that includes all of the listed features.** The hydrogen production process is a relatively simple process, hydrogen production can be stopped by cutting off the supply of electricity to the electrolysers, so other than normal operating conditions should be very limited. An EMS is required by Conditions 2.2, this should be inspected to ensure that it includes all relevant features as a relevant risk based OTNOC management plan.	Yes

BATC	Description	Summary of BATC and discussion	Complies with BATC?
4	Integrated waste gas management and treatment strategy.	**In order to reduce channelled emissions to air, BAT is to use an integrated waste gas management and treatment strategy that includes, in order of priority, process-integrated recovery and abatement techniques.** See section 5.2 of main document. The hydrogen production process is a relatively simple process with limited air emissions of substances which although they have process safety concerns, are relatively benign to the environment. As such waste gas treatment is not required	Yes
5	Minimisation of emission points.	**In order to facilitate the recovery of materials and the reduction of channelled emissions to air, as well as to increase energy efficiency, BAT is to combine waste gas streams with similar characteristics, thus minimising the number of emission points.** See section 5.2 of main document.	Yes
6	Waste gas treatment system design.	**In order to reduce channelled emissions to air, BAT is to ensure that the waste gas treatment systems are appropriately designed (e.g. considering the maximum flow rate and pollutant concentrations), operated within their design ranges, and maintained (through preventive, corrective, regular and unplanned maintenance) so as to ensure optimal availability, effectiveness and efficiency of the equipment.** See section 5.2 of main document.	Yes
7	Monitoring of key process parameters.	**BAT is to continuously monitor key process parameters (e.g. waste gas flow and temperature) of waste gas streams being sent to pretreatment and/or final treatment.** See section 5.2 of main document.	Yes
8	Monitoring of emissions to air.	**BAT is to monitor channelled emissions to air with at least the frequency given below and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.** None of the substances listed in BAT 8 are emitted from the process and therefore no monitoring requirements are defined based on the BAT-Cs.	Yes
9		**This BAT-C applies to organic compounds sent to the final waste gas treatment. As no organic compounds are emitted from the process, this BAT-C is not applicable.**	

BATC	Description	Summary of BATC and discussion	Complies with BATC?
10	Energy efficiency in relation to final waste gas treatment.	**In order to increase energy efficiency and to reduce the mass flow of organic compounds sent to the final waste gas treatment, BAT is to send process off-gases with a sufficient calorific value to a combustion unit that is, if technically possible, combined with heat recovery. BAT 9 has priority over sending process off-gases to a combustion unit.** Whilst gases with sufficient calorific content can be emitted from the process, this only occurs in the event of an emergency and prior to maintenance which will occur once annually. A combustion unit would not be suitable for very occasional and emergency use. For these purposes a safety vent has been specified and is regarded as BAT.	Yes
11		**This BAT-C applies to channelled emissions to air of organic compounds, As there are no emissions of organic compounds to air from the facility, the BAT-C is not applicable.**	N/A
12		**This BAT-C applies to channelled emissions to air of PCDD/F from thermal treatment of waste gases containing chlorine and/or chlorinated compounds. As there is no thermal treatment at the facility, the BAT-C is not applicable.**	N/A
13 - 14		**These BAT-Cs apply to emissions of dust and particulate-bound metals. As there are no emissions of dust and particulate-bound metals to air from the facility, the BAT-C is not applicable.**	N/A
15	Resource efficiency in relation to waste gas treatment.	**In order to increase resource efficiency and to reduce the mass flow of inorganic compounds sent to the final waste gas treatment, BAT is to recover inorganic compounds from process off-gases by using absorption and to reuse them.** Inorganic gases (hydrogen, oxygen, nitrogen) will be emitted from the process. Emission of hydrogen and nitrogen only occur in the event of an emergency and prior to maintenance which will occur once annually. Given the infrequent nature and emission profile recovery is impractical and release via a safety vent is regarded as BAT. Oxygen produced as a by-product from the process will be routinely vented to atmosphere, this is normal for hydrogen plants of this type unless a suitable user is sited locally, and is therefore considered to be BAT. Through the resource efficiency review SEPA will expect the Operator to continue to look for possible uses for capture/re-use of this stream.	Yes
16		**This BAT-C applies to channelled emissions to air of CO, NOX and SOX from thermal treatment. As there is no thermal treatment at the facility, the BAT-C is not applicable.**	N/A

BATC	Description	Summary of BATC and discussion	Complies with BATC?
17		**This BAT-C applies to channelled emissions to air of ammonia from the use of selective catalytic reduction (SCR) or selective non-catalytic reduction (SNCR) for the abatement of NOX emissions (ammonia slip). As neither SCR or SNCR are required to be used at the facility the BAT-C is not applicable.**	N/A
18		**This BAT-C applies to channelled emissions to air of inorganic compounds other than channelled emissions to air of ammonia from the use of selective catalytic reduction (SCR) or selective non-catalytic reduction (SNCR) for the abatement of NOX emissions), channelled emissions to air of CO, NOX and SOX from the use of thermal treatment, and channelled emissions to air of NOX from process furnaces/heaters. As none of these techniques are required to be used at the facility the BAT-C is not applicable.**	N/A
19-23		**These BAT-Cs apply to emissions of Volatile organic compounds. The facility does emit volatile organic compounds and so the BAT-Cs are not applicable.**	N/A
24 - 35		**These BAT-Cs apply to the production of polymers and synthetic rubbers and so are not applicable to hydrogen production**	N/A
36		**This BAT-C applies to process furnaces and heaters, the facility does not have either a furnace or a heater and so the BAT-C is not applicable.**	N/A

3. <u>Common waste water and waste gas treatment/management systems in the chemical sector BAT-C compliance assessment:</u>

BATC	Description	Type		Complies with BATC?
1	Environmental Management Systems (EMS)		**In order to improve the overall environmental performance, BAT is to implement and adhere to an environmental management system (EMS) that incorporates all of the listed features:** See section 5.7 of main document.	Yes
2	Establish and to maintain an inventory of waste water and waste gas streams.		**In order to facilitate the reduction of emissions to water and air and the reduction of water usage, BAT is to establish and to maintain an inventory of waste water and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the listed features.**	Yes

BATC	Description	Type		Complies with BATC?
3	Monitoring key process parameters.		**For relevant emissions to water as identified by the inventory of waste water streams (see BAT 2), BAT is to monitor key process parameters (including continuous monitoring of waste water flow, pH and temperature) at key locations (e.g. influent to pretreatment and influent to final treatment).** As no emission limit values have been set based on BAT-AELs and that the wastewater streams will be discharged into a trade effluent sewer regulated by Scottish Water, no monitoring requirements have been set in the permit. However, to allow overview by SEPA of the wastewater emissions from the facility, with no additional burden on the Operator, the permit requires the Operator to submit the results of Scottish Water wastewater monitoring annually.	Yes
4	Monitoring of emissions to water.		**BAT is to monitor emissions to water in accordance with EN standards with at least the minimum frequency given below. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.** As no emission limit values have been set based on BAT-AELs and that the wastewater streams will be discharged into a trade effluent sewer regulated by Scottish Water, no monitoring requirements have been set in the permit. However, to allow overview by SEPA of the wastewater emissions from the facility, with no additional burden on the Operator, the permit requires the Operator to submit the results of Scottish Water wastewater monitoring annually.	Yes
5			**This BAT-C applies to diffuse VOC emissions to air. As there are no VOC emissions from the facility the BAT-C is not applicable.**	N/A
6	Monitoring of odour emissions.		**BAT is to periodically monitor odour emissions from relevant sources in accordance with EN standards.** The hydrogen production process will not result in the generation of odour as hydrogen is odourless. Prior to export from the facility, Odorant NB will be added to the hydrogen to enable it to be detectable in the event of a leak. The Odorant injection process will take place within an enclosed unit and hydrogen gas which has been subject to odorant injection will be contained within the pipework. In the event odour is detected, the source of the odour will be investigated, this may require odour monitoring/assessment. Given the enclosed nature	Yes

BATC	Description	Type		Complies with BATC?
			of the process and the maintenance systems described in the application, this is regarded as BAT for the installation.	
7	Reduction in the usage of water and the generation of waste water.		**In order to reduce the usage of water and the generation of waste water, BAT is to reduce the volume and/or pollutant load of waste water streams, to enhance the reuse of waste water within the production process and to recover and reuse raw materials.** Given that water is the main raw material feed for the process, the amount of wastewater is directly related to the amount of hydrogen produced. Efficient operation of the water preparation process should ensure that water is not unnecessarily sent to sewer.	Yes
8	Segregation of uncontaminated waste water streams from waste water streams that require treatment.		**In order to prevent the contamination of uncontaminated water and to reduce emissions to water, BAT is to segregate uncontaminated waste water streams from waste water streams that require treatment.** Wastewater is segregated from surface water and they are disposed of independently so that resources are no not wasted treating uncontaminated surface water run-off.	Yes
9	Prevention of uncontrolled emissions to water.		**In order to prevent uncontrolled emissions to water, BAT is to provide an appropriate buffer storage capacity for waste water incurred during other than normal operating conditions based on a risk assessment (taking into account e.g. the nature of the pollutant, the effects on further treatment, and the receiving environment), and to take appropriate further measures (e.g. control, treat, reuse).** As the wastewater streams will be discharged into a trade effluent sewer regulated by Scottish Water, and the fact that if the process stops the production of wastewater stops, no additional buffer storage is considered necessary.	Yes
10	Integrated waste water management and treatment strategy.		**In order to reduce emissions to water, BAT is to use an integrated waste water management and treatment strategy that includes an appropriate combination of the listed techniques.** See section 5.3 of main document.	Yes
11	Pretreatment of waste water that contains pollutants that cannot be dealt with adequately during final waste water treatment.		**In order to reduce emissions to water, BAT is to pretreat waste water that contains pollutants that cannot be dealt with adequately during final waste water treatment by using appropriate techniques.** See section 5.3 of main document.	Yes

BATC	Description	Type		Complies with BATC?
12	Final waste water treatment.		**In order to reduce emissions to water, BAT is to use an appropriate combination of final waste water treatment techniques.** See section 5.3 of main document.	Yes
13	Waste management plan.		**In order to prevent or, where this is not practicable, to reduce the quantity of waste being sent for disposal, BAT is to set up and implement a waste management plan as part of the environmental management system (see BAT 1) that, in order of priority, ensures that waste is prevented, prepared for reuse, recycled or otherwise recovered.** A waste management plan is required by Condition 2.6 of the permit.	Yes
14	Reduction in the volume of waste water sludge requiring further treatment or disposal.		**In order to reduce the volume of waste water sludge requiring further treatment or disposal, and to reduce its potential environmental impact, BAT is to use one or a combination of the listed techniques.** As the wastewater streams will be discharged into a trade effluent sewer regulated by Scottish Water, no additional techniques are required on site.	Yes
15	Enclosure of emission sources and treatment of emissions.		**In order to facilitate the recovery of compounds and the reduction of emissions to air, BAT is to enclose the emission sources and to treat the emissions, where possible.** Due to the nature of the process, the bulk of the wastewater consists of concentrated constituents of the water supply itself and there are no emissions to air from the waste water. On this basis emissions sources do not require enclosure or treatment.	Yes
16			**This BAT-C applies to the use of an integrated waste gas management and treatment strategy that includes process-integrated and waste gas treatment techniques. Emissions to air are limited and do not require treatment before release, therefore the BAT-C is considered to not be applicable.**	N/A
17	Flaring.		**In order to prevent emissions to air from flares, BAT is to use flaring only for safety reasons or non-routine operational conditions (e.g. start-ups, shutdowns) by using one or both of the listed techniques.** Releases of hydrogen during emergencies and prior to maintenance, will be vented rather than flared. This stream could be flared but given the location this introduces potential visual and noise issues which can be safely avoided using a vent. For these purposes a safety vent has been specified and is regarded as BAT.	Yes

BATC	Description	Type		Complies with BATC?
18			**This BAT-C applies to emissions to air from flares. As there is no flare at the facility the BAT-C is not applicable.**	N/A
19			**This BAT-C applies to diffuse VOC emissions to air. As there are no VOC emissions from the facility the BAT-C is not applicable.**	N/A
20	Odour management plan.		**In order to prevent or, where that is not practicable, to reduce odour emissions, BAT is to set up, implement and regularly review an odour management plan, as part of the environmental management system (see BAT 1), that includes all of the listed elements.** See section 5.2 of main document.	Yes
21	Reduction in odour emissions from waste water collection and treatment and from sludge treatment.		**In order to prevent or, where that is not practicable, to reduce odour emissions from waste water collection and treatment and from sludge treatment, BAT is to use one or a combination of the listed techniques.** Due to the nature of the process, the bulk of the wastewater consists of concentrated constituents of the water supply itself and therefore not odorous.	Yes
22	Noise management plan.		**In order to prevent or, where that is not practicable, to reduce noise emissions, BAT is to set up and implement a noise management plan, as part of the environmental management system (see BAT 1), that includes all of the listed elements:** See section 5.4 of main document.	Yes
23	Reduction in noise emissions.		**In order to prevent or, where that is not practicable, to reduce noise emissions, BAT is to use one or a combination of the listed techniques.** See section 5.4 of the main document.	Yes

Appendix B: Site plan (showing emission points)