PPC Supporting Document A: Non-Technical Summary

Creed Hydrogen

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1 Non-Technical Summary

1.1 Background

This Non-Technical Summary provides an accessible overview of the proposed hydrogen production facility at Creed Park Waste Process Facility located approximately 2.8km south-west of Stornoway on the Isle of Lewis, Outer Hebrides, hereafter referred to as the 'Proposed Development'. The document outlines the purpose, design, and operation of the facility, summarising key information to support the Pollution Prevention and Control (PPC) permit application.

Developed by PlusZero Ltd, the facility will produce 'Green' hydrogen using renewable energy sources from on-site wind infrastructure supplemented by electricity from the national grid, providing a cleaner more sustainable fuel option for various applications, including direct refuelling of vehicles on-site and distribution via tube trailers for off-site use. This document explains the Proposed Development's operational processes, environmental safeguards and anticipated impacts, helping stakeholders understand the project's contribution to sustainable energy objectives and its compliance with regulatory standards.

This document is accessible to both technical and non-technical audiences, detailing the operational framework, environmental protections and expected impacts.

1.2 Project Overview

The Proposed Development aims to produce green hydrogen using on-site renewable energy from wind sources. This hydrogen production approach relies on electrolysis, which generates hydrogen without direct carbon emissions, aligning with sustainability goals and offering a cleaner alternative to traditional hydrogen production methods.

The project aims to produce green hydrogen from a 300kW wind turbine at the site and a power purchase agreement (PPA) with the National Grid. Hydrogen will be produced through the electrolysis of water.

Electrolysers will be used to generate green hydrogen from demineralised water, with an electrolytic capacity of approximately 295kW. The facility will meet SAE J2719:2020 and ISO 14687:2019 standards for hydrogen quality. The hydrogen will be purified, compressed, and stored in a high-pressure storage vessel, to ensure continuity of supply to dispenser for vehicle filling.

When operational, the facility will have an electrolytic capacity of approximately 295kW. The hydrogen produced will be compressed and distributed via tube trailers or dispensed into Fuel Cell Electric Vehicles (FCEVs), with oxygen by-products sold to local consumers. End users will include municipal vehicles, passenger cars, and commercial users, with hydrogen distribution through flexible storage solutions.

Planning permission for the project was registered in December 2024, and planning approval was received in March 2025. The report is accompanied by an Environmental Risk Assessment and a Noise Impact Assessment.

1.2.1 Site Location & access

The Proposed Development is centred at National Grid Reference (NGR) NB398312. The Proposed Development is approximately 0.27 hectares (ha) in size and is located on a pre-existing level concrete base sloping towards the north-east at a gradient of approximately 2%, with the elevation ranging from 50m AOD to 60m AOD.

The Proposed Development is located immediately adjacent to the existing Creed Park Waste Process Facility, which consists of a number of industrial style sheds, car parking, hardstanding, and areas of plant and machinery. The Proposed Development is located to the south-east of this existing infrastructure, within a level concrete area currently used for storing empty waste containers. The wider area is relatively flat in character with numerous

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rocky outcrops and small pools amongst a blanket bog habitat. The existing Creed Park Waste Process Facility contributes visual presence to the surrounding landscape, with various types of refuse equipment, machinery, and associated processes adding to the industrial fabric and functionality of the site.

The Proposed Development would be accessed by the existing road serving the Creed Industrial Park, which connects directly to the A859, located approximately 0.2km west of the Proposed Development. The Proposed Development is designed to accommodate one tube trailer and one additional vehicle type at any time, with a single hydrogen dispensing point designed to fuel one vehicle type at a time. Access to the trailer area will be secured by gates, requiring a granted access for added security. Additional access gates will restrict entry to the rest of the facility, with only trained daily operators and maintenance personnel allowed into designated hazardous areas.

1.3 Detailed Project Specifications

The Proposed Development's construction, operation, and eventual decommissioning will adhere to all applicable design standards and regulatory requirements. Each phase has been carefully planned to ensure compliance with industry best practices and environmental safeguards.

1.3.1 Plant core equipment

The installation includes several integrated components:

Component	Function
Site Office & Control Room	Houses control systems and servers managing production processes
Electrical Infrastructure	Transformers adjust AC voltage; rectifiers convert AC to DC for electrolysis
Water Purification System	Produces demineralised water essential for hydrogen production
Hydrogen Electrolysers	Convert water into hydrogen and oxygen via electrolysis
Hydrogen Storage Vessels	Store produced hydrogen; equipped with emergency venting systems
Compression Equipment	Pressurises hydrogen at 17 barg to required delivery pressure
Hydrogen Dispenser	Includes pressure reduction and metering for safe vehicle/tube trailer filling
Oxygen Compression & Storage	Compresses oxygen and stores in MCP cylinders

1.3.2 Hydrogen Production Process

The system consists of two electrolytic hydrogen production units, a pressurised alkaline electrolyser and an anion exchange membrane electrolyser. Each unit is equipped with electrolysis stacks and associated balance of plant, power control modules and cooling systems. Hydrogen produced via electrolysis will be produced at up to 35 bar(g) which will be compressed to three pressure points; 300barg, 500barg, and 950barg for tube trailer pressurisation.

Alongside the hydrogen production equipment, the facility will feature a water purification plant, a substation and associated hydrogen vehicle filling bays. Safety and security measures will include surveillance cameras, gated access, and floodlights. Drainage systems will ensure effective surface water management, directing both foul water from the hydrogen production equipment and surface water to a Scottish Water sewer connection, utilising design techniques such as kerbing and permeable block paving to enhance water infiltration.

The hydrogen production process involves several key components and systems, each designed to ensure efficient, safe and continuous operation. These components include:

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Hydrogen Production Plant Overview

Section	Details
Electrolyser System	Combination of bi-polar alkaline electrolyser and one AEM electrolyser.
Energy Application	Current applied across cathode and anode to generate H_2 (cathode) and O_2 (anode).
Electrodes	Gas forms on electrodes covered in electrolyte, reducing cell voltage and power consumption.
Electrolyte	Potassium Hydroxide (KOH) solution for high ionic conductivity and longevity.
Closed Loop System	KOH recirculated; drained only during maintenance.
KOH Change	Full change every 5 years.
Hydrogen Production Rate	55.93 Nm^3/hr (adjustable 15–100%).
Production Control	Based on renewable energy input and operational procedures.
Operating Temperature	38–80 °C.
Gas Purification	Removes residual oxygen and water from hydrogen.

Supporting Systems

System	Details
Water Treatment	Reverse osmosis; 1 kg tap water → 0.66 kg demineralised water + 0.33 kg brine (discharged to foul drains).
Instrument Air	75 kW on-site air compressor and dryer for pneumatic controls and gas compressor.
Nitrogen	Bottled nitrogen for purging hydrogen equipment and lines.
Oxygen Compression	Oxygen compressed and stored for offtakers when required.

Waste & Venting

Aspect	Details
Process Drains	Wastewater discharged to foul drains via non-hazardous holding tank (sampling point and buffer).
Vents	Hydrogen and oxygen vented separately to atmosphere via vent stacks, located 5m minimum apart to prevent explosive mixtures.

1.4 Production Process Operation

The process equipment is split between a main production hall and some equipment being located outside. The production building also houses the control room, server room, and welfare facilities. The facility requires approximately 71 litres of water per hour for full operation, including both production and general use.

The facility has three main distribution systems: one for filling tube trailers (at 350 barg pressure) and two for different types of vehicles (at 300 and 700 barg pressure). In its first year, the facility is expected to serve various vehicles including:

- Refuse collection vehicles
- Hydrogen cars

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- Delivery vans
- Telehandlers
- Tube trailers for hydrogen transport

The refuelling system can handle one vehicle at a time and includes precise metering to track hydrogen use. The hydrogen produced meets high purity standards (99.99%) required for fuel cell vehicles.

Fencing will be used to border the site and prevent the public and non-authorised personnel from entering. An Additional secondary fence will surround the hydrogen storage for further protection.

All raw materials, products, and waste materials are carefully managed with appropriate storage and containment methods to prevent any unwanted emissions, following chemical safety regulations.

1.5 Emissions

Emissions from the hydrogen production process will be carefully monitored and controlled, which include:

Category	Item	Details
Emissions to Sewer	Non-Hazardous Effluent	Includes RO purifier reject water, AC condensate, and domestic wastewater; discharged to Scottish Water sewer (north-east connection). Sampled at regular intervals to ensure it falls within the pH range permitted by license.
Wastewater Emissions to Tank	Hazardous Effluent	Process liquids potentially contaminated with KOH or ethylene glycol; collected in contained system and sent off-site for disposal by licensed contractor.
	Point Source to Watercourses	None; all emissions directed to sewer (non-hazardous) or captured for removal.
Point Source Emissions to Ground	Direct Releases	None planned.
Point Source Emissions to Air	Oxygen Venting	Controlled venting from AEM electrolyser; oxygen from alkaline electrolyser purified, compressed, and bottled.
	Refrigerant Emissions	Chillers use R410A (high GWP); emissions only possible during maintenance or accidental release; managed under F-gas regulations.
Infrequent Air Emissions	Hydrogen & Nitrogen Venting	Occurs during maintenance or emergencies; nitrogen used for purging hydrogen; vented volumes monitored and justified; venting via cold vent stacks with dispersion design.
Point Source to Watercourses	Drainage Outfalls	Managed to minimise environmental impact; no uncontrolled discharges.
Fugitive Emissions	Air	Possible minor emissions from compressed instrument air; assessed in Environmental Risk Assessment.
	Water/Groundwater	None expected.
Noise Emissions	Noise	Mitigation Measures include acoustic enclosures for transformers, rectifiers, and pressure-reduction systems to limit noise.

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1.6 Site Condition and Environmental Setting

The facility is being built on the existing Creed Park Waste Processing Facility site, which consists of made ground. The underlying geology includes metamorphic rocks (primarily gneiss) of the Lewisian Complex, with an area of thrust zone to the east. While the natural ground in the area typically consists of peat, the development's location on previously developed land minimizes any impacts on these deposits.

The site sits within the Lewis and Harris Coastal catchment area, with relatively flat topography. While there are several small watercourses and lochs in the surrounding area, the nearest significant watercourse (the Abhainn Ghrioda) is about 1.3km north and has no direct connection to the site. The development includes a surface water drainage system that integrates with existing infrastructure to manage rainfall and prevent uncontrolled runoff toward sensitive areas to the east.

The site is well-separated from protected environmental areas, with the nearest being the Lewis Peatlands Special Protection Area, located about 4.1km away. The Tong Saltings Site of Special Scientific Interest lies approximately 4.8km to the northeast.

The following protective measures are in place; with identified contamination risks are assessed as 'Low'. A detailed Conceptual Site Model has been developed to evaluate potential risks across all operational stages, from raw material handling through to hydrogen production and drainage management.

Category	Potential Risks / Receptors	Control Measures
Human Health	Site workers, visitors, and maintenance staff	Proper operational procedures; use of PPE; restricted access to hazardous areas
	Users of adjacent sites	Strategic site layout; security fencing; controlled venting protocols
Environmental	Surface water and site infrastructure	Integration with Scottish Water drainage systems; paved surfaces and hardstanding
	Ground and groundwater contamination from spills/leaks	Containment systems; bunding; regular monitoring; hazardous waste collection system
Air Quality	Air emissions from nitrogen purging and hydrogen venting	Controlled venting via cold vent stacks; nitrogen purging protocols; monitoring

The site was investigated in November 2024 to understand ground conditions.

The facility includes several important safety features and protocols:

Category	Item	Details
Design Safety	Water Supply Protection	Air gap between mains supply and process to prevent backflow into Scottish Water mains
	Site Layout	Designed to reduce risks to ALARP; no filled tube trailers near occupied buildings
	Emergency Shutdown	Automatic shutdown of electrolysers on gas leak, abnormal operation, or fire detection
	Purging	Nitrogen used during maintenance and emergency shutdowns
	Separation Distances	Adequate spacing between hydrogen storage and ignition sources
	Fire & Explosion Protection	Fire-resistant materials; explosion relief panels/vents
	Leak Detection	Hydrogen gas detectors installed

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	Ventilation	Forced ventilation to prevent hydrogen accumulation
	Flame Detection	Hydrogen flame detectors in process and dispenser areas
	Safety Components	Non-return valves and pressure relief valves
	Equipment Design	Compliant with design temperatures and pressures; protects personnel, environment, and assets
Administrative Safety	Personnel & Access Control	Only trained personnel operate equipment; restricted access with fencing
	Storage Limits	Hydrogen storage <110 kg to stay below major hazard thresholds
	Site Layout	Two access points; good ventilation; 5 m minimum separation between O_2 and H_2 vents
	Safety Signage	Prohibits mobile phones, smoking, and open flames (in relevant areas)
	Electrical Safety	Comprehensive high-voltage safety measures
	Security Measures	Secondary fencing for hydrogen storage and chiller units
Environmental Monitoring	Containment Systems	Bunding around electrolysers; waste tanks with high-level alarms
	Drainage & Treatment	Surface water drainage with filter trenches and treatment systems
	Maintenance Programme	Routine inspections, functional testing, scheduled servicing, and preventative maintenance
	Safety System Testing	Periodic testing of pressure relief valves, gas detectors, and ESD systems

Based on the initial site investigation conducted in November 2024 and planned control measures, the development is not expected to cause significant environmental impacts. Additional ground investigation will be conducted after construction but before operations begin, with ongoing monitoring to track any changes in soil or water conditions. The facility's design and operational procedures focus on preventing any release of contaminants while protecting workers, visitors, and the surrounding environment.

1.7 Site Closure

At the end of its operational life, a decommissioning method statement will be developed and submitted for approval to ensure safe dismantling, removal of infrastructure and subsequent site restoration. During decommissioning all vehicles and machinery will be securely stored to reduce environmental risks and ensure adequate restoration of the site. Decommissioning objectives are to return the site to baseline conditions, minimising any long-term environmental impact.

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