Novidon Limited

Best Available Techniques Assessment

Application for Environmental Permit for Modified Starch Manufacturing Facility and Medium Combustion Plant

Coed Aben Road, Wrexham Industrial Estate, Wrexham, Clwyd, LL13 9UH

Report Ref: CE-WH-1801-RP11-BAT-V2-FINAL

CRESTWOOD ENVIRONMENTAL LTD

ENVIRONMENT LANDSCAPE NOISE LIGHTING
ECOLOGY HERITAGE WATER TREES
MINERALS / WASTE AIR QUALITY LAND QUALITY VISUALISATION

Produced by Crestwood Environmental Ltd.

29 February 2024

Crestwood Report Reference: CE-WH-1801-RP11-BAT-V2-FINAL:

Version & Status	Date Produced	Written / Updated by:	Checked & Authorised by:
Draft V1	09/08/2021	Stephen Barnes BSc (Hons), MCIWM, CEnv	Andrew Abbott BSc (Hons), MSc
Draft V2	19/08/2021	Stephen Barnes BSc (Hons), MCIWM, CEnv	Andrew Abbott BSc (Hons), MSc
Final V1	21/12/2023	Kate Brady (Principal Consultant)	Chris Turner (Associate Director)
Final V2	29/02/2024	Rowena Maitland (Senior Consultant)	Kate Brady (Principal Consultant)

Crestwood Environmental Ltd.
Science, Technology and Prototyping Centre
University Of Wolverhampton Science Park,
Glaisher Drive, Wolverhampton,
West Midlands, WV10 9RU

Email: info@crestwoodenvironmental.co.uk
Web: www.crestwoodenvironmental.co.uk

CONTENTS

Appendices

DRAWINGS

Drawing No CE-WH-1801-DW01, Fig 1a	Environmental Permit Boundary Plan	1:1,250 @ A3
Drawing No CE-WH-1801-DW01, Fig 2	Factory Site Layout	1:500 @ A3
Drawing No CE-WH-1801-DW02, Fig 2b	Drainage Layout	1:1,250 @ A3

1 SITE DETAILS

1.1 BACKGROUND

1.1.1 This Best Available Techniques (BAT) Assessment supports an Environmental Permit application for a modified starch manufacturing facility and combined heat and power (CHP) plant at Coed Aben Road, Wrexham Industrial Estate, Wrexham, Clwyd, LL13 9UH ***(the Site)***. The Site is operated by Novidon Limited ***(the Applicant and Operator)***.

1.1.2 The Site modifies starches to produce high quality wallpaper paste flake and drilling starches for the geological drilling industries. In addition, it is proposed to install a Jenbacher combined heat and power (CHP) plant to generate electricity and heat for parasitic use at the Site. The CHP plant will comprise a Jenbacher J312GS gas engine, which has an electrical output of 524Kw/hr and a recoverable heat output of 659 Kw/hr. Its net rated thermal input is 1363Kw/hr, as a result of which it is classed as a Medium Combustion Plant. A detailed description of the plant, equipment and operations is included in In-process Controls (CE-WH-1801-RP01).

1.1.3 It is important to note that the CHP is not currently installed at the Site and it is a possible proposal in a few year's time. It has been considered within this permit application should the decision be made to commission in the future. There are as such no environmental impacts from this activity at present.

1.1.4 The activities carried out on Site fall under the requirements of the Environmental Permitting (England and Wales) Regulations 2016 and the Environmental Permitting (England and Wales) (Amendment) Regulations 2018, by virtue of:

- Schedule 1, Part 2, Chapter 4, Section 4.1, Part A (1):

  (a) (ii) organic compounds containing oxygen (e.g. alcohols, aldehydes, ketones, carboxylic acids, esters, ethers, peroxides, phenols, epoxy resins)

- Schedule 25A, Part 1, Paragraph 2(1):

  "new medium combustion plant" (means a medium combustion plant which is not an existing medium combustion plant).

- Schedule 25B, Part 1, Paragraph 2(1) (a) (i):

  "generator, other than an excluded generator, with a rated thermal input—

  (a) more than or equal to 1 megawatt and less than 50 megawatts".

1.1.5 Directly Associated Activities carried out on Site are listed in Table 1 overleaf.

Table 1: Directly Associated Activities

Directly Associated Activity	Description
Receipt and dispatch of materials	Receiving and checking raw material deliveries, storage in suitable locations, transfer to process area, dispatch of completed starch product.
Combustion of mains gas in dryer plant Starch Refinery	Combustion of natural gas in a 2000kW dryer to dry starch refined on site.
Combustion of mains gas in steam boilers	Combustion of natural gas in steam boilers to provide heat to dryers and reactor tanks.
Abatement of emissions to foul sewer Approx. 100 Litres twice a year	Operation of scrubber, using water as the scrubbing media.
Waste storage and handling	Collection of waste, storage of waste. Removal from site by approved contractors.

1.1.6 Under the Environmental Permitting (England and Wales) Regulations 2016, Schedule 1 activities are subject to the requirements of Best Available Techniques (BAT). Best available techniques are defined as "the most effective and advanced stage in the development of activities and their methods of operation which indicate the practical suitability of particular techniques for providing in principle the basis for emission limit values designed to prevent and, where that is not practicable, generally to reduce emissions and the impact on the environment as a whole:

(i) "techniques" shall include both the technology used and the way in which the installation is designed, built, maintained, operated and decommissioned;

(ii) "available techniques" means those developed on a scale which allows implementation in the relevant industrial sector, under economically and technically viable conditions, taking into consideration the costs and advantages, whether or not the techniques are used or produced inside the Member State in question, as long as they are reasonably accessible to the operator;

(iii) "best" means most effective in achieving a high general level of protection of the environment as a whole."

1.1.7 This BAT Assessment have been completed with consideration of the following guidance:

- 'How to comply with your environmental permit - Additional guidance for: Speciality Organic Chemicals Sector (EPR 4.02)' (March 2009). The Guidance applies to Installations falling under the Environmental Permitting (England and Wales) Regulations 2016, Schedule 1, Part 2, Section 4.1 and includes the use of organic chemicals.
- https://www.gov.uk/guidance/medium-combustion-plant-mcp-comply-with-emission-limit-values, last updated 27 March 2023.
- https://www.gov.uk/government/collections/medium-combustion-plant-and-specified-generator-regulations, published 15 July 2019.
- Best Available Techniques (BAT) Reference Document for Common Waste Water and Waste Gas Treatment/Management Systems in the Chemical Sector, 2016.

2 BEST AVAILABLE TECHNIQUES (BAT) - GENERAL

2.1 ENVIRONMENTAL PERFOMANCE

2.1.1 Novidon Limited is committed to providing the highest quality modified starch products in the shortest delivery period to its customers. The company is also committed to ensuring that this is accomplished in a safe and environmentally responsible manner by complying and striving to surpass all safety and environmental requirements.

- The company has developed a comprehensive environmental policy statement and has established targets in sustainable environmental improvement, which enables them to be regularly measured and monitored.
- Novidon UK Ltd is committed to protecting the environment, preventing pollution and minimising the impact of its operations on the environment by means of a programme of continuous improvement. In particularly the company will:
- Aim to minimise waste throughout all activities within its control. This will be achieved by eliminating waste production, by reusing and by recycling wherever possible. Where production of waste is unavoidable Novidon will ensure that it is disposed of in the most environmentally safe manner possible.
- Aim to minimise energy consumption throughout all activities within its control.
- Ensure that all activities within its control are performed so that there is no threat to the environment and are in full compliance with the Environmental Protection Act and Environmental Permitting (England and Wales) Regulations 2016.
- Aim to reduce wherever practicable the level of harmful emissions from its factory.
- Move towards an environmental management system that will comply with ISO 14001 requirements.

2.1.2 A site specific Environmental Management System (EMS) (CE-WH-1801-RP08) has been prepared for the Site and is included as part of the permit application. It includes detailed Emergency Procedures and Emergency Response Plan.

2.1.3 The company keeps a comprehensive and up to date record of raw materials used at the Site (see CE-WH-1801-RP06).

2.1.4 Wastes produced on site are removed by Registered Waste Carriers to authorised facilities. Where practicable wastes are recovered off site for reuse and suitable records maintained so that the company is fully aware of the end destination and purpose.

2.2 ACCIDENT MANAGEMENT

2.2.1 An Accidents Management Plan (CE-WH-1801-RP07) has been prepared for the Site as part of the permit application.

2.2.2 The company's Emergency Procedures and Emergency Response Plan are included in the EMS, as Appendix 2. They include emergency procedures in the case of:

- A fire;
- A gas leak;

- A major chemical spillage;
- A remote emergency;
- A pollution emergency.

2.2.3 Overall responsibility for documentation and implementation of the Emergency Response Plan rests with the Operations Manager. The Plant Manager has day to day responsibility at the Site. Each employee is responsible for understanding and following the procedures contained therein.

2.2.4 Safety Data Sheets and COSHH Assessments are maintained on Site for all hazardous chemicals and employees are provided with information and training on handling hazardous materials in the work area at the time of their initial assignment or job replacement and whenever a new hazard is introduced into their work area.

2.3 ENERGY EFFICIENCY

2.3.1 Electricity and natural gas use at the Site are recorded as part of the company's reporting procedures. An Energy Report (CE-WH-1801-RP05) has been prepared as part of the permit application. It includes energy efficiency measures used at the Site.

2.4 EFFICIENT USE OF RAW MATERIALS AND WATER

2.4.1 Raw materials use minimisation includes preventative maintenance in accordance with manufacturers' recommendations to ensure plant operates efficiently and any inadvertent leaks or spillages are quickly identified and remediated.

2.4.2 The company keeps a detailed record of raw materials used at the Site (see CE-WH-1801-RP06). Fluid levels in tanks are carefully controlled and checked to prevent over filling and wastage. Spent raw materials are recovered or recycled where feasible, to minimise the requirement for waste disposal.

2.4.3 A raw materials efficiency audit will be undertaken at intervals not exceeding 4 years.

2.4.4 Opportunities to collect water for reuse at the Site are relatively limited due to the need to maintain a high quality product in the production process. However, it is proposed that a water efficiency audit will be undertaken after 12 months and thereafter at intervals not exceeding 4 years.

2.5 WASTE REDUCTION

2.5.1 Waste reduction procedures have been prepared for the Site as part of the Health, Safety and Environmental Manual and are incorporated into the EMS (CE-WH-1801-RP08).

2.5.2 The Site's inventory of wastes produced on Site includes details of the waste type, quantity, Registered Waste Carrier used to remove the wastes, fate of material (e.g. recovery or disposal) and destination site. The inventory is used to generate precise figures about the amount and type of wastes produced on site and to identify waste recycling and recovery opportunities that may arise, so as to minimise waste disposal.

2.6 MODIFIED STARCH MANUFACTURING PROCESS

2.6.1 A detailed process description is included in 'In-process Controls, see CE-WH-1801-RP01. Details are reproduced below.

2.6.2 Imported unrefined starches are purified on Site in several stages. The impure starch is hoisted into a main mixing tank where it is blended with water to the required specific gravity (measured in Baumé). The blend is then sieved using a shaker sieve followed by a rotary sieve. This is followed by a rotary tank and a cyclone to remove sand waste. The sand is bagged prior to removal and recycling off-Site. The mixture is then transferred to another tank prior to the refining process. The blend is then transferred to the vacuum filters. The water from the filtration process is recovered for reuse. Starch recovered from the filtration process is dried prior to being bagged as a precursor for the modification processes (see below).

2.6.3 A 2000kW gas burner is used to dry the starch during the refining process. Emissions from the drying process comprise water vapour and these are vented to atmosphere via a 7.5m high stack. Other possible substances that may be emitted have been considered via an Air Quality Assessment which accompanies this application.

2.6.4 Imported refined starch is brought into the facility in 1 tonne sacks and is stored on Site within the building prior to being used in the starch modification processes on Site.

2.6.5 Starch Modification Processes

2.6.6 Refined starch is modified in several stages:

I. Reaction with sodium hydroxide and cross-linking agents in two large reaction vessels.

II. Sodium monochloroacetate (SMCA) is produced 'in-house' by the Operator by the controlled reaction of sodium hydroxide solution (32% rayon grade) with 80% monochloroacetic acid, which is an esterification agent to modify the starch. This reaction is exothermic and this part of the plant is controlled by temperature sensors which are alarmed over 65°C. At 78°C a water deluge system retards the reaction. This reaction has to be carried out at above 30°C. The reaction product is retained in the tanks and not released.

III. Transfer of the admixture to three horizontal mixing tanks where SMCA is added to produce a carboxylate derivative via carboxymethylisation. The resultant product is then dropped out of the reaction vessels where it is transferred to dryers (there are five dryers on Site for this purpose). The moisture content prior to drying is 32% and after drying about 8 to 10%. The dryers use heat derived from an existing steam boiler on Site.

IV. The scrubber water is 6 monthly refreshed. The used water is discharged to the foul sewer in accordance with a Trade Effluent Discharge Consent, issued by Dwr Cymru Cyfyngedig (Welsh Water), see Appendix 1.

V. This product then goes into the flakers to produce a fine flake which is then dosed with mergal (a biocide used to preserve product integrity). The manufactured product is a high-quality wallpaper paste flake.

VI. Any low grade or rejected flakes for wallpaper paste production are instead bagged for use as a drilling starch for supply to the geological drilling industry.

VII. A scrubber is installed on Site which is designed to capture off gas from the MCA/SMCA storage tank, whilst it is filled. The scrubber media is water, which runs in constant recirculation to capture any volatile MCA/SMCA vapour if present. A 6m pipe vents emissions from the top of the scrubber and exits horizontally through the side of the building wall. Spent scrubber water and starch refinery process water are discharged to foul sewer in accordance with the Trade Effluent Discharge Consent (see Appendix 1).

2.6.7 Carboxymethylisation Starch Modification

2.6.8 Refined starch is mixed with water and a cross linking agent in 2 x 12 m^3 mixing tanks. These tanks are open and the contents are mixed using stainless steel impellers. The resulting mixture is then transferred to three horizontal tanks where SMCA and 32% Caustic are added and heated. This is carboxymethlylisation and the reaction product is a carboxylated starch. The product is then transferred to the driers. The moisture content of the product is about 32%. The driers remove the moisture down to about 8 – 10%. This material is then transferred to the rollers which produce a thin film of the carboxylated starch. The next part of the process is the flaking operation which produces a fine flake. Mergal biocide is added at this point to prevent product degradation. The product is gravity fed into storage bags. During this process samples are taken and tested/analysed for quality control purposes. The raw material consumption is complete with no waste arising. The process aims to yield 100% with any reject batches being reused in drilling muds. A process flow diagram is shown in Appendix 3.

2.6.9 Emissions from the dryers have been considered in an Air Quality Assessment which accompanies this application. The assessment of substances and concentrations have been considered in a worst case scenario. Emissions are vented to atmosphere via a 7.5m high stack.

2.6.10 Over-pressure protection

2.6.11 The starch modification process involves the production of SMCA, which is exothermic. This part of the plant is controlled by temperature sensors, which are alarmed over 65°C. At 78°C the water deluge system retards the reaction. Retarding the reaction process at 78°C prevents over pressurisation of tanks.

2.6.12 Vacuum system

2.6.13 The vacuum systems are designed for purpose and are assessed as BAT.

2.6.14 Pumps, valves and pipework

2.6.15 All pumps and valves are specified to provide efficient and safe material transfer. Pumps are Seriflo Mag drive with polypropylene pumping heads, both duty and standby. Valves are stainless steel *'pressure nominale'* PN16 designed to operate up to 16 bar, air actuated with spring close (default). All control valves are normally closed with pneumatic actuation for open but spring close (default), so if air pressure is lost the system defaults safely to all valves closed.

2.6.16 All fittings and pipework are Schedule 40 Stainless Steel, which is sufficiently strong with 215MPa minimum yield strength and 505MPa minimum tensile strength. It has general corrosion resistance and good operating temperatures. MCA is Hastelloy and St/St shrouded PTFE and PP.

2.6.17 Gas fans, blowers and compressors

2.6.18 All of the above equipment has been specified so that suitable materials of construction are used.

2.6.19 Agitator systems

2.6.20 The agitators in the two mixing tanks are stainless steel impeller type driven at 76rpm by an 18Kw motor.

2.6.21 Heat exchangers and cooling systems

2.6.22 All of the above equipment is made of suitable materials of construction and is designed for purpose.

2.6.23 Alarms and Interlocks

2.6.24 The SMCA plant is fitted with alarms and interlocks. Alarms and interlocks, specified by the manufacturer, will be fitted on the CHP plant. An automated process control and data system will be used to measure and record performance of the SMCA plant and CHP plant. There will be strict compliance with start-up, shut down and operating procedures.

2.6.25 Operation of the SMCA plant and CHP plant will be subject to continuous process controls. Monitoring of the process will take place on a regular basis to ensure effective function of all stages of all processes. The SMCA plant incorporates a constant monitoring and alarm system, which sends alerts and alarms via email and text messages to appropriate site staff. The CHP plant will function under the control of an automated process control system and will incorporate a Supervisory Control and Data Acquisition (SCADA) system. The system is designed to cover all control, monitoring, reporting and analysis functions. It will ensure safe, reliable and automatic operation and provide remote control and monitoring capability.

2.6.26 Maintenance of plant and equipment will be in accordance with the manufacturers' recommendations. The high standard of plant manufacture and maintenance will minimise the risk of inadvertent emissions. Routine maintenance of site plant and equipment will be in accordance with the manufacturers' recommendations.

2.6.27 Sodium hydroxide tanks

2.6.28 The sodium hydroxide tanks and bund are designed and built to the British and European Standard BS EN 12573, 'Welded static non-pressurised thermoplastic tanks', with the primary design calculations derived from EN 1778, 'Characteristic values for welded thermoplastic constructions'. Within the design calculation, the storage tanks have been designated to Category 2.0, requiring use of the highest safety factor within the code.

2.6.29 The tanks and dedicated bund are manufactured from black UV stabilized polypropylene, manufactured by Royalite or equivalent. The tanks are constructed from the highest rated welding technique within BS EN 12573, i.e. the butt fusion of extruded thermoplastic plates.

2.6.30 The tanks and bund bodies were subject to a hydrostatic test prior to delivery, which was repeated after installation on Site.

2.6.31 The tanks and bund bodies also incorporate carbon strips behind all welds and connections, enabling interim spark-tests to be conducted during manufacture and the entire tank's integrity spark-tested after completion.

2.6.32 Other tanks

2.6.33 In the event that other potentially polluting liquids are stored in tanks, these will be either self-bunded or surrounded by bunds with a minimum capacity of 110% of the tank's contents. Where more than one tank is located in a bund, the capacity of the bund will be 110% of the largest tank or 25% of the total storage capacity, whichever is the greater. Bund bases and sides will be impermeable. All vents, sight glasses and pipework etc will be located within the bunded area. Absorbent material will be used to treat any spillage that may arise.

2.7 COMBINED HEAT AND POWER (CHP) PLANT

2.7.1 The CHP Plant will be installed to produce electricity and heat for parasitic use at the Site. The CHP plant will comprise a new Jenbacher gas engine with a net rated thermal input of 1363Kw/hr. Gas supply to the CHP plant will be from the national grid.

2.7.2 The Jenbacher JMS 312 GS-NL has an electrical output of 526 kW_e and a recoverable heat output of 659 kW_{th}. It is highly efficient, with a manufacturer specified efficiency of 86.9%.

2.7.3 Generated electricity will be used parasitically at the Site to power the plant, whilst recoverable heat will be ducted to a 500kg/hr steam boiler to provide heat to the drum dryers and reactor vessels. Exhaust gases from the CHP plant are discharged to atmosphere via a 15m high exhaust. Exhaust gas temperature is 504°C from the engine, but after passing to the steam boiler is circa 80°C.

2.7.4 Government guidance (https://www.gov.uk/guidance/medium-combustion-plant-mcp-comply-with-emission-limit-values) requires compliance with the emission limits stated in EU Directive 2015/2193 'on the limitation of emissions of certain pollutants into the air from medium combustion plants'. Emissions from the CHP plant are therefore required to comply with EU Directive 2015/2193 Annex II, Part 2, Table 2 emission limit values (mg/Nm^3) for new engines and gas turbines, at a temperature of 273K, a pressure of 101.3 kPa and after correction for the water vapour content of the waste gases and at a standardised O2 content of 15 % for engines and gas turbines. The NOx emission limit for the CHP plant is 95 mg/Nm^3.

2.7.5 The CHP plant meets the latest emission limits requirements of the Environmental Permitting (England and Wales) Regulations 2016, as amended, and the Medium Combustion Plant Directive. The CHP plant has a high level of efficiency (86.9%) and the generated electricity and heat will be parasitically used at the Site. It is therefore considered to be BAT.

2.8 EXISTING STEAM BOILERS

2.8.1 There are two existing steam boilers on Site, namely a 6,000Kg/hour Yorkshireman 2 boiler and a standby 3,600Kg/hour unit, which is used when the Yorkshireman 2 boiler is off-line for serving, maintenance etc. Both are fired by gas from the national grid and emissions are vented to atmosphere via a 13.5m high stack. Generated steam is used to provide heat to the drum dryers and reactor vessels.

2.8.2 The main Yorkshireman 2 boiler is a high efficiency unit. It is a low NOx unit, designed to meet an emission limit of $100mg/m^3$ NOx. During emissions testing of the boiler all firing points were within this threshold, with the highest level of NOx recorded from firing port P13, at 47ppm (i.e. 96 mg/Nm^3), see Appendix 1. Note that additional potential emissions (i.e. sulphur dioxide, carbon monoxide, particulates and carbon monoxide) have been considered in an Air Quality Assessment which accompanies this application.

2.8.3 Due to the high efficiency of the Yorkshireman 2 boiler (95%) and the incorporation of a low NOx system, the unit is considered BAT.

2.9 POINT SOURCE EMISSIONS TO AIR

2.9.1 Point source emissions to air are shown on Drawing No CE-WH-1801-DW01, Fig 2 as follows:

- A1, 7.5m high stack used to discharge emissions to air from the burner used to dry the starch during the refining process. Emissions from the drying process comprise water vapour. There is no monitoring of these emissions.
- A2, 13.5m high stack used to discharge emissions to air from the existing steam boiler. These emissions are primarily water vapour. Emissions monitoring showed that the highest level of NOx recorded was 96 mg/Nm^3.
- A3, 15m high stack used to discharge emissions to air from the proposed CHP plant. The CHP plant is designed to meet a NOx emission threshold no higher than 96 mg/Nm^3.
- A4, 6m high vent used to discharge vapours from the MCA/SMCA tank via the scrubber.

2.10 POINT SOURCE EMISSIONS TO FOUL SEWER

2.10.1 Point source emissions to foul sewer are shown on Drawing No CE-WH-1801-DW01, Fig 2, as follows:

- FW1, point source emission to foul sewer.

2.10.2 Trade effluent water from the SMCA scrubber and process water from the starch refinery is discharged to foul sewer, in accordance with a Trade Effluent Discharge Consent (see Appendix 1). The maximum volume of discharge is 360m^3 in any continuous 24 hours period and the discharge shall not exceed 4.2 litres per second. Permitted discharge limits are shown in Table 1 below.

Table 2: Trade Effluent Discharge Consent Limits

Parameter	Limit
Flow rate	360m^3 per continuous 24 hours period and 4.2 litres per second
Chemical Oxygen Demand	<3,000 mg/l, expressed as oxygen
Suspended solids	<800 mg/l
Fats, oils and greases	<100 mg/l
Phosphate	<15mg/l
Ammonia	<25mg/l
Sulphate	<500mg/l
Sulphide	<2mg/l

2.10.3 The Operator records flow rate daily and monitors trade effluent quality on an annual basis, with the sample sent to an independent UKAS accredited laboratory for analysis. The foul sewer discharge is also monitored monthly by Dwr Cymru Cyfyngedig to check compliance. All effluent discharges from the manufacturing process are to foul sewer.

2.11 FUGITIVE EMISSIONS

2.11.1 The potential for fugitive emissions to air is considered insignificant and have been screened out via the H1 software tool risk assessment therefore do not require further modelling.

2.11.2 The manufacturing process takes places entirely within the confines of an enclosed and roofed building, which has an impermeable concrete floor. The condition of both the building and the concrete floor are good, with no visible defects. Externally, the majority of the Site consists of a concrete and tarmac yard area and car park, which drain to storm water sewer, via penstock valves that are kept closed as a matter of routine. The condition of the external concrete and tarmac was good and no visible defects were noted during a Site walkover survey by Crestwood Environmental on 3 September 2020.

2.11.3 The use of an enclosed building minimises any potential for fugitive emissions to escape the Site.

2.11.4 During the Site walkover survey there were no visible dust emissions from the Site. The external yard area comprises entirely engineered surface (there is no unmade ground) and there are no inherently dusty materials stored outside. The risk of dust emissions from the Site is considered negligible.

2.12 FUGITIVE EMISSIONS OF ODOUR

2.12.1 As stated above the manufacturing process takes place within the confines of an enclosed building with impermeable concrete floor.

2.12.2 Chemicals delivered to the Site for use in the manufacturing process are typically in enclosed containers or drums. Similarly wastes dispatched from the Site to authorised facilities are stored in enclosed drums and IBCs etc, minimising any potential for odour escape. Odour was not detected during the Site Walkover Survey and there is no history of odour complaints at the Site.

2.12.3 Any inadvertent leaks or spills at the Site, either within the building or external yard area are cleaned up as a priority, using either dedicated spill kits or absorbent material. Contaminated spill kits or absorbents are discarded as waste to a suitably authorised facility.

2.13 NOISE AND VIBRATION

2.13.1 As stated above the manufacturing process takes place entirely within the confines of the building. The use of an enclosed building minimises any potential for noise escape from the Site.

2.13.2 To minimise noise emissions, all vehicles, plant and machinery operated at the Site is maintained in accordance with the manufacturer's specification. Plant and vehicles are switched off when not in use and no activity will be carried out beyond the permitted hours of working as specified under the planning consent. Routine maintenance of plant and equipment is carried out to minimise noise emissions.

2.13.3 During the Site walkover survey on 3 September 2020 there was no noticeable noise emission from the Site. The predominant source of noise external to the Site was local road traffic using the public highway, especially 'Coed Aben Road', which is located to the immediate south of the Site and serves the Wrexham industrial Estate.

2.14 SURFACE WATER DRAINAGE

2.14.1 Surface water run-off from the external yard area falls to surface water drains which discharge to surface water sewer, which in turn falls to the Redwither Brook. The two discharge pipes to surface water sewer are both are fitted with penstock valves close to and upstream of the discharge points SW1 and SW2 (see Drawing Fig 2b 'Site Plan – Drainage Layout'). The penstock valves are kept closed as a matter of routine, so that in the event of an accidental spillage on Site there would be no discharge to the surface water sewer. An H1 Assessment for sewer emission accompanies this application.

2.15 FURTHER CONSIDERATIONS

2.15.1 Consideration was also given to the Common Waste Water and Waste Gas Treatment/Management Systems in the Chemical Sector.

- Section 4.1 Environmental Management Systems - The management system is certified to ISO 9001, details of the EMS are found in the Report Ref: CE-WH-1801-RP08-Draft v2.0.
- Section 4.2 Monitoring will be in accordance with the relevant current practice and environmental permit conditions. Olfactory monitoring will be employed to detect and monitor odour though the process is not considered malodorous.
- Section 4.3 Emissions to Water Emissions to water are controlled under the Consent to Discharge Trade Effluent (Consent No 709008, 6 August 2018). See the In-Process Controls (CE-WH-1801-RP01) document.
- Section 4.4 Waste reduction procedures have been prepared for the Site as part of the Health, Safety and Environmental Manual and are incorporated into the EMS (CE-WH-1801-RP08).
- Section 4.5 Emissions to Air See section 2.9 of this document and the In-Process Controls (CE-WH-1801-RP01) document.
- Section 4.6 Descriptions of Techniques See Non-Technical Summary (CE-WH-1801-RP09) and Appendix 1 – 5 for further details.

3 BAT – CHEMICAL SECTOR

3.1.1 The following responses are numbered in accordance with the Best Available Techniques (BAT) Reference Document for Common Waste Water and Waste Gas Treatment/Management Systems in the Chemical Sector (2016).

4.1 Environmental management systems

BAT 1

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 following features:

The Novidon management system is certified to ISO9001:2015 certificate GB04/61969 issued by certification body SGS and covers the BAT requirements.

I. commitment of the management, including senior management;

As per ISO9001:2015

II. an environmental policy that includes the continuous improvement of the installation by the management;

See attached – Environmental Policy

III. planning and establishing the necessary procedures, objectives and targets, in conjunction with financial planning and investment;

As per ISO9001:2015

IV. implementation of procedures paying particular attention to:

(a) structure and responsibility;

As per ISO9001:2015

(b) recruitment, training, awareness and competence;

As per ISO9001:2015

(c) communication;

As per ISO9001:2015

(d) employee involvement;

As per ISO9001:2015

(e) documentation;

As per ISO9001:2015

(f) effective process control;

As per ISO9001:2015

(g) maintenance programmes;

See document CE-WH-1801-RP08-Draft v2.0 section 3 – pg5

(h) emergency preparedness and response;

See document CE-WH-1801-RP08-Draft v2.0 section 4 – pg6, Appendix 2 and Accident Management Plan (ref CE-WH-1801-RP07)

(i) safeguarding compliance with environmental legislation;

As per ISO9001:2015

V. checking performance and taking corrective action, paying particular attention to:

(a) monitoring and measurement (see also the Reference Report on Monitoring of Emissions to Air and Water from IED installations – ROM);

As per discharge conditions and to Environmental permit

(b) corrective and preventive action;

As per ISO9001:2015

(c) maintenance of records;

As per ISO9001:2015

(d) independent (where practicable) internal or external auditing to determine whether or not the EMS conforms to planned arrangements and has been properly implemented and maintained;

See document CE-WH-1801-RP08-Final v2.0 section 8 – pg9

VI. review of the EMS and its continuing suitability, adequacy and effectiveness by senior management;

See Management Review

VII. following the development of cleaner technologies; Novidon Are a global organisation, developing the best techniques and employing them throughout its business consideration for the environmental impacts from the eventual decommissioning of the plant at the design stage of a new plant, and throughout its operating life;

VIII. The site operations are internal, the buildings and surrounding areas are sealed so the potential of polluting the works area is negligible. Novidon Have invested heavily in the Wrexham site and have no intention of moving.

See Site Condition Report CE-WH-1801-RP03-SCR-Final v2.0.

IX. Application of sectoral benchmarking on a regular basis;

The sector is very small, most assessments/benchmarking exercises are carried out through the European Head Office, if a trend is highlighted all group members are informed.

X. Waste management plan (see BAT 13).

Waste on site is reprocessed so that very little leaves site CE-WH-1801-RP08-Final v2.0 section 5 – Waste reduction Specifically for chemical sector activities, BAT is to incorporate the following features in the EMS:

XI. On multi-operator installations/sites, establishment of a convention that sets out the roles, responsibilities and coordination of operating procedures of each plant operator in order to enhance the cooperation between the various operators;

N/A

XII. Establishment of inventories of wastewater and waste gas streams (see BAT 2).

CE-WH-1801-RP08-Final v2.0 section 2 – Site Records and section 5 – Waste reduction

In some cases, the following features are part of the EMS:

XIII. Odour management plan (see BAT 20);

N/A – process does not give rise to noticeable odour

XIV. Noise management plan (see BAT 22).

N/A – all works are carried out internally

Applicability

The scope (e.g. level of detail) and nature of the EMS (e.g. standardised or non-standardised) will generally be related to the nature, scale and complexity of the installation, and the range of environmental impacts it may have.

BAT 2

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 wastewater and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the following features:

I. information about the chemical production processes, including:
(a) chemical reaction equations, also showing side products;
(b) simplified process flow sheets that show the origin of the emissions;
(c) descriptions of process-integrated techniques and wastewater/waste gas treatment at source including their performances;

See Non-Technical SummaryIn-Process Controls CE-WH-1801-RP019-Draft v1.0
See Appendix 2 - On StarchProposed Starch Refining Process Flow
See Appendix 3 - Carboxymethylisation Process Flow

II. information, as comprehensive as is reasonably possible, about the characteristics of the wastewater streams, such as:
(a) average values and variability of flow, pH, temperature, and conductivity;
(b) average concentration and load values of relevant pollutants/parameters and their variability (e.g. COD/TOC, nitrogen species, phosphorus, metals, salts, specific organic compounds);
(c) data on bioeliminability (e.g. BOD, BOD/COD ratio, Zahn-Wellens test, biological inhibition potential (e.g. nitrification));

The wastewater is controlled as per the Consent to Discharge Trade Effluent (Consent No. 709008, 6 August 2018)

III. information, as comprehensive as is reasonably possible, about the characteristics of the waste gas streams, such as:
(a) average values and variability of flow and temperature;
(b) average concentration and load values of relevant pollutants/parameters and their variability (e.g. VOC, CO, NOX, SOX, chlorine, hydrogen chloride);

(c) flammability, lower and higher explosive limits, reactivity;
(d) presence of other substances that may affect the waste gas treatment system or plant safety (e.g. oxygen, nitrogen, water vapour, dust).

See the attached H1 assessment Air Quality Assessment CE-WH-1801-RP14

4.2 Monitoring

BAT 3

For relevant emissions to water as identified by the inventory of wastewater streams (see BAT 2), BAT is to monitor key process parameters (including continuous monitoring of wastewater flow, pH and temperature) at key locations (e.g. influent to pre-treatment and influent to final treatment).

The wastewater is controlled as per the Consent to Discharge Trade Effluent (Consent No. 709008, 6 August 2018) – all monitoring occurs as set out in the consent document.

BAT 4

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.

Discharge is not continuous. All water discharges are controlled as per the Consent to Discharge Trade Effluent (Consent No. 709008, 6 August 2018) – all monitoring occurs as set out in the consent document.

BAT 5

BAT is to periodically monitor diffuse VOC emissions to air from relevant sources by using an appropriate combination of the techniques I – III or, where large amounts of VOC are handled, all of the techniques I – III. Diffuse VOC emissions are not considered an issue with the Novidon process. See Air Quality Assessment CE-WH-1801-RP14, section 5.3.36. VOC concentrations are not considered to be significant.

VOC monitoring will occur annually.

BAT 6

BAT is to periodically monitor odour emissions from relevant sources in accordance with EN standards.

Description

Emissions can be monitored by dynamic olfactometry according to EN 13725. Emission monitoring may be complemented by measurement/estimation of odour exposure or estimation of odour impact.

Applicability

The applicability is restricted to cases where odour nuisance can be expected or has been substantiated. The process does not produce nuisance odour. The site has never received a complaint relating to odour.

4.3 Emissions to water

4.3.1 Water usage and wastewater generation

BAT 7

To reduce the usage of water and the generation of wastewater, BAT is to reduce the volume and/or

pollutant load of wastewater streams, to enhance the reuse of waste water within the production process and to recover and reuse raw materials.

Best practice is employed to reduce all raw material usage, this includes water. The scrubber unit is part of an enclosed loop system used to cool the process. The scrubber water is 6 monthly refreshed. The used water is discharged to the foul sewer in accordance with the Consent to Discharge Trade Effluent (Consent No. 709008, 6 August 2018). This water has never been discharged.

4.3.2 Wastewater collection and segregation

BAT 8

To prevent the contamination of uncontaminated water and to reduce emissions to water, BAT is to segregate uncontaminated wastewater streams from wastewater streams that require treatment.

Applicability

The segregation of uncontaminated rainwater may not be applicable in the case of existing wastewater collection systems. See CE-WH-1801-RP06-Final v1.0 – Raw Materials section 5 - Water use and Section 6 - Water Efficiency Measures

BAT 9

To prevent uncontrolled emissions to water, BAT is to provide an appropriate buffer storage capacity for wastewater 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).

Applicability

The interim storage of contaminated rainwater requires segregation, which may not be applicable in the case of existing wastewater collection systems.

All water discharges are controlled as per the Consent to Discharge Trade Effluent (Consent No. 709008, 6 August 2018) – all monitoring occurs as set out in the consent document.

Rainwater is collected and diverted to either the effluent tank or drainage system.

The scrubber unit is part of an enclosed loop system used to cool the process. The scrubber water is 6 monthly refreshed. The used water is discharged to the foul sewer in accordance with the Consent to Discharge Trade Effluent (Consent No. 709008, 6 August 2018). This water has never been discharged.

4.3.3 Wastewater treatment

It is worth noting that there are two penstock valves in place that can be used to restrict or stop the flow of water from the plant getting into the wastewater system.

BAT 10

To reduce emissions to water, BAT is to use an integrated wastewater management and treatment strategy that includes an appropriate combination of the techniques in the priority order given below.

Description

The integrated wastewater management and treatment strategy is based on the inventory of wastewater streams (see BAT 2).

BAT-associated emission levels (BAT-AELs): See Section 4.3.4.

All water discharges are controlled as per the Consent to Discharge Trade Effluent (Consent No. 709008, 6 August 2018) – all monitoring occurs as set out in the consent document. Rainwater is collected and diverted to either the effluent tank or drainage system. The scrubber unit is part of an enclosed loop system used to cool the process. The scrubber water is 6 monthly refreshed. The used water is discharged to the foul sewer in accordance with the Consent to Discharge Trade Effluent (Consent No. 709008, 6 August 2018). This water has never been discharged.

BAT 11

To reduce emissions to water, BAT is to pre-treat wastewater that contains pollutants that cannot be dealt with adequately during final wastewater treatment by using appropriate techniques.

Wastewater pre-treatment is carried out as part of an integrated waste water management and treatment strategy (see BAT 10) and is generally necessary to:

- protect the final wastewater treatment plant (e.g. protection of a biological treatment
- plant against inhibitory or toxic compounds);
- remove compounds that are insufficiently abated during final treatment (e.g. toxic compounds, poorly/non-biodegradable organic compounds, organic compounds that are present in high concentrations, or metals during biological treatment);
- remove compounds that are otherwise stripped to air from the collection system or during final treatment (e.g. volatile halogenated organic compounds, benzene);
- remove compounds that have other negative effects (e.g. corrosion of equipment; unwanted reaction with other substances; contamination of wastewater sludge).

In general, pre-treatment is carried out as close as possible to the source in order to avoid dilution, in particular for metals. Sometimes, wastewater streams with appropriate characteristics can be segregated and collected in order to undergo a dedicated combined pre-treatment.

All water discharges are controlled as per the Consent to Discharge Trade Effluent (Consent No. 709008, 6 August 2018) – all monitoring occurs as set out in the consent document The scrubber unit is part of an enclosed loop system used to cool the process. The scrubber water is 6 monthly refreshed. The used water is discharged to the foul sewer in accordance with the Consent to Discharge Trade Effluent (Consent No. 709008, 6 August 2018). This water has never been discharged.

BAT 12

To reduce emissions to water, BAT is to use an appropriate combination of final wastewater treatment techniques. Final wastewater treatment is carried out as part of an integrated wastewater management and treatment strategy (see BAT 10).

Appropriate final wastewater treatment techniques, depending on the pollutant, include:

All water discharges are controlled as per the Consent to Discharge Trade Effluent (Consent No. 709008, 6 August 2018) – all monitoring occurs as set out in the consent document The scrubber unit is part of an enclosed loop system used to cool the process. The scrubber water is 6 monthly refreshed. The used water is discharged to the foul sewer in accordance with the Consent to Discharge Trade Effluent (Consent No. 709008, 6 August 2018). This water has never been discharged.

4.3.4 BAT-associated emission levels for emissions to water

The BAT-associated emission levels (BAT-AELs) for emissions to water given in Table 4.1, Table 4.2 and Table 4.3 apply to direct emissions to a receiving water body from:

i. The activities specified in Section 4 of Annex I to Directive 2010/75/EU;
ii. Independently operated wastewater treatment plants specified in Section 6.11 of Annex I to Directive 2010/75/EU provided that the main pollutant load originates from activities specified in Section 4 of Annex I to Directive 2010/75/EU;
iii. The combined treatment of wastewater from different origins provided that the main pollutant load originates from activities specified in Section 4 of Annex I to Directive 2010/75/EU.

The BAT-AELs apply at the point where the emission leaves the installation.

All water discharges are controlled as per the Consent to Discharge Trade Effluent (Consent No. 709008, 6 August 2018) – all monitoring occurs as set out in the consent document.

The scrubber unit is part of an enclosed loop system used to cool the process. The scrubber water is 6 monthly refreshed. The used water is discharged to the foul sewer in accordance with the Consent to Discharge Trade Effluent (Consent No. 709008, 6 August 2018). This water has never been discharged.

4.4 Waste

BAT 13

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.

See Document, Environmental Management System Ref: CE-WH-1801-RP08-Final v2.0, Section 5 – Waste reduction and Appendix 3 – extract from the Health, Safety and Environmental Manual.

BAT 14

In order to reduce the volume of wastewater sludge requiring further treatment or disposal, and to reduce its potential environmental impact, BAT is to use one or a combination of the techniques given below.

Wastewater sludge is not a known issue. Flocculants are used in the effluent tank. The scrubber unit is part of an enclosed loop system used to cool the process. The scrubber water is 6 monthly refreshed. The used water is discharged to the foul sewer in accordance with the Consent to Discharge Trade Effluent (Consent No. 709008, 6 August 2018). This water has never been discharged.

4.5 Emissions to air

4.5.1 Waste gas collection

BAT 15

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.

Applicability

The applicability may be restricted by concerns on operability (access to equipment), safety (avoiding concentrations close to the lower explosive limit) and health (where operator access is required inside the enclosure). Gases are in the form of steam from boilers and processes. Gas streams are either recycled as part of the process, go through Bag filter systems or are vented

4.5.2 Waste gas treatment

BAT 16

To reduce emissions to air, BAT is to use an integrated waste gas management and treatment strategy that includes process-integrated and waste gas treatment techniques.

Description

The integrated waste gas management and treatment strategy is based on the inventory of waste gas streams (see BAT 2) giving priority to process-integrated techniques. Some Gas streams are either recycled as part of the process, or pass through Bag filter systems

4.5.3 Flaring – Not applicable

BAT 17

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 techniques given below.

BAT 18

To reduce emissions to air from flares when flaring is unavoidable,

BAT is to use one or both of the techniques given below.

4.5.4 Diffuse VOC emissions

BAT 19

To prevent or, where that is not practicable, to reduce diffuse VOC emissions to air, BAT is to use a combination of the techniques given below.

See Air Quality Assessment CE-WH-1801-RP14, section 5.3.36. VOC concentrations are not considered to be significant. VOCs are not considered an issue with this process

4.5.5 Odour emissions

BAT 20

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 following elements:

I. A protocol containing appropriate actions and timelines;
II. A protocol for conducting odour monitoring;
III. A protocol for response to identified odour incidents;
IV. An odour prevention and reduction programme designed to identify the source(s), to measure/estimate odour exposure, to characterise the contributions of the sources, and to implement prevention and/or reduction measures.

The associated monitoring is in BAT 6.

Applicability

The applicability is restricted to cases where odour nuisance can be expected or has been substantiated. Olfactory monitoring occurs on a daily basis and would highlight both fugitive emission releases and process failures/issues. The process is not malodorous and Novidon have never received a complaint regarding odours relating to their processes.

BAT 21

To prevent or, where that is not practicable, to reduce odour emissions from wastewater collection and treatment and from sludge treatment, BAT is to use one or a combination of the techniques given below.

Correct control of the process ensures potential odour issues are eliminated. The scrubber unit is part of an enclosed loop system used to cool the process. The wastewater system is not known to produce offensive odours.

4.5.6 Noise emissions

BAT 22

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 following elements:

I. A protocol containing appropriate actions and timelines;
II. A protocol for conducting noise monitoring;
III. A protocol for response to identified noise incidents;
IV. A noise prevention and reduction programme designed to identify the source(s), to measure/estimate noise exposure, to characterise the contributions of the sources and to implement prevention and/or reduction measures.

Applicability

The applicability is restricted to cases where noise nuisance can be expected or has been substantiated. The whole process is internal, there is one internal noise zone. This is an advisory zone as per the Control of Noise at Work Regs (2005). Noise is not considered an issue, Novidon have never received a complaint regarding Noise

BAT 23

To prevent or, where that is not practicable, to reduce noise emissions, BAT is to use one or a combination of the techniques given below.

The whole process is internal and located on an industrial estate. Noise is not considered an issue, Novidon have never received a complaint regarding Noise.

DRAWINGS

Drawing No CE-WH-1801-DW01, Fig 1a	Environmental Permit Boundary Plan	1:1,250 @ A3
Drawing No CE-WH-1801-DW01, Fig 2	Factory Site Layout	1:500 @ A3
Drawing No CE-WH-1801-DW02, Fig 2b	Drainage Layout	1:1,250 @ A3

Legend:

Permit Boundary

Consultant:

Crestwood Environmental Ltd

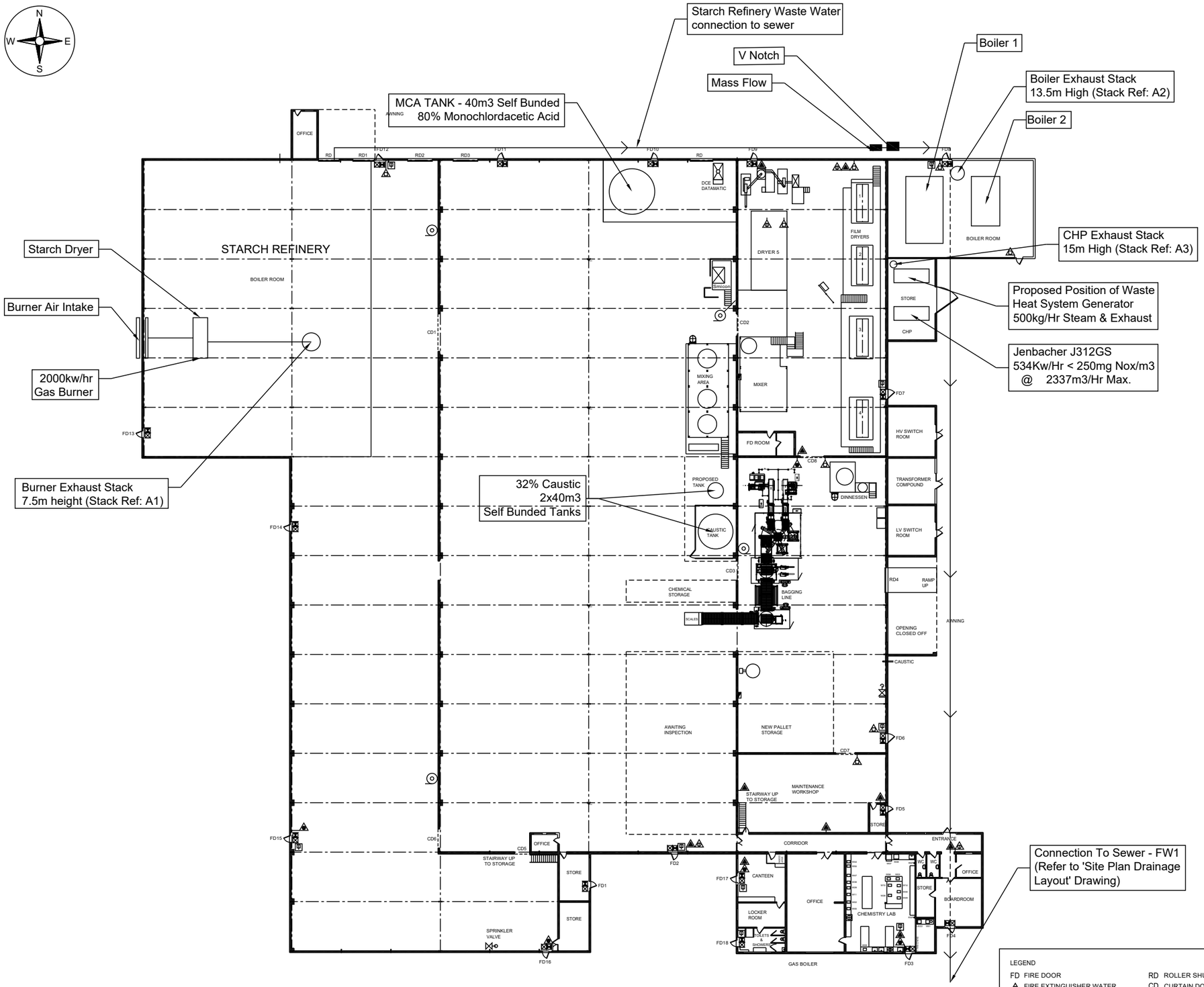
Science, Technology & Prototyping Centre
University of Wolverhampton Science Park
Glaisher Drive, Wolverhampton
WV10 9RU

Tel: 01902 229563
info@crestwoodenvironmental.co.uk
www.crestwoodenvironmental.co.uk

Client:

Novidon

Site: Novidon - Wrexham			
Drawing Title: **Permit Boundary Plan**			
Date: 23 / 2 / 2024	Scale 1:1,250	Paper Size: A3 (420×297mm)	
Drawn By: RM	Checked By: KB	Status: FINAL	Final Revision: a
Drawing Ref: CE-WH-1801-DW01	Drawing No: **Figure 1a**		



LEGEND

FD FIRE DOOR	RD ROLLER SHUTTER DOOR
FIRE EXTINGUISHER WATER	CD CURTAIN DOOR
FIRE EXTINGUISHER CO^2	
FIRE EXTINGUISHER FOAM	
FIRE EXTINGUISHER DRY POWDER	
FIRE BLANKET	FIRE EXIT ILLUMINATED SIGN
BREAK GLASS ACTUATOR	EYE WASH
SMOKE SENSOR	FIRST AID
FIRE HOSE	

Consultant:

CRESTWOOD ENVIRONMENTAL

Client:

NOVIDON

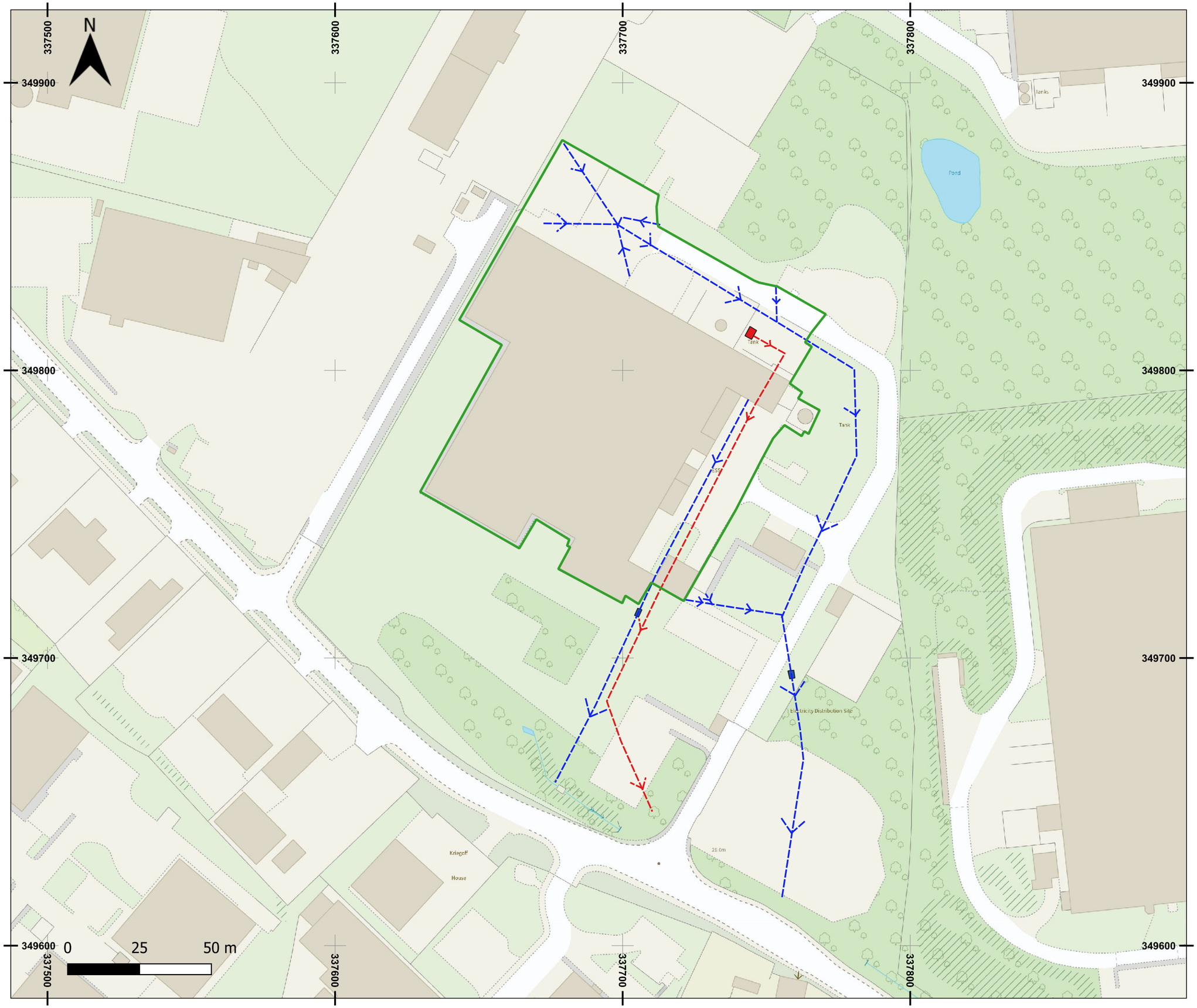
Site: **NOVIDON - WREXHAM**

Drawing Title: **Factory Site Plan**

Date:	Scale:	Paper Size:
11 Aug 2021	1:500	A3 (420×297 mm)

Drawn By:	Checked By:	Status:	Final Revision:
IS	SB	FINAL	-

CAD Ref:	Drawing No: / Client Ref:
CE-WH1801-DW01 - FINAL	**Fig 2**



Legend:
- Permit Boundary
- Drainage SW
- Drainage (Sewers)
- Penstock Valve

Consultant:
Crestwood Environmental Ltd
Science, Technology & Prototyping Centre
University of Wolverhampton Science Park
Glaisher Drive, Wolverhampton
WV10 9RU

Tel: 01902 229563
info@crestwoodenvironmental.co.uk
www.crestwoodenvironmental.co.uk

Client:
Novidon

Site: Novidon - Wrexham			
Drawing Title: **Drainage Layout**			
Date: 29 / 2 / 2024	Scale 1:1,250	Paper Size: A3 (420×297mm)	
Drawn By: RM	Checked By: KB	Status: FINAL	Final Revision: b
Drawing Ref: CE-MR-1798-DW02	Drawing No: **Drawing 2b**		

Appendix 1 Consent to Discharge Trade Effluent (Consent No 709008, 6 August 2018)

Consent no: 709008

DWR CYMRU CYFYNGEDIG
WATER INDUSTRY ACT 1991

CONDITIONAL CONSENT TO THE DISCHARGE OF TRADE EFFLUENT TO THE PUBLIC SEWER.
Novidon, Wrexham Industrial estate, LL13 9UH

TO : The Owner of the trade premises (hereinafter called "the Occupiers") whose registered office is situated at **Coed Aben Road, Wrexham Industrial estate, Wrexham, LL13 9UH**

RECITALS.

The **6th August 2018** you applied for consent under Section 119 of the Water Industry Act 1991 for consent to discharge trade effluent from the following trade premises known as **Novidon Ltd** (hereinafter, the Application) and which trade premises are situate at **Coed Aben Road, Wrexham Industrial Estate, LL13 9UH**, for the purpose of identification only shown on the location plan attached hereto and marked "A" (hereinafter, "the said trade premises").

1. Compliance with the conditions hereunder shall be ascertained by reference to the method of analysis as from time to time employed by the Undertaker, its servants, agents or contractors, save where the said condition(s) otherwise expressly provide(s)

DWR CYMRU CYFYNGEDIG ("the Undertaker") in the exercise of its powers under Section 121 of the Water Industry Act 1991, and thinking it fit to impose conditions as hereinafter appear, **GIVES ITS CONSENT** to the discharge of trade effluent from the said trade premises into the Undertaker's public sewers, **SUBJECT TO THE FOLLOWING CONDITIONS AND NOT OTHERWISE.**

(1) The public sewer(s) into which the trade effluent may be discharged is the 225 mm more particularly identified by means of a line(s) coloured RED drawn on the plan attached hereto and marked "B".

(2) The discharge of trade effluent shall be made at the point marked "X" on the said plan and the said trade effluent shall enter into the public sewer shown on the said plan at the point marked "Y" thereon and nor otherwise. Further, no connection, linkage, conduit, pipe, channel or other communication whatsoever shall be made to the said sewer between the said points "X" and "Y" (without the prior approval in writing of the Undertaker).

(3) The trade effluent to be discharged shall consist solely that which is specified in the Application and derived (exclusively) from the refining and drying of potato starch.

(4) Without prejudice to condition 3 above, the nature and/or composition of the trade effluent which may be discharged is as specified in the FIRST SCHEDULE hereto.

(5) The trade effluent shall not include any of the substances or properties listed in the SECOND SCHEDULE hereto in concentration greater than stated therein.

(6) The maximum quantity of trade effluent discharged on any day (being any continuous 24 hour period) shall not exceed **360 cubic metres.**

(7) The highest rate at which trade effluent may be discharged shall not exceed **4.2 litres per second.**

(8) The trade effluent shall only be discharged into the public sewer(s) from 0.00 hours to 2400 hours (on the following days each week, namely Monday to Sunday).

(9) No uncontaminated condensing water shall be discharged.

(10) There shall be eliminated from the trade effluent before it is discharged the matters listed below:

a) Effluent with a temperature in excess of 43° Celsius (110° Fahrenheit);
b) Calcium Carbide;
c) Petroleum Spirit within the meaning of Section 111 of the Water Industry Act 1991, save otherwise permitted herein:
d) Other material forming a constituent of the trade effluent, whether along or in combination with other materials, specified hereby as that which is explosive;
e) Any other substance forming a constituent of the trade effluent which is hereby specified as that which is likely to injure the sewers or to interfere with the free flow of their contents or to affect prejudicially the treatment and disposal of their contents.

(11) No trade effluent shall be discharged the pH value of which is less than **5 or greater than 10.0.**

(12) No trade effluent shall be discharged the nature or composition of which includes a matter, substance, property or matters, substances or properties which would constitute the trade effluent as Special Category Effluent within the meaning of Section 138 of the Water Industry Act 1991.

(13) The Occupier shall give to the Undertaker prior written notice of any change in the process of manufacture, materials, or other circumstances howsoever arising capable of altering the nature and/or composition of the trade effluent. No new substances or properties shall be discharged until the Undertaker has agreed thereto, either with or without imposing a limit and thereafter the said substance(s) and/or property(ies) shall be deemed incorporated into the SECOND SCHEDULE.

(14) An inspection chamber or manhole shall be provided and maintained by the Occupier in a suitable position and/or at the point(s) marked "X" on the plan annexed hereto in connection with each pipe through which the trade effluent is discharged and such inspection chamber or manhole shall be constructed and maintained in accordance with the Undertaker's reasonable requirements as from time to time notified in writing to the occupier so as to enable a person readily at any time to take samples of the trade effluent being discharged.

(15) A notch gauge, continuous recorder or some other apparatus suitable and adequate to the Undertaker for measuring and automatically recording the volume and rate of trade effluent so discharged shall be provided, such apparatus to be tested and maintained in accordance with the Undertaker's reasonable requirements as from time to time notified in writing to the Occupier.

(16) Apparatus capable of accurately determining, measuring and recording the nature and/or composition of the trade effluent discharged shall be provided, such apparatus to be tested and maintained in accordance with the Undertaker's reasonable requirements as from time to time notified in writing to the Occupier.

(17) The Occupier shall keep records of the volume, rate, nature and/or composition of the trade effluent discharged into the sewer(s) at all times available for inspection by any authorised officer of the Undertaker and copes of such records shall be sent to the Undertaker on demand.

(18) (a) The Occupier shall pay to the Undertaker charges for the reception, conveyance, treatment and disposal of the trade effluent and the costs of sampling, measuring and/or analysis of the same under the Undertaker's trade effluent's functions, which charges shall be determined as set out below, and all sums payable under this condition shall be payable upon demand;

(b) The charges under (a) above shall be calculated in accordance with Undertaker's Scheme of Charges as from time to time amended;

(c) For the avoidance of doubt, the charge shall be payable by any person who is or was the Occupier of the said trade premises during the period of discharge of the trade effluent or at the time payment is due.

(19) If the notch gauge, meter, recorder or other apparatus ceases to record or is suspected of not recording and/or measuring accurately, the quantity of trade effluent discharged into the sewer(s) during the period from the date and/or time at which the records were last accepted by the Undertaker as being correct up to the date when the notch gauge, meter, recorder or other apparatus again registers accurately shall for the purpose of any payment to be made under these conditions be based on the average daily volume of trade effluent discharged during the preceding period over which the records were last accepted by the Undertaker as being

accurate or during the month immediately after the notch, gauge, meter, recorder or other apparatus or means of measurement and recording has been accurate whichever is the higher.

YOUR RIGHT OF APPEAL

Any person aggrieved by: -

The refusal of a Sewage Undertaker to give consent for which application has been made to the Undertaker under Section 119 of the Water Industry Act 1991; or

Any condition attached by a Sewage Undertaker to such consent may appeal to the Director General of Water Services.

On an appeal in respect of a refusal to give consent, the Director may give the necessary consent either unconditionally or subject to such conditions as he thinks fit to impose.

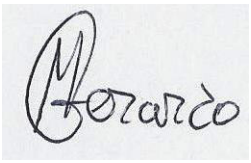
On an appeal in respect of a condition the Director may take into review all the conditions whether appealed against or not and may substitute for them any other set of conditions (whether more or less favourable to the Appellant) or annul any of the conditions and may include provision as to the charges to be made in pursuance of any condition attached to a consent for any period before the determination of the appeal.

On any appeal the Director may give direction that the trade effluent shall not be discharged until a specified date.

FAILURE TO COMPLY WITH CONDITIONS.

If in the case of any trade premises a condition is contravened, the Occupier of the premises will be guilty of an offence and liable on conviction by a Magistrates' Court to a fine not exceeding the statutory maximum or on conviction by the Crown Court to an unlimited fine.

DATED **16 day of August 2018**

For and on behalf of the Company 

(Michael Gerardo)

Designation: _Wastewater Science Manager_

Address of Division:

Northern Division
Dinas Depot
Llanwnda
Caernarfon
Gwynedd
LL54 5UD

FIRST SCHEDULE

(1) Effluent derived from the **washing, refining and drying of potato starch.**

(2) Water (including such elements, compounds and organisms normally present in water at trace or harmless levels and not exceeding such levels that as may be imposed by regulations for the time being regulating the quality drinking water)

SECOND SCHEDULE.

PART A (Applicable to spot samples)

(1) Total suspended solids of the trade effluent shall not exceed **800 milligrams per litre.**

(2) The chemical oxygen demand of the trade effluent after one-hour quiescent settlement shall not exceed **3000 milligrams per litre.**

(3) Fats, Oil sand Greases shall not exceed **100 milligrams per litre.**

(4) Phosphate shall not exceed **15 milligrams per litre**.

(5) Ammonia shall not exceed **25 milligrams per litre.**

(6) Sulphate shall not exceed **500 milligrams per litre**.

(7) Sulphide shall not exceed **2 milligrams per litre**

PART B (Applicable to Composite samples)

(1) Total suspended solids of the trade effluent shall not exceed **800 milligrams per litre.**

(2) The chemical oxygen demand of the trade effluent after one-hour quiescent settlement shall not exceed **3000 milligrams per litre.**

(3) Fats, Oil sand Greases shall not exceed **100 milligrams per litre.**

(4) Phosphate shall not exceed **15 milligrams per litre**.

(5) Ammonia shall not exceed **25 milligrams per litre.**

(6) Sulphate shall not exceed **500 milligrams per litre**.

(7) Sulphide shall not exceed **2 milligrams per litre**

THIRD SCHEDULE

Not applicable.

Appendix 2 Proposed Starch Refinery (Using Imported Starch) Process Flow Diagram

Refinary

Load Big Bags via hoist

Main Mix Tank

Bags mixed with water and stirred - Baume

Rotary Tank

Shaker Sieve

Buffer Tank

Nivoba Rotary Sieve

Bag for Waste

Sand Cyclone

Bag for Sand waste

Tank 4100

Tank 5000

4301 Cyclone

Vacuum Filter A

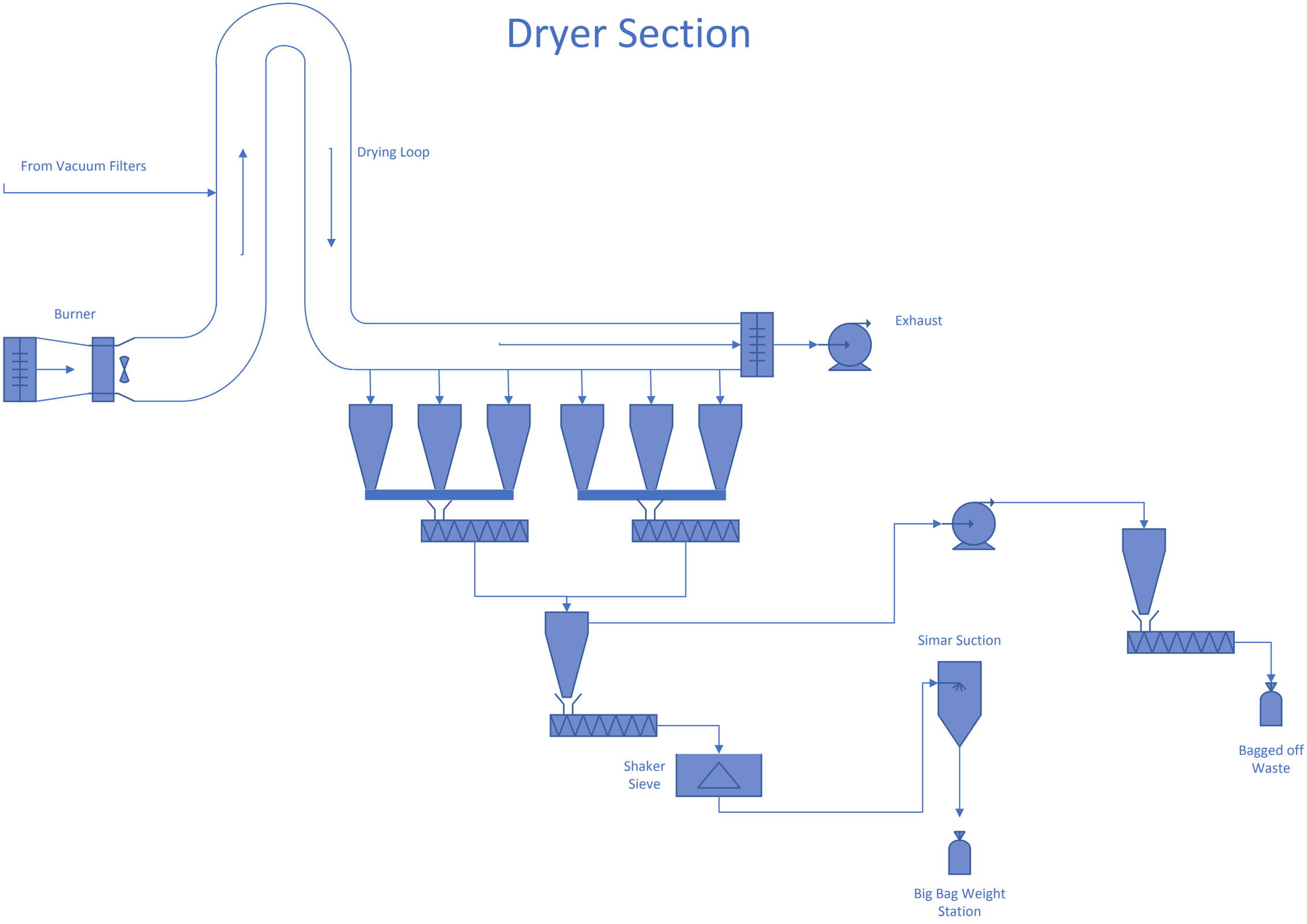
Vacuum Filter B

Water recovery

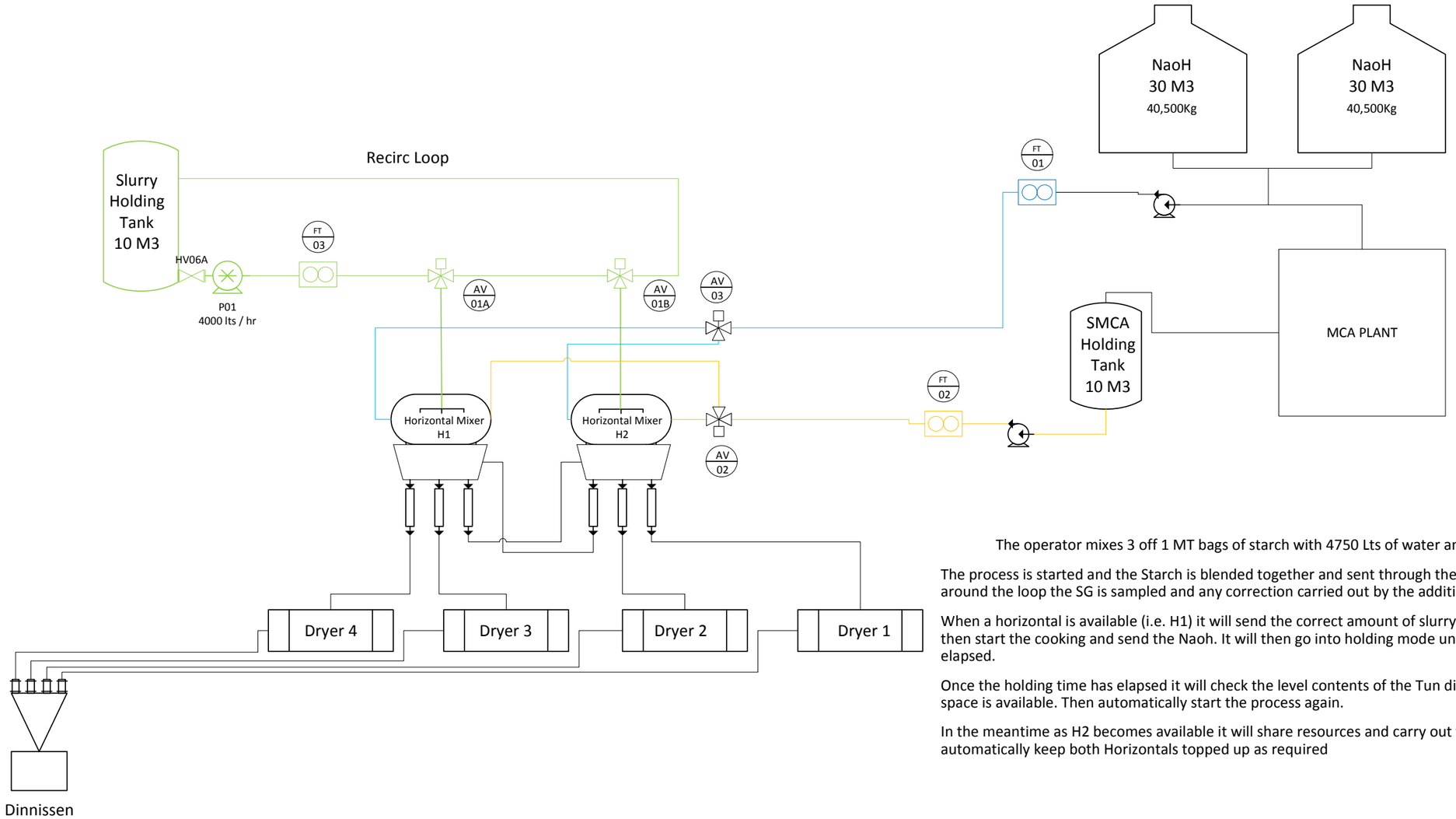
Tank 4003

To Dryer Section

Dryer Section



Appendix 3 Carboxymethylisation Starch Modification Process Flow Diagram



The operator mixes 3 off 1 MT bags of starch with 4750 Lts of water and adds the crosslinker

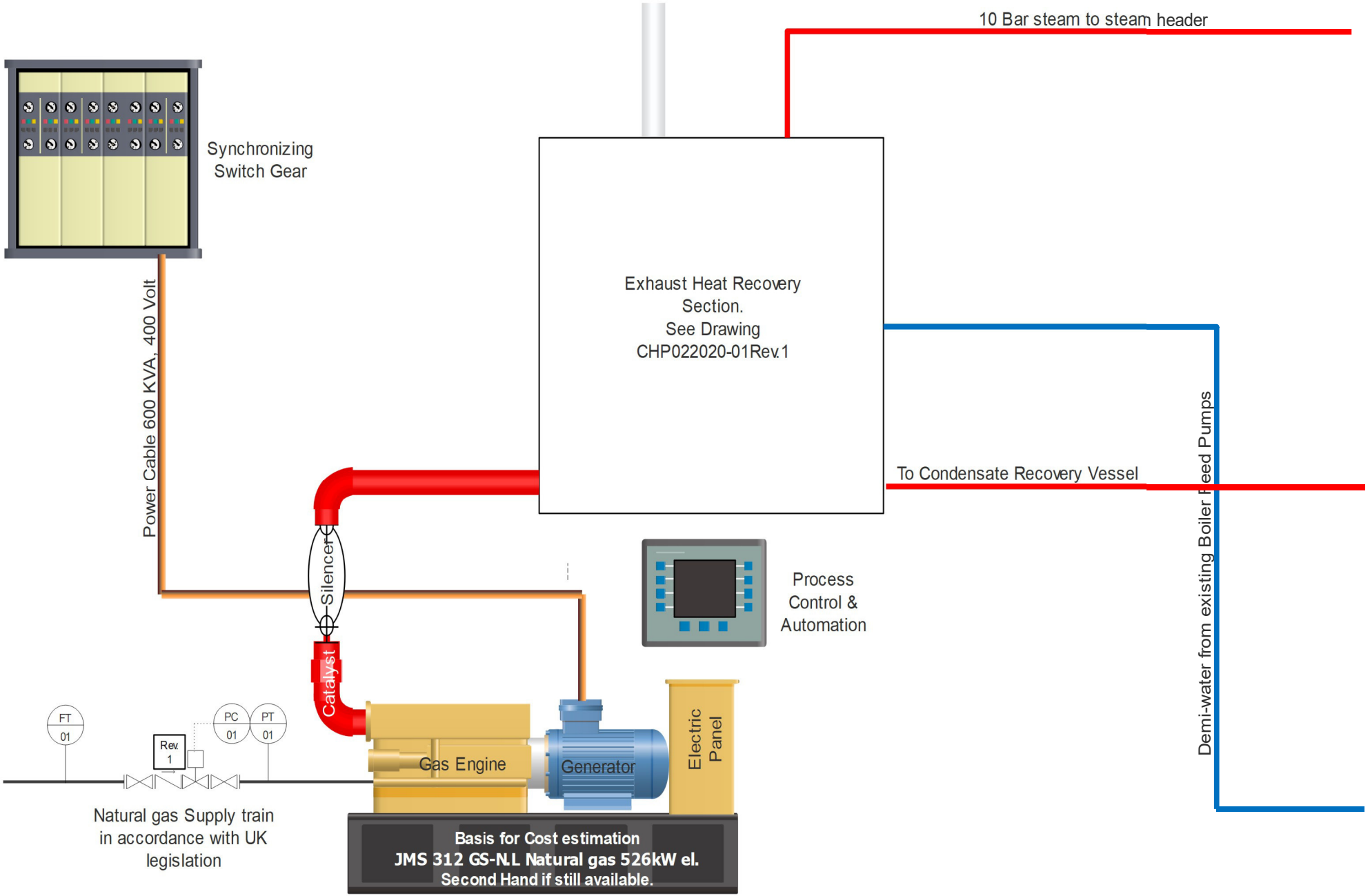
The process is started and the Starch is blended together and sent through the Recirc loop. It circulates around the loop the SG is sampled and any correction carried out by the addition of water. .

When a horizontal is available (i.e. H1) it will send the correct amount of slurry , water and SMCA to H1 , then start the cooking and send the Naoh. It will then go into holding mode until the correct time has elapsed.

Once the holding time has elapsed it will check the level contents of the Tun dish and drop the mix when space is available. Then automatically start the process again.

In the meantime as H2 becomes available it will share resources and carry out the same process into H2 and automatically keep both Horizontals topped up as required

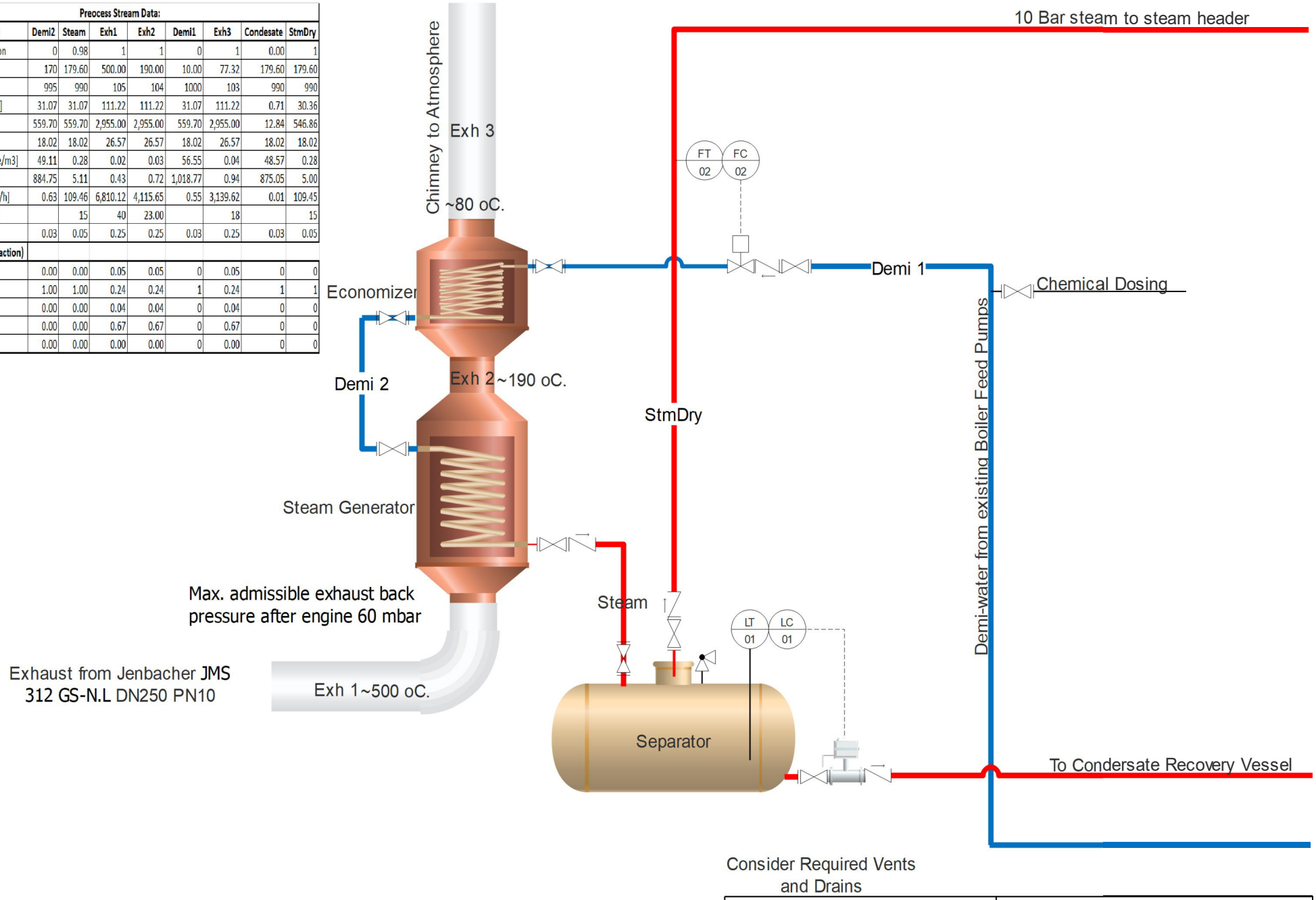
Appendix 4 CHP Plant Process Flow Diagram



Note: LLH decipation / utilization must be discussed. (~300 KWth.)
Heat Level ~ 80 oC.

Novidon Sustainable starch solutions	Process Flow Diagram CHP Wrexham	
	Drawing	CHP012020-01Rev. 1
	Date	July 2020
	Purpose	For Process Design & Cost Estimation

Preocess Stream Data:								
Stream Name	**Demi2**	**Steam**	**Exh1**	**Exh2**	**Demi1**	**Exh3**	**Condesate**	**StmDry**
Vapour / Phase Fraction	0	0.98	1	1	0	1	0.00	1
Temperature [C]	170	179.60	500.00	190.00	10.00	77.32	179.60	179.60
Pressure [kPa]	995	990	105	104	1000	103	990	990
Molar Flow [kgmole/h]	31.07	31.07	111.22	111.22	31.07	111.22	0.71	30.36
Mass Flow [kg/h]	559.70	559.70	2,955.00	2,955.00	559.70	2,955.00	12.84	546.86
Molecular Weight	18.02	18.02	26.57	26.57	18.02	26.57	18.02	18.02
Molar Density [kgmole/m3]	49.11	0.28	0.02	0.03	56.55	0.04	48.57	0.28
Mass Density [kg/m3]	884.75	5.11	0.43	0.72	1,018.77	0.94	875.05	5.00
Act. Volume Flow [m3/h]	0.63	109.46	6,810.12	4,115.65	0.55	3,139.62	0.01	109.45
Pipe velocity: (m/sec)		15	40	23.00		18		15
Pipe size: (m)	0.03	0.05	0.25	0.25	0.03	0.25	0.03	0.05
Composition: (Mol Fraction)								
CO2	0.00	0.00	0.05	0.05	0	0.05	0	0
H2O	1.00	1.00	0.24	0.24	1	0.24	1	1
Oxygen	0.00	0.00	0.04	0.04	0	0.04	0	0
Nitrogen	0.00	0.00	0.67	0.67	0	0.67	0	0
NO2	0.00	0.00	0.00	0.00	0	0.00	0	0



Novidon Sustainable starch solutions A ROYAL COSUN COMPANY	**Process Flow Diagram CHP Wrexham HRS**
Drawing	CHP022020-01Rev.1
Date	July 2020
Purpose	For Process Design & Cost Estimation