PERMIT VARIATION SUPPORTING INFORMATION

Simec Uskmouth Power Ltd - EPR/LP3131SW

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NON-TECHNICAL SUMMARY

Introduction

This document forms the application to vary the environmental permit held by Simec Uskmouth Power Limited (SUP) at Uskmouth Power Plant, Newport (EPR/LP3131SW). The facility is currently permitted as a large combustion plant (LCP) as defined by articles 28 and 29 of the Industrial Emissions Directive (IED). The facility is currently predominantly coal fired with the capability to burn a small amount of biomass. It consists of three steam turbine driven alternator sets fed each from a dedicated radiant type natural circulation water tube steam boiler with a rated thermal input of 330 MWth served by individual and common associated plant.

This variation seeks to permit a change in the permitted fuel. SUP intends to combust fuel pellets derived from waste; these fuel pellets have similar calorific value to coal (between 19 and 25 MJ/kg).

The SUP conversion seeks to utilise (where possible) the existing infrastructure. The main combustion plant will utilise existing plant, the abatement system will be updated. The conversion process will entail modifications to existing plant required to enable the fuel pellets to be stored, combusted and the resultant emissions controlled prior to release. This variation also seeks to consider how, following the changes to the permitted fuel, the facility will comply with the requirements of the LCP BAT conclusions and other requirements as set out in a notice from NRW sent under Regulation 61 Environmental Permitting (England and Wales) Regulations 2016 dated 9 May 2018.

This non-technical summary provides a brief overview of the proposals subject to this application.

Site Location

The site is located at Uskmouth Power Plant, West Nash Road, Newport, NP18 2BZ approximately 4.2 km south east of Newport city centre. The site is centred at national grid reference ST 32736 83748.

There will be no change to the installation boundary as a result of the proposed variation.

Description of Changes

SUP proposes to convert two of the existing three combustion units; units 13 (110 MWe net) and 14 (110MWe net) to operate on fuel pellets derived from non-recyclable waste and biomass pellets rather than coal and biomass. Where possible the existing infrastructure and equipment will be reused or reconfigured to accommodate the combustion of this new type of fuel.

The facility will have the nominal capacity to burn 875,000 tonnes of waste derived fuel per annum. The maximum throughput is 1,093,000 tonnes per annum.

The third combustion unit (15) will remain non-operational, will not operate as part of the new facility and is not considered within this permit variation. There is a possibility that unit 15 could be converted in the future, however if that occurs it will be the subject of a further permit variation application.

The emission points for the facility will remain unchanged. There will be no new point source emissions to air or water.

The fuel to be burned in the converted units 13 and 14 will be predominantly fuel pellets derived from non-recyclable waste processed to meet the stringent fuel specification criteria. The fuel pellet composition is set out in a fuel supply agreement which has been used to inform the Front End Engineering Design (FEED). The fuel pellets will make up the majority of the fuel. Biomass may also be burned and could constitute up to 1% of the fuel.

Front End Engineering Design (FEED) activities will determine the design requirements for the SUP conversion. At the close of FEED, the design specification is provided to the EPC contractor for the

completion of detailed design, engineering, construction and testing of required upgrades, modifications and additions. FEED and EPC phases will run in parallel to the permitting deliberation process.

The delivery routes post conversion will replicate previous operational delivery patterns:

- under normal operating conditions, all fuel pellets delivered by rail – replicating historic coal delivery;
- operational consumables for abatement delivered to SUP by road;
- biomass delivered to SUP by road; and
- ash transported off site by road

The fuel pellets will be delivered by rail into a rail unloading facility and are conveyed into four primary storage silos, each with a capacity of up to 10,000 tonnes; pellets are then transferred via conveyors into two day silos (1,600 tonnes each) each serving one converted unit (13 and 14).

In addition to the raw materials currently used at the site, it is anticipated that the following will be required for use in the new abatement system:

- urea;
- activated carbon; and
- ammonium sulphate.

In the event that other corrosion mitigants assessed during FEED prove necessary for final design. NRW will be notified and the relevant environmental impacts will be assessed and presented.

The required volumes and storage locations for these abatement materials will be determined during FEED and design phases of the EPC contract following submission of this application. Once required volumes and storage locations are determined NRW will be notified and the environmental risk assessment which accompanies this application will be reviewed and updated where necessary.

The combustion plant will be operated on the new fuel; pellets and biomass. The plant remains fundamentally similar to when fuelled by coal, changes include the introduction of SNCR for NO_x control and new ultra low NO_x burners. It is anticipated that SNCR will be installed using urea solution as a reagent for additional NO_x emission reduction.

The facility will be designed to combust fuel pellets at a rate of 63 tonnes per hour per unit with a design fuel pellet net calorific value (NCV) of between 19 and 25 MJ/kg. The throughput of pellets will differ depending upon the actual fuel NCV which will vary within acceptable norms.

Fuel pellets will be reclaimed from the primary storage and conveyed to the day silos for discharge into the existing fuel bunkers and fed into the pulverising mills via a new mass flow measurement device.

The mills will pulverise the fuel pellets with biomass to a suitable particle size for pneumatic conveying to the burners.

Combustion air will be provided by two existing forced draught fans, each feeding one end of the furnace windbox and overfire air system. Air from each fan will pass through the existing air pre-heater, to facilitate heat transfer from the hot flue gases to pre-heat the combustion air and increase cycle efficiency. The two existing induced draft fans will be utilised to draw flue gases from the boiler to the stack.

The main solid residues produced by the facility will be:

- Bottom ash (including boiler ash) (also referred to as Furnace Bottom Ash) and
- Air Pollution Control (APC) residue, which contains fly ash and abatement chemicals.

Bottom ash will discharge from the boiler into the bottom ash handling system onto a series of conveyors for transportation to bottom ash storage. The nature of the bottom ash handling system will be determined during the FEED and design phases of the EPC project.

Air Pollution Control residue (APCr) will be removed using the existing bag filter system, collected in a hopper and pneumatically conveyed into an APCr silo for disposal. The APCr is discharged into sealed road tankers and is expected to be sent to landfill following off-site pre-treatment.

A noise assessment has been carried out to support the permit variation. The results of the noise assessment indicate that significant adverse noise or vibration effects would not be expected as a result of proposed SUP conversion.

Releases to air will be monitored and reported by the SUP facility using continuous emissions monitoring equipment supported by periodic stack monitoring. All emissions monitoring will meet the requirements of the Industrial Emissions Directive. Equipment certified to the Environment Agency MCERTS monitoring standard will be used to carry out monitoring at the facility where available.

Process control systems will be included to provide process monitoring to ensure that the facility is controlled and operated within the design parameters.

The quantity of residues generated from the facility will be monitored. Further monitoring and reporting of bottom ash and APC residues will be carried out in accordance with the requirements of the environmental permit.

A full description of the condition of the site at the time of this application is provided in the IED Baseline and Site Condition Report (Appendix I), which provides a coherent record of the site and its baseline conditions at the time of permit variation.

A site closure plan will be developed in order to demonstrate the decommissioning process, once SUP has reached the end of its operational lifetime. The decommissioning process aims to control all significant pollution risks and return the site to the condition prescribed within the environmental permit.

Assessments of air quality effects and human health risk have been undertaken and concluded that no significant effects will arise as a result of operation of the facility in accordance with the proposed change in fuel. The air quality assessment also considered effects at sensitive ecological sites and concluded that no significant effects would occur.

In summary, the design and operation of the proposed SUP conversion will ensure that significant impacts to the environment and human health will not arise as a result of its operation. The main plant will operate techniques that are proven, reliable and represent Best Available Techniques.

Contents

Tables

Appendices

1 INTRODUCTION

1.1 Background

1.1.1 The Simec Uskmouth Power Limited (SUP) facility is permitted (EPR/LP3131SW) for the operation of a large combustion plant (LCP) as defined by articles 28 and 29 of the Industrial Emissions Directive (IED). The SUP facility is currently permitted as a coal fired large combustion plant with the capability to burn a small amount of biomass. It consists of three steam turbine driven alternators, each having a dedicated boiler and associated plant with a rated thermal input of 330 MW.

1.1.2 The site is located at Uskmouth Power Plant, West Nash Road, Newport, NP18 2BZ approximately 4.2 km south east of Newport city centre. The site is centred at national grid reference ST 32736 83748.

1.1.3 The SUP conversion seeks to utilise, where possible, the existing plant infrastructure. The main combustion plant and the abatement system will be updated. The conversion process will entail modifications to existing plant required to enable the fuel pellets to be stored, combusted and the resultant emissions controlled prior to release. This variation also seeks to consider how, following the changes to the permitted fuel, the facility will comply with the requirements of the LCP BAT conclusions and other requirements as set out in a notice from NRW sent under Regulation 61 Environmental Permitting (England and Wales) Regulations 2016 (EPR) dated 9 May 2018. This variation also considered how the facility will comply with the requirements of the draft Waste Incineration BAT reference Document.

1.1.4 The change in fuel will change the main permitted activity at the facility from a combustion activity under s 1.1 of Schedule 1, Pt 2 of the EPR to a co-incineration activity under s 5.1 of Schedule 1 Pt 2 of the EPR.

1.1.5 Due to the nature of the changes being made to the SUP facility this application constitutes a substantial variation.

1.1.6 The completed NRW application forms (Part A, C2, C3 and F1 forms) accompany this supporting information document in appendix A.

1.2 The Operator

1.2.1 There will be no change in the Operator of the facility. SUP is listed on Companies House with company number 05104786.

1.2.2 The company directors are listed on Companies House as follows:

- Timothy James Cornelius
- Andrew Luke Dagley

1.2.3 The directors' dates of birth are listed in appendix D.

1.3 Proposed Variation

1.3.1 There will be no changes to the permitted boundary as a result of this variation.

1.3.2 SUP proposes to convert two (of the three) combustion units; 13 and 14, both 110 MWe net, to operate on fuel pellets derived from non-recyclable waste and biomass rather than coal and biomass. Where possible, the existing infrastructure and equipment will be reused or reconfigured to accommodate the combustion of this new fuel pellet.

1.3.3 The facility will have the nominal capacity to burn 875,000 tonnes of fuel pellets per annum. The fuel pellets will comprise treated non-hazardous waste and will be produced to a defined specification. The maximum throughput is 1,093,000 tonnes per annum. In addition, a small proportion of biomass will be co-fired with the fuel pellets.

1.3.4 The third combustion unit (15) will remain non-operational and will not operate as part of the converted facility. It is not considered in this permit variation. There is a possibility that unit 15 may be converted in the future, however, this will be the subject of a further variation application.

1.3.5 The emission points for the facility will remain unchanged. There will be no new point source emissions to air or water from the facility.

1.3.6 The main elements of the SUP facility comprise:

- fuel and consumable delivery, handling and storage;
- combustion;
- power and steam generation;
- flue gas treatment; and
- residue handling and treatment.

1.3.7 Many elements will remain unchanged as a result of this variation, Section 2 of this document sets out those elements of the scheme that will change as a result of this variation versus those which will remain unchanged from the permitted scheme. A site layout plan for the proposed facility is provided in appendix B.

1.3.8 The scheduled activities to be included in the varied permit are detailed in Table 1-1 below.

Table 1-1: Permitted Activities

Table S1.1 Activities			
Activity Reference	**Activity listed in Schedule 1 of the EP Regulations**	**Description of specified activity**	**Limits of specified activity**
A1	~~Section 1.1A(1)(a):burning any fuel in an appliance with a rated thermal input of 50 megawatts or more.~~ Section 5.1A(1)(b): The incineration of non-hazardous waste in a waste incineration plant or waste co-incineration plant with a capacity exceeding 3 tonnes per hour.	~~LCP312:~~ electricity generation in ~~three coal fired units 13, 14 and 15.~~two waste-derived fuel fired units 13 and 14.	~~Receipt of coal and biomass at the coal mills, and the supply of oil to the combustion unit and any associated activities necessary to maintain the operation of the plant and fuel supplies through to the discharge of exhaust gases from the stack, ash removal from the combustion process and the export of steam to the steam systems.~~ Waste co-incineration including co-incineration lines, waste reception, storage, on site pre-treatment facilities, waste-, fuel- and air-supply systems, boilers, facilities for the treatment of waste gases, on-site facilities for treatment or storage of residues and waste water, stacks, devices and systems for controlling co-incineration operations, recording and monitoring co-incineration conditions.
~~A2~~	~~Section 3.5 Part B(f)~~	~~Pulverised fuel ash (PFA) handling and storage~~	~~Removal of ash from the combustion process to despatch from site.~~
~~A3~~	~~Section 4.2 Part A(1)(a)(iv)~~	~~Operation of six Flue Gas Desulphurisation (FGD) units~~	~~Receipt of calcium oxide to despatch of FGD end product.~~
Directly Associated Activities			
~~A4~~	~~DAA~~	~~Surface water drainage~~	~~Handling and storage of site drainage until discharge to the site surface water system.~~

Table S1.1 Activities			
Activity Reference	Activity listed in Schedule 1 of the EP Regulations	Description of specified activity	Limits of specified activity
A~~5~~2	DAA	Water treatment	From receipt of raw materials and raw water to dispatch of demineralised water to the process and chemical effluent to the drainage system via cooling system.
A~~6~~3	DAA	The generation and export of electricity	The receipt of steam at the steam turbine to the export of electricity to the national grid station and the direct generation of electricity.
~~A7~~	~~DAA~~	~~Fuel Storage~~	~~Receipt and handling of coal, oil and biomass up to the delivery of coal and solid biomass to the coal mills and delivery of oil and gas to the combustion units.~~
~~A8~~	~~DAA~~	~~The use of treated effluent from Welsh Water sewage treatment works to condense steam.~~	~~The pumping, filtering (including use of hydrocyclones) and chemical treatment of water, its use in the condenser and the cooling water system to the discharge of the water back to 'Julian's Pill'.~~
A4	DAA	Specified generator for emergency back-up power	Operated for the sole purpose of providing power at the site during an onsite emergency. This generator will be tested for a maximum of 50 hours per year.

1.4 Legislation and Guidance

1.4.1 The following legislation and guidance has been considered in relation to the operation of the SUP facility as described in this variation:

- Industrial Emissions Directive[1]
- Large Combustion Plant BAT Conclusions (07/2017)[2]
- Waste Incineration BAT Conclusions (12/2019)[3]
- Sector Guidance Note EPR 5.01 – The Incineration of Waste (March 2009)[4]

1.5 Classification of the Facility

1.5.1 The SUP facility is currently permitted as a large combustion plant (LCP) under section 1.1 of Schedule 1 Part 2 of the EPR. Discussions have taken place with NRW regarding the most appropriate designation for the plant in light of the proposed change in fuel.

1.5.2 The main fuel for the combustion process will be fuel pellets derived from non-recyclable waste destined for landfill. As such, NRW have confirmed that the main permitted activity for the facility falls under section 5.1 of Schedule 1 Part 2 of the EPR.

1.5.3 The fuel for the combustion process will consist fuel pellets in the majority and may consist of up to 1% biomass.

[1] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32010L0075&from=EN

[2] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32017D1442&from=EN

[3] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32019D2010&from=EN

[4] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/297004/geho0209bpio-e-e.pdf

1.5.4 NRW guidance[5] has been used to assess the categorisation of the plant as a co-incinerator. This is on the basis that:

- The output from the plant is energy;
- Energy is generated from a plant that uses waste as a principal source of fuel;
- Energy is recovered and there is a net export of energy;
- The feedstock is waste with consistent characteristics that is comparable to a virgin fuel (coal);
- The plant recovers at least 0.8 MWh_e / tonne of waste.

1.5.5 The recovery of energy has been calculated as 1.74 MWh_e / tonne based on the lower end of the design values for net calorific value (19 MJ / kg), an efficiency of 33% and a conversion factor of GJ to MWh of 0.2777:

(19 GJ / tonne x 0.2777) x 33% = 1.74 MWh / tonne

1.5.6 NRW have further confirmed that the facility will fall within the scope of the LCP BAT Reference Document[6] including section 6 on waste co-incineration of waste in combustion plant.

1.5.7 There is an intention on behalf of the proposed fuel supplier to apply for end of waste (EoW) status through the Environment Agency in England, where the fuel will be produced.

1.5.8 The proposed fuel supplier anticipates that the EoW designation will be acquired ahead of SUP operation in 2022. In the event that EoW designation is achieved then the waste co-incineration designation would no longer be appropriate, and a further variation of the permit will be required to revert the designation to LCP activity under section 1.1 of Schedule 1 Part 2 of the EPR.

[5] https://naturalresources.wales/media/2101/guidance-on-when-a-plant-is-a-co-incineration-plant.pdf

[6] https://eippcb.jrc.ec.europa.eu/reference/BREF/LCP/JRC_107769_LCPBref_2017.pdf

2 DESCRIPTION OF CHANGES

2.1 Overview

2.1.1 The proposed changes included within this variation are described in this section.

2.2 Fuel

2.2.1 The fuel to be combusted in the converted units will be predominantly “fuel pellets” which will comprise treated non-hazardous waste which has been processed to meet the required fuel specification. The specification for the fuel pellets has been set out in a fuel supply agreement which has been used to inform the system design. The fuel pellets will make up the majority of the total fuel mix and may be co-fired with up to 1% biomass.

2.2.2 Biomass is currently permitted to be combusted within the SUP facility. The specification for the biomass fuel post conversion is provided in appendix O.

2.2.3 The fuel pellets will be classed under European waste code 19 12 12.

2.2.4 The fuel pellet specification is attached at appendix N.

2.3 Receipt of Fuel and other Raw Materials

2.3.1 Deliveries to SUP post conversion will replicate the transport patterns as the permitted coal fired power station. The fuel pellets will be delivered to site primarily by rail. In the event that rail deliveries are temporarily unavailable there will be an option to deliver fuel pellets by road. Biomass and abatement reagents will be delivered by road and bottom ash / APCr will be transported off site by road.

Rail

2.3.2 Fuel pellet loads will be delivered by rail and unloaded by bottom discharge rail cars into the existing rail unloading facility which will be upgraded as part of the SUP conversion. It is anticipated that rail cars will have a maximum capacity of 90m^3 and a maximum working volume of 75m^3.

2.3.3 The existing conveyor system will be upgraded. From the rail unloading facility fuel pellets will be transferred to the primary storage silos via existing enclosed conveyors numbers 13, 15 and 16 on the site layout in appendix B.

2.3.4 Fuel pellets delivered to site will be tested prior to loading or transportation at the fuel production facility to ensure they meet the agreed specification. In the unlikely event that QC issues are identified, the batch will be assessed as outlined in the Fuel Supply Agreement and appropriate action taken including the option to return the fuel to the supplier.

Road

2.3.5 In the unlikely event that fuel pellets are delivered by road they will be delivered to the facility within an enclosed tipper lorry. All road vehicles will be inspected on arrival to the site to ensure they are providing adequate containment of the fuel pellets. In the event that a problem arises this would be investigated and appropriate action taken to prevent a reoccurrence.

2.3.6 Loads delivered by road will be weighed upon entry to the site at the upgraded weighbridge located at the site entrance. Paperwork will be checked to ensure that loads conform to that which the facility is permitted to accept. In the event that a delivery is suspected to contain non-conforming fuel a visual spot check of the fuel will be made within the fuel unloading facility. If confirmed as unacceptable the load will be rejected and returned to its place of origin.

2.3.7 The containers / containerised vehicles will transport the fuel pellets to the lorry unloading facility using the dedicated circulatory access roads within the site. All delivery vehicles will be directed to the unloading bay where the fuel pellets will be tipped and transferred to the primary storage silos via an enclosed conveyor system.

Biomass and other Raw Materials

2.3.8 Receipt of biomass (if utilised) will continue as per the current permit and will be delivered by road and deposited into the biomass storage shed as shown on the site layout plan at appendix B.

2.3.9 The facility will continue to utilise the following raw materials in line as per the existing permit:

- lime (reagent for abatement of acid gases);
- gas oil / diesel (auxiliary and back-up fuel);
- water; and
- boiler water treatment chemicals.

2.3.10 All chemical reagents will be delivered by road and discharged into dedicated storage vessels as per the current permit. Deliveries are overseen by a trained operative and spill containment facilities are in place, see section 3 for full details.

2.3.11 In addition to those raw materials listed in the existing permit it is anticipated the converted SUP facility will utilise:

- urea;
- ammonium sulphate; and
- activated carbon

for the abatement systems.

2.3.12 In the event that other corrosion mitigants assessed during FEED prove necessary for final design, NRW will be notified and the relevant environmental impacts will be assessed and presented.

2.3.13 It is anticipated that urea will initially be delivered as a solution by road and discharged into a dedicated storage vessel. The location of the urea storage vessel will be determined during the design phase of EPC contract, once confirmed SUP will notify NRW and the Environmental Risk Assessment will be reviewed and updated as necessary. Deliveries will be overseen by a trained operative and spill containment facilities will be in place. It is anticipated that in future phases of SUP operation, urea will be delivered to the site as solid prills or powder and the required solution made up on site. The selection will be determined during the design phase of EPC the contract.

2.3.14 If this change is confirmed, NRW will be notified. The environmental risk assessment at appendix G has assessed both options.

2.3.15 It is anticipated that ammonium sulphate will be used within the abatement system for the reduction of NO_x and to mitigate corrosion within the boilers. The quantity and storage location of ammonium sulphate will be determined during the design phase of EPC contract; once confirmed, SUP will notify NRW and the Environmental Risk Assessment will be reviewed and updated as necessary.

2.3.16 Ammonium sulphate (or equivalent reagent serving the same purpose) will be delivered by road and discharged into a dedicated storage vessel. Deliveries will be overseen by a trained operative and spill containment facilities will be in place.

2.3.17 It is anticipated that activated carbon will be utilised for the adsorption of dioxins, furans and heavy metals. The quantity and storage location of activated carbon will be determined during the design phase of EPC contract; once confirmed, SUP will notify NRW and the Environmental Risk Assessment will be reviewed and updated as necessary.

2.3.18 Activated carbon will be delivered by road and discharged into a dedicated storage vessel. Deliveries will be overseen by a trained operative and spill containment facilities will be in place.

2.4 Fuel Storage

2.4.1 The fuel pellets will be stored in up to four primary storage silos each with a volume of up to 18,000 m^3 which will hold up to approximately 10,000 tonnes of pellets based on a fuel pellet density of 550kg/m^3.

2.4.2 The primary fuel pellet storage areas are shown on the site layout plan in appendix B.

2.4.3 Two day silos will be used during transhipment of the fuel pellets from primary storage silos to the milling process. These are also shown on the site layout plan in appendix B.

2.4.4 During filling the storage silos will be sealed as far as practicable to capture potential fugitive dust. Displaced air through the loading points will be captured by fan assisted reverse jet filters and the dust removed before escape to the atmosphere. The captured dust will be reintroduced to the storage silo at a controlled rate.

2.4.5 The primary storage silos will be loaded from the top and fuel pellets will be unloaded from the bottom. A vibrating floor will ensure fuel pellets do not accumulate at the edges of the silos to ensure a first-in, first-out system is maintained.

2.5 Combustion

2.5.1 The SUP conversion seeks to utilise, where possible, existing infrastructure for the handling, milling and combustion of the fuel. The combustion plant will be updated to accommodate the new fuel and to limit the primary generation of gaseous pollutant emissions where possible. It is anticipated that the principal changes to the plant will include modification or replacement of milling equipment, modification of pulverised fuel conveying and distribution pipework, replacement of existing low NOx burners with new ultra-low NOx variants designed for use with the new fuel pellets, modification of staged combustion overfire air systems, upgrade of bottom ash handling systems and the addition of SNCR and ammonium sulphate injection for NO_x and corrosion control.

2.5.2 Fuel pellets will be transferred from the primary storage silos via conveyors to the day silos for discharge via a pneumatic transport system to feed the mills. The exact nature of this process and required equipment modification and addition will be determined during the design phase of EPC contract.

2.5.3 The SUP facility will be designed to combust fuel pellets at a rate of approximately 63 tonnes per hour per unit with a design fuel pellet net calorific value (NCV) of 19 to 25 MJ/kg. The throughput of pellets will differ depending upon the actual fuel NCV which will vary within acceptable norms.

2.5.4 The mills will pulverise the fuel pellets with biomass into a suitable particle size for pneumatic transport into the burners. The final design of the milling process will be determined during the design phase of EPC contract, potential options include use of vertical spindle or hammer milling equipment.

2.5.5 Combustion air will be provided by two existing forced draught fans, each feeding one end of the furnace windbox and overfire system. Air from each fan will pass through the existing air pre-heater, to facilitate heat transfer from the hot flue gases to pre-heat the combustion air and increase cycle efficiency. The two existing induced draft fans will be utilised to draw flue gases from the boiler to the stack.

2.5.6 Existing furnace and boiler sections may require upgrade, this will be determined during FEED and design phase of the EPC contract. This may include modifications to heating surfaces for evaporation, superheating and reheating and the addition of advanced protective coatings.

2.5.7 The facility will operate to ensure that the fuels are combusted with a gas temperature in excess of 850ºC. The residence time at this temperature after the last injection of combustion air has not currently been confirmed. This residence time will be determined during the detailed design phase of the EPC contract. The design will aim to maintain the combustion temperature for at least two seconds following the last injection of combustion air. In the event that the two seconds residence time cannot be achieved the design of the plant will ensure compliance with Articles 51(2) and 51(3) of the IED and details of such design will be communicated with a supporting justification to NRW.

2.5.8 Fuel feed into the furnace will be prevented at start up until a gas temperature of 850ºC has been reached.

2.5.9 The SUP furnace will be equipped with an automatic control system which will initiate a controlled shut down of fuel feeding to the furnace in the following circumstances:

- whenever the temperature of 850ºC cannot be maintained;
- whenever the continuous emission monitors show that any emission limit value is exceeded due to disturbance or failure of the purification devices.

2.5.10 In the event that the automatic system is triggered, the Operator will be alerted via alarms.

2.5.11 Each combustion unit is equipped with auxiliary burners. These burners will be started automatically when the temperature of the combustion gases after the last injection of combustion air falls below acceptable levels. The auxiliary burners are used during plant start-up and shut-down operations in order to maintain acceptable furnace temperatures and ramp rates. The auxiliary burners are be fuelled by gas oil.

2.5.12 The existing low NOx burners will be replaced by bespoke ultra-low NO_x burners.

2.5.13 In addition, SNCR will be installed using urea solution as a reagent for additional NO_x emission reduction. It is anticipated ammonium sulphate injection system will also be installed for the reduction of NO_x and corrosion control.

2.5.14 The combustion system will be a fully integrated design, developed using advanced design techniques including both computational and non-computational tools.

2.6 Boilers

2.6.1 The radiant natural circulation boilers are designed to produce steam at a temperature of 543ºC to drive the steam turbines. The boilers include an intermediate pressure reheat system. Steam temperature controls are fitted to maintain the superheater and reheater outlet temperature at +/- 50ºC of their design figure.

2.6.2 The boiler and furnace are integrated to maximise energy recovery. A single combustion unit is provided for each line generating approximately 390 tonnes per hour of steam.

2.6.3 Energy is recovered from the hot flue gases within a water tube steam boiler. The resulting high pressure steam is directed to the steam driven turbo-alternator, generating electricity which is exported to the grid.

2.6.4 Each boiler comprises one vertical radiant pass housing the main furnace combustion section and secondary superheaters; and one vertical convective section housing economiser, primary superheater and reheater heating surfaces.

2.6.5 The different boiler passes are designed to promote a uniform flue gas flow distribution, avoid local dead spaces in the gas flow, ensure maximum fly ash carry over to the emissions abatement system and to ensure uniform heat absorption to boiler heating surfaces where possible.

2.6.6 There are 8 steam sootblowers installed on each combustion unit which operate to effectively clean deposited ash from the boiler tubes. The design and performance of the existing system will

be reviewed and the final design of boiler cleaning equipment requirements will be determined during FEED and design phases of the EPC contract.

2.6.7 Both low and high pressure boiler feedwater heating systems are utilised to improve plant efficiency, minimise thermal gradients and maintain flue temperatures above the condensation point. This plant will remain largely unaltered.

Measures for minimisation of Dioxins Within the Boiler

2.6.8 The FEED will consider all available strategies to mitigate the reformation of dioxins and furans from flue gas within the boiler sections taking into consideration the indicative BAT requirements set out in section 2.10 of Sector Guidance Note EPR 5.01 – The Incineration of Waste (March 2009).

2.7 Flue Gas Treatment

2.7.1 Exhaust flue gas from each boiler pass through an existing flue gas de-sulphurisation (FGD) unit, here lime is injected into the flue gas stream producing APCr (flue gas and abatement chemicals). These solids are filtered using dry bag filtration prior to the flue gas being vented to the atmosphere through a 122 metre common stack.

2.7.2 Flue gas exiting each boiler is separated into two flue gas streams. Each flue gas stream is treated in a dedicated Novel Integrated Desulphurisation (NID) unit.

2.7.3 Each NID unit comprises the following:

- one fabric filter;
- one NID reactor;
- two pneumatic conveyors; and
- one intermediate silo one set of NID equipment (mixer, hydrator, lime distributor and valve rack).

2.7.4 The following equipment is common for the whole FGD system:

- one lime silo;
- two APCr silos;
- one compressor station; and
- four fluidised air fans.

2.7.5 Free flowing, humidified APCr and lime is fed into the NID reactor where it is mixed with hot untreated flue gas from the boiler. A specifically designed gas dispersion plate ensures uniform distribution of the dust over the entire gas stream.

2.7.6 The lime reacts with the acid components in the flue gases. Simultaneously the water from the humidification process is evaporated to give the optimal flue gas temperature for the HCl and SO_2 absorption.

2.7.7 The moisture content of the flue gases is optimised for absorption of the acid components.

2.7.8 Flue gas exits the NID reactor and enters the fabric filter which collect particulates, forming a layer of dust on the bag surface. The flue gases pass this layer where enhanced absorption and micro-particle filtration takes place.

2.7.9 The majority of solid particles collected are recycled to the NID reactor via the mixer. A level control in the filter hopper controls the quantity of solids discharged to the ash silo for disposal.

2.7.10 The rate of re-circulating dust, lime feed, filter cleaning and humidification process is controlled to provide optimal conditions for gas absorption relative to the emission rate within the stack.

2.7.11 The NID system operates with quick lime (CaO) as absorbent. The quick lime is slaked to hydrated lime in the hydrator and integrated with the mixer. The absorption efficiency and the lime utilisation are related to temperature, humidity, HCl and SO_2 concentration and the SO_2: HCl ratio at the NID inlet.

2.7.12 SO_2 within flue gas is a relatively slow reacting component, by keeping the reactor outlet temperature low, the individual particles will maintain the wet surface film for a longer period of time, hence promoting the reaction between SO_2 and $Ca(OH)_2$. The degree of absorption efficiency and lime utilisation are thereby optimised.

2.7.13 In moderate quantities, HCl assists SO_2 absorption, calcium sulphate is hygroscopic and retains moisture, facilitating low “approach temperature”.

2.7.14 The fabric filter is located after the reactor and collects the dust formed during the gas absorption process as well as any amount of APC residue present in the flue gas.

2.7.15 Four air fans fluidise the fly ash and make it easier to transport.

2.7.16 Control and supervision of the gas cleaning plant is via the automated control system.

2.7.17 During the SUP conversion, a powdered activated carbon addition system will be added.

2.8 Ash Collection

2.8.1 Currently each boiler unit is fitted with a bottom ash hopper system comprising five individual compartments for the collection of bottom ash.

2.8.2 High pressure water passes through oscillating jets and washes the ash out of the ash hoppers, into a cross sluiceway. Further jets situated in the sluiceway force the ash on into an ash crusher. A hydrojector gathers the mixture leaving the ash crusher and pumps it through an ash return-line, that discharges into one of two ash settling pits. The mixture settles and the water overflows through scum boards as the pit fills with ash. The overflow returns via gullies to a settling compartment that overflows to the clean side reservoir and recirculating pumps.

2.8.3 When the first settling pit is full the ash return is transferred to the second settling pit. The full pit is drained through the louvre drains into the settling compartment of the reservoir. After draining, the ash is suitable for transfer into road vehicles or deposition into the draining apron if necessary.

2.8.4 During the SUP design phase of the EPC project a dry bottom ash cooling and handling / conveying system will be investigated with the controlled addition of combustion air at boiler bottom to ensure complete combustion of bottom ash residues in line with the requirements for the IED for total carbon or loss on ignition in bottom ash.

2.8.5 The nature of bottom ash handling systems following the SUP conversion will be determined during FEED and design phases of the EPC project.

2.8.6 Fly ash suspended in the flue gas will pass through the existing NID System where it is mixed with injected lime and activated carbon reagents to produce APCr. The APCr will then be collected in the adjacent pulse jet fabric filter system and drop out into the collection hopper. The dry APC dust will be pneumatically conveyed into the APCr silo. The APCr is discharged into sealed road tankers via a sealed connection and transported by road offsite for disposal.

2.9 Control System

2.9.1 The plant will be operated by an upgraded automatic control system. This will ensure safe, efficient operation and environmental compliance. The control system will automatically adjust the injection of abatement reagents based on the monitoring of emissions.

3 MANAGEMENT OF ACTIVITIES

3.1 General

3.1.1 SUP operates an Environmental Management System (EMS) which complies with the requirements of ISO 14001:2004. SUP is in the process of updating and changing the EMS to an Integrated Management System (IMS) which will comply with all relevant ISO standards. This IMS will incorporate new plant, equipment and activities. The current EMS incorporates the following policies:

1. commitment, leadership, and accountability of the management, including senior management, to the implementation of an effective EMS;
2. an analysis that includes the determination of the organisation's context, the identification of the needs and expectations of interested parties, the identification of characteristics of the installation that are associated with possible risks for the environment (or human health) as well as of the applicable legal requirements relating to the environment;
3. an environmental policy that includes the continuous improvement of the environmental performance of the installation;
4. objectives and performance indicators in relation to significant environmental aspects, including safeguarding compliance with applicable legal requirements;
5. planning and implementing the necessary procedures and actions (including corrective and preventive actions where needed), to achieve the environmental objectives and avoid environmental risks;
6. determination of structures, roles and responsibilities in relation to environmental aspects and objectives and provision of the financial and human resources needed;
7. ensuring the necessary competence and awareness of staff whose work may affect the environmental performance of the installation (e.g. by providing information and training);
8. internal and external communication;
9. fostering employee involvement in good environmental management practices;
10. establishing and maintaining a management manual and written procedures to control activities with significant environmental impact as well as relevant records;
11. effective operational planning and process control;
12. implementation of appropriate maintenance programmes;
13. emergency preparedness and response protocols, including the prevention and/or mitigation of the adverse (environmental) impacts of emergency situations;
14. implementation of a monitoring and measurement programme;
15. periodic independent (as far as practicable), internal auditing and periodic, independent external auditing in order to assess the environmental performance and to determine whether or not the EMS conforms to planned arrangements and has been properly implemented and maintained;
16. evaluation of causes for nonconformities, implementation of corrective actions in response to nonconformities, review of the effectiveness of corrective actions, and determination of whether similar nonconformities exist or could potentially occur;
17. periodic review, by senior management, of the EMS and its continuing suitability, adequacy and effectiveness;
18. waste stream management

19. residues management plan including measures aiming to:
    a. minimise the generation of residues;
    b. optimise the reuse, regeneration, recycling of, and/or energy recovery from the residues;
    c. ensure the proper disposal of residues;
20. Other Than Normal Operating Conditions (OTNOC) management plan;
21. accident management plan.

3.1.2 In order to comply with BATC the EMS will be updated to include policies on the following:

1. following and taking into account the development of cleaner techniques
2. when (re)designing a (new) installation or a part thereof, consider its environmental impacts throughout its life, which includes construction, maintenance, operation and decommissioning;
3. application of sectoral benchmarking on a regular basis;

3.1.3 A high-level closure and decommissioning plan will be developed outlining key considerations, this will be reviewed and updated during the plant operation life.

Operations and Maintenance

3.1.4 Procedures are in place to ensure that those operations which have the potential to give rise to significant environmental effects are controlled. These will be updated where necessary to account for the variation in operations. Procedures do not only cover normal operation but also address abnormal operation, including start-up and shutdown. Planned maintenance routines are in place to ensure all key plant components which have the potential to affect the environmental performance of the facility remain in good working order, these will be updated to include all relevant new plant and equipment. Maintenance routines draw on manufacturers' recommendations, unless operational experience during the lifetime of the facility would indicate the need for variance.

3.1.5 In particular procedures will be updated in relation to the following:

- control of the combustion process, to ensure good combustion is achieved and compliance with IED requirements;
- operation of the flue gas cleaning systems; and
- storage, handling and removal of wastes from the site.

3.1.6 New procedures will be included for fuel pellet reception and handling, including pre-acceptance and acceptance procedures. As there is only one treatment method available at the site procedures for decision making in relation to this are not required.

Fuel pellet pre-acceptance procedure

3.1.7 Fuel pellets will comply with stringent fuel specification and subject to rigorous quality control (QC) procedure, the fuel pellet manufacturer will exercise an accept /reject QC procedure before the pellets are transported to site. In addition SUP will conduct QC activities when the pellets are delivered to site to double check fuel pellet manufacturer conformance

3.1.8 A QC procedure will be put in place to ensure compliance of fuel pellets with the agreed stringent fuel specification this will include obtaining the following information prior to the fuel pellets arriving at the site:

- Confirmation of the pellet process production;
- The composition of the fuel pellets (chemicals present and individual concentrations);

- A representative sample of the fuel pellets is taken from the production process batch and analysed; and
- For each new fuel pellet enquiry, a comprehensive characterisation of the fuel pellets will be undertaken to ensure it is suitable for the co-incineration process.

3.1.9 All QC information will be recorded and kept available at the site.

Fuel pellet acceptance procedure

3.1.10 A QC procedure will ensure that the characteristics of the fuel pellets are confirmed upon delivery to site. A pre-booking system will be in place to ensure there is storage capacity available at the site.

3.1.11 Upon arrival at the site QC procedures will be in place to check the paperwork and conduct visual inspection of the fuel pellets. Where required, a sample will be taken. The acceptance procedure will also include the following:

- fuel specification verification and compliance testing;
- assess consistency with pre-acceptance information;
- rejection criteria;
- sample retention system;
- procedure for periodic review of pre-acceptance information; and
- identification of staff members responsible for acceptance or rejection of fuel.
- record keeping of the above.

Fuel Pellet Storage

3.1.12 All fuel pellets accepted at the site have the same waste code, pre-acceptance and acceptance procedures to conform to the agreed fuel specification. It is not anticipated there will be any need to segregate fuel pellets after delivery. All accepted incoming fuel pellets will be conveyed directed to Primary or Day storage silos. The storage silos have been designed to ensure a first in first out system is maintained.

3.1.13 Volumes of fuel pellets accepted and stored will be recorded in a tracking system.

Competence and Training

3.1.14 SUP provides operator training to ensure that the permitted facility is operated by a competent workforce. Operator training will be undertaken prior to commissioning of the facility to ensure relevant staff are aware of operational, maintenance requirements etc, for the new plant and equipment or changes to operational requirements for the converted plant. Training will not only address normal operations but will also include those actions required in the event of abnormal operations and emergencies.

3.1.15 Job specifications define and include details on relevant qualifications and training (including where relevant on the job training) required for that role. These will be reviewed and changes made in advance of the plant conversion . Records of training will be stored and maintained. Records as a minimum will include: date; type of training; and training provider.

3.1.16 All relevant staff (including contractors forming part of the commissioning team) will be made aware of the requirements of the permit, in particular those conditions in relation to emission limits, notification procedures and any conditions which have changed as a result of the conversion. A copy of the permit will be available for reference within the site office.

3.1.17 Procedures will also be in place to ensure that contractors undertaking work at the installation are qualified for the task they are undertaking.

Organisation

3.1.18 An organisation chart for the facility is provided in appendix E and indicates the main lines of responsibility. Roles and responsibilities will be clearly defined within the management system. This will be subject to regular review and may change to meet the future needs of the business. The Plant Manager will be the technically competent manager for the site and SUP will assess what relevant qualifications are required and ensure these are obtained prior to operations commencing.

3.1.19 Further details on specific aspects of the management systems for the facility are provided in the following sections.

3.2 Accident Management

3.2.1 The accident management plan (AMP) will be updated prior to re-commencing operation of the facility. Procedures to follow in the event of an: emergency, accident or incident will be updated prior to operating the converted station on fuel pellets. This includes small incidents such as minor spills and leaks and complaints as well as major incidents such as a fire or explosion. A Fire Prevention and Mitigation Plan (FPMP) has been produced as part of this variation application and can be found at appendix J. A copy of the FPMP will be available for reference within the site office.

3.2.2 A procedure including a system for recording and allocating appropriate follow-up for accidents, incidents and non-conformances is in place.

3.2.3 To support this application an initial Environmental Risk Assessment is provided in appendix G, which was carried out in accordance with EA[7] guidance[8],[9]. This will be reviewed prior to commencing operation and maintained as part of the AMP throughout the operational life of the facility.

3.2.4 As part of the design process the proposals will be subject to detailed HAZOP/HAZID with a view to designing out safety, health and environmental risks.

3.2.5 Fire detection and suppression systems will be in each of the storage silos.

3.2.6 A minimum of 5 m will separate the concrete primary silo walls to act as a partial fire separation gap.

Abnormal Operation

3.2.7 Article 46 (6) of the IED set out specific requirements covering abnormal operating conditions. The Operator will ensure that the facility will not exceed the maximum permissible period of any technically unavoidable stoppages, disturbances or failures of the abatement plant or monitoring systems. In particular, unless stricter timescales are set within the permit, the facility shall not continue operation for more than four hours uninterrupted where emission limit values are exceeded and moreover, the cumulative duration of operation over 1 year shall not exceed 60

[7] NRW are continuing to follow the EA guidance https://naturalresources.wales/permits-and-permissions/environmental-permits/horizontal-guidance/?lang=en

[8] Risk assessments for your environmental permit, 1st February 2016, Environment Agency. Available online: https://www.gov.uk/guidance/risk-assessments-for-your-environmental-permit

[9] Air emissions risk assessment for your environmental permit, 1st February 2016, Environment Agency. Available online: https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit

hours. An air quality assessment of emissions during abnormal operations has been undertaken and is included in appendix H. The assessment concluded that under abnormal operations, all air quality impacts are considered to have an insignificant effect.

3.2.8 Systems will be established for recording the duration of any such event and calculating the cumulative duration such that compliance with the permit can be demonstrated. Where any incident or cumulative duration will exceed the maximum permitted time period the facility will be shut down as soon as practicable.

3.2.9 The EMS will include a risk based OTNOC management plan including the following elements:

- identification of potential OTNOC (e.g. failure of equipment critical to the protection of the environment ('critical equipment')), of their root causes and of their potential consequences, and regular review and update of the list of identified OTNOC following the periodic assessment below;
- appropriate design of critical equipment (e.g. compartmentalisation of the bag filter, techniques to heat up the flue-gas and obviate the need to bypass the bag filter during start-up and shutdown, etc.);
- set-up and implementation of a preventive maintenance plan for critical equipment
- monitoring and recording of emissions during OTNOC and associated circumstances;
- periodic assessment of the emissions occurring during OTNOC (e.g. frequency of events, duration, amount of pollutants emitted) and implementation of corrective actions if necessary.

Site Security

3.2.10 There will be no change to the security provisions at the site. The nature of the variation being proposed does not require changes to the security measures already in place. The site is currently fenced and an electronic security gate is closed between 10 pm and 5 am. This gate is controlled from the security office which is manned 24/7. This gate can only be opened manually if the safety mechanism is disengaged.

3.2.11 A second gate provides access to the Liberty Steel site. This gate remains locked unless required for access. This gate is unmanned. The rail gates are controlled from the security office.

3.2.12 CCTV cameras are in operation. Security personnel carry out a perimeter check every few hours.

3.3 Energy Efficiency

General

3.3.1 The facility has been designed and will be operated and maintained to minimise internal energy demand. An energy flow diagram is in appendix C which indicates the energy flows for the nominal design point. The efficiency of the plant will not change significantly as a result of the conversion. The current facility has an efficiency of approximately 31.5%, once the conversion is complete the facility is expected to achieve efficiency of 33%.

3.3.2 The facility has been converted to generate electricity from combustion of fuel pellets and biomass, however the process itself will require energy to operate. The parasitic load will be supplied in the form of electricity to drive pumps, motors etc. Two existing emergency back-up generators (tested for fewer than 50 hours per year) and auxiliary firing will use low sulphur fuel oil (diesel) see paragraph 2.5.11. There will be no change in the efficiency of these generators. A breakdown of delivered and primary energy consumption at the facility is provided in Table 3-1 below:

Table 3-1: Expected Breakdown of Delivered and Primary Energy Consumption

Energy Source	Energy Consumption		
	Delivered MWh	Primary MWh	% of Total
Electricity	88,000	266,667	98.6
Fuel oil	3,731	3,731	1.4

Based on 8,000 hours operation

Electricity is assumed to be provided from the facility with a parasitic load of circa 11MWe. A site-specific conversion factor of 3.03 is used to convert delivered to primary energy, this has been calculated using the plant efficiency of 33%.

Assumes annual fuel oil consumption of 330 tpa and net CV of 40.7 GJ/tonne.

3.3.3 The facility will generate up to circa 242 MW of electricity (~220 MWe for export).

3.3.4 Specific energy efficiency measures which will be incorporated include the following:

- air pre-heat is minimised from extracting combustion air from the highest (which is also the warmest) point in the building, making use of natural warming of the air;
- the furnace section will be effectively insulated and lined to ensure heat is retained;
- design and construction of the facility to avoid uncontrolled air ingress;
- optimisation of the facility layout to avoid excessive transfer of materials, where possible;
- effective plant maintenance regime to ensure energy efficiency is maintained over time and reduce down time or prolonged outages;
- use of ion exchange instead of high-pressure membrane filtration for boiler water treatment;
- primary air cooler will be installed to reduce temperatures within the mill and recover heat back into the boiler feed water system.

Operating, Maintenance and Housekeeping Measures

3.3.5 Where relevant, operating procedures will be updated to ensure maintenance and housekeeping measures cover all new plant.

Physical Techniques

3.3.6 Insulation is provided to avoid heat losses from relevant plant items such as the main furnace, steam systems etc. The main plant items are housed within buildings and doors will be kept shut other than for access.

Building Services

3.3.7 Energy requirements for building services are low and are not expected to change significantly as a result of the proposed conversion. Energy efficient lighting will be employed where feasible and lights will be turned off in unoccupied buildings where they are not required for safety or security reasons.

3.3.8 Space heating will be limited to manned areas such as the control room and administration areas, heating of other process buildings will not be required.

Energy Management Techniques

3.3.9 Currently key members of staff undertake training in energy conservation management. This will continue and in addition, energy use will be monitored and recorded. Periodically usage will be reviewed to identify areas for improvement and ensure that any abnormal increase in energy use is investigated and appropriate action taken to resolve the issue.

3.3.10 Any areas where improvements are identified will be incorporated within the energy efficiency plan. This plan will be incorporated within the EMS to ensure that it is regularly reviewed and maintained up to date in the light of technology developments.

Consideration of Energy Efficiency with other Environmental Effects

3.3.11 Whilst maximising energy efficiency is important it is noted that other environmental issues need to be considered alongside maximising energy efficiency. Sector guidance notes the following BAT considerations and requires justification of how the proposals represent BAT:

- The choice of fuel impacts upon emissions other than carbon e.g. sulphur in fuel
- Where the potential minimisation of waste emissions by recovery of energy from waste conflicts with energy efficiency requirements
- Where the nature of the waste is such that the primary concern of safe waste disposal may be jeopardised by additional energy recovery

3.3.12 The proposed fuel pellets comprise treated non-hazardous wastes and will replace energy currently generated from coal. The driver for the SUP conversion is to provide future energy security through fuel diversification strategy away from fossil fuel combustion. The consideration of other fossil fuels other than comparison with coal (as the current fuel) is not appropriate. The choice of fuel and effect upon emissions is discussed separately within section 4.

3.3.13 Emissions to air will change as a result of burning the alternative fuel mix (fuel pellet and biomass). However as demonstrated from the air quality assessment the conversion will not give rise to significant environmental effects (see section 4). In addition, the global warming potential of the facility burning fuel pellets will be less than two thirds of that of the previous coal-burning operation (see section 5.7).

3.4 Efficient Use of Raw Materials and Water

Incoming Fuel Pellets

3.4.1 The European Waste code of the fuel pellets to be accepted by the facility is 19 12 12.

3.4.2 Hazardous waste material will not be accepted to site and in any event these materials would present increased environmental risks compared to the proposed fuel inputs.

3.4.3 The fuel pellets were developed on the following basis:

- To closely resemble calorific properties of coal, thereby allowing the reuse of the majority of existing facilities and minimising conversion activities.
- The fuel pellets combust and sustain a stable flame for stable operation of the SUP facility and with calorific value similar to coal and in excess of unprocessed waste materials.

Gas Oil

3.4.4 Gas oil (containing less than 0.1% sulphur) will be used for auxiliary firing. An alternative to the low sulphur gas oil is natural gas which does present environmental advantages in lower emissions. However, gas oil was selected for auxiliary firing as the onsite storage provides guaranteed availability.

Water

3.4.5 Water consumption of the facility will not significantly change as a result of the change in fuel. A water flow diagram is indicated in figure 2 of appendix C. The main use of fresh water is within the

boiler water treatment plant supplying top-up water to the boilers and to the process water tank. Some losses will occur and fresh water top-up will be needed.

3.4.6 The supply of treated water direct from the Nash sewerage treatment works (STW) will continue as per the existing arrangement between SUP and STW. Water will primarily be used within the cooling tower pond and possibly in the demineralised water plant.

3.4.7 The following waste waters will continue to be collected for re-use:

- Boiler water treatment plant regeneration wastewaters;
- Boiler blowdown;
- Cleaning waters from process areas.

3.4.8 Clean rainwater is currently collected from building roofs, conveyor 13 sump and the ash tunnel sump. This drains to the storm water sump and subsequently to the cooling tower for use in the condensers.

3.4.9 Expected usage and storage volumes for the main raw materials are summarised in Table 3-2 below:

Table 3-2: Changes to Raw Material Usage and Storage

Raw Material	Nature	Expected Usage (approx.)	Storage including capacity	Fate	Environmental Effects	Alternatives
Incoming Fuel Pellets	Non-hazardous treated waste	875,000 tpa	Up to 72.728m^3 approx. (equates to approximately 40,000 tonnes)	Combusted, to air as exhaust gases; solid residues for reuse, recycling or disposal	The fuel is derived from non-hazardous waste streams which have the potential to contain List I and List II substances. Potentially toxic although this is through leachate rather than the solid waste.	Other waste likely to have similar or increased environmental effects (e.g. hazardous waste).
Biomass	Pellets	Up to 8,750 tpa		Combusted	Content controlled by the specification ensuring low levels of potentially harmful substances.	Alternatives have similar effects
Urea	Solution (initially)			Reagent in SNCR	Not significantly bio-accumulative. Spillage of urea to water course will promote algae growth which may degrade water quality and taste.	Ammonium hydroxide, which has higher environmental risks associated with storage and handling.
Lime	Powder		650m^3 dedicated storage silo adjacent to stack	Reagent in FGD	Low toxicity to mammals, severe irritant, corrosive. Reacts vigorously with water.	Alternatives have similar effects
Ammonium sulphate	Solution			Reagent in abatement system		
Activated carbon	Powder			Reagent in abatement system	Low toxicity to mammals, low bioaccumulation potential, highly insoluble and immobile.	Alternatives have similar effects

3.5 Avoidance, Recovery and Disposal of Wastes

3.5.1 The facility will generate two main process wastes/residues, namely Bottom ash (including boiler ash) and air pollution control (APC) residues. The type and quantities of these residues are not expected to change significantly from those already permitted taking into account that only two units will be re-energised rather than all three. Expected amounts of each of these wastes is summarised in Table 3-3 below:

Table 3-3: Waste Generation, Storage and Disposal / Recovery

Waste	Expected Amount	Storage	Disposal/Recovery Route
Bottom ash (including boiler ash) from fuel	27,632 tpa	Dedicated ash storage area as currently permitted.	Subject to final chemical composition. Bottom ash will be sent to an offsite facility, and bottom ash will be transported for re-use within aggregates.
Air Pollution Control residues from fuel	110,526 tpa	Dedicated silos as currently permitted.	Subject to final chemical composition. APCr will be treated off site for reuse where possible otherwise disposal to landfill, following treatment, or neutralisation and alternative disposal will be conducted.

3.5.2 At the time of this application only the APC residues are expected to be sent to landfill. This will be regularly reviewed and should an alternative re-use option be identified as feasible then preferentially this option will be investigated.

3.5.3 In addition to the above main wastes, smaller quantities of waste oils, used drums and containers will be generated. Where possible empty drums and containers will be returned to the manufacturers. Waste oils will be sent for recovery.

Bottom Ash

3.5.4 From the boiler, bottom ash will discharge from the under-fired grate into the ash hoppers. High pressure water is used to wash ash out of the hoppers into crushers and then further into one of the settlement pits.

3.5.5 Ash collection is described in detail in section 2.8 and will be determined during FEED and design phases of the EPC project.

Air Pollution Control (APC) Residue

3.5.6 APC residues in the flue gas will be removed in the existing NID system, where it will be collected in bag filters and subsequently will drop out into the collection hopper. The ash, in the form of dry dust, will be pneumatically conveyed into the APCr silos for disposal.

3.5.7 APC residues are handled within a fully enclosed system. The residues will be stored in silos and discharged via sealed connections into fully contained disposal vehicles. These measures will avoid the release of dust from handling and transfer of this material.

3.5.8 There is currently no mechanism by which APC residues can be eliminated completely, however, the monitoring and control of reagent injection rates will be designed to minimise quantity of the residue formed.

3.5.9 Subject to testing to quantify the nature of the APC residues once operational, opportunities for reuse will be explored. At this stage, the operator will seek to permit the flexibility to landfill this material initially and until such a time as an alternative solution is secured.

3.5.10 APCr handling is described in detail in section 2.8.

4 ENVIRONMENTAL RISKS AND EFFECTS

4.1 Environmental Risk Assessment

4.1.1 An ERA has been carried out including consideration of the new plant and processes described above. The ERA considers only the risks from hazards potentially affected by the proposed changes. Other hazards will remain unchanged. The ERA can be found in appendix G.

4.1.2 There are no changes or additions to emissions to water or land as a result of this variation.

4.1.3 The majority of risks such as vandalism, flooding etc. remain unchanged as a result of the proposed conversion. The majority of raw materials used at the site will be the same as those currently permitted and storage arrangements will remain unchanged. Any new raw materials and their storage arrangements have been assessed. Environmental risks from the storage and combustion of coal have been removed.

4.1.4 The results of the ERA have shown that the risk of odour, noise and vibration, fugitive emissions, visible plumes, and accidents ranges from 'not significant' to 'low'.

4.2 Point Source Emissions to Air

4.2.1 The location of the point source emissions to air will not change as a result of the proposed variation. The nature of the emissions will change and the expected emissions and associated emission limits are detailed in Table 4-1.

4.2.2 The facility will give rise to emissions to air, primarily water vapour and carbon dioxide (CO_2) as a result of the combustion process. However, given the nature of the incoming fuel there will also be low concentration releases of the following:

- nitrogen oxides (NO_x);
- acid gases e.g. sulphur oxides (SO_x), hydrogen chloride (HCl), hydrogen fluoride (HF);
- particulate matter;
- heavy metals; and
- volatile organic compounds (VOCs), carbon monoxide (CO), dioxins and furans.

4.2.3 The combustion line will be provided with a dedicated abatement system for controlling emissions prior to release to atmosphere. The abatement system design and operation will ensure compliance with relevant emission limits as set out in Table 4-1. The proposed methods for control of emissions to air are detailed in Section 2.7.

4.3 Point Source Emissions to Water and Sewer

4.3.1 There will be no change to the point source emissions to water and sewer as a result of the proposed conversion. The sources of water discharge will be similar to those currently permitted and expected concentrations of contaminants is not expected to change significantly. All discharges will be via existing emission points.

4.4 Point Source Emissions to Land

4.4.1 There are currently no point source emissions to land and no emissions to land will be introduced as a result of the proposed changes included within this variation.

4.5 Fugitive Emissions to Air, Land, Water and Sewer

4.5.1 In general fugitive emissions and the measures in place to control and mitigate such emissions will not change as a result of the proposed variation. Where changes to the potential for fugitive releases have been identified they have been assessed as part of the Environmental Risk Assessment (see appendix G). The assessment indicates that the proposed measures for control of new fugitive releases will ensure that no significant risks from potential fugitive releases are expected from the facility.

4.5.2 Existing good housekeeping practices are in operation to ensure that any spillages of potentially dusty materials are cleared up at the earliest opportunity. Spill kits will be available for clean-up of all chemicals (i.e. boiler water treatment chemicals) and oils (i.e. fuel oil and maintenance oils) stored and used within the facility and will be located in proximity to the relevant storage area(s) and/or delivery points. Site procedures detail those actions which should be followed in the event of a spillage.

4.5.3 Potential fugitive releases to surface water, sewer and groundwater are likely to occur only as a result of an incident or accident and the risk of this will not change as a result of the proposed variation.

4.5.4 Table 3-2 identifies the storage tanks and containment for the new raw materials required as a result of the proposed variation. Further storage and process tanks/drums will be provided for various waters used/recycled within the process.

4.5.5 The incoming fuel pellet storage silos will be constructed of concrete with steel roofs and will be impervious.

4.5.6 All process areas are located on hard standing. The new fuel pellet storage area and all associated new plant will be located on impermeable hard standing with sealed drainage.

4.5.7 All bunds provided for chemical and oil storage tanks will be manually inspected to ensure they remain empty as per the existing procedures.

4.5.8 Bunds will all be designed to contain at least 110% of the contents of the largest storage tank or 25% of the total tankage, whichever is the greater and will be resistant to the material which they are designed to contain. Procedures will be in place for visual inspection of all bunds to ensure they remain free from accumulation of rainwater. Any discharge of rainwater will be tested for pH and visible solids and oil. Should the tests indicate that there was no contamination; the water would be discharged to the outfall. In the event that the water is found to be contaminated the waters would either be treated on site or tankered for off-site disposal.

4.5.9 The following existing underground structures will remain in use:

- site drains;
- drainage sumps;
- unloading conveyors; and
- incoming clean water systems.

4.5.10 In addition, new drains will be incorporated into the area containing the primary storage silos which will connect into the existing drainage system.

4.5.11 New underground conveyors may be put in place from the road unloading facility to the primary storage silos. The route of the new conveyor is indicated on the site layout plan at appendix B.

4.6 Odour

4.6.1 Although the fuel pellets will be derived from waste they will have been subject to pre-treatment which includes the use of heat at the sites where the fuel pellets are produced. This pre-treatment

will act to minimise the odour from the fuel pellets. The risk of odour is not expected to increase at the site as a result of the proposed variation. An assessment of odour impacts has been scoped out on the basis of a low risk from the fuel pellets and the nearest sensitive receptors (that are not part of the facility itself) are more that 250 m from the site.

4.7 Noise

4.7.1 An increased risk of amenity impacts from noise is not expected as a result of the proposed variation. The predominant noise sources will remain the same as those currently permitted, with only the new storage and external fuel pellet conveyors being installed as part of this variation. A noise assessment has been undertaken which concludes that the noise impacts of the proposed variation are anticipated to be negligible.

4.8 Monitoring and Reporting of Emissions (Water, Sewer and Air)

Monitoring of and Reporting of Emissions to Air

4.8.1 The following emissions monitoring for releases to air will be undertaken:

Table 4-1: Summary of Monitoring of Emissions to Air

Pollutant	Emission Point	Monitoring Method	Monitoring Frequency	Emission Limit Values mg/Nm^3 +	MCERTS certified?	Origin of ELV
NO_x	A4	BS EN 15267-3	Continuous	225	Yes	WI BATC
N_2O	A4	EN 21258	Once per year	No limit		
SO_2	A4	BS EN 15267-3	Continuous	60	Yes	WI BATC
CO	A4	BS EN 15267-3	Continuous	75	Yes	WI BATC
Particulate Matter	A4	BS EN 15267-3	Continuous	7.5	Yes	WI BATC
VOC (expressed as TOC)	A4	BS EN 15267-3	Continuous	10	Yes	LCP BATC
HCl	A4	BS EN 15267-3	Continuous	12	Yes	WI BATC
HF	A4	BS ISO 15713	Quarterly for the first 12 months and six monthly thereafter	1.5	Yes	WI BATC
Ammonia	A4	BS EN 15267-3	Continuous	23	Yes	WI BATC
Mercury	A4	BS EN 13211 Then, BS EN 15267-3	Quarterly for the first 12 months and six monthly thereafter. Continuous monitoring will be employed according to the requirements of the new waste incineration BAT conclusions, once issued.	0.03	Yes	WI BATC

Pollutant	Emission Point	Monitoring Method	Monitoring Frequency	Emission Limit Values mg/Nm^3 +	MCERTS certified?	Origin of ELV
Other heavy metals (Sb+As+Pb+Cr+ Co+Cu+Mn+Ni+V)	A4	BS EN 14385 (As, Cd, Co, Cr, Cu, Mn, Ni, Pb, Sb, Tl, V)	Quarterly for the first 12 months and six monthly thereafter	0.3	Yes	LCP BATC
Cd+Tl	A4	BS EN 14385 (As, Cd, Co, Cr, Cu, Mn, Ni, Pb, Sb, Tl, V)	Quarterly for the first 12 months and six monthly thereafter	0.03	Yes	WI BATC
Dioxins and Furans	A4	BS EN 1948 Part 1-3	Quarterly for the first 12 months and six monthly thereafter	$9x10^{-5}$	Yes	WI BATC
Dioxin-like PCBs	A4	BS EN 1948	Quarterly for the first 12 months and six monthly thereafter	0.00012	Yes	WI BATC
Polycyclic Aromatic Hydrocarbons (PAHs)*	A4	BS ISO 11338-1 and BS ISO 11338-2	Quarterly for the first 12 months and six monthly thereafter	No limit	Yes	

* PAHs - Comprise; Anthanthrene, Benzo[a]anthracene, Benzo[b]fluoranthene, Benzo[k]fluoranthene, Benzo[b]naph(2,1-d)thiophene, Benzo[c]phenanthrene, Benzo[ghi]perylene, Benzo[a]pyrene, Cholanthrene, Chrysene, Cyclopenta[c,d]pyrene, Dibenzo[ah]anthracene, Dibenzo[a,i]pyrene Fluoranthene, Indo[1,2,3-cd]pyrene, Naphthalene.

+Ref O_2 at 6%

4.8.2 The limit of 75 mg/kg CO is required by the WI BATC. However, the FEED and design phases of the EPC project will determine the expected CO emission limit that will be achievable whilst also ensuring compliance with the required NO_x limit. The achievable CO limit will be verified during commissioning of the plant. In the event that the plant cannot comply with this emission limit SUP will put forward a derogation case to NRW under an improvement condition.

4.8.3 As permitted under Annex VI Part 6 of IED, continuous measurement of HF will not be undertaken on the basis that the acid gas abatement system will operate to guarantee that the emission limit for HCl will not be exceeded. Monitoring of HF as detailed in Table 4-1 above will be undertaken.

4.8.4 Monitoring results will be corrected to standard reference conditions and reported to the EA, as required by the permit.

4.8.5 An annual periodic stack test will also be undertaken by an MCERTS certified body to confirm the performance of the continuous emissions monitoring. Further, the CEMS monitoring system will be calibrated by means of parallel measurements with the reference methods at least every three years.

4.8.6 The location of the sampling and measurement points will not change as a result of this variation.

4.8.7 Emission limits to air will be regarded as having been complied with where monitoring data confirms that emission values are below the limits specified in the IED, over the corresponding monitoring period.

4.8.8 At the daily emission limit value level, the value of the 95% confidence intervals of a single measured result shall not exceed the following percentages of the emission limit value.

- carbon monoxide 10%
- sulphur dioxide 20%
- nitrogen dioxide 20%
- total dust 30%
- total organic carbon 30%

- hydrogen chloride 40%
- hydrogen fluoride 40%

4.8.9 A valid daily average monitoring value will have no more than 5 half hourly average values in any day discarded due to malfunction or maintenance of the CEMS. No more than 10 daily average values per year shall be discarded due to malfunction or maintenance of the CEMS.

Monitoring and Reporting of Emissions to Water and Sewer

4.8.10 There will be no change to the monitoring and reporting of emissions to water as a result of this permit variation.

4.8.11 Discharges to sewer will be limited to domestic effluents from the onsite amenities. There will be no process discharges to sewer.

Monitoring and Reporting of Waste Emissions

4.8.12 Given the fuel is changing, all residues will be characterised prior to disposal to demonstrate suitability for the selected disposal or recycling route. Similar tests would be carried out should there be a future major plant modification which could affect the nature of residues.

4.8.13 The test protocol to establish the pollution potential of the ash will cover:

- total organic carbon (for bottom ash);
- heavy metals concentration (to include Cd, Tl, Hg, As, Cu, Co, Cr, Mn, Pb, Zn, Ni, V);
- dioxin, furan and dioxin-like PCB content;
- pH and alkali reserve; and
- leachable metal ions.

4.8.14 Additionally, any test that is required by the company who will be seeking to accept the processed bottom ash or the waste disposal site accepting the APC residues will be undertaken as required.

4.8.15 During operation the following routine monitoring will be undertaken:

Table 4-2: Waste Monitoring

Residue	Parameter	Frequency
Bottom Ash (including boiler ash)	Total Organic Carbon	Quarterly
	Heavy Metals	Quarterly
	Dioxin and Furans	Quarterly
	Dioxin-like PCBs	Quarterly
APC Residues	Total Organic Carbon	Quarterly
	Heavy Metals	Quarterly
	Dioxin and Furans	Quarterly
	Dioxin-like PCBs	Quarterly
All wastes	Mass/Volume	Every load removed from the facility for disposal or recovery/recycling

4.8.16 An ash sampling protocol for the sampling of APC residues and bottom ash will be established and submitted for agreement with NRW, prior to commencing operations at the Site.

Environmental Monitoring (Beyond the Installation)

4.8.17 A programme of environmental monitoring beyond the installation will be carried out in accordance with the requirements of the varied permit when issued.

Monitoring of Process Variables

4.8.18 Monitoring of process variables listed in Table 4-3 will be undertaken in addition to the following which will continue to be monitored in accordance with the permit:

- power generated;
- exhaust gas temperature;
- exhaust gas pressure; and
- electricity exported.

Table 4-3: Summary of New Process Monitoring

Line (s)	Process Variable	Description
U13 & U14	Combustion temperature	Continuous monitoring to demonstrate compliance with minimum temperature requirement of 850 °C as required by IED Article 50(3) and Annex VI Part 6
U13 & U14	Oxygen content in the combustion chamber	Continuous monitoring to ensure good combustion is achieved and to minimise CO and NOx formation.
U13 & U14	Exhaust gas water vapour content	Continuous monitoring as required by IED Annex VI Part 6
U13 & U14	Exhaust gas oxygen content	Continuous monitoring as required by IED Annex VI Part 6
U13 & U14	Exhaust gas flowrate	Continuous monitoring to enable evaluation of mass emissions.
U13 & U14	Reagent flowrate	Continuous monitoring to ensure optimal addition of reagents (hydrated lime, activated carbon and solid urea).
U13 & U14	Fuel pellets delivered (tonnage)	Recording of input tonnage to demonstrate compliance with design capacity.
U13 & U14	Steam exported (when applicable)	Continuous monitoring to track plant efficiency.
U13 & U14	Internal energy usage	Continuous monitoring to track plant efficiency.

Monitoring Standards (Standard Reference Methods)

4.8.19 The information provided within the sections above details the proposed monitoring and identifies the relevant methods proposed for monitoring.

4.8.20 In addition, quality assurance monitoring will be undertaken in relation to the CEMS system in accordance with the requirements of BS EN 14181.

5 IMPACT SUMMARY

5.1.1 To support this application a number of environmental impact assessments have been completed. The full details of these assessments are appended to this application and for each of the environmental issues discussed within this section a reference to the location of the full assessment is provided.

5.2 Emissions to Air

5.2.1 An air quality assessment has been undertaken to support this application and full details of the assessment are reported in appendix H.

5.2.2 The approach to the assessment of emissions from the facility stack has involved the following key elements:

- Establishing the background Ambient Concentration (AC) from consideration of Air Quality Review & Assessment findings and assessment of existing local air quality through a review of available air quality monitoring and Defra background map data in the vicinity of the proposed site.
- Quantitative assessment of the operational effects on local air quality from stack emissions utilising a “new generation” Gaussian dispersion model, ADMS 5. Assessment of Process Contributions (PC) from the facility in isolation, and assessment of resultant Predicted Environmental Concentrations (PEC), taking into account cumulative impacts through incorporation of the AC.

5.2.3 Concentrations have also been modelled across a coarse 30 km by 30 km grid, with a spacing of 100 m, and a fine 4 km by 4 km grid, with a spacing of 10 m. Both grids are at a height of 1.5 m, centred on the proposed development.

5.2.4 There are a number of designated ecological sites within 15 km of the site. The air quality impact on ecological receptors has been assessed.

Determination of Appropriate Stack Height

5.2.5 The existing common stack will not change as a result of the proposed variation to the fuel. The stack is 122 m high. A stack height assessment has been completed as part of the air quality assessment and confirms this is acceptable.

Dispersion Modelling Assessment Results

5.2.6 Emissions from the combustion plant have been assessed through detailed dispersion modelling using best practice approaches. The assessment has been undertaken based on a number of conservative assumptions. This is likely to result in an over-estimate of the contributions that will arise in practice from the facility. The operational impact on receptors in the local area is predicted to be ‘negligible’ taking into account the changes in pollutant concentrations and the absolute levels. Using the criteria adopted for the assessment, together with professional judgement, the effects are not considered significant.

5.3 Human Health

5.3.1 A detailed human health risk assessment (HHRA) has been completed to identify potential health risks associated with exposure to emissions from the proposed facility. Full details of the assessment are provided within appendix K.

5.3.2 The HHRA considered the effects from dioxin/furan emissions from the facility based on the US EPA HHRAP methodology.

5.3.3 Human exposure to dioxins and furans has been compared against the Committee of Toxicity (COT) Tolerable Daily Intake (TDI) of 2 pg/kg per day. An assessment of exposure to dioxin-like PCBs has also been included.

5.3.4 The emissions from the facility during the modelled operational scenario would contain a number of substances that cannot be evaluated in terms of their effects on human health simply by reference to ambient air quality standards. Health effects could occur through exposure routes other than purely inhalation. As such, an assessment needs to be made of the overall human *exposure* to the substances by the local population and then the *risk* that this exposure causes.

5.3.5 The HHRA considers the potential impact of substances released by the facility on the health of the local population at the point of maximum exposure. These substances are those that are 'persistent' in the environment and have several pathways from the point of release to the human receptor.

5.3.6 An exposure assessment for the purposes of characterising the health impact of the proposed facility emissions requires the following steps:

- Measurement or estimation of emissions from the source.
- Modelling the fate and transport of the emitted substances through the atmosphere and through soil, water and biota following deposition onto land. Concentrations of the emitted chemicals in the environmental media are estimated at the point of exposure, which may be through inhalation or ingestion.
- Calculation of the uptake of the emitted chemicals into humans coming into contact with the affected media and the subsequent distribution in the body.

5.3.7 The risk assessment methodology used in this assessment has been structured so as to create worst case estimates of risk. A number of features in the methodology give rise to this degree of conservatism. It has been demonstrated that for the maximally exposed individual, exposure to dioxins, furans and dioxin-like PCBs is not significant.

5.4 Ecological Impacts

5.4.1 To support this application, information to inform the decision is provided as appendix C of the AQ assessment in appendix H and the Habitats Regulation Assessment (HRA) at appendix L.

5.4.2 The following European designated nature conservation sites within 10 km of the site were identified:

- River Usk SAC;
- Severn Estuary SAC;
- Severn Estuary SPA;
- Severn Estuary Ramsar site.

5.4.3 The HRA includes the following steps:

- Step 1 – Qualifying interest features
- Step 2 – Likely Significant Effect
- Step 3 – Appropriate Assessment
- Step 4 – In-combination

5.4.4 It has been concluded that there are no potential likely significant effects on any interest features within the River Usk SAC, Severn Estuary SAC, SPA and Ramsar sites during the operational phase of the SUP conversion either alone or in combination.

5.5 Emissions to Water and Sewer

5.5.1 The emissions to water from the facility will not change significantly as a result of the proposed variation. The existing emissions have been assessed using the EA's H1 screening tool in order to satisfy point 6 of the Regulaiton 61 Notice dated 9 May 2018.

5.5.2 There are three point source emissions to surface water from the site. W1a and W1b are rainfall dependant run off discharges into the Severn Estuary. W2 is a discharge of waters from the cooling towers into the River Usk via Julian's Pill.

W1a and W1b

5.5.3 There is no effluent flow limit for these discharges within the permit and no monitoring data available. The assessment has therefore calculated the maximum allowable effluent flow rate for the contaminants within the permit. The actual effluent flow rates for these discharges is expected to be lower than those used within the assessment.

5.5.4 In addition the flow rate for the River Severn has been derived from upstream gauge information from the River Usk, River Wye and the River Severn. It does not take into account inflows from Gloucestershire or Somerset and as such is a very conservative flow rate.

5.5.5 The only contaminants which are limited within the permit are Cadmium and Mercury. The assessment shows these to screen out as insignificant.

W2

5.5.6 Limited data is available for Julian's Pill as this is a small water course heavily influenced by the discharge from the Nash Sewerage Treatment Works (STW). Following discussions with NRW two separate assessments have been undertaken. The first assesses the discharge into Julian's Pill the second assessed the discharge as if it was discharging directly into the River Usk.

5.5.7 The first assessment does not allow any of the contaminants listed within the permit to be screened out. However, this is not considered an appropriate assessment for the following reasons:

- Julian's Pill itself is a heavily modified watercourse with little natural flow. The continuous nature of the flow is due to the permitted discharge from the STW.
- the mean high water level encompasses Julian's Pill to a point further in land than the discharge from the SUP site. the discharge point is therefore considered to be a predominantly saline environment for which the Trac Estuarine assessment would be more appropriate.

5.5.8 Using the TraC Estuarine assessment model all contaminants are below the allowable effective volume flux.

5.5.9 On this basis the impact is considered to be insignificant and further modelling is not considered necessary.

5.6 Noise

5.6.1 An assessment of noise and vibration effects from the operation of the facility can be found at appendix M.

5.6.2 The noise assessment has been carried out for the daytime (07:00 hrs to 19:00 hrs), evening (19:00 hrs to 23:00 hrs) and night-time (23:00 hrs to 07:00 hrs) periods. It is noted that these hours vary from those provided in BS 4142:2014+A1:2019 as they split the daytime period between daytime and evening. This allows for separate consideration of the evening period, which is generally considered to be more sensitive.

5.6.3 The specific sound levels range from 26 to 34 dB LAeq,T during the daytime and 20 to 25 dB LAeq,T during the evening and night-time. These levels are well below the criteria for speech intelligibility and moderate annoyance during the daytime and sleep disturbance during the night-time provided in the WHO GCN. The specific sound levels are sufficiently below residual sound levels that they would not cause an increase to the overall ambient sound levels. There are other industrial activities in the vicinity, some of which were audible at the baseline sound monitoring location. The site is therefore not vastly different to existing sources of sound in the area.

5.6.4 Therefore, with consideration of the context, the noise impact of the site is considered to be negligible. As such further mitigation measures for noise are expected to be required, although as a matter of best practice BAT would still need to be applied as per the requirements of the permit.

5.7 Global Warming Potential

5.7.1 The global warming potential (GWP) has been calculated in accordance with the H1 guidance. The total GWP score of approximately 1,645,530 comprises direct carbon dioxide and nitrous oxide emissions from combustion of fuel pellets. As GWP excludes the biogenic carbon content, the GWP score for the design fuel spec of 50% biomass would be approximately 871,695.

5.7.2 The GWP score for direct carbon dioxide emissions from combustion of the fuel pellets comes from an estimated annual tonnage of CO_2 of 1,547,674 tonnes based on burning 880,000 tonnes of fuel pellets for 8,760 hours. Note that half of this tonnage is comprised of biogenic CO_2, meaning the GWP score would be halved. In 2013, the coal-fired power station burned 600,441.47 tonnes of coal, producing approximately 1,333,855 tonnes of CO_2, all of which is non-biogenic. The combustion of fuel pellets will therefore result in a GWP score that is less than two thirds of that of the previous coal-burning operation.

5.7.3 The direct releases from burning fuel pellets are consistent with BAT, which promotes maximising efficient burnout of the material and the conversion of its carbon content to carbon dioxide. These releases are therefore determined by the carbon content of the incoming fuel pellets and the desire to achieve BAT.

5.7.4 Supplementary burners are essential to ensure that the facility meets agreed limits for emissions at all stages of operation and their use is considered BAT. This has been excluded from the GWP calculations as expected usage of auxiliary fuel is uncertain. It should be noted that overall the GWP contributions from auxiliary fuel usage is not expected to be significant and would be small compared to the contribution from burning the fuel pellets.

5.8 Photochemical Ozone Creation Potential (POCP)

5.8.1 The photochemical ozone creation potential (POCP) has been calculated in accordance with the H1 guidance. Three substances emitted to air by the facility are identified as having the potential to form ozone: nitrogen dioxide, sulphur dioxide and carbon monoxide. The total POCP score for the facility is calculated as 7,779.14.

5.8.2 The facility will be controlled to ensure that agreed emission limits for the POCP pollutants are met; the supporting information document details the proposed measures for preventing and minimising the release of these pollutants and concludes that the proposed measures are BAT.

6 BEST AVAILABLE TECHNIQUES ASSESSMENT

6.1.1 In section 2 and 3 of this document a description of the proposed facility has been provided, detailing those techniques that are considered to represent BAT for the proposed facility. This section provides additional supporting information for the selected BAT in accordance with the following documents:

- Large Combustion Plant BAT Conclusions (07/2017)
- Waste Incineration BAT Conclusions (12/2019)
- Sector Guidance Note EPR 5.01 – The Incineration of Waste (March 2009)

6.1.2 BATC or 'BAT conclusions' means a document containing the parts of a BAT reference document laying down the conclusions on best available techniques, their description, information to assess their applicability, the emission levels associated with the best available techniques, associated monitoring, associated consumption levels and, where appropriate, relevant site remediation measures.

6.2 General BAT Conclusions (LCP)

BAT 1 – Environmental Management System	
In order to improve the overall environmental performance, BAT is to implement and adhere to an environmental management system (EMS) that incorporates a list of features (as identified in the BATC document).	
SUP justification / evidence	Details of the EMS are provided in section 3 above. The management system currently in place will be updated to ensure that all elements set out in BAT conclusions for both LCP and waste incineration are incorporated where they are not already and to address changes due to modifications to the fuel. Specifically, a fire prevention and mitigation plan (FPMP) is required for sites that accept combustible waste. A FPMP has been included with this application and once approved by NRW will be incorporated within the EMS and maintained as part of the site accident management procedures. Decommissioning has been considered as part of the current redesign of the plant. A procedure will be incorporated into the EMS so that for any future redevelopment consideration will be given to the environmental impacts from the eventual decommissioning of the installation and throughout its operational life. As part of the current application to vary the environmental permit the following assessments are being carried out: • Noise risk assessment • Air quality assessment The assessment of odour and dust have been screened out as unnecessary due to the remoteness of the site from sensitive receptors and the nature of the fuel pellets. Fuel pellets have been subject to upstream pre-treatment which includes the use of heat which would eliminate most odour. Following the completion of these assessments, where it is concluded that a management plan is necessary this will be developed and incorporated into the EMS. Where it is concluded that a management plan is not necessary a record will be made of this decision including the reasons. A procedure relating to sectoral benchmarking will be incorporated into the EMS.
Compliant / Not Compliant	Not yet compliant
Action	The operator will incorporate policies with regard to decommissioning of the installation and sectoral benchmarking as described in section 3.1.2 by 17 August 2021. Where the results of relevant risk assessments conclude that noise, odour or dust management plans are required these will be developed and incorporated into the EMS by 17 August 2021. If it is concluded that any of these management plans is not necessary the reasons for this decision will be recorded in the EMS.

BAT 2 – Monitoring	
BAT is to determine the net electrical efficiency and/or the net total fuel utilisation and/or the net mechanical energy efficiency of the gasification, IGCC and/or combustion units by carrying out a performance test at full load, according to EN standards, after the commissioning of the unit and after each modification that could significantly affect the net electrical efficiency and/or the net total fuel utilisation and/or the net mechanical energy efficiency of the unit. 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.	
SUP justification / evidence	The purpose of this application to vary the environmental permit is to change the fuel type that will feed the combustion units. This is considered to be a modification that could affect the net electrical efficiency and the new total fuel utilisation of the combustion units. As such performance testing of these parameters will be tested in accordance with EN standards following the commissioning of the re-energised units.
Compliant / Not Compliant	Compliant
Action	Performance tests as detailed above to be carried out as part of the commissioning of the converted plant.

BAT 3 – Monitoring **BAT is to monitor key process parameters relevant for emissions to air and water including those identified in the BATC document.**	
SUP justification / evidence	Process monitoring is summarised in Table 4-3. This includes all parameters listed in the BATC document for flue gas. The flue gas treatment is a dry process and therefore there is no waste water produced from the abatement (flue gas treatment) systems. The parameters relating to the waste water from flue gas treatment are therefore not relevant to this installation.
Compliant / Not Compliant	Compliant
Action	No action needed.
BAT 4 – Monitoring **BAT is to monitor emissions to air with at least the frequency stated in the BATC document 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.**	
SUP justification / evidence	Details of emissions monitoring are provided in Table 4-1. This includes monitoring of all substances listed in the BATC document relevant to the co-incineration of waste with biomass and the frequency of monitoring is at least to the frequency stated in the BATC document in relation to BAT 4. Monitoring of point source emissions to air shall be undertaken in line with the requirements of the environmental permit and using the standards detailed in the BAT conclusions.
Compliant / Not Compliant	Compliant
Action	No action needed.
BAT 5 – Monitoring **BAT is to monitor emissions to water from flue-gas treatment 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.**	
SUP justification / evidence	There will be no emissions to water from flue gas treatment and therefore BAT 5 is not relevant.
Compliant / Not Compliant	N/A
Action	N/A

BAT 6 – General Environmental and Combustion Performance **In order to improve the general environmental performance of combustion plants and to reduce emissions to air of CO and unburnt substances, BAT is to ensure optimised combustion and to use an appropriate combination of the techniques detailed in the BATC document.**	
SUP justification / evidence	The following techniques will be used in order to optimise combustion: • Fuel blending and mixing – the fuel pellets will be subject to upstream pre-treatment processes prior to arriving at the site to ensure they comply with the specification and are homogenised. • Maintenance of the combustion system – details of planned maintenance are included in the EMS, see paragraph 3.1.3. • Advanced control system – the automated control system will control combustion efficiency and optimise combustion. • Fuel choice – the use of fuel pellets allows the recovery of energy from waste and reduces the reliance on fossil fuels. The parameters required for classification of waste fuel and coal provided in the table in BAT 9 are broadly similar. The detailed design for the system will ensure compliance with NRW guidance "Draft templates for furnace design submissions for waste incineration plant V0.2". The emission limits set out in Table 4-1 have been derived from the lower of the limits detailed in the LCP BATC and the WI BATC. An air quality assessment has been carried out to assess impacts of all emissions.
Compliant / Not Compliant	Compliant
Action	No action needed.
BAT 7 – General Environmental and Combustion Performance **In order to reduce emissions of ammonia to air from the use of selective catalytic reduction (SCR) and/or selective non-catalytic reduction (SNCR) for the abatement of NO_X emissions, BAT is to optimise the design and/or operation of SCR and/or SNCR (e.g. optimised reagent to NO_X ratio, homogeneous reagent distribution and optimum size of the reagent drops).**	
SUP justification / evidence	SNCR will be added to the abatement system for NO_x abatement and the design will be optimised in order to balance effective NO_x control without excessive ammonia slippage. Ammonium sulphate will also be injected to aid NO_x control as well as to reduce corrosion. During commissioning the SNCR system will be calibrated to inject the optimum amount of urea for NO_x reduction at typical stable load conditions. Running at stable loads will allow for the optimisation of urea injection to maximise NO_x reduction and minimise ammonia slippage. Ammonia will be continuously monitored as set out in Table 4-1. This continual monitoring will feed back to the automated control system and the injection of urea will be automatically adjusted if monitored emissions of NO_x increase.
Compliant / Not Compliant	Compliant
Action	No action needed.

BAT 8 – General Environmental and Combustion Performance **In order to prevent or reduce emissions to air during normal operating conditions, BAT is to ensure, by appropriate design, operation and maintenance, that the emission abatement systems are used at optimal capacity and availability.**	
SUP justification / evidence	The flue gas abatement systems will be used at optimal capacity and availability by ensuring appropriate operation and maintenance as described in the EMS (note the EMS is to be updated to account for changes to abatement systems as a result of the proposed variation). The abatement system has been designed in order to achieve the ELVs set out in Table 4-1. This includes existing abatement for flue gas desulphurisation with bag filters and new SNCR system, activated carbon injection and ammonium sulphate injection. Emission abatement systems are described in section 2 above and emissions will be monitored as described in Table 4-1. The automated monitoring and alarm system will be designed in accordance with good practice to alert operators when operation deviates from the optimum.
Compliant / Not Compliant	Compliant
Action	No action needed.

BAT 9 – General Environmental and Combustion Performance **In order to improve the general environmental performance of combustion and/or gasification plants and to reduce emissions to air, BAT is to include the elements described in the BATC document in the quality assurance/quality control programmes for all the fuels used, as part of the environmental management system (see BAT 1).**	
SUP justification / evidence	Fuel characterisation will be carried out in accordance with the stringent fuel specification within fuel supply agreement and will also be reflected within fuel pre-acceptance and fuel acceptance procedures in the EMS. Details are provided in section 3.1. The fuel pellets must conform to the fuel specification in order to be accepted at the facility. This specification and subsequent characterisation include the following parameter categories: • Proximate Analysis - including: – LHV – Moisture content – Volatiles • Ultimate Analysis • Physical Properties • Particle Size • Inorganic Compounds - Major Oxides • Elements • Ash Characteristics • Trace Elements • Safety Related Characteristics • Miscellaneous: – Tamp Materials – Odour All fuel pellets will confirm to the required stringent fuel specification. It is not therefore anticipated that significant adjustments of the plant settings will be required compared, for example, to plants co-incinerating less homogenous feed e.g. municipal waste.

Compliant / Not Compliant	Compliant
Action	No action needed.

BAT 10 – General Environmental and Combustion Performance

In order to reduce emissions to air and/or to water during other than normal operating conditions (OTNOC), BAT is to set up and implement a management plan as part of the environmental management system (see BAT 1), commensurate with the relevance of potential pollutant releases.

SUP justification / evidence	The main function of the plant is to provide baseload and flexible response to meet the requirements of electricity Grid Code. This is designed to be a continuous operation and as such the plant is typically operating between minimum stable generation and generator rated capability under normal operating conditions the majority of the time. OTNOC such as start up and shut down occurrences are therefore infrequent. Start up and shut down periods are governed by a suite of operating instructions in order to deliver safe, reliable and replicable SU/SD sequences optimised to minimise mass emissions whilst maintaining plant integrity. Maintenance requiring shut down of the plant or otherwise leading to OTNOC is minimised by scheduling significant works to occur within specific planned outages (typically one major outage every two years). The servicing and maintenance regime shall take in to account the frequency of any OTNOC events in order to identify and alleviate problems. Procedures relating to other than normal operating conditions are set out in the EMS and detailed at section 3.2.9. These include the following elements: • appropriate design of the systems considered relevant in causing OTNOC that may have an impact on emissions to air, water and/or soil; • set-up and implementation of a specific preventive maintenance plan for these relevant systems; • review and recording of emissions caused by OTNOC and associated circumstances and implementation of corrective actions if necessary; • periodic assessment of the overall emissions during OTNOC (e.g. frequency of events, duration, emissions quantification/estimation) and implementation of corrective actions if necessary.
Compliant / Not Compliant	Compliant
Action	No action needed.

BAT 11 – General Environmental and Combustion Performance

BAT is to appropriately monitor emissions to air and/or to water during OTNOC.

SUP justification / evidence	Monitoring will be carried out by direct measurement of emissions with the exception of HF which will be calculated based on the emissions of HCl, see section 0. Where emissions are continuously monitored, these emissions during start-up and shutdown (SU/SD) will be assessed based on a detailed emission measurement carried out for a typical SU/SD procedure at least once every year and using the results of this measurement to estimate the emissions for each and every SU/SD throughout the year. Process water emissions are limited to cooling water (there are no aqueous discharges from abatement systems) and will be monitored for the same parameters and to the same frequency as undertaken during normal operation.
Compliant / Not Compliant	Compliant
Action	No action needed.

BAT 12 – Energy Efficiency **In order to increase the energy efficiency of combustion, gasification and/or IGCC units operated ≥ 1 500 h/yr, BAT is to use an appropriate combination of the techniques described in the BATC document.**	
SUP justification / evidence	Energy efficiency measures are set out in section 3.3. Energy efficiency measures include the following: • optimisation of combustion as described in BAT 6 above; • minimisation of internal energy usage, a breakdown of energy usage is provided in Table 3-1; • pre-heating of combustion air; • fuel pre-drying (both fuel pellets and biomass will be dried prior to arriving at the site, the specifications for both fuel pellets and biomass contain a maximum moisture content).
Compliant / Not Compliant	Compliant
Action	No action needed.
BAT 13 – Water usage and emissions to water **In order to reduce water usage and the volume of contaminated waste water discharged, BAT is to use one or both of the techniques described in the BATC document.**	
SUP justification / evidence	Water recycling is used as a technique for reducing the volume of contaminated waste water discharged from the site. The drainage system at the site is complex and there are many drains, overflow drains and sumps. These are shown on a flow diagram at figure 3 of appendix C. The majority of the drainage infrastructure directs process waters and clean run-off water into the storm water sump. From here water is recycled and directed either to the ash settlement plant or the cooling towers. Oils are skimmed and from the storm water sump and these are disposed of. The measures in place to reduce water usage and the volume of contaminated water discharged are set out in section **Error! Reference source not found.**3.4.5 to 3.4.9.
Compliant / Not Compliant	Compliant
Action	No action needed.
BAT 14 – Water usage and emissions to water **In order to prevent the contamination of uncontaminated waste water and to reduce emissions to water, BAT is to segregate waste water streams and to treat them separately, depending on the pollutant content.**	
SUP justification / evidence	Clean rain water run off is discharged separately from other run off waters and process waters at W1 to the Severn Estuary. Other surface water run off is directed to the storm water sump and used in either the ash settlement plant or the cooling towers, this reduces the volume of fresh water used at the site. Rain water collected in bunds for fuel or waste oil tanks is disposed of separately. Process waters are limited to cooling waters which are treated for pH and temperature before being discharged at W2 to Julian's Pill.
Compliant / Not Compliant	Compliant
Action	No action needed.

BAT 15 – Water usage and emissions to water **In order to reduce emissions to water from flue-gas treatment, BAT is to use an appropriate combination of the techniques given below, and to use secondary techniques as close as possible to the source in order to avoid dilution.**	
SUP justification / evidence	There will be no emissions to water from flue gas treatment and therefore BAT 15 is not relevant.
Compliant / Not Compliant	N/A
Action	N/A

BAT 16 – Waste management **In order to reduce the quantity of waste sent for disposal from the combustion and/or gasification process and abatement techniques, BAT is to organise operations so as to maximise, in order of priority and taking into account life-cycle thinking:** a. waste prevention, e.g. maximise the proportion of residues which arise as by-products; b. waste preparation for reuse, e.g. according to the specific requested quality criteria; c. waste recycling d. other waste recovery (e.g. energy recovery), e. by implementing an appropriate combination of techniques such as those described in the BATC documents.	
SUP justification / evidence	The new fuel to be used at the facility is pre-treated waste in the form of fuel pellets. The facility as a whole is being redeveloped in order to recover energy from the fuel pellets. The mix of fuel will maximise the use of waste derived fuel. The plant shall be operated so as to achieve a level of incineration such that the total organic carbon content of bottom ash is less than 3% of the dry weight of the material. Each combustion chamber is equipped with an auxiliary burner to ensure that temperatures are maintained as long as unburned waste is in the combustion chamber. The content of unburnt substances in the ashes will be monitored in accordance with BAT 7 of the WI BATC. Reagent dosing will be controlled in order to minimise APC residue generation. The fuel pellets will be of a standard specification and therefore the dosing levels are not expected to require regular adjustment. This should ensure that the optimum dosing level is maintained. Bottom ash will be recovered and where markets are identified and an appropriate contract secured it will be sold on for use in the construction industry.
Compliant / Not Compliant	Compliant
Action	No action needed.

BAT 17 – Noise emissions **In order to reduce noise emissions, BAT is to use one or a combination of the techniques described in the BATC document.**	
SUP justification / evidence	The main sources of noise on site have been identified as follows: • Railway line • Conveyors • Mobile plant on site and road deliveries • Milling process • Combustion units • Cooling water plant • Oil fired unit • FGD and associated plant Of these sources the, milling process, combustion units, oil fired unit and FGD plant are all within buildings. The main building containing the combustion unit has several doors for vehicular access. These doors are occasionally kept open for ventilation however, given the remote location of the site noise breakout during these periods is not considered to be significant. Where possible windows and doors are kept closed. Deliveries of fuel pellets will in general take place by rail although delivery by road will be an option where rail is temporarily unavailable. Biomass will be delivered by road. The only operations which will take place at night are the following: • Operation of the combustion units • Operation of the cooling water system • Operation of the FGD plant • Operation of Fuel Materials Handling Plant These operations are necessarily continuous, however due to the remote location of the site none are considered to require additional noise attenuation. Deliveries by rail are discharged via bottom hopper discharge into the rail unloading facility and transported to the primary storage silos via enclosed conveyors. Fuel pellets are subsequently transported to the day silos and milling process via additional enclosed conveyors. A preventative maintenance regime is in place at the existing site and will be updated to include new plant and procedures as a result of the fuel conversion. Training of staff includes relevant measures for avoidance of excess noise and familiarisation with the noise management plan. Where new plant and equipment is being designed in relation to the fuel conversion of the plant noise low-noise options have been considered. Noise attenuation and noise control equipment are not applicable as the majority of the plant, in particular the noisy plant, is existing and space does not allow for retrofitting. The majority of the buildings and plant are existing and therefore it is not possible to reconsider the location of these potential sources of noise. However, a noise assessment has been carried out and concludes that the noise impact from the site is considered negligible.
Compliant / Not Compliant	Compliant
Action	No action needed

6.3 BAT Conclusions for the combustion of coal and / or lignite (LCP)

6.3.1 BAT 18 to 23 relate to installations where coal and / or lignite are being burned. This fuel will not be burned at this installation and therefore these BAT sections are not relevant and have not been addressed.

6.4 BAT Conclusions for the combustion of solid biomass and / or peat (LCP)

6.4.1 Up to 1% of the fuel burned in the combustion units may be made up of biomass. As such BAT 24 to 27 are assessed below.

BAT 24 – NO_X, N_2O and CO emissions to air

In order to prevent or reduce NO_X emissions to air while limiting CO and N_2O emissions to air from the combustion of solid biomass and/or peat, BAT is to use one or a combination of the techniques described in the BATC document.

SUP justification / evidence	The following techniques are already a part of the combustion unit design: • Overfire air (air staging) The existing burners will be replaced with ultra low NO_x burners. In addition, SNCR will be added to the abatement system as described in section 2.5.12 prior to commissioning of the re-energised combustion units. Flue gas recirculation (FGR) is being considered as part of the detailed design of the system. Whether this is required to meet agreed emission limits will be determined during full trials of the system following submission of this application to vary the permit. The benefits of incorporating FGR will be considered alongside the potential corrosion issues associated with its use. The abatement system will be designed during the FEED and design EPC phase to ensure the BAT-AELs in Table 4-1 are met.
Compliant / Not Compliant	Compliant, subject to confirmation during commissioning.
Action	No action needed.

BAT 25 – SO_X, HCl and HF emissions to air

In order to prevent or reduce SO_X, HCl and HF emissions to air from the combustion of solid biomass and/or peat, BAT is to use one or a combination of the techniques described in the BATC document.

SUP justification / evidence	The biomass may make up a small fraction of the fuel input (up to 1% of the total fuel). The specification for biomass is provided at appendix O, this limits the acceptable amount of chlorine and sulphur in the biomass. The remainder of the fuel will be waste derived fuel pellets. The fuel pellets will meet a fuel specification which includes a maximum amount of sulphur and chlorine, see appendix N. Due to the low amount of sulphur and chlorine in the fuel additional techniques are not required to meet the BAT-AELs in Table 4-1 above.
Compliant / Not Compliant	Compliant
Action	No action needed

BAT 26 – Dust and particulate-bound metal emissions to air In order to reduce dust and particulate-bound metal emissions to air from the combustion of solid biomass and/or peat, BAT is to use one or a combination of the techniques described in the BATC document.	
SUP justification / evidence	The following techniques are already incorporated into the abatement system: • Bag filters which form part of the dry flue gas desulphurisation system Only up to 1% of the fuel will be biomass, the remainder will be waste derived fuel pellets which will meet the fuel specification in appendix N. The ash content of this fuel is controlled by the fuel specification. In addition, combustion controls will be in place to ensure maximum burnout of the fuel as described in BAT 16 above. The abatement system has been designed to meet the ELVs set out in Table 4-1 above which are within the range of the BAT-AELs in Table 12 of the BATC
Compliant / Not Compliant	Compliant
Action	No action needed.
BAT 27 –Mercury emissions to air In order to prevent or reduce mercury emissions to air from the combustion of solid biomass and/or peat, BAT is to use one or a combination of the techniques described in the BATC document.	
SUP justification / evidence	Activated carbon will be injected into the flue gas to act as a sorbent in order to reduce mercury emissions. In addition, the following techniques which provide a co-benefit of reducing mercury while primarily used to reduce emissions of other pollutants are already incorporated into the abatement system: • Bag filters which form part of the dry flue gas desulphurisation system Only up to 1% of the fuel will be biomass, the remainder will be waste derived fuel pellets which will meet the fuel specification in appendix N. The biomass will meet the specification in appendix O. The mercury content of both types of fuel are controlled by the relevant specification. The abatement system has been designed to meet the ELVs set out in Table 4-1 above, for mercury this is the same as the BAT-AEL.
Compliant / Not Compliant	Compliant
Action	No action needed.

6.5 BAT Conclusions for the combustion of liquid fuels (LCP)

6.5.1 BAT 28 to 39 relate to installations where liquid fuels are burned. This type of fuel will not be burned at this installation and therefore these BAT sections are not relevant and have not been addressed.

6.6 BAT Conclusions for the combustion of gaseous fuels (LCP)

6.6.1 BAT 40 to 54 relate to installations where gaseous fuels are burned. This type of fuel will not be burned at this installation and therefore these BAT sections are not relevant and have not been addressed.

6.7 BAT Conclusions for multi-fuel-fired plants (LCP)

6.7.1 BAT 55 to 59 relate to plant burning process fuels from the chemical industry. This type of fuel will not be burned at this installation and therefore these BAT sections are not relevant and have not been addressed.

6.8 BAT Conclusions for the Co-incineration of Waste (LCP)

6.8.1 BAT 64, BAT 66 and BAT 68 relate to the co-incineration of waste with coal and / or lignite. This installation will not use coal or lignite as a fuel for co-incineration and therefore these BAT sections are not relevant and have not been addressed.

BAT 60 – General environmental performance **In order to improve the general environmental performance of the co-incineration of waste in combustion plants, to ensure stable combustion conditions, and to reduce emissions to air, BAT is to use technique BAT 60 (a) described in the BATC document and a combination of the techniques given in BAT 6 and/or the other techniques described in the BATC document.**	
SUP justification / evidence	Prior to accepting fuel pellets on site procedures will be in place setting out pre-acceptance and acceptance processes for the fuel pellets. These are described in section 3.1.6 to 3.1.11. Only waste which conforms to the fuel specification will be accepted at the site. This will be a homogenous fuel pellet which has been pre-treated, there will be no need for ongoing waste selection or limitation. The fuel pellets will be milled together with biomass in to ensure an effective mixing occurs and a homogenous fuel is produced. The fuel pellets will have been subject to up stream pre-treatment prior to arriving at the site. This pre-treatment includes the use of heat which will reduce moisture content. The allowable moisture content is set out in the fuel specification. The method of storage will ensure that moisture is not introduced during storage. Therefore, there will be no need for further drying before introduction to the combustion process. The only pre-treatment that will take place on site is the milling together of fuel pellets with biomass.
Compliant / Not Compliant	Compliant
Action	No action needed.

BAT 61 – General environmental performance **In order to prevent increased emissions from the co-incineration of waste in combustion plants, BAT is to take appropriate measures to ensure that the emissions of polluting substances in the part of the flue-gases resulting from waste co-incineration are not higher than those resulting from the application of BAT conclusions for the incineration of waste.**	
SUP justification / evidence	The abatement system has been designed to ensure compliance with the ELVs set out in Table 4-1. These ELVs have been derived from the lower of the limits in the LCP BATC and the WI BATC and have been agreed with NRW.
Compliant / Not Compliant	Compliant
Action	No action needed.

BAT 62 – General environmental performance **In order to minimise the impact on residues recycling of the co-incineration of waste in combustion plants, BAT is to maintain a good quality of gypsum, ashes and slags as well as other residues, in line with the requirements set for their recycling when the plant is not co-incinerating waste, by using one or a combination of the techniques given in BAT 60 and/or by restricting the co-incineration to waste fractions with pollutant concentrations similar to those in other combusted fuels.**	
SUP justification / evidence	Once commissioned using the mixture of fuel pellets and biomass with light fuel for auxiliary firing, the combustion units will only utilise the permitted fuels and will not use other non-waste fuels. Relevant techniques are described in BAT 60 above. Analysis of residues will be carried out during FEED and EPC design phase to confirm their hazardous or non-hazardous nature and assess appropriate recycling and / or disposal routes. As described above where appropriate markets are identified and contracts obtained the gypsum and ash by-products will be sold on for reuse.
Compliant / Not Compliant	Compliant
Action	No action needed.
BAT 63 – Energy Efficiency **In order to increase the energy efficiency of the co-incineration of waste, BAT is to use an appropriate combination of the techniques given in BAT 12 and BAT 19, depending on the main fuel type used and on the plant configuration.**	
SUP justification / evidence	See description for BAT 12 above. The net electrical efficiency of the units is 33%. This is within the range of the of the BAT-AEELs detailed in Table 8 of the BATC document for existing plant. It is also within the range provided in the WI BATC for existing plant.
Compliant / Not Compliant	Compliant
Action	No action needed.

BAT 65 – NOx and CO Emissions to Air **In order to prevent or reduce NO_X emissions to air while limiting CO and N_2O emissions from the co-incineration of waste with biomass and/or peat, BAT is to use one or a combination of the techniques given in BAT 24.**	
SUP justification / evidence	As described in section 2.5 the following techniques will be used in order to reduce NO_x emissions while limiting CO and N_2O emissions to air: • Ultra low-NO_x burners; • Selective non- catalytic reduction The abatement systems have been designed to meet the ELVs set out in Table 4-1 which meets the BAT AELs. Urea will be used as the reagent for the SNCR system due to the existing nature of the plant and the resulting difficulties in stabilising combustion conditions. In addition, lower environmental hazards of handling and storage have been considered. In addition ammonium sulphate will be injected into the flue gas for additional NO_x abatement as well as corrosion control. N_2O production will be controlled by ensuring that the temperature of gases is maintained at the optimal level for both NO_x reduction and the prevention of N_2O production. Temperature is controlled by the advanced control system. The volume of urea injected and the residence time will also be automatically controlled.
Compliant / Not Compliant	Compliant, subject to confirmation during commissioning.
Action	No action needed.
BAT 67 – SOx, HCl, HF Emissions to Air **In order to prevent or reduce SO_X, HCl and HF emissions to air from the co-incineration of waste with biomass and/or peat, BAT is to use one or a combination of the techniques given in BAT 25.**	
SUP justification / evidence	The flue gas desulphurisation system is in place to control acid gases. Lime dosing is automatically controlled based on an analysis of SO_2 to ensure optimum performance of the FDG system is maintained. The FGD system was installed to control acid gas emissions from the combustion of coal and biomass and has been tested to ensure it is capable of meeting the ELVs set out in Table 4-1 following the conversion to the combustion of fuel pellets and biomass. In addition, an ammonium sulphate injection system will be installed to control acid gases.
Compliant / Not Compliant	Compliant
Action	No action needed.
BAT 69 – Dust and particulate-bound metal emissions to air **In order to reduce dust and particulate-bound metal emissions to air from the co-incineration of waste with biomass and/or peat, BAT is to use one or a combination of the techniques given in BAT 26.**	
SUP justification / evidence	The abatement systems have been designed to meet the ELVs set out in Table 4-1 which meet the BAT AELs. As described in section 2.6 the dry flue-gas desulphurisation plant which incorporates bag filters will be used to reduce emissions of particulate matter.
Compliant / Not Compliant	Compliant.
Action	No action needed.

BAT 70 – Mercury emissions to air In order to reduce mercury emissions to air from the co-incineration of waste with biomass, peat, coal and/or lignite, BAT is to use one or a combination of the techniques given in BAT 23 and BAT 27.	
SUP justification / evidence	The amount of mercury in the fuel pellets is one of the parameters in the fuel specification and therefore potential for mercury within the fuel will be limited to 0.2 mg/kg. The mercury content of the biomass will be limited to 0.1 mg/kg as per the biomass specification. The average mercury content of waste recovered fuel from mixed MSW across Europe is 0.4 mg/kg[10]. The pre-treatment of the waste will ensure it complies with the fuel specification. In addition, activated carbon will be injected into the flue gases for the adsorption of mercury. The abatement systems have been designed to meet the ELVs set out in Table 4-1 and meet BAT AELs.
Compliant / Not Compliant	Compliant.
Action	No action needed.
BAT 71 – Emissions of volatile organic compounds and polychlorinated dibenzo-dioxins and -furans to air In order to reduce emissions of volatile organic compounds and polychlorinated dibenzo-dioxins and -furans to air from the co-incineration of waste with biomass, peat, coal and/or lignite, BAT is to use a combination of the techniques given in BAT 6, BAT 26 and described at BAT 71.	
SUP justification / evidence	Emissions of these substances will be reduced by controlling the combustion temperature and residence time. Activated carbon will also be injected into the flue gas for the adsorption of pollutant molecules. The abatement systems have been designed to meet the ELVs set out in Table 4-1 which meet BAT AELs.
Compliant / Not Compliant	Compliant.
Action	No action needed.

6.9 Waste Incineration BATC

6.9.1 The WI BATC have been reviewed and requirements have been incorporated where these are additional to those found in the LCP BATC. Those relevant BATC are considered below. Where requirements are identical to those in the LCP BAT this has been identified and the justification has not been repeated here.

6.9.2 BAT 8 relates to the incineration of hazardous waste. No hazardous waste will be incinerated at the site and therefore this BAT section is not relevant and has not been addressed.

[10] https://ec.europa.eu/environment/waste/studies/pdf/rdf.pdf

6.9.3 BAT 13 relates to the storage and handling of clinical waste. No clinical waste will be accepted at the site and therefore this BAT section is not relevant and has not been addressed.

6.9.4 BAT 22 relates to the handling of gaseous and liquid wastes. No gaseous or liquid wastes will be accepted at the site and therefore this BAT section is not relevant and has not been addressed.

BAT 1 – Environmental Management Systems **In order to improve the overall environmental performance, BAT is to elaborate and implement an environmental management system (EMS) that incorporates all of the features listed in the BATC.**	
SUP justification / evidence	The WI BATC includes certain features that are not included in the LCP BATC. These are as follows: ii.an analysis that includes the determination of the organisation's context, the identification of the needs and expectations of interested parties, the identification of characteristics of the installation that are associated with possible risks for the environment (or human health) as well as of the applicable legal requirements relating to the environment; Procedures relating to this feature will be incorporated into the EMS prior to compliance date once the BATC are published as final.
Compliant / Not Compliant	Not yet compliant
Action	Develop and incorporate relevant features into the EMS before hte compliance date.
BAT 2 – Monitoring **BAT is to determine either the gross electrical efficiency, the gross energy efficiency, or the boiler efficiency of the incineration plant as a whole or of all the relevant parts of the incineration plant.**	
SUP justification / evidence	Performance testing to establish the gross electrical efficiency will be carried along with the tests for net electrical efficiency required in LCP BAT 2 following the commissioning of the re-energised units. It is noted that there is no EN standard available for determination of the boiler efficiency of co-incineration plants and that the FDBR guidelines should be used.
Compliant / Not Compliant	Compliant
Action	Performance tests as detailed above to be carried out as part of the commissioning of the new plant.
BAT 3 – Monitoring **BAT is to monitor key process parameters relevant for emissions to air and water including those given in the BATC document.**	
SUP justification / evidence	In addition to those parameters listed in LCP BAT 3 the following monitoring is required by this BAT: • Combustion chamber – temperature • Waste water from bottom ash treatment plants – flow, pH, conductivity Combustion chamber temperature will be monitored as detailed in Table 4-3. No bottom ash treatment takes place at the facility and therefore monitoring of waste waters applicable to this activity is not relevant.
Compliant / Not Compliant	Compliant
Action	No action needed.

BAT 4 – Monitoring **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.**	
SUP justification / evidence	The majority of the requirements in BAT 4 are identical to the requirements in the corresponding LCP BAT. The monitoring frequency varies for some pollutants with the LCP BAT requiring monitoring every three months and the WI BAT requiring every six months. For these pollutants it is suggested that monitoring will be carried out every three months for the first year and thereafter every 6 months, assuming emissions are shown to be stable.
Compliant / Not Compliant	Compliant
Action	No action needed.
BAT 5 – Monitoring **BAT is to appropriately monitor channelled emissions to air from the incineration plant during OTNOC.**	
SUP justification / evidence	These requirements are covered in LCP BAT 11. This BAT specifically refers to monitoring of emissions of dioxins and furans which will be included in the monitoring as described in LCP BAT 11 above.
Compliant / Not Compliant	Compliant
Action	No action needed.
BAT 6 – Monitoring **BAT is to monitor emissions to water from FGC and/or bottom ash treatment 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.**	
SUP justification / evidence	There will be no emissions to water from the abatement system and no bottom ash treatment takes place at the facility.
Compliant / Not Compliant	Compliant
Action	No action needed.
BAT 7 – Monitoring **BAT is to monitor the content of unburnt substances in slags and bottom ashes at the incineration plant with at least the frequency given in the BATC document.**	
SUP justification / evidence	The parameters that will be monitored once the re-energised plant is commissioned are set out in Table 4-2. This includes monitoring of the bottom ash and APC residues for TOC on a quarterly basis using appropriate EN standards. An ash sampling protocol for the sampling of APC residues and bottom ash will be established and submitted for agreement with NRW, prior to commencing operations.
Compliant / Not Compliant	Compliant once sampling protocols established and agreed with NRW.
Action	Produce and agree sampling protocols prior to commissioning of the re-energised plant.

BAT 9 – General environmental and combustion performance **In order to improve the overall environmental performance of the incineration plant by waste stream management (see BAT 1), BAT is to use all of the techniques (a) to (c) given below, and, where relevant, also techniques (d), (e) and (f).**	
SUP justification / evidence	a. The fuel specification has been determined based on the characteristics of the existing combustion units. All fuel combusted at the site will be required to meet the fuel specification which includes details of acceptable ranges for calorific value, moisture content, ash content and size. b. Waste characterisation procedures are not considered necessary as all fuel pellets accepted at the site must meet the fuel specification. Pre-acceptance procedures are described in sections 3.1.7 to 3.1.9. These procedures will be put in place prior to any fuel pellets being accepted at the site. They will ensure the suitability of the fuel pellets. c. Fuel acceptance procedures are described in section 3.1.10 to 3.1.11. These procedures will be put in place prior to any fuel pellets being accepted on site. These procedures will ensure that the fuel pellets arriving at site is compliant with type and quantity identified during the pre-acceptance stage. d. A tracking system will be implemented prior to any fuel pellets being accepted on site. This will record the date and quantity of fuel pellets arriving at the site and its storage location. The primary storage silos have been designed to ensure a first in first out system in maintained. e. e and f are not considered relevant to this site as only one type of waste will be accepted and it will not be hazardous.
Compliant / Not Compliant	Not yet compliant.
Action	Implement procedures as described above prior to the acceptance of fuel pellets at the site.

BAT 10 – General environmental and combustion performance **In order to improve the overall environmental performance of the bottom ash treatment plant, BAT is to set up and implement an output quality management system (see BAT 1).**	
SUP justification / evidence	No bottom ash treatment takes place at the facility.
Compliant / Not Compliant	Compliant
Action	No action needed.

BAT 11 – General environmental and combustion performance **In order to improve the overall environmental performance of the incineration plant, BAT is to monitor the waste deliveries as part of the waste acceptance procedures (see BAT 9 c) including, depending on the risk posed by the incoming waste, the elements given below.**	
SUP justification / evidence	The fuel pellet acceptance procedure described in BAT 9 and section 3.1.10 to 3.1.11 above will include the following elements: • Weighing of the waste deliveries • Visual inspection • Periodic sampling of waste deliveries and analysis of key properties/substances (e.g. calorific value, content of halogens and metals/metalloids). Where fuel pellets are delivered by rail they will be weighed across a calibrated rail weigh bridge system.
Compliant / Not Compliant	Not yet compliant.
Action	Implement procedures as described above prior to any waste being accepted on site.
BAT 12 – General environmental and combustion performance **In order to reduce the environmental risks associated with the reception, handling and storage of waste, BAT is to use both of the techniques described.**	
SUP justification / evidence	Fuel pellets will be stored in up to four concrete primary storage silos designed to hold a maximum of 40,000 tonnes. There are also two day silos which each have a maximum storage capacity of 1,600 tonnes. The silos will be located on an impermeable surface with sealed drainage. Fuel pellet reception and handling areas have been designed with the type of fuel pellets that will be received in mind. Reception areas have impermeable surfaces with sealed drainage. The fuel pellets will be transported to the primary storage silos via enclosed conveyors. The quantity of fuel pellets stored and residue times will be monitored via a tracking system see sections 3.1.12 and 3.1.13. A fire prevention and mitigation plan has been prepared in order to address and mitigate any additional fire risk associated with the reception, handling and storage of the fuel pellets. See details in sections 2 and 4 above.
Compliant / Not Compliant	Compliant.
Action	No further action required once site is redeveloped in accordance section 2.4.1, 4.5.5 and 4.5.6.
BAT 14 – General environmental and combustion performance **In order to improve the overall environmental performance of the incineration of waste, to reduce the content of unburnt substances in slags and bottom ashes, and to reduce emissions to air from the incineration of waste, BAT is to use an appropriate combination of the techniques given below.**	
SUP justification / evidence	The fuel pellets will be subject to upstream pre-treatment and will arrive at site as a homogenous pellet. The fuel pellets and the biomass will be milled together in order to reach the optimal consistency for combustion and ensure the overall fuel for combustion is homogenous.
Compliant / Not Compliant	Compliant
Action	No action needed.

BAT 15 – General environmental and combustion performance **In order to improve the overall environmental performance of the incineration plant and to reduce emissions to air, BAT is to set up and implement procedures for the adjustment of the plant's settings, e.g. through the advanced control system (see description in Section 5.2.1), as and when needed and practicable, based on the characterisation and control of the waste (see BAT 11).**	
SUP justification / evidence	Only one type of fuel pellet will be accepted at the site and it must meet the fuel specification in order to be accepted. As such it is not anticipated that the plant settings would require significant regular adjustment. An automated control system will be in place for control of the critical functions of the power plant. In addition, an advanced control system will be established for the regulation of urea and ammonium sulphate injection based on the continuous monitoring of specific gases within the combustion system.
Compliant / Not Compliant	Compliant
Action	No action needed.
BAT 16 – General environmental and combustion performance **In order to improve the overall environmental performance of the incineration plant and to reduce emissions to air, BAT is to set up and implement operational procedures (e.g. organisation of the supply chain, continuous rather than batch operation) to limit as far as practicable shutdown and start-up operations.**	
SUP justification / evidence	Existing operational procedures will be developed and new procedures established where necessary in relation to ensuring continuity in the supply chain to limit unforeseen shut down and start-up operations
Compliant / Not Compliant	Not yet compliant
Action	Develop operational procedures prior to commissioning of re-energised plant.
BAT 17 – General environmental and combustion performance **In order to reduce emissions to air and, where relevant, to water from the incineration plant, BAT is to ensure that the FGC system and the waste water treatment plant are appropriately designed (e.g. considering the maximum flow rate and pollutant concentrations), operated within their design range, and maintained so as to ensure optimal availability.**	
SUP justification / evidence	The abatement system will be designed in order to meet the ELVs set out in Table 4-1 within their normal design range. They will be subject to planned maintenance in accordance with the manufacturers' recommendations.
Compliant / Not Compliant	Compliant.
Action	No action needed.

BAT 18 – General environmental and combustion performance **In order to reduce the frequency of the occurrence of OTNOC and to reduce emissions to air and, where relevant, to water from the incineration plant 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 elements described in the BATC document.**	
SUP justification / evidence	A procedure will be developed and incorporated into the EMS relating to OTNOC including the following elements: • identification of potential OTNOC (e.g. failure of equipment critical to the protection of the environment ('critical equipment')), of their root causes and of their potential consequences, and regular review and update of the list of identified OTNOC following the periodic assessment below; • set-up and implementation of a preventive maintenance plan for critical equipment (see BAT 1 xii); • monitoring and recording of emissions during OTNOC and associated circumstances (see BAT 5); • periodic assessment of the emissions occurring during OTNOC (e.g. frequency of events, duration, amount of pollutants emitted) and implementation of corrective actions if necessary. In addition critical equipment will be appropriately designed to reduce the frequency of OTNOC occurring.
Compliant / Not Compliant	Not yet compliant.
Action	Develop and implement procedure as set out above before accepting any fuel pellets at the site.
BAT 19 – Energy Efficiency **In order to increase the resource efficiency of the incineration plant, BAT is to use a heat recovery boiler.**	
SUP justification / evidence	A heat recovery boiler is used to produce steam which is used to produce electricity for export to the grid.
Compliant / Not Compliant	Compliant.
Action	No action needed.
BAT 20 – Energy Efficiency **In order to increase the energy efficiency of the incineration plant, BAT is to use an appropriate combination of the techniques given below.**	
SUP justification / evidence	Minimisation of heat loss is achieved through the following: • use of integral furnace boilers; • thermal insulation of boilers. Flue gas recirculation is being considered as part of further detailed design of the abatement system. The combustion units have an efficiency of 33% which is within the range of the BAT-AEEL.
Compliant / Not Compliant	TBC
Action	TBC

BAT 21 – Diffuse Emissions In order to prevent or reduce diffuse emissions from the incineration plant, including odour emissions, BAT is to use the techniques described.	
SUP justification / evidence	The fuel pellets are not odorous and do not require additional measures to prevent odour emissions. No liquid wastes will be stored on site.
Compliant / Not Compliant	Compliant
Action	No action needed.

BAT 23 – Diffuse emissions In order to prevent or reduce diffuse dust emissions to air from the treatment of slags and bottom ashes, BAT is to include in the environmental management system (see BAT 1) the diffuse dust emissions management features described in the BATC.	
SUP justification / evidence	No treatment of slags or bottom ash takes place at the facility.
Compliant / Not Compliant	Compliant
Action	No action needed.

BAT 24 – Diffuse Emissions In order to prevent or reduce diffuse dust emissions to air from the treatment of slags and bottom ashes, BAT is to use an appropriate combination of the techniques given below.	
SUP justification / evidence	No treatment of slags and bottom ashes takes place at the facility.
Compliant / Not Compliant	Compliant
Action	No action needed.

6.9.5 BAT 25 to 31 relate the channelled emissions. These BAT sections are covered in the response to the relevant LCP BAT 64 to BAT 71. All WI BAT AELs will be met.

6.9.6 BAT 32 to 34 relate to emissions to water. These BAT sections are covered in the response to the relevant LCP BAT 13 to BAT 15. There are no emissions to water from the abatement system and no bottom ash treatment takes place on site.

BAT 35 – Material Efficiency **In order to increase resource efficiency, BAT is to handle and treat bottom ashes separately from FGC residues.**	
SUP justification / evidence	These residues will be handled and disposed of separately. See section 2.8 for details of the ash collection systems.
Compliant / Not Compliant	Compliant
Action	No action needed.
BAT 36 – Material Efficiency **In order to increase resource efficiency for the treatment of slags and bottom ashes, BAT is to use an appropriate combination of the techniques given below based on a risk assessment depending on the hazardous properties of the slags and bottom ashes.**	
SUP justification / evidence	No treatment of slags or bottom ashes takes place at the facility.
Compliant / Not Compliant	Compliant
Action	No action needed.
BAT 37 – Noise **In order 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.**	
SUP justification / evidence	See response to LCP BAT 17 above.
Compliant / Not Compliant	Compliant
Action	No action needed.

APPENDICES

Appendix A

Application Forms

Appendix B

Site Layout Plan

Appendix C

Figures

Appendix D

Directors' Dates of Birth

Appendix E

Organogram

Appendix F

Process Flow Diagrams

Appendix G

Environmental Risk Assessment

Appendix H

Air Quality Assessment

Appendix I

IED Baseline and Site Condition Report

Appendix J

Fire Prevention and Mitigation Plan

Appendix K

Human Health Risk Assessment

Appendix L

Ecological Assessment

Appendix M

Noise Assessment

Appendix N

Fuel Specification

Appendix O

Biomass Specification