2 PROJECT DESCRIPTION

2.1 Introduction

2.1.1 This chapter provides a description of the project and forms the basis for the environmental assessment provided in this Environmental Statement (ES). Further, more detailed information can be found in the appendices to this chapter provided in Volume 3 of this ES (Appendix 2.1: Proposed Layout and Elevations).

2.1.2 The effects of the project have been assessed throughout the ES based on what is likely. For example, construction information is presented as the 'likely case'. A number of measures which would reduce or avoid adverse environmental effects have been included as part of the project design. A summary of these measures is provided in this chapter and they are set out where relevant in each topic chapter. This chapter, together with the subsequent topic chapters, provide the data required to identify and assess the main, likely significant effects of the project in accordance with Regulation 18 and Schedule 4 of the EIA Regulations.

2.1.3 This chapter provides a description of the site and the key components of the project, including an overview of the approach to construction.

2.2 The Application Site and the Surrounding Area

Site Location

2.2.1 The Application Site is located approximately 4.5 km west of Redcar town centre and 8.5km north east of Middlesbrough city centre (see Figure 2.1– Site Location Plan).

2.2.2 Access to the Application Site is via a series of internal access roads which serve the industrial area. The internal road merges with the A1085 Trunk Road as a single road via a roundabout approximately 2.7km to the south east of the site. The A1085 provides a strategic access to Middlesbrough and beyond to the north and south via the A19.

Site Description

2.2.3 The Application Site forms part of the demise of Redcar Bulk Terminal and occupies an area of approximately 10.1 hectares of what was heavily industrialised land. Redcar Bulk Terminal is a port used for the transhipment of coal and coke and other bulk goods, and for many years was the import dock for iron ore.

2.2.4 The Application Site is open in character with a small area used for the storage of bulk materials such as coal scrapings. In addition, there are a number of small corrugated metal buildings located on the eastern part of the site.

2.2.5 The eastern boundary of the Application Site is formed by coke ovens associated with the former Teesside Steel Works, a further area of the Steel Works is located to the south east of the Application Site. An internal access road, providing access to the docks forms the southern boundary to the development site beyond which an area associated with the storage for the Redcar Bulk Terminal is located.

2.2.6 The north and north eastern boundaries to the site are formed by a 2 to 3 metre high earth bund beyond which is an area of sand dunes associated with Bran Sands, situated at the mouth of the Tees Estuary and Coatham Sands facing onto the North Sea, with the reclaimed land and breakwater of South Gare separating them.

2.2.7 The western boundary to the site is not enclosed or marked; a further area of storage area of the Redcar Bulk Terminal and the Tees Estuary being located beyond it.

Surrounding Land Uses

2.2.8 The surrounding landscape to the south, east and west is heavily dominated by industrial, distribution and storage activities. Major facilities and infrastructure in close proximity to the application site include:

- The docks associated with the Redcar Bulk Terminal approximately 950 metres to the west;
- PD Ports Teesport and associated areas of storage, a major deep sea complex handling 28 million tonnes per year approximately 2.5km to the south;
- Tesco Distribution Teesport approximately 1.8km to the south of the application site which acts as a distribution warehouse to Tesco stores;
- BOC gas plant for the production of industrial gas approximately 2.5km to the south east of the Application Site;
- The biomass fuelled Teesport Renewable Energy Plant, which is due to be commissioned in 2020, approximately 3km to the south west of the site and the Tata steel works 3km to the south east;
- A large water treatment works, Bran Sands, operated by Northumbria Water approximately 1.8km to the south east of the Application Site.
- Able Port - this facility is used for shipbreaking and decommissioning of oil rigs - is located approximately 3.5km to the west of the Application Site, on the opposite side of the Tees Estuary.
- Hartlepool Nuclear power station directly adjacent to Able Port on the opposite side of the Tees Estuary from the application site.
- The Teesside Refinery approximately 1.6km to the south west of the Application Site, the refinery was both an oil refinery and chemical plant. Refining was suspended in 2009, however, the site continues to operate as a terminal and storage facility.

Nearest Receptors

2.2.9 The Application Site is directly adjacent to the Teesmouth and Cleveland Coast Site of Special Scientific Interest (SSSI) which borders the site to the north. The Teesmouth and Cleveland Coast Special Protection Area (SPA) and Ramsar is located approximately 80 metres from the site boundary.

2.2.10 The closest nature reserve to the Application Site is Saltholme Nature Reserve on Bran Sands approximately 109 metres to the north. Seaton Dunes and Common Local Nature Reserve isg located 2.7km to the north west of the site on the opposite side of the Tees Estuary. The Teesmouth National Nature Reserve is approximately 1.5km to the west of the Application Site again, on the opposite side of the Tees Estuary.

2.2.11 Further afield the Northumbria Coast SPA and SSSI is approximately 15km to the north west of the development site and the North York Moors SPA, Special Area of Conservation (SAC), SSSI and National Park is approximately 14km to the south.

2.2.12 The nearest residential receptor is an isolated dwelling located approximately 2.3km to the east of the site at Marsh Farm on the western edge of Warrenby. The closest more densely populated areas to the project are located approximately 3km to the south east of the site on Broadway West, Dormanstown and 3km to the east of the site along York Road, Coatham.

2.2.13 The Teesdale Way/England Coastal Path runs through the sand dunes along the beach/coast to the north, up to Bran Sands and the South Gare Breakwater, from Marsh Farm/Dormanstown to the west.

2.2.14 The nearest heritage receptor is the Grade II listed South Gare Lighthouse (UID: 1140391) approximately 2.2km to the north of the site. There are also three Grade II buildings located 2.3km to the east of the development site at Marsh Farm, these being Marsh farmhouse and farm cottage (UID: 1160308); the barn and stable (UID: 1139620); and the garden wall (UID: 1139619).

2.3 Planning Context

2.3.1 The Redcar and Cleveland Local Plan ('RCLP') (May 2018), and the Tees Valley Joint Minerals and Waste Core Strategy DPD (September 2011) together set out the relevant strategic policy provisions of statutory development plan.

2.3.2 The Redcar and Cleveland Local Plan sets out the strategic policy for the South Tees Development Corporation area in which the development site is located. The RCLP sets out the spatial strategy for the area through its strategic economic aims;

- delivering significant economic growth and job opportunities through the South Tees Development Corporation;
- support for the regeneration of the South Tees Development Corporation area through the implementation of the South Tees Area Supplementary Planning Document (STASPD);
- growing the environmental and recycling sector;
- supporting the expansion and protection of the port and logistics sector; and
- taking a lead role in supporting the future regeneration of the steel sites as part of the South Tees Development Corporation.

2.3.3 The RCLP also sets out that further strategic policy support is derived through the site's location within an area where land and buildings will continue to be developed and safeguarded for employment uses including specialist uses, including suitable employment related sui generis users and general employment uses. Such uses would include waste management facilities such as the proposed REC. The RCLP requires proposals within the South Tees Development corporation to have regard to the STASPD (2018).

2.3.4 The TVCS identifies that proposals for large waste management facilities will be supported in areas including that south of the River Tees in which the site is located.

2.3.5 The STASPD supports the economic and physical regeneration of the South Tees Development Corporation area, one of its key objectives is to promote and support development uses aligned with a low carbon, circular economy while delivering redevelopment within a framework of reduced energy costs and waste minimisation. THE STASPD adopts a series of strategic development principles and site-specific development principles including:

- STDC6 - Energy Innovation which sets out that the planning authority will support the development of new energy generation within the South Tees Development Corporation area including renewable energy and the promotion of other innovative energy projects;
- STDC 10 – Utilities which confirms support for power generation facilities utilising both conventional and renewable sources; and the site-specific development principle
- STDC 11 identifies that the site is located within the Northern Industrial Zone of the South Tees Development Corporation area in which development proposals including power generation and port related industry are encouraged.

2.3.6 Further strategic policy support is derived from national planning policy including the National Planning Policy Framework (NPPF) and the National Planning Policy for Waste (NPPW).

Planning History

2.3.7 A planning history search undertaken for the Application Site identified the following application:

- R/2001/0936 Corus Steel Works Redcar, TS105QW. Construction of a wind farm comprising 19 no. turbines and new site roads. Decision: Withdrawn 16/07/2002.

2.3.8 The transport corridors relating to the Teeside Cluster Carbon Capture and and Usage Project (referece R/2019/0124/DCO) encroach onto the Application Site, however the main facility is located some distance away. This project is considered in the cumulative effects assessment (see Appendix 4.2.

2.4 Project Description

Key Components

2.4.1 The proposed development includes the following key operational components:

- a Material Recovery Facility incorporating a Bulk Storage Facility;
- an Energy Recovery Facility; and,
- an Incinerator Bottom Ash Recycling Facility.

2.4.2 The key operational components of which the REC is comprised may operate as a single facility or as standalone projects independent of each other with some or no inter-relationship. The ERF may receive residual waste directly from the MRF and from elsewhere. The IBA Recycling Facility is intended to receive IBA directly from the ERF but could also import IBA from elsewhere.

2.4.3 In addition to being well served by road, all three operational components have the potential to bring waste and materials into and out of the Application Site using the rail and port infrastructure in the wider area.

Site Layout

2.4.4 The Application Site would be served by an access road which provides two lane ingress and two lane egress incorporating an 'In' and 'Out' weighbridge with a Gatehouse located to the west of the access road. The Application Site is broadly rectangular in shape with the exception of the access road and the northern part of the site, which is defined by the existing shape of the coastline. The three operational components split the Application Site into three distinct areas: the MRF to the west, the ERF occupying the area to the east, and the IBA Recycling Facility to the north.

2.4.5 The Application Site layout provides one-way circulation around the site with direct access to each of the distinct operational components. Parking facilities would be provided at the MRF and ERF facility.

A layout plan for the Application Site is provided in Figure 2.2 and a summary of the building dimensions that form the basis of this assessment is provided in

Table 2.1: Schedule of dimensions

2.4.6 below. A full suite of plans and elevations is provided at Appendix 2.1.

Table 2.1: Schedule of dimensions

Structure	Length (metres)	Width (metres)	Height (metres)
Gatehouse	12.6	4.3	5.6
MRF Offices	21	21	6
Sprinkler Tanks (MRF)	8 (diameter)		10
MRF Building	168.	121	17.5
IBA Building	43	26	17.5
Conveyor	172	5.5	7.5
Stacks			90
Flue Gas Treatment	42	52	30
ACC Unit	74	30	24.9
ERF Offices	15	37	24
Turbine Hall	51	26	25
Boiler Hall	66	40	49
Bunker	65	37	38
Tipping Hall	63	34	24
Sprinkler Tanks (ERF)	8 (diameter)		10
Substation	11	5.5	6
Transformer	7.5	25	6.3

The Material Recovery Facility (MRF) incorporating Bulk Storage Facility

2.4.7 The Materials Recovery Facility (MRF) would receive up to approximately 200,000 tonnes per annum (tpa) of MSW and/ or C&I waste. The specialist facility would separate, recover and store the waste, sorting it into recyclable and non-recyclable materials i.e. residual waste.

2.4.8 The recyclable material would be reprocessed into products, materials or substances for their original purposes or new ones as part of the circular economy i.e. re-used or recycled.

2.4.9 The residual non-recyclable materials left behind would be processed into a waste fuel or Refuse Derived Fuel (RDF) from which energy would be recovered either in the adjacent ERF, where it has the capacity, or elsewhere in the wider economy.

2.4.10 The process equipment would be wholly enclosed within the MRF building. Elevations which show the location of the main components of the plant within the MRF building are set out within Appendix 2.1. The side and roof panels would be clad in profiled steel sheeting in a muted colour palette sympathetic to the surrounding area utilising dark grey horizontally laid cladding along the base of the building with horizontally laid light grey cladding broken up by horizontally laid dark blue cladding.

2.4.11 The MRF office building would be a three-storey flat roof building located adjacent to the car parking area dedicated to the MRF operation. The walls are proposed to be dark blue horizontally cladding matching the base of the MRF building elevations, broken up by a glazed atrium at the entrance extending to each floor.

2.4.12 The MRF Building provides access and egress from its south (west) side and one-way access from its north side, allowing HGVs access into and through the building via roller shutter doors to import waste and export materials.

2.4.13 The processing building would have a series of internal push bay walls and storage containers for any recyclables that were recovered through the processing of the materials. The floor of the MRF buildings would be concrete and include grated drains to collect any runoff from the incoming waste. The runoff would be stored in a sealed drainage system, reused on site where possible, and exported via tanker or sewer connection for offsite treatment where necessary.

2.4.14 In addition, the proposed MRF building will also incorporate a dedicated Bulk Storage Facility where both unprocessed and processed recyclable materials, and residual waste and RDF can be stored and/ or bulked up for onward transportation off site.

Operation of the MRF

2.4.15 The MRF operation will comprise of two primary operations: waste reception and mechanical processing.

2.4.16 On receipt of the waste (which may have already undergone a degree of processing depending on the source) it will be deposited into a waste reception hall which will include a storage area for pre-treated feedstock.

2.4.17 The MRF has been designed to allow vehicles to drive into it and tip their feedstock onto the floor where it will be manually inspected, and a degree of manual ‘picking’ may take place on conveyors. Each bay within the MRF will be clearly labelled in order to make sure that drivers can identify which bay into which the waste load should be tipped. Any odorous material received in the MRF will be transferred to the ERF.

2.4.18 The MRF would use manual and mechanical processes which use high-tech equipment to maximise the amount of waste that can be recycled (an improved value commodity) separating the waste stream received into:

- glass, ferrous and non-ferrous metals,
- paper and card,
- solid/dense plastics and packaging, and
- any inert material recoverable from the waste stream such as gravel, concrete, rubble and ceramic waste; as well as
- the non-recyclable material including organic material, and any fabric, and other plastics and card, etc., which cannot be removed or is not recyclable.

2.4.19 The mechanical equipment (which would separate the recyclable waste from the waste stream) would include processes which separate and recover the waste materials by their physical and chemical properties; shape, size, weight, magnetism, and using optical scanning and wind sifting. Using both primary screening and secondary separation waste would be passed through a series of equipment using conveyors and overhead cranes including a combination of trommels, shredders, magnets, eddy current, flip-flop screens, hard particle separators and air boxes.

The Energy Recovery Facility (ERF)

2.4.20 The proposed ERF would recover energy from residual waste[1] comprising of mixed C&I waste, MSW and / or RDF[2] using a two-line process.

2.4.21 The proposed ERF would be capable of generating up to 49.9 MW(e) of electricity from up to approximately 450,000 tonnes per annum of waste, depending on calorific value. The mixed waste stream would have a predicted average net calorific value[3] of 9.2 MJ/kg but could vary typically in the range 7.5-11 MJ/kg. Throughput is therefore variable, rather than constant, as the plant would be designed to operate at constant steam conditions.

2.4.22 The precise sources of treated waste fuel have yet to be determined as they would be subject to the securement of commercial contracts. It is, however, envisaged that the majority of the throughput would be made up of RDF or C&I waste sourced regionally and nationally. MSW would also be sourced where contracts are available, but would not be relied upon.

2.4.23 The electricity generated by the ERF would be provided:

- initially to satisfy the on-site parasitic load
- directly to the National Grid; and / or,
- directly by private wire agreement to existing and future planned business in the wider South Tees Development Corporation area including energy intensive users such as advanced manufacturing.

2.4.24 In addition, the proposed ERF would be a Combined Heat and Power (CHP) Ready facility to ensure that where feasible and viable, it would be capable of exporting heat energy, as hot water or steam, to end users with minimal modification should existing and future planned users in the wider area be willing and able to use the thermal energy produced by the ERF. These features may be attractive to certain types of investor and thus attract further investment and development in the area.

2.4.25 It is likely that waste would be brought to the REC along the existing strategic highway network and highway infrastructure by heavy goods vehicles (HGVs) with a minimum load of 6 tonnes and in bulk delivery with a typical load of 20-22.5 tonnes. In addition, where feasible and viable, waste may also be brought to the site utilising the existing rail and port infrastructure available.

2.4.26 The process equipment would be wholly enclosed within a building. The building would be divided into a number of distinct operational areas all of which relate to functions of the overall energy plant process. Elevations which show the location of the main components of the plant within the ERF building are set out within Appendix 2.1. The side and roof panels would be clad in profiled steel sheeting in a muted colour palette sympathetic to the surrounding area utilising dark grey

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[1] Residual wastes being those materials that remain after the process of waste recycling has taken place and that are not able to be recycled, re-used or composted.

[2] Refuse derived fuel (RDF) consists of residual waste that complies with the specifications in a written contract between the producer of the RDF and a permitted end-user for the thermal treatment of the waste in an energy from waste facility or a facility undertaking co-incineration such as cement and lime kilns. The written contract must include the end-user's technical specifications relating as a minimum to the calorific value, the moisture content, the form and quantity of the RDF.

[3] The calorific value of a waste fuel is a measure of how much energy is available per tonne of the fuel.

horizontally laid cladding along the base of the building with horizontally laid light blue cladding broken up by translucent vertically laid dark blue cladding and louvres to the Boiler Hall.

2.4.27 The facility would utilise proven technology, which is designed to treat residual C&I and MSW waste that would otherwise go to landfill or require some other form of treatment, and RDF.

Overview of the ERF Process

2.4.28 The stages of the ERF process are described in the following sections. A schematic of the ERF process is provided below at Plate 2.1.

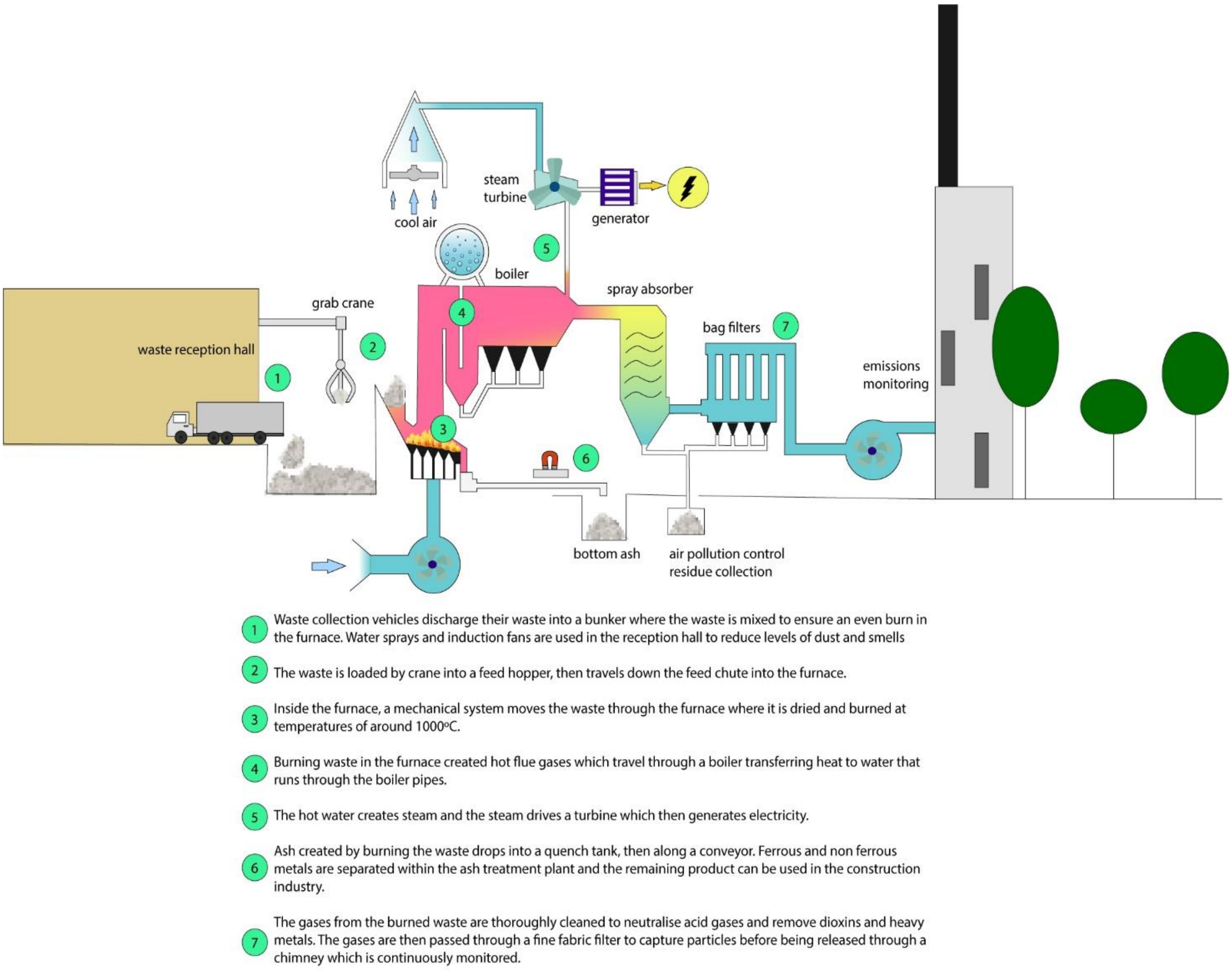

Plate 2.1 – Schematic of an energy recovery process

Operation of the ERF

2.4.29 The main ERF building has been divided into a number of operational areas, relating to different functions of the plant process.

Waste Reception and Storage

Acceptance of Waste

2.4.30 The plant would be capable of processing up to 450,000 tonnes of residual waste each year. Waste would be delivered to the plant by HGVs and weighed upon entry. The residual waste would arrive at the ERF either directly or via the adjacent MRF.

2.4.31 On entering the Application Site, waste vehicles accessing the ERF directly would follow the access road within the site to stop on the inbound weighbridge and be weighed. Once weighed they would go to the tipping hall to unload waste into the bunker. After leaving the tipping hall, the waste vehicles would travel via the outbound weighbridge to the REC exit. The Application Site layout has been designed to operate as a one-way system for all HGV traffic, which is segregated from staff and visitor vehicular access.

2.4.32 It is likely that the weighbridge would use automatic number plate recognition to identify delivery vehicles. Each waste vehicle driver would also have a card or PIN number that when inputted automatically identifies the driver and allows the weighbridge control system to calculate the tonnage of waste delivered. The details of the weight of incoming waste would be printed, to provide a record for the waste carrier.

2.4.33 The location of the tipping hall on the Application Site allows space to accommodate waste vehicles queuing on site. A HGV queuing zone would be located in the central reserve between the Application Site entrance and the weighbridges for vehicles entering the site, to prevent any traffic queuing on external roads. There is the capacity to accommodate seven of the largest HGVs at the weighbridge without interrupting other accesses, but the site is not likely to be a nuisance in this regard in any event as it is remote from other road users.

Reception Hall and Waste Bunker

2.4.34 The unloading of waste would be within an enclosed reception hall, accessed through fast closing rolling shutter doors which would only open and close when vehicles are entering and leaving. Waste delivery vehicles would drive directly into the tipping hall area of the building and reverse into one of the allocated delivery bays to discharge their contents into the waste bunker. This fast-acting door system would be designed to minimise the noise of vehicles reversing inside the building and avoid odours being released. The waste reception area would also be kept under a slight negative pressure in order to prevent air escaping from the building when the doors are open.

2.4.35 The tipping hall would have eight delivery bays to allow multiple vehicles to unload at any one time. One bay may be occupied by a mobile shredder. The waste bunker would take the form of a rectangular concrete pit set into the tipping hall. It would have a floor level below the level of the tipping hall, sized to store approximately 12,500 tonnes of waste (approximately seven days of storage capacity).

2.4.36 The input waste can vary widely in moisture content and calorific value, therefore, waste within the bunker would be regularly mixed by gantry cranes located above the waste bunker. This would ensure there is a homogeneous mix of waste to provide a consistent quality of waste as fuel. Operators would monitor the waste flow and composition of the waste within the bunker.

Combustion of Waste

2.4.37 Overhead cranes would transfer the waste from the bunker and into a feed hopper above the furnace chamber. Waste would be fed into the furnace from the feed hopper using a mechanical pusher (ram) to ensure a consistent feed rate. At the bottom of the furnace chamber there would be a moving grate that would slowly move and mix the waste through the combustion process. The waste would then pass slowly through the furnace where it would burn under carefully controlled conditions to ensure efficient combustion. The combustion process would be controlled such that the flue gases maintain a minimum temperature of 850°C for two seconds after the last injection of combustion air, therefore ensuring complete combustion. In normal operation this temperature would be maintained without the need for supplementary fuel.

2.4.38 Primary combustion air extracted from the reception hall would be injected beneath the grate into the furnace to promote good combustion. Secondary air extracted from the boiler hall, would be injected at high velocity through nozzles positioned in the walls of the combustion chamber above the level of the waste. This would create turbulence to promote mixing and help achieve complete combustion of any volatilised gases. The volume of both primary and secondary air would be regulated by an automatic combustion control system to ensure optimum combustion in the furnace.

2.4.39 Non-combustible items such as metals, glass and other inert materials pass along the grate and fall off the end as incinerator bottom ash. At the end of the grate, the hot IBA would be deposited into an ash extractor, which is filled with water (‘quenching’), to reduce its temperature. The quenched bottom ash passes through vibrating fingers that are designed to separate out oversize materials (around 300mm in size). The residual bottom ash would be transferred along a conveyor system to the bottom ash reception bunker located at the adjacent IBA Facility.

Energy Recovery

2.4.40 The main feature of the steam water cycle is a refractory lined water tube boiler that encases the furnace chamber. Heat is transferred from the hot combustion gases generated from thermal treatment of the waste into the water in the boiler producing steam. This steam is further conditioned to produce a dry, superheated steam by convective heat transfer in the later stages of the boiler. This also cools the combustion gases further as they pass through the boiler so they are at the optimum temperature for the chemical reactions in the flue gas cleaning process. The high temperature, high pressure steam is used to drive a steam turbine and generator that produces electricity. This electricity is used to provide the power for the REC with the excess electricity exported to the local electricity grid.

2.4.41 Steam at different pressures can be extracted at different points in the turbine. This low-pressure steam could be exported for use as process steam or heat (in the form of hot water) to third party heat users should a customer be secured.

2.4.42 The REC would generate up to 49.9MWe gross electricity. The electrical energy would be generated in the synchronous generator at a voltage of 11kV. Step down transformers would supply the REC’s 600V and 415V networks, which in turn supply electrical power to the plant itself. Electricity exported from the REC is fed to the local distribution network via a step-up transformer which is anticipated to operate at 33kV or higher (but would be dependent on the exact point of connection to the local distribution network). The REC has the capability to produce up to approximately 100 MWth per hour of heat for external use dependent on customer demand and internal steam consumption to operate the steam / water cycle.

2.4.43 The proposed EfW facility would have the capacity to export approximately 44.5 MWe net to the grid accounting for approx. 5.5MWe that is required to power the facility itself (known as parasitic load).

2.4.44 Electrical power exported from the facility would be fed to the local grid via a substation located in the southern part of the Application Site as indicated on Figure 2.2. The exact connection voltage would depend on the local distribution network operator but is anticipated to be at 66kV.

2.4.45 The proposed facility offers the possibility of supplying steam or hot water to local users, depending on demand, location and supply conditions. Whilst there would be a reduction in the amount of electricity generated should the facility operate in CHP mode, the overall efficiency of the facility could be significantly increased, assuming appropriate customers are secured.

2.4.46 Space for heat offtake pipework to the Application Site boundary has been included within the layout design.

Table 2.2: Summary of REC Performance

Elements	Units	Total
Maximum electricity generation capacity of the facility	MWe	Up to 49.9
Expected net electrical output (assuming 5.5MWe parasitic load and no heat export)	MWe	Circa 44.5
Potential maximum heat export	MWth	Circa 100
Expected net electrical efficiency (range depending upon heat offtake)	%	Circa 28-30%
Assumed annual average waste net calorific value (NCV)	MJ/Kg	9.2-9.9
Expected annual availability	%	Circa 91.3
Expected annual exported electricity to grid	GWh	356
Waste throughput based on NCV of 9.2 MJ/kg and annual availability	Tonnes/ annum	420,000

Emissions Clean Up

Air Cooled Condenser

2.4.47 The purpose of the air-cooled condenser (ACC) is to condense the steam exhausted from the turbine (i.e. once all useful energy has been extracted) back to water so it can be recirculated back to the boiler for re-use within the EfW process. The ACC at the facility would likely comprise six cells and be situated in the open space to the east of the main REC building.

Flue Gas Treatment and Exhaust

2.4.48 Combustion gases would be cleaned before they are released to the atmosphere via the stacks to achieve the stringent limits set under the EU Industrial Emissions Directive (IED) (Council Directive 2010/75/EU). The first stage is the reduction of nitrogen oxides (NO_x) produced during combustion into nitrogen and steam. A dry flue gas treatment system using hydrated lime for the neutralisation of acid gases is proposed for this facility and is well proven for this type of application.

2.4.49 The abatement of nitrogen oxides (NO_x) in the flue gases would be achieved using selective non-catalytic reduction (SNCR). SNCR chemically reduces the NO_x to nitrogen and water through the injection of a reducing reagent[4]. The reducing agent (urea or ammonia solution) reacts with nitrogen dioxide in the flue gases within a temperature range of 850°C and 950°C.

2.4.50 The flue gases would pass from the boiler to the flue gas cleaning equipment. Dry hydrated lime is injected into the flue gases, which reacts with and neutralises the acidic gases. The lime injection rate would be regulated to optimise the efficiency of gas scrubbing and lime usage by measurement of the hydrogen chloride (HCl) concentration in the flue gas. Activated carbon would be injected into the flue gases to adsorb trace dioxins, other volatile organic compounds (VOCs), mercury and other trace metals. Activated carbon removes these pollutants from the flue gas and retain these within the fine matrix of cavities in the activated carbon powder.

2.4.51 Following injection of the reagents, the flue gas passes through a filter system. This would consist of a large number of long sock type filter bags in a metal casing. Excess reagent, the salts of acid gas neutralisation, activated carbon powder and any dust particles collect on the outside of the filters while the clean gas passes through. At regular intervals a pulse of compressed air would be used to knock off the excess dust build up, which falls down into hoppers at the base of the filter housing.

2.4.52 A proportion of air pollution control residues (APCr) captured by these filters would be recirculated to help improve acid gas capture and reduce excess lime consumption. The APCr not recirculated is conveyed to the residue storage silos. The complete system is sealed to prevent any dust escape.

2.4.53 Clean exhaust gases would be drawn to the stack by an induced draught fan. An exhaust silencer would control noise emissions at the stack outlet if required.

2.4.54 The flue gas treatment system will be subject to the assessment of Best Available Techniques, which is a requirement of the Environmental Permitting Regulations process.

2.4.55 A continuous emissions monitoring system would analyse the flue gases as they pass through the stack. The recorded information would be used to fine tune the flue gas cleaning process as well as fulfilling the reporting requirements under the Environmental Permit.

Stacks

2.4.56 Two process lines are proposed, and each line would be served by a stack located close together at a height of 90 metres located to the north of the ERF building. The height of the stacks has been determined through dispersion modelling of emissions taking account of emission rates, pollutant concentrations, local topography and meteorology to ensure acceptable ground level concentrations of pollutants, under all operating conditions.

2.4.57 The air quality and plume dispersion modelling used to identify the stack height necessary for appropriate dispersion is described in detail in Chapter 11: Air Quality and Appendix 11.5.

The Incinerator Bottom Ash Recycling Facility

2.4.58 The IBA Recycling Facility would be located in the north eastern corner of the Application Site. It would process IBA from the ERF facility and may also accept IBA from external sources. The material would be recycled into an aggregate product (known as Incinerator Bottom Ash Aggregate (IBAA)) for use in the construction industry. The facility would also extract ferrous and non-ferrous metals from the IBA for further processing and reuse.

[4] The reducing agent typically employed in SNCR systems is ammonia or urea solution

2.4.59 The facility would primarily comprise a large concrete-based storage yard with a building and a conveyor on the western boundary. The facility would be surrounded by a 5 metre high concrete wall which would serve as a push wall for the operation of the facility and a screen for the adjacent land uses.

Operation of the IBA Facility

2.4.60 The IBA from the ERF process would be transferred along an inclined conveyor system to the bottom ash reception bunker where it is stored prior to being transferred to the process building. If materials are brought to the REC from other sources for processing, these will be delivered by road and placed in the same bunker, having been weighed and recorded as with any other incoming materials.

2.4.61 The IBA would be transferred by conveyor from the bottom ash reception bunker to the process building where it would be fed into a hopper for processing using a variety of mechanical processes, including vibrating screens, magnetic and eddy current separation. The process screens, separates and sizes the IBA and extracts the ferrous and non-ferrous metals.

2.4.62 The processed IBAA material would be moved from the process building by front-end bucket loader into temporary stockpiles in the dedicated external storage yard, where it would be stored for a period for pH stabilisation. The stockpiles would be open to the elements and rainwater runoff may contain contaminants. The runoff would be collected by a sealed drainage system underneath the concrete pad and temporarily stored in a waste water pit before being re-used on site for ash drenching in the ERF or damping down of the stockpiles. Any excess water wouldeither be treated. Via an on site Liquids Treatment Plant within the building, or taken offsite to a specialist facility for cleanup.

2.4.63 The IBA material would be removed from the facility by vehicles for onward delivery. The recovered ferrous and non-ferrous metals would be stored separately in containers pending their removal from the IBA Recycling Facility for recycling.

2.4.64 The IBA which is delivered to the IBA Recycling Facility may contain material which is not completely combusted and thus suitable for reprocessing at the energy from waste facility. Such will be separated, stored, loaded to vehicles and returned to the ERF.

2.4.65 All IBAA leaving the Application Site would be sheeted. All materials would leave the Application Site via the internal access roads and ultimately joining the A1085 Trunk Road.

2.5 Main Project Wide Elements

Hours of Operation

2.5.1 The REC would operate 24 hours a day, 7 days a week throughout the year except during shutdown periods for maintenance and repair.

2.5.2 It is assumed that each line would achieve approximately 91% availability as a result of planned and unplanned downtime. A two-line plant provides operational flexibility during periods of maintenance, enabling one line to be shut down whilst the second continues to operate. Planned maintenance activities would be for approximately three weeks per line per year. Procedures for waste acceptance during plant shutdown periods are discussed later in this chapter.

Site Staff

2.5.3 The REC would employ up to 100 full time equivalent employees comprising operation and maintenance staff, clerical and administrative staff and plant management. The ERF plant operations and maintenance staff would be employed within up to five shift teams. In addition, approximately 100 additional contractors will be temporarily employed during the planned annual shutdowns.

2.5.4 All staff would be suitably trained, qualified and experienced and a structured training and development programme will be provided.

Traffic

2.5.5 Traffic access and movement around the Application Site has been designed to ensure efficiency and to maximise vehicle and pedestrian safety. All vehicles delivering waste, IBA, process reagents or removing process residues or products, along with maintenance vehicles, will follow the designated internal access routes. All routes are to be hard surfaced.

2.5.6 Staff and visitor traffic would be segregated from HGV traffic on site. A separate car park with 41 car parking spaces would be provided in front of the MRF facility, giving pedestrian access to the MRF office building. 50 car parking spaces are provided to the side of the ERF facility giving direct pedestrian access to the Office element incorporated into the ERF building. Cycle parking would also be provided for both staff and visitors compromising of 12 cycle spaces, with more to be made available on demand.

Use of Natural Resources

2.5.7 The main natural resource to be used in the process would be water.

2.5.8 The Redcar EFW process has been designed to minimise water consumption and maximise water re-use where possible. In order to supplement the plant's reliance on mains water, roof water from the proposed facility will be collected and stored in a rainwater tank with a capacity of approximately 100m^3. A by-pass from the rainwater tank will be in place to ensure roof water enters the main surface water drainage system in the event that the tank is full. This tank would feed the following systems:

- Top up of the process washing systems; and
- Feeding the demineralised water plant which includes water for boiler blowdown.

2.5.9 The ERF plant would be connected to the mains water system. Approximately 21,600m^3 per year (~2.7m^3/hour, based on 8,000 hours operation) of mains water would be used in addition to rainwater, as make up to the process water system and for domestic usage for the staff and visitors on site. Water will be treated (demineralised) prior to being used in the boiler. The steam system comprising the boiler, turbine, condensers and associated pipe work would be a closed system, which will require topping up only for relatively small losses.

2.5.10 Waste water from boiler blow-down and the demineralisation process would be utilised to quench bottom ash. There would be no water discharge from the ash quench because water would either be re-circulated, absorbed by the ash or evaporated.

2.5.11 Other resources that would be used at the REC include urea or ammonia, lime, activated carbon and diesel fuel. There are also small quantities of other chemicals used on site for example the chemicals for boiler water treatment. These resources are listed in the table below together with the estimated quantity used during an average year.

Table 2.3: Natural Resources

Natural Resources	Units	Quantity
Lime	Tonnes /year	5,040

Natural Resources	Units	Quantity
Carbon	Tonnes /year	840
Fuel Oils	Litres/year	168,000

Waste

2.5.12 IBA is the inert or incombustible material from the combustion process. This would be equivalent to approximately 25% by weight of the waste treated which would equate to up to approximately 105,000 tonnes per annum of IBA.

2.5.13 IBA would be transferred from the site to the adjacent IBA Recycling Facility where metals would be recovered and the remaining ash converted into secondary aggregate for use within the construction industry.

Residues and Emissions

2.5.14 It is anticipated that approximately 20,000 tonnes of APCr would be produced per annum. These residues would be handled within a fully enclosed system. The residues would be stored in sealed 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. All transfers would be under the Environmental Permit, duty of care and the receiving facility Environmental Permit or other licensing requirements. The APCr will be transported to a suitably permitted treatment facility.

2.5.15 A new foul water drainage system is required to serve the new site office and any associated catering facilities on the Redcar EFW site. It is proposed that the any new foul drainage from the facility will be connected to the existing pumped sewerage system referred to as the Redcar Flygt System.

Environmental Permit

2.5.16 The operation of the REC would be regulated by an Environmental Permit issued by the Environment Agency prior to commencing operation. In issuing a permit to operate, the Environment Agency must be satisfied that the facility would not give rise to significant effects on the environment or human health and that the proposals will utilise Best Available Techniques (BAT) to prevent, or where this is not possible, control effects. The permit would include conditions aimed at ensuring this is achieved throughout the life of the facility.

2.5.17 For any waste to energy process, the key issues controlled within the environmental permit are as follows:

- Types of wastes which can be accepted
- Waste treatment/storage capacity
- Tight limits on emissions to air
- Monitoring requirements for releases from the plant
- Conditions to promote energy efficiency and waste minimisation
- Conditions controlling noise and odour
- General management and operational requirements, including specific measures to ensure compliance with the Industrial Emissions Directive

- Regular reporting of environmental and operational performance, including performance relative to emission limits

Emissions Monitoring

2.5.18 A dedicated emissions monitoring system would be installed. This would continuously monitor emissions from the stacks for a range of substances as dictated by the Environment Agency, which will be set out in the Environmental Permit issued for the operation of the plant. Typically, this would include particulate matter, CO, SO_2, NO_x, HCl and VOCs.

Drainage

2.5.19 An outline drainage scheme is provided at Appendix 8.2. It provides for foul water connection to existing services and surface water drainage managed within the Application Site. Roof runoff would be collected and used in the process. Other clean surface runoff would be managed through a discharge into the River Tees. Runoff would be directed to the attenuation pond in the north west of the Application Site and through oil interceptors prior to discharging from the south of site near the access road.

Landscape Strategy

2.5.20 A scheme of landscaping comprising strengthening of the northern boundary and habitat improvements forms part of the application. Amenity planting on site will be low maintenance and resilient to climate change.

2.5.21 Areas of landscaping would be provided at the entrance to the site from the access road to the south of the MRF and ERF buildings, around and between the car parks and office entrances; and with a landscaping buffer planting belt along the site northern boundary to the IBA Recycling Facility and to the attenuation and firewater retention pond to the north of the MRF building, intended to act as a natural biodiversity buffer in this area and to provide a stand off from the mound that separates the site from the beach and dune area to the north. This buffer area would be protected from activity on site, with a 5m concrete wall along the edge of the IBA to retain ash within the IBA complex.

Lighting

2.5.22 The plant would operate on a 24-hour continuous basis. External site lighting would be selected and positioned at low level in order to minimise light pollution, visual impact on the local environment and energy use but also to ensure good working conditions and safety for personnel and security.

2.5.23 The lighting will incorporate measures which would:

- Minimise the potential for sky glow by reducing the potential for upward reflected light.
- Minimise light spread through directional lighting.
- Use shielding to prevent glare.

2.5.24 Lighting installed along internal roads and walkways would be provided in accordance with appropriate standards to provide illumination for safe access and operational tasks.

Fencing and Security

2.5.25 A site perimeter fence would be constructed for security. Additional security would be provided by CCTV cameras.

Sustainability

2.5.26 The proposed facility is designed to generate electricity from unrecyclable wastes close to the point of need in a more sustainable way than landfill, in accordance with the waste hierarchy. Use of natural resources and the generation of wastes are described above. Energy and water efficiency would be a priority in the delivery of the REC.

Vulnerability to Accidents and Disasters

2.5.27 The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 require that this description of development include, where relevant, the risk of major accidents and/or disasters. This is interpreted here to refer to manmade events 'accidents' and naturally caused events 'disasters' including those caused by climate change. This environmental statement includes an assessment of the likely significant effects arising from the vulnerability of the proposed development to major accidents or disasters that are relevant to the REC. Individual topic chapters contain, where relevant, such an assessment for example, flood risk, traffic accidents, emissions releases and fire.

2.5.28 Good sustainable design proactively considers resilience, requiring the integration of hazard identification, risk evaluation and risk management into the design process. Furthermore, if risk is significant, it is likely to have a major consequence and is therefore covered by specific legislation e.g. regulations on the control of major accident hazards or regulations on the secondary containment of pollutants such as the oil storage regulations.

2.5.29 Energy from waste facilities can present fire hazards and associated toxic gas release. These areas of the plant/process are well-understood and the design of the facility will incorporate measures to remove or significantly reduce such risks in accordance with the applicable legislation and standards. The operation of energy plants is subject to a number of regulatory regimes and monitored on a continuous basis.

2.5.30 If an incident occurs that could endanger life, the facility or the environment, an emergency shutdown procedure would be implemented. The emergency shutdown would stop waste feed, shut off combustion air fans and the burner essentially shutting down the operation of the plant.

2.5.31 Fire water runoff from the sprinkler discharge would be managed principally by containment within the REC. Proposed levels for the new development would be set such that all firefighting water runoff would be fully contained inside the building and bunker, thus removing the risk of uncontrolled contaminated runoff entering the surface water network. The attenuation pond in the north west corner would be used for the receipt of firefighting water where required and the fire water would be tankered off site.

2.5.32 A manual penstock/valve would be located immediately downstream of the attenuation pond and in the penultimate chamber before leaving the site as a minimum to allow containment of firefighting water.

2.5.33 Fire water contained in such an event would be classed as contaminated runoff and hence require off-site disposal by tanker

Plant Maintenance and Shutdown

2.5.34 During periods when one or both of the EFW process lines are off line, waste would continue to be accepted at the facility. The waste bunker would have a storage capacity of up to seven days. The amount of waste stored within the bunker would be reduced prior to planned maintenance periods, which would be one line at a time.

2.6 Construction

Construction Programme

2.6.1 The timing of the project would be dependent on securing planning permission and the discharge of planning conditions. The indicative construction programme envisages approximately 32 months from start on site to end of commissioning.

2.6.2 Assuming that planning permission is granted for the facility in winter 2019 the following development timescales are anticipated:

- Notice to Proceed to Contractor: 1st Quarter 2021.
- Clearance and Demolition: 2nd Quarter 2021.
- Commencement of Construction: 3rd Quarter 2021.
- Commissioning: 1st Quarter 2024.
- Commercial Operation: 2nd Quarter 2024.

Indicative Construction Phasing

2.6.3 It is assumed that the construction is likely to be phased in order to efficiently manage the interdependent but separate disciplines of civil engineering and process engineering. The first stage in construction works would be the clearance and demolition of existing buildings on the Application Site. A brief overview of potential activities is provided below in Table 2.4.

Table 2.4: Indicative Construction Phase Activities

Stage	Discipline	Activity
Phase 1	Civils	Site clearance, site set up, ground works (piling, cut and fill etc).
	Process	Detailed design and engineering.
Phase 2	Civils	Waste bunker excavation, concrete works (floor slabs, walls, columns etc).
	Process	Manufacturing.
Phase 3	Civils	Continue the concrete works.
	Process	Furness and boiler installation.
Phase 4	Civils	Building structural steelwork installation.
	Process	FGT, Stack, Turbine installation. Continue boiler and pipework installation.
Phase 5	Civils	Cladding installation.
	Process	Continue installation in all areas. Boiler pressure tests.
Phase 6	Civils	Building services installation. Cladding installation.
	Process	Cabling installation, complete pipework and instrumentation installation.
Phase 7	Civils	External works, admin building fit out.
	Process	Cold commissioning.
Phase 8		Hot commissioning and testing

Construction Working Hours

2.6.4 Construction operations likely to give rise to disturbance would generally take place between the following hours:

- Monday – Saturday 07:00 – 19:00 hours;
- Sunday and Bank Holidays – No intrusive working.

2.6.5 It is envisaged that non-intrusive activities and internal works (such as electrical installations, plumbing and similar activities) would be undertaken outside of these hours in order to minimise overall construction time. HGV movements associated with such activities would be insignificant.

2.6.6 Commissioning activities would be conducted on a 24 hour, 7 days a week basis, most of which would take place inside the buildings.

Access and Traffic

2.6.7 Site access during constructionwould be via the existing site entrance.

Construction Plant

2.6.8 Plant to be used during the construction phase would typically involve a variety of machinery including:

- tracked excavators (excavation and loading);
- water pumps;
- articulated dump trucks;
- concrete pump;
- wheeled back hoe loaders;
- generators;
- wagons;
- cement mixer truck;
- telescopic handlers;
- cranes;
- rollers; and
- piling rig(s).

Construction Activities

2.6.9 The proposed development is anticipated to utilise standard construction methodologies (including piling) for infrastructure and buildings.

2.6.10 The broad sequence of construction activities is likely to be:

- creation of the barrier wall between the Application site and the adjacent Teesmouth and Cleveland Coast SSSI;
- demolition, site clearance and enabling works;
- infrastructure works, including construction of internal roads and drainage works;
- construction of substructures;

- erection of superstructures;
- installation of process equipment;
- completion of superstructures and building finishes;
- commissioning; and
- planting in accordance with the landscape strategy.

2.6.11 The Application Site site would also be temporarily fenced during construction.

Demolition, Site Clearance and Enabling Works

2.6.12 The construction areas would be cleared of below ground infrastructure and foundations. Any topsoil and hardcore materials would be reused on the application site where possible. Office and welfare facilities for the construction phase would be established.

2.6.13 The site would be levelled to achieve a cut and fill balance, unless any contaminants are identified where in situ remediation is not possible.

2.6.14 Due to the industrial history of the site, it is envisaged that there is a possibility of contaminated materials being encountered. If on site remediation is not possible, any contaminated material will stay on site until exported for disposal via an appropriately licensed contractor (see Chapter 10: Geology, Hydrogeology and Ground Conditions for more details.

Civil Works

2.6.15 Some levelling of the site would be undertaken and there would be excavations for some of the foundations, including the waste bunker. A cut and fill exercise would be carried out to reduce the removal of surplus material. Structures on the site would require appropriate foundation design and substantial piling to support the key items of process equipment. A key element of the civil works construction phase would be the construction of the reinforced concrete bunker. It is likely that the bunker would be of slip-form construction which would involve continuous pouring of concrete over a period of 18-26 days until construction of the bunker is complete.

Plant Erection

2.6.16 The key element within this phase would be the erection of the boiler plant. As far as practicable, the boilers would be brought to site in large modules and erected using either fixed or mobile cranes. Other main plant items include the waste feeding system, flue gas treatment system, stacks, steam turbine and air-cooled condensers. These items would also be modularised as far as possible to reduce the amount of work on the site. Following the erection of the main plant items, connecting pipework, conveyors and cabling would be installed, followed by the control systems.

Environmental Management during Construction

2.6.17 Construction would be undertaken in accordance with the CoCP that would be prepared post consent. The CoCP sets out the key management measures that contractors would be required to adopt and implement. These measures have been developed based on those identified during the EIA process and set out in the topic chapters of this ES. They include strategies and control measures for managing the potential environmental effects of construction and limiting disturbance from construction activities as far as reasonably practicable.

2.6.18 This CoCP would form the basis of more detailed plans and method statements, to be prepared during the pre-construction period once a Principal Contractor has been appointed.

Construction Working Areas

2.6.19 It is anticipated that the construction works would be fully accommodated within the red line boundary and therefore no other temporary land has been identified for construction use.

2.6.20 Within the application site, a number of temporary facilities would be required during construction including:

- temporary offices and welfare facilities;
- storage area for materials, fuels, plant and equipment;
- waste management areas; and
- car parking facilities.

2.6.21 As far as possible, storage areas would be bunded to mitigate any spillages of potential contaminants and would avoid being located in areas of vegetation or habitat to be retained.

Construction Access and Logistics

2.6.22 The entrance to the Application Site would be used for all construction traffic. Construction heavy goods vehicle (HGV) movements are expected to be substantially fewer than the operational phase and so have not been separately assessed. Although it is not expected that the proposed development would generate any abnormal loads, if this was required, the routing and nature of such loads would be agreed with the highway authority as required.

2.6.23 It is anticipated that the peak periods for traffic movements associated with the construction phase would be 07.00-08.00 and 15.00-16.00. Further details of predicted traffic flows associated with the project are provided in Chapter 10: Traffic and Transport of this ES.

Construction Drainage

2.6.24 The construction phase would incorporate pollution prevention and flood response measures to ensure that the potential for any temporary effects on water quality or flood risk are reduced as far as practicable. These measures are listed in Table 2.5 and would be included within the CoCP.

Construction Waste

2.6.25 The principal types of construction waste (by volume) arising from the project would be materials excavated for the waste bunker and building foundations. Inert materials would, where possible, be reused on site and other demolition wastes will be recycled where possible. Other general construction wastes, and wastes generated by the construction office and mess facilities will be recycled as far as possible.

2.6.26 A SWMP will be developed prior to the commencement of construction setting targets for waste of each type.

Use of Natural Resources

2.6.27 The CoCP requires the contractor to identify the main types and quantities of materials required for the project in order to assess potential for sourcing materials in an environmentally responsible way. The construction specification would place preference, when options are available, on the use of materials with a high recycled content.

2.6.28 The Considerate Contractors Scheme includes measures relating to the use of resources, including categories in relation to minimising the use of water. All timbers used as primary structural elements would be required to be Forest Stewardship Council (FSC) certified.

2.6.29 The construction process would take into account the principles of good practice in soil handling and restoration set out in the following documents, wherever possible, to reduce the possibility of damage to soil materials during the construction process:

- Ministry for Agriculture Fisheries and Food (MAFF) (2000) Soil Handling Guide (MAFF, 2000); and
- Department for Food and Rural Affairs (Defra) (2009) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (including the Toolbox Talks) (Defra, 2009).

Vulnerability to Accidents and Disasters (during construction)

2.6.30 The CoCP would include a plan for preventing and responding to construction hazards such as fire and natural hazards. The site is not vulnerable to flooding and so the hazard response plan is likely to focus on the mitigation of fire and the consequences of spills.

Measures Adopted as Part of the Project

2.6.31 In order to avoid or reduce the environmental effects, a number of measures have been designed into the project. Details of these can be found within each topic chapter of the ES and are summarised in Table 2.5 and Table 2.6 below.

Table 2.5: Schedule of Measures to be Adopted as Part of the Proposed Development during Construction

Topic	Proposed Measures During Construction
Landscape and Visual Resources	Construction of the 5 metre high wall early in the construction programme (see Table 2.7) otherwise, no mitigation measures during construction.
Ecology and Ornithology	Construction of the 5 metre high wall early in the construction process, retention and protection of the existing bund. Mitigation measures from the Hydrology and Flood Risk, Air Quality and Noise and Vibration topics would also apply here. A Code of Constuction Practice would be prepared prior to the construction works and agreed with Redcar and Cleveland Borough Council. The CoCP would set out procedures to ensure all activities with potential to affect the environment are appropriately managed and would include, amongst other things, a Pollution Prevention Plan, Oil Spill Contingency Plan and Noise Management Plan. A method statement for the piling activity would be agreed with Natural England prior to construction commencing.
Hydrology and Flood Risk	The CoCP would set out pollution prevention / construction best practice methods in accordance with the following guidance: • Environment Agency guidance for discharge to surface water and groundwater environmental permits (Environment Agency 2016b); • Environment Agency guidance for oil storage regulations for businesses (Environment Agency, 2015b); • Environment Agency guidance for work on a river, flood defence or sea defence (Environment Agency, 2016c); • Environment Agency, Pollution Prevention Guidance Note 6: Pollution Prevention Guidelines – Working at Construction and Demolition Sites (Environment Agency, 2012) now withdrawn, however still provides valid best practice guidance • Control of Water Pollution from Construction Sites – Guidance for Consultants and Contractors CIRIA (C532) (Construction Industry Research and Information Association (CIRIA), 2001); • CIRIA – SuDS Manual (CIRIA, 2015a); • CIRIA (C741) Environmental good practice on site guide (CIRIA, 2015b); and • CIRIA (C648) Control of water pollution from linear construction projects (CIRIA, 2001).

Topic	Proposed Measures During Construction
	The following pollution comtrol measures would be implemented: • All construction staff would be briefed on the location of the nearby watercourses and pollution prevention measures would be included within the site induction. • Areas with prevalent run-off would be identified and drainage would be actively managed, e.g. bunding of stockpiled material and/or temporary drainage. • A buffer would be established to exclude construction activity within 2 metres of the foot of the existing boundary. • Machinery would be routinely checked to ensure that it is in good working condition. Refuelling of machinery would only be undertaken within a designated area of the site where spillages can easily be contained. Any storage tanks and associated pipe work containing fuels would be double skinned or bunded, provided with leak detection equipment and inspected daily. • Storage areas of hazardous substances (including oils and chemicals) would be bunded to minimise the risk of hazardous substances entering the drainage system or the local watercourses. Additionally, the bunded areas would have impermeable bases to limit the potential for migration of contaminants into groundwater following any leakage/spillage. The bunding systems for oil/chemical storage would have a capacity of 110% of the oil/chemical volume stored and ideally would be covered to prevent ingress of rainwater. Oil/chemical storage areas would be visually inspected on a daily basis. • Designated areas for the unloading, storage and handling of materials (including the storage of oils/fuels/chemicals) would be sited away from the northern boundary of the Application Site and surface watercourses. Storage containers would be appropriate for the materials being stored and all products would be clearly marked. • Any leaks or spillages of potentially polluting substances would be contained, collected and then removed from site in an appropriate manner, e.g. use of absorbent material or bunding. Spill kits would be provided at agreed locations on the Application Site and all construction staff would be trained in their use. • Measures would be installed to manage the surface water runoff from the Application Site to prevent silty water entering the ponds to the north east or the River Tees to the west. Silty water will be treated to allow suspended solids to settle out before disposal. Treatment is likely to include settlement tanks (e.g. siltbuster) or lagoons or a combination of both. • Washing out concrete would only take place in dedicated areas on the site: the wash out areas would be bunded and the water removed for treatment. • Site wheel washing facilities would be located away from watercourses and any waste water would undergo settlement and reused where possible. • No direct discharges of liquids or materials into the ponds or River Tees would be permitted. • Dust suppression equipment would be used to reduce the migration of sediment within the Application Site. The dust suppression equipment would be used in areas where construction drainage systems has features to remove sediment and therefore, reduce the risk of sediment discharging into the surrounding watercourses or the adjacent designated ecological areas. • The construction phase would include temporary drainage mitigation techniques including, but not limited to, run-off interceptor channels installed prior to the construction of the formal drainage to ensure that discharges from the proposed development are controlled in quality and volume during construction. This may include the use of settling tanks and /or ponds to remove sediment, temporary interceptors and hydraulic brakes
Geology, Hydrogeology and Contamination	Measures would include the following: • the implementation of dust suppression measures in accordance with guidance provided by the Institute of Air Quality Management e.g. dampening/sheeting of stockpiles and exposed soils; • the provision of appropriate working practices and personal protective equipment (PPE) for construction workers and provision of guidance regarding high levels of personal hygiene;

Topic	Proposed Measures During Construction
	• a site investigation to confirm the presence/absence of soil and groundwater contamination and ground gas as well as general ground conditions to inform geotechnical design. The scope of the investigation would be confirmed with the Environment Agency and/or Redbridge & Clevelenad Borough Council; • where the results of the site investigation determine that remediation is required to ensure that the site is suitable for its proposed use, a remediation strategy would be prepared and the scope would be agreed with Environment Agency and/or Redbridge & Clevelenad Borough Council. The remediation strategy would identify and prescribe appropriate mitigation / remediation requirements to manage the risk associated with ground contamination to all identified receptors during the operational phase; • on completion of the mitigation/remediation works, a validation report would be prepared with testing to confirm that contaminants in soil and groundwater and ground gas levels (as appropriate) are at acceptable levels and that design measures for remdiation/mitigation have been appropriately installed; • site personnel would be given training to detect any unusual visual or odorous characteristics of soils and groundwater which could indicate the presence of previously unknown contamination. Should any previously unidentified contamination be detected at the site during the construction phase, • a procedure to manage any previously unidentified contaminated soils or groundwater that are encountered (e.g. work in the area would temporarily cease. A suitability qualified environmental consultant would attend site to advise on an appropriate course of action. Details of the conditions encountered would be reported to Local Authority and the Environment Agency, and a suitable risk assessment and management strategy for dealing with the contamination would be submitted for approval by the Local Authority; • imported soils, if required, for use would be subject to tetsing to ensure suitable for use for the landscaping areas; • appropriate storage and hadling of potentially polluting materials and chemicals in accordance with the Control of Pollution (Oil Storage) Regulations, 2001,eg providing a secondary containment system with a capacity of at least 110% of the storage tank capacity and the base and walls of the containment system to be impermeable; • any areas for the storage of bulk materials including oils, fuels and chemicals would be sited away from the northern boundary of the Application Site. Storage areas would be bunded to minimise the risk of substances entering the drainage system. Storage areas would be managed according to current best practice and in compliance with prevailing legislation and Environment Agency guidance; • no substances or liquids would be discharged to ground without the prior approval of the Environment Agency; and • leaks or spillages of potentially polluting substances would be contained, collected then removed from site in an appropriate manner, e.g. use of absorbent material, bunding or booms. An emergency action plan would be formulated which all site personnel would be required to read and understand.
Traffic and Transport	A Code of Construction Practice (CoCP) would be prepared post consent and agreed with Redcar and Cleveland Borough Council prior to the commencement of construction. The CoCP would include measures for the planning and management of construction traffic in terms of routeing, loads and general good practice. The CoCP would seek to minimise the effects of construction traffic upon sensitive receptors along the affected road network
Air Quality	Highly recommended measures from the Instiute of Air Quality Management (see Chapter 11:Air Quality.
Noise and Vibration	Good construction practices, in accordance with Best Practicable Means, would be applied to minimise noise emissions during the construction of the REC. The measures would include: • the use of quieter alternative methods, plant and equipment, where reasonably practicable;

Topic	Proposed Measures During Construction
	• plant, ancillary plant, equipment, site offices, storage areas and worksites will be positioned away from existing noise sensitive receptors, where reasonably practicable; • portable acoustic enclosures/screens will be used for static activities where necessary and practicable; • all construction plant and equipment will comply with EU noise emission limits; • machinery in intermittent use will be shut down in the intervening periods between works or throttled down to a minimum; • no plant or machinery engines will be left running unnecessarily; • materials will be handled as carefully as possible when loading lorries and skips to minimise noise; • as far as reasonably practicable, the noise from reversing alarms will be controlled and limited (e.g. setting reversing alarms to the minimum output noise levels required for health and safety compliance); • all vehicles, plant and equipment will be maintained and operated in an appropriate manner, to ensure that extraneous noise from mechanical vibration, creaking and squeaking is kept to a minimum; and • as far as reasonably practicable, any plant or machinery fitted with noise control equipment found to be defective will not be operated until repaired.

Table 2.6: Schedule of Measures to be Adopted as Part of the Proposed Development during Operation

Topic	Proposed Measures During Operation
Design	A 5 metre high wall will be erected along the north-eastern boundary of the Application Site, which will act to attenuate noise levels at the nearest ecologically sensitive area (the Saltholme Nature Reserve), creating both a sound and visual barrier. The IBA building will contain IBA processing equipment and will act as a further sound and visual barrier. Within views from the close proximity, a level of obstruction to some local views is expected consideration to the orientation of the building to these local receptors, and the external finishes arrangement have been designed to help reduce the massing of the built form within the view. This includes the breaking up of the mass of the energy recovery building through breaking up the overall height and depth changes and careful use of suitable colours. The finishing colours of the proposed development of muted greys and blues have been selected to help assimilate the proposed development into its immediate setting of industry and the sea. The overall external design of the project buildings, including layout, massing and colours, has been developed to aid in reducing its overall landscape and visual impact.
Landscape and Visual Resources	Also, the landscape proposals have been designed as an integral part of the proposed design to provide treatments appropriate to the coastal/dune setting and internal green spaces (see Landscape Strategy Figure 6.9) The REC would require external lighting. A full lighting strategy would be submitted to the local planning authority for agreement prior to the project becoming operational. As the plant would operate on a 24-hour continuous basis, lighting would be selected and positioned in order to minimise light pollution, visual impact on the local environment and energy use but also to ensure good working conditions and safety for personnel and security. Lighting generally would be located along internal roads and walkways. Fittings would be selected to reflect light to focus on the areas where light is required and avoid light stray and would incorporate measures which would: • Minimise the potential for sky glow by reducing the potential for upward light;

Topic	Proposed Measures During Operation
	• Minimise light spread through directional lighting; and • Use of shielding to prevent glare.
Ecology and Ornithology	The landscape strategy (Figure 6.9) reflects the wider ecology of the area and plants would be of local provenance. The strategy includes a small waterbody with shallow slopes and marginal reeds to provide suitable habitat for invertebrates such as dragonfly and damselfly to complete their lifecycle to increase local biodiversity. The landscape strategy would include objectives to encourage wall butterfly into the Application Site by creating suitable habitat such as broken turf and exposed stony areas incorporating the food plants of cock's-foot, bent grass species, wavy hair-grass and Yorkshire-fog. The management of surface water would be in accordance with the drainage strategy (see Appendix 8.2)..
Hydrology and Flood Risk	Surface water during the operation phase would be managed in accordance with the outline drainage strategy (Appendix 8.2) which would be approved by the LLFA prior to construction commencing. For clean runoff, the outline drainage strategy includes the collection of surface water via traditional slot / channel drains before discharging via suitable oil interceptors to an attenuation pond and onward via an off-site gravity discharge to the River Tees at an uncontrolled rate. No process effluent or boiler water would be discharged to the clean water surface water system and a separate system to deal with this water would be provided. Any excess process water produced in planned outages of the proposed development would be directed to an onsite wastewater tank and any surplus would be tankered off site. The operation of REC would be managed via the Environmental Permit.
Geology, Hydrogeology and Contamination	The storage and use of fuels and chemicals would be managed via the Environmental Permit.
Traffic and Transport	No mitigation measures during operation other than the design of the access route through the REC to avoid queueing traffic on the highway..
Air Quality	Air quality emissions during operation would be managed via the Environmental Permit.
Noise and Vibration	No mitigation measures during the operation.

2.7 Decommissioning

2.7.1 On cessation of the activities the site would be closed and decommissioned in a manner that avoids any pollution from decommissioning activities and ensures the site is returned to a satisfactory state.

2.8 References

Department for Food and Rural Affairs (2009) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (including the Toolbox Talks)

Ministry for Agriculture, Fisheries and Food (2000) Good Practice Guide for Handling Soils