REPORT

Boston Alternative Energy Facility – Environmental Statement

Chapter 5 Project Description

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5 Project Description

5.1.1 This chapter a description of the location of the proposed Boston Alternative Energy Facility (the 'Facility'), a site description and a description of the construction and operation of the Facility.

5.2 Site Location

5.2.1 The Development Consent Order (DCO) Application Site for the Boston Alternative Energy Facility (hereafter referenced to as 'the Application Site') is located approximately 2 km to the south east of Boston town centre as shown on **Figure 1.1**. The Application Site covers 26.8 hectares (ha) and is split in to two components: the area containing operational infrastructure for the Facility (the 'Principal Application Site'); and an area containing habitat mitigation works for wading birds (the 'Habitat Mitigation Area'). The Principal Application Site (NGR TF33950 42241) covers 25.3 ha and is neighboured to the west by the Riverside Industrial Estate and to the east by The Haven, a tidal waterway of the River Witham between The Wash and the town of Boston. The A16 public highway is located approximately 1.3 km to the west. The Habitat Mitigation Area covers 1.5 ha and is located approximately 170 m to the south east of the Principal Application Site, encompassing an area of saltmarsh and small creeks at the margins of The Haven.

5.2.2 The Principal Application Site is accessed by road via the Riverside Industrial Estate's existing road network from Nursery Road. Access to the site from the west to Marsh Lane is gained from Bittern Way.

5.2.3 The Boston Biomass UK No.3 Ltd gasification plant is located on the eastern boundary of the Principal Application Site. A waste management facility (previously operated by Mick George, but having ceased operation at the time of submission) which processed construction and demolition waste is located to the east of Nursery Road and is bounded by the Principal Application Site on all sides (but not included within the proposed Application Site itself).

5.2.4 A Household Waste Recycling Centre (HWRC) (built in 2018) is located to the west of the Principal Application Site, south of the junction with Nursery Road/Callen Road. Public access to the HWRC is from Bittern Way.

5.2.5 A Waste Transfer Station (WTS) operated by Lincolnshire County Council (LCC) is located to the south of the Principal Application Site, off Slippery Gowt Lane. The WTS receives all of the residual household waste from Boston Borough

Council (BBC) and South Holland District Council (SHDC) areas, and some residual household waste from East Lindsey Council area. This waste is bulked and transferred to the North Hykeham energy from waste incineration facility (Lincoln).

5.3 Site Description

5.3.1 The Principal Application Site comprises both undeveloped and previously developed land enclosed by a network of drainage ditches and forms part of a wider emerging industrial/commercial area.

5.3.2 The eastern site margins of the Principal Application Site are defined in part by a primary flood defence bank along The Haven. Large and small industrial business units are located to the north, west and south of the site. A 132 kilovolt (kV) overhead powerline on pylons traverses the site from north to south and bisects the Application Site.

5.3.3 The Habitat Mitigation area comprises the margins of The Haven, predominantly saltmarsh with several small tidal creeks. A small portion of this area extends below Mean High Water Springs (MHWS) and is therefore covered with estuarine water around high water on some tides.

5.3.4 There are several public rights of way that cross the Principal Application Site. The Boston Public Footpath No.14 starts in Boston and follows the A16 (London Road) south over The Haven and merges with the existing footpaths along The Haven (BOST/14/12, BOST/14/2, BOST/14/4, BOST/14/5 and BOST/14/7). Footpaths BOST14/4 and BOST14/5 follow the crest of the primary flood bank that routes in parallel to The Haven. Footpath BOST/14/11 and BOST/14/9, follow the route of Roman Bank (also known as 'Sea Bank'), which bisects the Principal Application Site and then continues south (see **Figure 5.3**).

5.3.5 The part of the Application Site which will accommodate the wharf is approximately 750 m downstream from the existing Port of Boston (measured from the entrance to the impounded basin, the Wet Dock, to the approximate centre of the site).

5.3.6 The Haven is contained within flood banks (in good condition) which are located within the Principal Application Site at approximately 6.3 m Above Ordnance Datum (AOD). Typical dimensions across the river directly to the east of this site, are as below and illustrated in **Plate 5-1**:

- From the edge of the flood defence to the centre of the channel is approximately 80 m;

- The width of base of channel is approximately 20 m; and
- From edge of the flood defence bank to MHWS is approximately 30 m.

5.3.7 The navigation channel is not dredged at this point. The bed level changes over time. Under normal conditions it gradually silts up but erodes when large water volumes are discharged from the sluices upstream. This will not occur at high tides, so will not affect vessel manoeuvring.

5.3.8 A water main runs across the Principal Application Site from Bittern Way to the north-eastern corner of the Principal Application Site where it then crosses The Haven. This piece of infrastructure will be avoided by the proposed wharf infrastructure. Where the water main would cross the Principal Application Site it will be diverted, and this is subject to a separate application to Anglian Water on behalf of the landowner. The route of the diversion will be determined in accordance with advice provided by Anglian Water. The diversion will be completed before construction of the Facility.

5.3.9 There are no existing buildings within any part of the Application Site that will require demolition.

5.3.10 The Application Site is located within National Character Area 46: The Fens (Natural England, 2013), the Reclaimed Saltmarsh Landscape Character Type and Welland to Haven Reclaimed Saltmarsh Landscape Character Area (LCA) (ECUS Ltd, 2009). However, the area is significantly influenced by urban/industrial features including electricity pylons, industrial units, cranes and gantries at the Port of Boston.

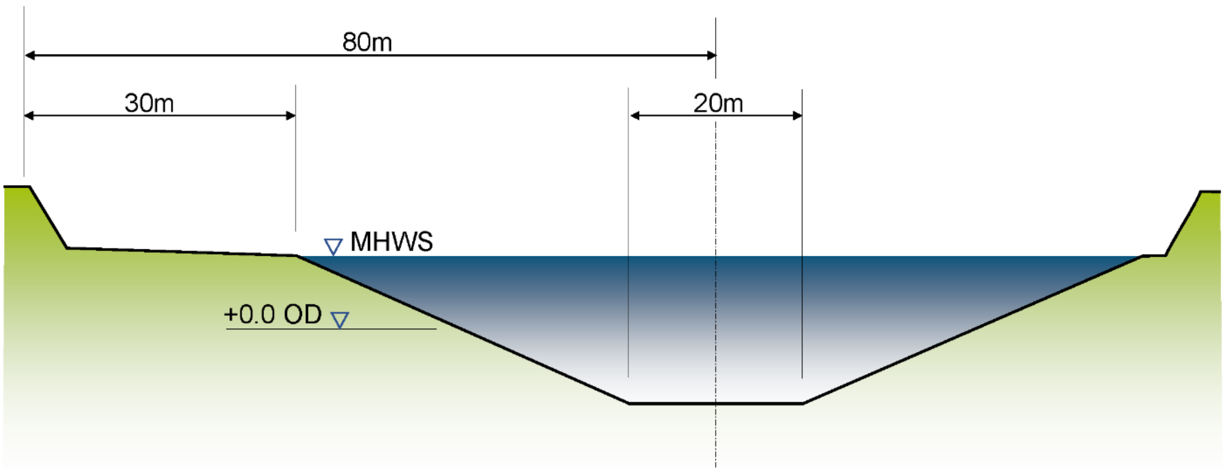

Plate 5-1 Indicative cross section through The Haven to the east of the Principal Application Site. Note that vertical scale is different to horizontal.

Local Plan Allocation

5.3.11 Policy SL3, of the Lincolnshire Minerals and Waste Local Plan (Site Locations) December 2017, identifies the 119 ha Riverside Industrial Estate as an allocated area, referenced as WA22-BO. The allocated area has been identified as a suitable location for waste management related development (Resource Recovery Park, Treatment Facility, Waste Transfer, Materials Recycling Facility, Household Waste Recycling Centre, Metal Recycling/End of Life Vehicles, Re-Use Facility, C&D Recycling, Energy Recovery).

5.3.12 The Principal Application Site is located predominantly located within the WA22-BO allocated area.

5.3.13 Further detail on the allocation of the land is addressed in **Chapter 3 Policy and Legislation**.

5.4 Overview of the Development

5.4.1 The proposed Facility would deliver approximately 80 megawatts electric (MWe) of renewable energy to the National Grid using Refuse Derived Fuel (RDF) as a feedstock into a thermal treatment facility generating power via steam turbine generators. This technology provides significant environmental benefits compared to landfilling residual waste and contributes to Government sustainable energy targets to achieve a net zero reduction in carbon emissions by 2050.

5.4.2 The Facility would comprise the following main elements:

- a wharf and associated infrastructure (including re-baling facility, workshop, transformer pen and welfare facilities);
- a RDF bale contingency storage area, including sealed drainage, with automated crane system for transferring bales;
- conveyor system running in parallel to the wharf between the RDF storage area and the RDF bale shredding plant. Part of the conveyor system is open and part of which is under cover (including thermal cameras);
- bale shredding plant;
- RDF bunker building;
- thermal treatment plant comprising three nominal 34 MWe combustion lines (circa 120 megawatts thermal (MWth)) and associated ductwork and piping, transformer pens, diesel generators, three stacks, ash silos and ash transfer network; and air pollution control residues (APCr) silo and transfer network;

- turbine plant comprising three steam turbine generators, make-up water facility and associated piping and ductwork;
- air-cooled condenser structure, transformer pen and associated piping and ductwork;
- Lightweight Aggregate (LWA) manufacturing plant comprising four kiln lines, two filter banks with stacks, storage silos for incoming ash, APCr, and binder material (clay and silt), a dedicated berthing point at the wharf, silt storage and drainage facility, clay storage and drainage facility, LWA workshop, interceptor tank, LWA control room, aggregate storage facility and plant for loading aggregate / offloading clay or silt;
- electrical export infrastructure;
- two carbon dioxide (CO_2) recovery plants and associated infrastructure, including chiller units;
- associated site infrastructure, including site roads, pedestrian routes, car parking, site workshop and storage, security gate, control room with visitor centre and site weighbridge; and
- habitat mitigation works for Redshank and other bird species comprising of improvements to the existing habitat through the creation of small features such as pools/scrapes and introduction of small boulders (Habitat Mitigation Works) within the Habitat Mitigation Area.

5.4.3 Details of additional supporting infrastructure are provided in subsequent sections of this chapter. A process flow diagram is provided in **Plate 5-2**.

5.4.4 Details of landscaping are shown on the Illustrative Landscape Plans (document reference 4.4) and explained within the Outline Landscape and Ecological Mitigation Strategy (document reference 7.4).

5.4.5 The construction period for the whole development, including commissioning, is anticipated to be between 46 and 48 months.

5.4.6 The Facility would be designed to operate for an expected period of at least 25 years, after which ongoing operation will be reviewed and if it is not appropriate to continue operation the plant will be decommissioned. The wharf structure would replace a section of the current primary flood defence bank (without impacting on the integrity of the bank) and would form a permanent structure that is not anticipated to be decommissioned.

5.4.7 The Facility would comprise a range of buildings and structures, shown on the site layout plan (**Figure 5.1**), the tallest of which are the three thermal treatment plant exhaust stacks and the two proposed LWA plant stacks which are each anticipated to be approximately 80 m in height. The approximate maximum heights of the main buildings are as follows:

- Bale shredding plant: 20 m;
- Thermal treatment plants: 44 m;
- Turbine Hall: 20 m;
- Air-cooled condensers: 30 m;
- Lightweight Aggregate (LWA) manufacturing plant: 44 m; and
- Carbon dioxide (CO_2) recovery plant: 12 m.

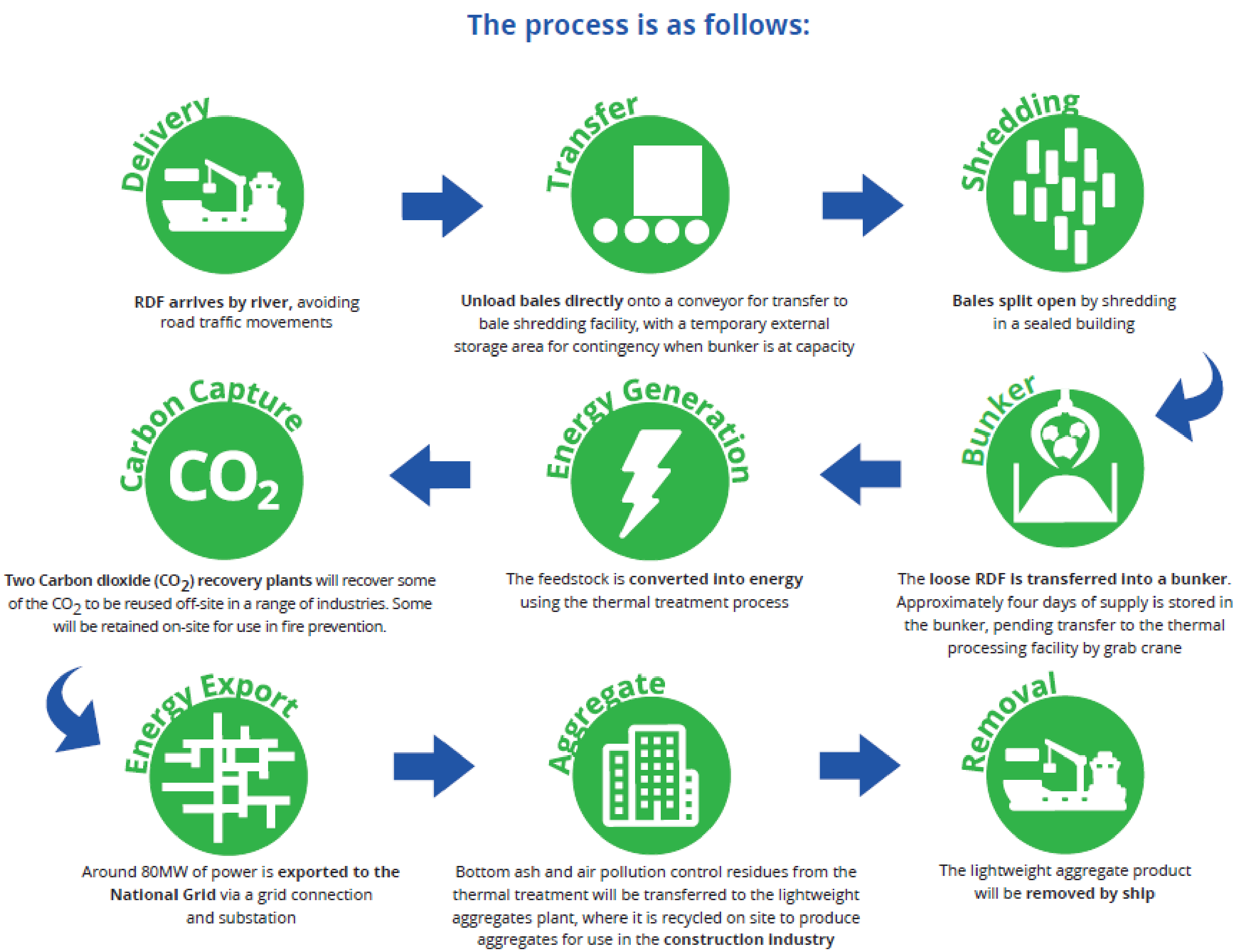

Plate 5-2 Process Flow Diagram

5.5 Construction of the Proposed Development

Introduction

5.5.1 The overall construction period, including commissioning, is assessed as being no greater than 48 months, from 2022 to 2026. It is expected that there will be between 250-300 construction workers at peak construction. Construction activities would take place six days a week (Monday to Saturday) between 8am and 8pm (with an option of 7am to 7pm), with no bank holiday or public holiday working. There may be short periods of 24 hour working where concrete is being poured.

5.5.2 An outline of the construction traffic programme is discussed in **Chapter 19 Traffic and Transport** and shown in **Appendix 19.3 Transport Assignment on Indicative Construction Programme**.

5.5.3 An Outline Code of Construction Practice (OCoCP) (document 7.1) has been prepared to set out principles, controls and management measures to be implemented during the construction phase to manage potential significant effects. A final detailed CoCP will be produced post-consent, prior to construction of the Facility, and will follow the principles outlined within this OCoCP (as secured under Requirement 10 of the draft DCO (document reference 2.1)).

5.5.4 Contracts with companies involved in the construction works will incorporate environmental control measures, health and safety regulations and current guidance with the intention that all contractors involved are committed to agreed best practice and in meeting relevant environmental legislation.

5.5.5 It is anticipated that temporary construction laydown areas will be required for the construction of the Facility. These areas are shown on **Figure 5.1**.

5.5.6 All construction works will adhere to the Construction (Design and Management) (CDM) Regulations 2015 (HMSO, 2015).

5.5.7 A brief overview of the construction of the Facility is outlined below.

Site Preparation

5.5.8 As per paragraph 5.3.7 an existing water main running through the Principal Application Site will be diverted in advance of any construction activity, in accordance with advice provided by Anglian Water, and a separate application for this operation will be submitted.

5.5.9 It is proposed that foul drainage would be collected through a new mains connection to the existing sewer system (which serves the industrial estate on the northern boundary) to provide a sewerage system for use in both construction and operation. To facilitate this, there will be a spur constructed from the main sewerage line to the Principal Application Site. The proposed route of this will follow advice given by Anglian Water.

5.5.10 Topsoil will be removed across the Principal Application Site and this site will be graded using imported stone. The proposed cut and fill balance for the Principal Application Site is to be determined, however, it is anticipated that soil that is suitable for use would be retained on site for grading use to minimise imports and disposal of soil.

5.5.11 Laydown areas will be prepared for the storage of plant components and equipment and office use (portacabins) in construction. Heras fencing will be erected around the Principal Application Site (an estimated fence distance of 4 km).

Delivery of Raw Materials

5.5.12 Delivery of raw materials to the Principal Application Site will be via both ship and road. The first phase of the wharf construction will be undertaken to allow a proportion of the raw materials to be delivered by ship rather than transportation by local roads. It is estimated that it will take approximately six months to construct the first section of the wharf to allow raw materials to be received by ship. The remaining section of the wharf will take a further 12 months (approximately) to complete.

5.5.13 A concrete batching plant will be installed to reduce transport movements associated with concrete. Aggregate brought in via ship will then be transferred from the wharf via an overland temporary conveyor to the concrete batching plant. The concrete batching plant will take approximately four days to install. The temporary aggregate conveyor will take around five months to install. This will be deconstructed when the need for aggregate supply by ship has come to an end.

5.5.14 The bulk of cement will come from Ketton Cement works in the County of Rutland, with potential alternative sources from Purfleet or Tyneside. It is not considered practical to deliver cement via ship due to the vessel size required and the logistical requirements associated with timetabling of deliveries.

5.5.15 Other bulk loads including reinforcement materials such as steel and fibre will also be brought in via ship, with on-site vehicle transport to lay-down areas within the Principal Application Site.

5.5.16 It is anticipated that there will be approximately 89 shipments of raw materials during the construction period.

Footbridge

5.5.17 A footbridge will be installed early in the construction programme to allow safe passing for the public over the Principal Application Site. This will be installed on the current public right of way which follows the route of Roman Bank (also known as 'Sea Bank') along footpath sections BOST/14/11 and BOST/14/9 where it crosses the Principal Application Site - see **paragraph 5.6.115**.

Wharf

5.5.18 The wharf would be built in a phased manner as per **paragraph 5.5.12**, replacing sections of the current flood defence bank and will comprise the quay wall, the main area of the wharf and an area behind the wharf for associated infrastructure, such as the re-baling facility, workshop, transformer pen and welfare facilities.

5.5.19 The wharf facility would include a berthing pocket to allow ships to safely dock without restricting the navigable channel within The Haven. The berthing pocket would be constructed by dredging and excavation of the mud flats and land to the edge of the proposed wharf. Most of these construction works would be carried out by land-based equipment, although some floating plant may be required to complete the excavation of the berthing pocket towards the edge of the main channel, due to the distance from the wharf edge (approximately 50 m).

5.5.20 There will be two phases of dredging for the construction of the wharf and the berthing pocket. The first phase of dredging of the slope will be required to construct the revetment (which will be located under the wharf once built) and this will comprise approximately 75,000 m^3 of dredged sediment. This activity would be completed using land-based equipment with long-arm hydraulic excavators (and/or suitable cranes equipped with a grab) located on top of the flood defence to excavate the slope. A second phase of capital dredging will be required for the berthing areas in front of the quay wall, with approximately 150,000 m^3 of sediment requiring excavation to create enough water depth in the berthing areas in front of the quay wall. The final depth of the berthing pocket will be -3.5 m Ordnance Datum (OD).

5.5.21 The deck structure would be constructed by first driving the piles and then constructing the deck. The Contractor would work from the shore outwards, using the installed piles as part of the temporary works for construction of the structure further offshore. The deck would be constructed of concrete precast beams and deck slabs, tied together with *in-situ* concrete.

5.5.22 Protection required to stop erosion of the dredged slope under the wharf would need to be completed prior to placing the concrete deck. This slope protection would be placed after the piles have been driven and before the deck is formed, as this allows easy access to the area using cranes, and or excavators to place the scour protection mattress. Scour protection will be required at either end of the wharf, as shown on **Figure 5.2**. To minimise impacts the detailed design will prioritise a solution that avoids habitats loss and disturbance.

5.5.23 The area behind the wharf would be consolidated with a suitable specification of fill material. If necessary, it would be surcharged to reduce post construction settlements. Prefabricated vertical drains (PVDs), if required, would be installed in the first stage.

5.5.24 Once the ground improvement is complete, the surcharge would be removed, and the retaining wall constructed.

5.5.25 The estimated quantities associated with construction of the wharf are provided in **Table 5-1.**

Table 5-1 Wharf Estimated Quantities

Item	Indicative Quantity
Excavation of the revetment slope	75,000 m^3
Dredging of channel	150,000 m^3
Fill required	7,000 m^3
Piles for suspended deck	300 no.
Concrete for suspended deck	7,000 m^3
Slope protection	10,000 m^2

RDF Storage Area

5.5.26 The RDF storage area would be constructed as a sealed concrete pad with a sealed drainage system.

Fuel Conveyors

5.5.27 The fuel conveyors will be constructed in two phases. During Phase 1 the turntable house (shown at the right angle of the conveyors in **Figure 5.1**) will be piled and erected. Following this the east to west conveyor will be erected, then the inclined conveyors will be erected with a minimum 6 m clearance over internal roads. Steelwork and the roof of the covered conveyor would then be erected. Conveyor units and turntables will be installed following this. During Phase 2 the south to north steelwork, conveyor units and conveyor modules would then be installed.

Bale Shredding Plant and Bunker

5.5.28 The RDF bale shredding building and bunker foundations would be piled, and concrete poured to form the hall base.

5.5.29 The building will be completed with an internal ventilation and fire systems. Following delivery of the conveyor this will be wired which will take approximately five months.

Thermal Treatment Plant

5.5.30 The thermal treatment (EfW) main hall slab will be marked out and the foundations piled, and concrete poured for the base slab.

5.5.31 The three lines of the combustion plant are proposed to have staggered construction start dates. Line 1 (western most combustion plant), would begin first, followed by line 3 (eastern most combustion plant) approximately two months later and line 2 approximately one month after that. The main parts of each combustion plant line will be constructed in the following order:

- Boiler installation;
- Scrubber installation;
- Bag filter installation;
- Flue gas installation;
- Furnace installation;
- Piping installation; and
- Wiring and insulation installation.

5.5.32 Following installation cold commissioning will take around six months, after which there will be a stage of de-snagging before hot commissioning for approximately five months with another period of de-snagging for each line after this.

5.5.33 Overall, from the beginning of line one to the end of commissioning and de-snagging, construction of the three lines of thermal treatment plant would take approximately 48 months.

Turbine House

5.5.34 The turbine hall ring will be piled, and concrete poured before erecting the portal frames and building side cladding. There will be engineering, shipping and installation of the turbine generators and the clad roof installed afterwards.

Air Cooled Condenser

5.5.35 Foundations for the Air Cooled Condenser will be piled and reinforced and concrete poured with jointing strips placed between the slabs. The multi-fan air cooled condenser units and associated equipment will be installed and wired.

Lightweight Aggregate Facility

5.5.36 Foundations for the LWA facility building will be piled before the base slab is cast. The four kilns will be produced off-site and then transferred. The lightweight aggregate forming equipment will then be procured and transferred to Principal Application Site. The four lines would then be erected on individual steel structures over approximately four months. Finally, there would be installation of wiring. Overall, the LWA facility would take approximately 19 months to be constructed.

Power Export Island

5.5.37 The infrastructure for the power export island would be designed, procured, manufactured and the transformer factory acceptance tested off site before being transferred to the Principal Application Site. The power export island will then be installed and an additional pylon erected. There would be a period of testing on site before connection to the grid after approximately 20 months from construction start.

Control Room and Office

5.5.38 The control room and office building base will be piled and reinforced with concrete poured to form the slab. The building will be constructed, and cladding fitted. The building will then be fitted out and an access control and alarm system fitted.

Construction Phase Lighting

5.5.39 Construction phase lighting shall be designed, installed and controlled to limit any potential impact upon the surrounding area by minimising sky glow, glare and light spillage in accordance with British Standards. Lighting would be installed to comply with the following regulations, standards and guidance documents, including:

- Lighting at Work, HSG 38, Health and Safety Executives Books Publication;
- Lighting Guides, LG1 and LG6 published by the Chartered Institution of Building Services Engineers; and
- Light and lighting – lighting of workplaces. Outdoor workplaces, BS 12464-2.

5.5.40 Luminaires to be mounted on any lighting columns would be of flat glass construction with 0-degree tilt to minimise any potential glare, sky glow and obtrusive light to the surrounding areas.

5.5.41 The use of mobile lighting taller than the fixed lighting columns shall be minimised and not be operated outside of normal construction hours.

Habitat Mitigation Works

5.5.42 The Habitat Mitigation Works within the Habitat Mitigation Area are provided in order to mitigate the loss of the roosting and foraging habitats for waders, notably redshank (see **Chapter 17 Marine and Coastal Ecology**, and the **Outline Landscape and Ecological Mitigation Strategy**). Works will be carried out to enhance the habitat within this area to improve roosting and foraging habitat. This will involve the creation of four shallow pools (maximum 15 cm deep) in the existing marshy habitat; re-profiling the edges of existing pools and a low bank; and, increasing the volume of 'roosting' rocks in the upper intertidal area by translocating rocks to this area that would otherwise be lost due to the development of the wharf. Construction of these features is relatively minor and will take place outside of the overwintering season for birds, in advance of the wharf construction. Plant and equipment will be highly limited and is likely to consist of a long reach excavator which may be brought to this site on a floating barge (to avoid impacts on the saltmarsh or effects on Public Rights of Way) and a small workforce using hand tools. The works are unlikely to take longer than a week (weather and tide dependant).

5.6 Detailed Description of the Operation of the Proposed Development and Facility Processes

Introduction

5.6.1 This section describes each element of the Facility in terms of operation.

5.6.2 The Facility is proposed to operate 24 hours a day, seven days a week, and expected to commence operation in 2026. There would be approximately 125 permanent workers employed at the Facility.

Refuse Derived Fuel Supply

5.6.3 The Facility would receive approximately 1,200,000 tonnes of RDF per year.

5.6.4 The RDF feedstock would be delivered by ship to the Facility sealed in plastic-wrapped bales. The bales will be wrapped by the supplier who will pre-screen the feedstock prior to baling to ensure that no unacceptable material (for example hazardous waste or gas cannisters) is baled.

5.6.5 The RDF will be sourced from UK suppliers and comprise of Materials Recycling Facility (MRF) residues. This waste will be residual household waste and similar municipal-type waste that has been through the MRF and had all potential recyclate and contaminants (for example hazardous wastes) removed. The Facility will not divert any source-segregated or co-mingled recyclate from being recycled.

5.6.6 The material would be dispatched to the Facility from UK ports. The specific departure locations will be dictated by market conditions at the time of supply. All of the RDF that is transported to the Facility will be sourced from UK ports. A list of potential ports has been identified as follows:

- Glasgow King George V;
- Montrose;
- Grangemouth;
- Fleetwood;
- Hartlepool;
- Hull;
- Great Yarmouth;
- Ridham;
- Sheerness;
- Southampton;
- Port Talbot; and
- Belfast.

5.6.7 The bales will be labelled to identify the source of the RDF and the location and date of baling. The label will be clearly displayed on each bale.

5.6.8 The bales will be loaded onto ships at the departure points using grab-cranes. If a bale is damaged during loading, it will be removed prior to departure and re-baled and wrapped. No damaged bales will be dispatched to the Facility.

5.6.9 The bales will be brick-shaped and have an approximate volume of 1.85 m^3, weighing approximately 1.3 to 1.5 tonnes. Dimensions will vary according to the composition of the RDF and source location, but typical dimensions are presented in **Table 5-2**.

Table 5-2 Reference Dimensions for the RDF Bales

Size of RDF bales (m^3)	1.85
Length of RDF bales (m)	1.4
Width of RDF bales (m)	1.2
Height of RDF bales (m)	1.1
Minimum weight of RDF bales (tonnes)	1.3
Maximum weight of RDF bales (tonnes)	1.5
Design weight (tonnes)	1.4

5.6.10 There will be up to ten (9.2) RDF deliveries by ship per week assuming each vessel has a 2,500 tonne payload. The vessels are anticipated to have typical dimensions as detailed in **Table 5-3**, however, this will be directed by the market forces and the shipping fleet operator.

Table 5-3 Proposed Vessel Size and Capacity

Minimum Draught (m)	3.5
Maximum Draught (m)	4
Minimum Length (m)	90
Maximum Length (m)	100
Minimum Beam (m)	13
Maximum Beam (m)	15
Capacity of RDF bales (tonnes)	2,500

Wharf

5.6.11 The proposed new wharf (set out in **Figure 5.2**) would provide accessibility between the Facility and incoming and outgoing ships via The Haven and The Wash, enabling delivery of RDF feedstock, sediment and clay (both of which can be used as binder material in the manufacture of the LWA plant); and the dispatch of lightweight aggregate. Using ships to transport materials would significantly reduce the operational impact of the Facility on the local road network.

5.6.12 The proposed wharf comprises a 400 m long docking facility, loading and offloading equipment and access / egress ramp. The wharf would have two berths for receiving RDF feedstock, and one berth for loading aggregate and receiving clay, which are required by the LWA plant (clay is likely to be sourced from south-east England) and sediment (maintenance dredged material from the river).

5.6.13 Arriving vessels must navigate up The Haven to the proposed berth over high tide and leave over the next available high tide. A Navigation Impact Assessment (NIA) has been provided in consultation with the Port of Boston, see **Chapter 18 Navigational Issues**. The findings of the NIA will then inform the subsequent Navigational Risk Assessment (NRA) which will be produced in consultation with the Port of Boston post-submission. The NRA will consider current controls to mitigate risks and further controls that could be adopted to minimise risk as low as reasonably practicable. The findings of the NRA will inform the Navigational Management Plan (NMP), which is secured through a requirement of the DCO.

5.6.14 It is anticipated that vessels will be turned at the Port of Boston, either at the ‘Knuckle’ point turning circle outside of the Wet Dock, or within the Wet Dock. The vessels could be turned on arrival or departure, taking account of advice from the Port of Boston Harbour Master.

5.6.15 The berths at the proposed wharf will allow vessels to sit on the bed of the river at low tide whilst waiting for the next high tide because there is insufficient water depth at low tide to float (NAABSA, ‘Not Always Afloat But Safe Aground’, berths). The berthing pocket will have a bed at elevation of approximately -3.5 m OD and a width of approximately 20 m with gravel/chalk (or similar) forming a surface for the vessels to remain level when resting on the bed at low tide.

5.6.16 The berth points for the proposed wharf would be set parallel to the waterway but set back in the berthing pocket to maintain a safe distance from passing vessels.

5.6.17 Bales would be removed from the ships by hydraulic cranes equipped with clamps, with two cranes per berth. The bales will be unloaded by crane directly onto the conveyor and then transferred to the bale shredder building to allow RDF to be tipped into the RDF bunker building.

5.6.18 If a bale is observed to be damaged when it is offloaded, it will be immediately sent to the re-baling facility. This is to prevent litter from a damaged bale potentially falling or being blown into the river during unloading.

5.6.19 The outbound quantity of aggregate is dependent upon the composition of the RDF (in particular the ash content), which dictates the quantity of bottom ash and Air Pollution Control (APC) residues produced, and the amount of binder material required to produce the aggregate. For a design reference point, it is anticipated that just over 200,000 tonnes (design point = 201,890 tonnes) of LWA would be produced from bottom ash residues, and just less than 100,000 tonnes (design point = 97,531 tonnes) from APC residues. Therefore, 100 ships bearing approximately 3,000 tonnes of aggregate per load would be required to export this material from the Facility. This is equivalent to approximately two ships per week.

5.6.20 In total approximately 580 vessels per year, or up to 12 per week, would be required by the fully operational Facility.

Temporary RDF Storage Area

5.6.21 When the bunker reaches full capacity the RDF bales will be transferred from the ships to a temporary storage area and stacked in stockpiles pending transfer to the bale shredding facility.

5.6.22 The storage area would be surfaced with hardstanding and include a sealed drainage system. The surface would be graded to flow to the sealed drainage. Water collected from the sealed drainage system would be used in the LWA.

5.6.23 The temporary RDF storage area will be in the open and accommodate approximately two days of feedstock (approximately 6,500 tonnes).

5.6.24 If a bale is damaged when the bale is loaded onto the wharf, it will be immediately transferred to a covered damaged bale storage area (30 m long, 15 m wide and 4 m to eaves). The damaged bale would then be re-baled in the covered baler shed (24 m long, 8 m wide and 4 m to eaves) then replaced to the appropriate stockpile in the temporary RDF storage area.

5.6.25 There are not anticipated to be significant odour issues when the RDF is temporarily stored because the bales are tightly wrapped in plastic and are only stored for a short period of up to five days. Any bales that are damaged whilst in storage would be immediately removed to the baler shed as described above. Bales will be removed from the temporary storage area on a first in first out principle.

5.6.26 The RDF stockpiles will be managed so that they are compliant with the Environment Agency's guidance on Fire Prevention Plans (FPP). A FPP will be submitted with the Environmental Permit application for the Facility. For the feedstock piles, the maximum height allowed is 4 m and the maximum length or width allowed is 20 m. The maximum stockpile volume will be 450 m³. A minimum separation of 6 m must be in place between stockpiles, the Principal Application Site perimeter, buildings and any other combustible materials.

5.6.27 The bale stockpiles will also be monitored for temperature using probes. Any bales that are found to be hot would be removed to the quarantine area. This process will be described in detail in the FPP and is summarised below.

5.6.28 A quarantine area will be provided in the damaged bale store. This is required as a temporary storage area for any prohibited waste that has been detected at the Facility. It will also be used for temporary storage for any bale that has been detected to be 'hot'. In such cases, the bale will be carefully split open and allowed to cool. Quarantined material would be inspected, and a decision taken regarding appropriate off-site disposal. The quarantine area will be large enough to hold at least 50% of the volume of the largest stockpile and there will be a separation distance of at least 6 m around the quarantine area from any other material, the Principal Application Site perimeter and buildings.

5.6.29 The temporary storage area will accommodate an approximate two day supply of RDF. The RDF would be transferred for processing on a ‘first in first out’ basis.

5.6.30 The bales will be date stamped so that the date of baling will be clear. All RDF will be received and processed in the thermal treatment facility within three months of first being baled and wrapped.

5.6.31 The bales would be removed from stockpiles via an automated process onto the conveyor lines, which transport the bales to the bale shredding facility.

5.6.32 Thermal imaging cameras will be provided at the loading points on the conveyor to also monitor for ‘hot’ bales, i.e. bales that are shown to be above ambient temperature.

5.6.33 There would be ancillary infrastructure provided in the storage area, including welfare facilities for site workers and fuelling facilities for mobile equipment.

RDF Bale Conveyors

5.6.34 Two proposed parallel RDF conveyors approximately 600 m long will transport sealed bales from the temporary storage area to the RDF feedstock processing building.

5.6.35 The initial section of the conveyor in the temporary storage area will be an open conveyor, to allow bales to be loaded either directly from ships, or at the temporary bale storage area. The conveyor will then become covered and will follow an L-shaped route via a 90° turning point, running at approximately 2 m above ground level. Thermal cameras will be provided at the bale turning point.

5.6.36 The conveyor line will then pass under the footbridge spanning the gap in Roman Bank (or ‘Sea Bank’) and will then ramp up using a belt-conveyor to feed the RDF bales into the RDF shredding building at a height of 6 m.

5.6.37 Thermal cameras will also be provided at the point of entry for the bales into the feedstock processing facility.

Bale Shredding

5.6.38 The feedstock bales will be loaded into a shredder from the conveyor lines inside the building approximately 15 m x 8 m footprint and 20 m high. The shredder will chop and shred the plastic wrap and the contents of the bale to a reduced maximum particle size of less than 300 mm.

5.6.39 A small quantity of material would be segregated from the shredded material. These would comprise ‘massive particles’, i.e. large bulky items that have previously not been screened from the RDF bale prior to wrapping and binding, a brake disc for example. It is anticipated that less than 1,000 tonnes per annum would be separated out at this point. The remaining shredded RDF would be supplied to the RDF bunker.

5.6.40 The shredded RDF will be transferred from the shredder into a common RDF feed bunker. The bunker would have an approximate floor space of 110m x 22 m, with approximately 34,000 m^3 (12,075 tonnes at 350 kg/m^3) capacity which is four days’ worth of supply.

5.6.41 The unit will operate in an enclosed environment using odour control measures to ensure no unacceptable odour is released. The air from the space over the shredded RDF bunker will be continually extracted and fed to the thermal treatment process for use as combustion air. Hence, all odours will be treated at >850°C for >2 seconds (see below in **paragraph 5.6.55**).

5.6.42 Fast acting roller shutter doors would allow access into the unit for maintenance.

5.6.43 The waste bunker will have a partition so that it is possible to completely empty one side at a time. This eliminates build-up over time of wet material or liquids that can lead to odour production.

5.6.44 The building will be suitably insulated to ensure no unacceptable noise levels are experienced outside the building (for operating plant noise assessment, see **Chapter 10 Noise and Vibration**).

5.6.45 The feedstock is transferred from the common RDF feed bunker into the thermal treatment plant feed chutes via grab cranes.

Thermal Treatment Plant

5.6.46 The thermal treatment plant is a process which converts a solid feedstock into a gaseous form for a more efficient power generation process. It involves direct combustion of the processed RDF feedstock.

5.6.47 The proposed thermal treatment plant is a three-line combustion plant with associated power station. The combustion plant consists of a furnace and afterburning zone, superheated steam raising plant and flue gas cleaning equipment.

5.6.48 The thermal treatment plant would receive approximately one million tonnes of processed RDF, to generate approximately 102 MWe of renewable electricity. Some of the energy generated will be used to power the various elements of the

Facility ('parasitic load'). Approximately 80 MWe will be exported to the National Grid for distribution via a 132 kV grid connection point on-site.

5.6.49 Each combustion plant would operate for 8,000 hours per year, with scheduled maintenance planned in for the combustion plant. Two lines would always be running when one is undergoing maintenance.

5.6.50 An indicative conceptual image of a combustion plant is shown in **Plate 5-3**.

Plate 5-3 Indicative Image of a Combustion Plant

Feeding System

5.6.51 The shredded RDF feedstock would be transferred from the common RDF feed bunker into the thermal treatment plant. Grab cranes will feed shredded RDF into the feed chutes of each of the combustion unit furnaces.

Combustion Plant

5.6.52 The combustion of the waste takes place on the furnace grate. An inclined, moving grate system is used. The grate consists of sections where drying and main combustion take place. The afterburning zone serves to complete the burn out in the combustion plant furnace. At the bottom, the furnace has a gas-tight connection to the chute.

5.6.53 Entrained fly ash from the combusted feedstock is then carried by the combustion air and flue gas towards the flue gas cleaning section of the system.

5.6.54 The number, size and heights of the combustion plant are detailed in **Table 5-4**. A concept image of the internal elements of the combustion plant is provided in **Plate 5-4.**

Table 5-4 Combustion Plant Dimensions

Number of units	3
Power generation (MW per unit/hour)	34
Maximum Height of thermal treatment plant (m)	44

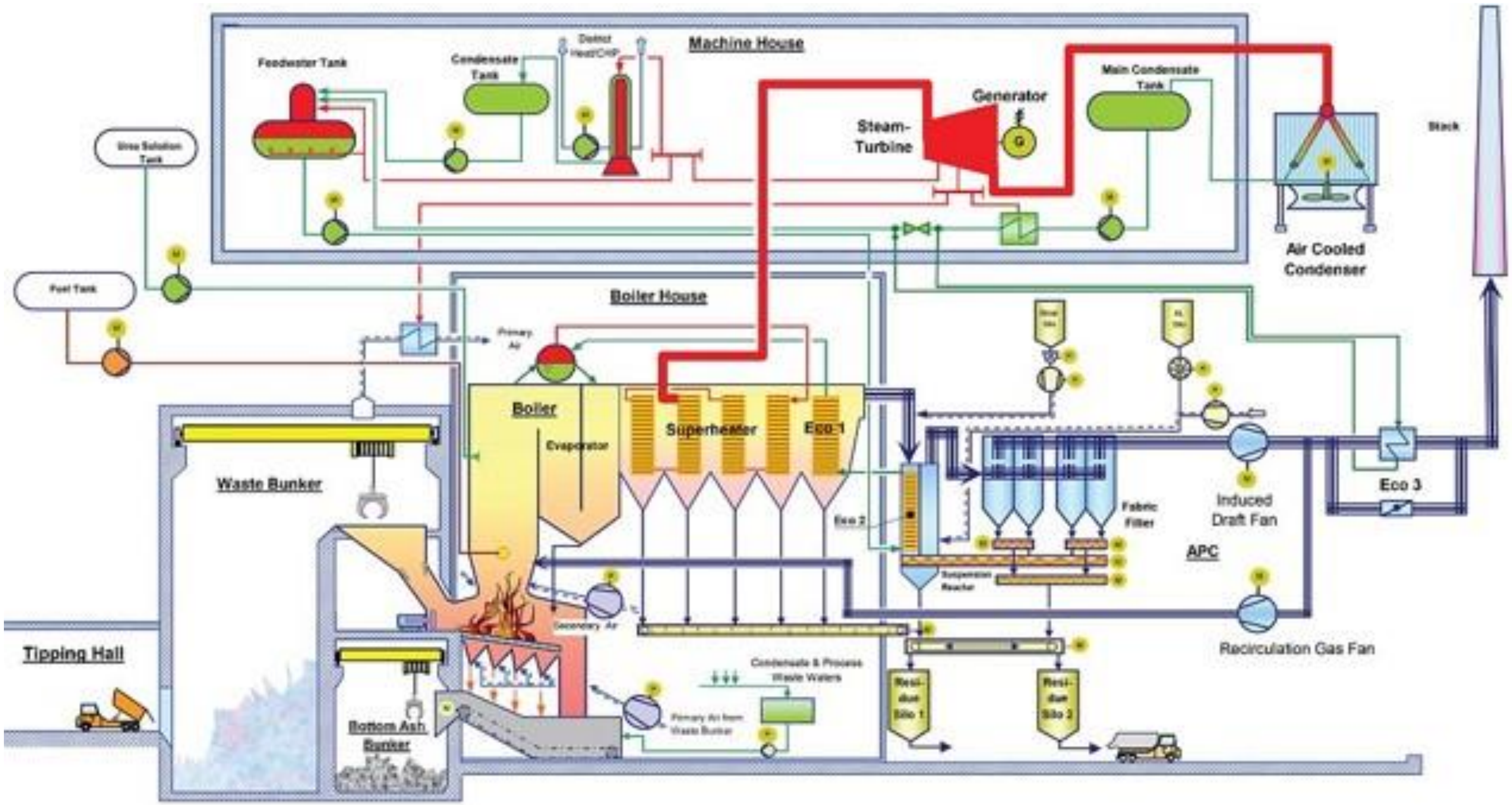

Plate 5-4 Concept Image of Internal Elements of the Combustion Plant

Secondary Combustion Zone

5.6.55 The secondary combustion zone starts at the Over Fire Air (OFA) nozzles and ends in the middle or top of the first pass, where the flue gas is cooled to 850˚C. The function of the afterburning zone is to ensure complete burn-out of the gases through good mixing of the flue gas and combustion air at the inlet of the first boiler pass. The velocity of the flue gas is kept down to reduce the volume of fly ash carried over into the 2nd pass, and to maintain a two second residence time at a temperature above 850˚C.

5.6.56 An advanced Selective Non-Catalytic Reduction (aSNCR) system would be located in the secondary combustion zone space to provide reduction of NO_x. Aqueous urea will be injected through multiple injection nozzles into the secondary combustion zone of the vessel.

Grate Ash Extraction

5.6.57 The ash material resulting from combustion will pass the last grate and fall through a vertical chute into a plunger type ash extractor, filled with water. The water serves as a seal to the atmosphere and to cool down the ash. The water level is regulated via a water chamber located at the side wall with an integrated overflow system.

5.6.58 The grate ash will be collected and conveyed for further processing (Ferrous metal removal and screening) prior to being used in the production of Non APCr LWA, see **paragraphs 5.6.68 - 5.6.74**.

Steam Generation

5.6.59 Hot flue gases from the combustion chamber pass over multiple bundles of tubes that form a heat transfer surface to enable the transfer of heat to the water within, which turns into steam inside the tubes. The tube material, arrangement in the boiler and all other aspects of the boiler are purpose-designed to efficiently collect the heat from the flue gas.

5.6.60 Steam generated in the boiler is superheated to 400°C at 40-bar(g) (gauge pressure).

Flue Gas Treatment

5.6.61 The cooled gases leaving the boiler pass to the pollution control system in a spray tower where reagents, typically hydrated lime and activated carbon, are injected into the gas flow to capture any residual emissions (heavy metals, sulphur dioxide, hydrogen chloride, particulates, etc.). The final treatment stage is a bag filter, which will filter the remaining ash / dust emissions (fly ash) from the combusted waste gas.

5.6.62 These APCr are collected in a silo.

5.6.63 Dedicated Induced Draft (ID) fans will draw the cleaned gases to the stack on each line, where an on-line Continuous Emission Monitoring System (CEMS – one per line) would provide continual monitoring of the exhaust gases to ensure the overall system meets the Industrial Emissions Directive (IED) emission limits. The height of the three stacks has been determined to be 80 m to ensure effective dispersion (see **Chapter 14 Air Quality**).

Electricity Generation

Turbines

5.6.64 The steam turbine generators will be located in a single building, 53 m long, 40 m wide and 20 m high.

5.6.65 The generated steam would be routed to turbines where the hot high-pressure steam (approximately 400°C / 40bar) expands through the turbine, imparting energy to rotate the turbine shafts. These shafts rotate electrical generators connected by a gearbox, delivering power to the 'power export zone'.

Air-Cooled Condenser

5.6.66 After the energy in the steam turbine is released for electricity production, the cooled steam would be routed to the air-cooled condenser. Condensed water is then pumped to the feed water tank, from where it is pumped back to the boiler via the economiser, closing the steam – water circuit.

5.6.67 The air-cooled condenser footprint would be 45 m x 65 m and 30 m high**.**

Ash Management

5.6.68 Bottom ash treatment takes place within a dedicated building to the north of the thermal treatment plant units. This processing building is sized to hold two days' supply of incinerator bottom ash (IBA).

5.6.69 The IBA, post water bath, is passed over an in-line grizzly scalping screen to remove any macro metal and/or slag into removable skips for treatment off-site by others (outside process). The remaining IBA is transported by en-masse chain conveyor and distributed by overhead travelling crane into pens (constructed in self-locating, concrete blocks). The Ash is recovered by internal wheeled front loader into a treatment process hopper. After the process hopper is a conveyor with over-head electro-magnet to remove any ferrous metal, then sized into 3 fractions; being -1.0mm, 1 to 3mm, 3 -10mm, the +10mm material is sent to an inline mill to grind to -6mm and returned for rescreening in the previous circuit. The -1.0mm fraction is then stored in an internal silo, and the two coarser fraction ground to <1.00mm by a duty and standby slow running trapezium mill, which will also increase the available surface area.

5.6.70 It is anticipated that approximately 5,000 tonnes reject material and ferrous metal would be screened from the ash. This would be recovered off-site. Material will be assessed for potential off-site recycling opportunities in accordance with the waste hierarchy. There are several local options for recycling or recovery of this material (see **Chapter 23 Waste**).

5.6.71 The recovered metal will be collected separately for removal by road to an off-site recycling facility in accordance with the waste hierarchy. There are several local options for metal recycling within the Riverside Industrial Estate.

5.6.72 The remaining ground ash will be transferred via sealed conveyor to storage silos at the LWA plant.

5.6.73 It is anticipated that approximately 200,000 tonnes (198,242 tonnes) of ash and just less than 17,000 tonnes (16,667 tonnes) of APCr will become residual material to be removed from the combustion plant. The residual ash is classified as non-hazardous waste and APCr are likely to be classified as hazardous. Operational proportions will vary according to the nature of the feedstock.

5.6.74 Ash and APCr would be transferred separately from the combustion plant to the LWA facility, as described below.

Lightweight Aggregate Plant

5.6.75 Residual ash and APCr would be processed on site to produce a marketable lightweight construction aggregate product. This would be exported via ship from the dedicated berth at the wharf. The ships that deliver clay as binder to the wharf can also be used to remove the aggregate. These ships would not be used for the incoming RDF supply.

5.6.76 The LWA plant is a high temperature kiln that will use the residues from the combustion plant to produce a usable LWA product and additional heat, which will be used in the LWA process. There will be one dedicated line in the LWA plant to produce aggregate using APCr alone; and two dedicated lines to produce aggregate from the ash. One additional line would be held as redundancy to be used in the event of maintenance.

5.6.77 The LWA plant would have four lines, with a footprint of approximately 75 m by 40 m, and a dedicated berth on the wharf for loading the LWA product for export by ship to UK markets (location dictated by market forces). This berth will also be used for receiving binder material comprising sediment and clay.

5.6.78 LWA has been manufactured since the 1930s utilising mainly bloatable clays, low carbon Pulverised Fuel Ash (PFA) (ash from coal fired power stations) and selected shales. The basic process is to form pellets and then sinter the material using a rotary kiln.

5.6.79 Traditional aggregate manufacturing processes are selective of the materials used. The LWA would incorporate a trefoil process. This process uses a triple-lobed (trefoil – see schematic in

5.6.80 **Plate 5-5**) rotary kiln which enables a much wider range of materials to be used because the process allows for more efficient distribution of heat into the materials as the kiln rotates.

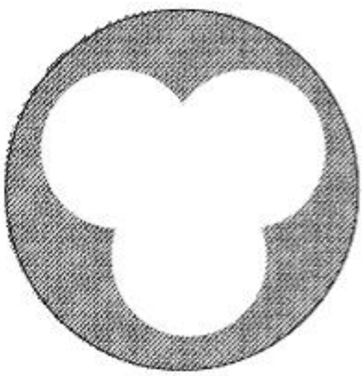

Plate 5-5 Schematic Image of Trefoil Kiln Shape

Ash

5.6.81 The main source materials are the residual ash from the thermal treatment plant and the APC residues (each processed in a different line). These would be transferred from the respective ash and APC residue hoppers at the thermal treatment plant in blown tubes to convey each residual stream separately to their individual silos on each LWA process line. Both streams would be separately mixed with a binder material in the trefoil process to form the aggregate.

5.6.82 Processing of the APC residues on site will remove the need for off-site disposal of the ash and APCr and associated vehicle movements, promoting both the waste hierarchy and the proximity principle (see **Chapter 23 Waste**).

Binder Material and Mixing Water

5.6.83 Clay and / or silt would be used in the process primarily as a binder to give strength to the pellet, but it also sinters (i.e. compacts and forms the solid mass of material by heat or pressure without melting) to become part of the filler material in the fired aggregate.

5.6.84 Clay sourced from the south-east of England would be the primary binder source, delivered by ship.

5.6.85 Where silt is used, this will be from dredged material obtained from The Haven from maintenance dredging of the wharf berthing pocket, or from other maintenance dredging on The Haven (the latter activity being subject to the relevant permissions outwith the DCO). The Port of Boston carries out maintenance dredging of The Haven (See **Chapter 18 Navigational Issues**).

5.6.86 Silt from dredging can be used as binder material for the LWA. The dredgings will be free drained prior to landing and are assumed to have no free water to drain under self-load. No more than 5% free draining water will be contained in acceptable silt on landing.

5.6.87 A free draining area would be constructed for freshly landed silt piles with integrated sumps with automatic pumps which will take all run-off water to collection tanks. This will be re-used within the LWA process for formulation mixing prior to formation of pellets and will minimise any fresh water requirements.

5.6.88 Sediment dredged as part of the maintenance of the Facility’s berth pocket would be carried out by crane from land. All run-off water would free drain under its own weight into an enclosed sump and be pumped into the holding tank before use in the LWA mixing process.

Pelletisation Process

5.6.89 The ash would be thoroughly mixed with binder material in accurately metered quantities. This mix is formed into pellets, with controllable variation in size between 4 mm and 20 mm.

5.6.90 The formed pellet will be dried before entering the kiln to prevent it from bursting. The rolling of an outer “egg shell” skin is an important part of the process. When pellets are dried, they will usually shrink proportionally to the moisture content lost. With a successful “egg shell” rolled onto the pellet in a polishing drum (closing the outer pores of the green pellet) there will be virtually no loss in size when dried. This is important for both the looseness of compaction within the pellet (allowing easy access of combustion air) and it is the start of the formation of a lighter aggregate. The pellet will be dried from approximately 20% moisture to less than 3% moisture. This drying process will use heat energy recovered from the LWA process.

5.6.91 The dried pellets will be transferred to a pellet buffer prior to firing. The purpose of the storage is to enable immediate control over feed rate.

Firing

5.6.92 When entering the kiln zone, volatiles in the pellet mix are released. It is important to ensure that there is sufficient excess oxygen at this stage to allow the volatiles to combust in the kiln zone where the energy release will assist in the heating of the pellet rather than in the kiln ductwork. The incoming combustion air would be pre-heated using energy from the plant (i.e. from aggregate cooling and pellet dryer air).

5.6.93 The plant will operate in accordance with Best Available Techniques (BAT) and will be required to meet the standards of the IED. The exhaust emissions from the kiln will be held at a temperature of >850°C for a minimum of two seconds to ensure complete burn out. Following this, the exhaust gas would be rapidly cooled to prevent the formation of dioxins. Exhaust gases would be treated via an APC system to remove contaminants and will discharge to atmosphere via two stacks, following filtration in baghouses. Residues from the baghouse system would be recirculated back into the process, and the LWA Plant would operate in accordance with an Environmental Permit.

5.6.94 The aggregate product would be stored in silos pending transfer to ships via a dedicated berth at the wharf. Each silo is 6m x 6m in plan with an overall height of 25 m. A conveyor system would be used to move the product from the storage silos to the vessel. The conveyor will move along the vessels and will be able to move vertically to reduce noise, dust and damage to the pellets.

Grid Connection

5.6.95 A grid connection point would be located within the Principal Application Site to facilitate the net export of 80 MWe (and also an import of 5 MW) of electricity. The connection point and substation will be located in the south-east corner of the Principal Application Site. The grid connection infrastructure would include a primary substation to convert the site-produced power into the local 132 kV line. An additional overhead tower located in the south-east corner of the Principal Application Site may need to be constructed (by Western Power Distribution) to manage the connection to the grid system.

5.6.96 The electrification power output zone footprint is approximately 95 m x 35 m. There are two zones as described below.

5.6.97 The customer compound includes a transformer, high-level disconnector, marshalling kiosk (this provides the connection points for the various control, protection and instrumentation wires which go to, and come from, all the different substation plants), lighting and CCTV. The compound footprint will cover an area of 500 m².

5.6.98 The Western Power Distribution Compound includes a pylon, high-level disconnector, low-level disconnector, circuit breaker, cable trench to switchroom, surge arrestors, anchor blocks and lighting/CCTV. The compound footprint will cover an area of 700 m².

Carbon Dioxide (CO_2) Recovery Plants

5.6.99 The Facility will include the connection of the flue-gas system from the two outer thermal treatment plant lines to carbon dioxide (CO_2) recovery plants, which will recover CO_2 (to food-grade) for off-site reuse in various industries. Some of the CO_2 will also be retained on-site for use in fire prevention.

5.6.100 The two CO_2 plants will be fully automatic systems designed for constant operation (24 hours per day, 7 days per week).

Flue Gas Cleaning and Cooling

5.6.101 Each CO_2 plant will draw the exhaust flue gas from one thermal treatment line.

5.6.102 The incoming flue gas is cooled using a flue gas scrubber to ensure optimal operating parameters and remove water-soluble impurities, e.g. sulphur dioxide. Cooling and sulphur dioxide removal will take place by recirculation of pH controlled water over a mass transfer packing. The resulting lower pH and warm water will be pH adjusted through soda ash or caustic dosing, and the water will then be cooled via a plate heat exchanger.

CO_2 Absorption

5.6.103 From the scrubber, the flue gas would be received by a variable speed-controlled extraction fan. The treated flue gas exhaust from the fan will be introduced to the sump section of the stainless-steel absorption column.

5.6.104 The flue gas will flow upward within the stainless-steel absorption column, making contact with the mass transfer packing sections counter-current to an absorption solvent.

5.6.105 The solvents chemically react with the CO_2 present in the flue gas, absorbing up to 90% of the CO_2 present in the incoming flue gas. The residual vent gas leaving the absorber column would be further treated in the wash section of the absorber column, where low concentration solvent is washed, condensed and returned to the absorption column, limiting solvent losses. The remaining products of combustion in the flue, namely N_2, O_2, CO etc. are re-routed back to the main stack.

5.6.106 The CO_2-saturated solvent is pumped from the absorption column sump via a rich/lean solvent heat exchanger to the top of the solvent CO_2 gas stripping column. The stainless-steel stripping column complete with mass transfer packing allows the CO_2 gas to be released (desorbed) from the rich solvent.

5.6.107 The now lean solvent in the sump of the stripper column is pumped again via the lean/rich heat exchanger to return to the top section of the absorption column to maximise CO_2 recovery.

5.6.108 The liberated CO_2 gas exiting the stripping column requires cooling, which results in the condensate being separated from the CO_2 gas and automatically recycled back to the absorption column, thus ensuring solvent losses or carry-over are kept to an absolute minimum.

5.6.109 The CO_2 gas is then compressed from approximately atmospheric conditions to ± 18 to 20 bar(g). Once compressed, the CO_2 gas will be purified by means of potassium permanganate, dried by absorption using specially designed molecular sieve packed bed columns to a dew point adequate for liquefying the CO_2. On completion of drying, the gas is finally treated by activated carbon before liquefaction.

5.6.110 Once compressed, purified, and dried, the pure, odour-free, colour-free CO_2 gas will then be converted from gaseous to liquid product (condensed) by low temperature refrigeration. This would be completed in the CO_2 gas condenser by use of a self-contained refrigeration system. At this point, the liquid CO_2 would be stored for further use or distribution.

5.6.111 The CO_2 storage tanks will include a high-quality perlite vacuum insulation complete with all pipework, valves, safety devices, liquid level indicator, pressure gauge, automatic pressure build up and pressure reducing systems.

5.6.112 The final product quality will meet standards prescribed by the International Society of Beverage Technologists (ISBT) 2001 quality guidelines for liquid carbon dioxide (CO_2). This ensures the final liquid CO_2 quality is acceptable to international markets.

On-Site Lighting

5.6.113 The Facility would operate 24 hours a day. Lighting would therefore be required during the hours of darkness to fulfil health and safety requirements at the Principal Application Site.

5.6.114 Operational phase lighting will be provided to the lighting design standards and guidance documents relevant to permanent lighting installations, including the following:

- UK Parliament, 1990: The Environmental Protection Act 1990 (as amended by the Clean Neighbourhoods and Environmental Act 2005), specifically 79 and 80;
- BS-EN 12464-2:2014: Lighting of Work Places - Outdoor Work Places;

- Chartered Institute of Building Services Engineers (CIBSE) Lighting Guide 6:2016; Outdoor Environment;
- Institution of Lighting Professionals (ILP (formerly ILE)); Guidance Notes for the Reduction of Light Pollution;
- ILP Guidance Note 08/18 Bats and Artificial Lighting in the UK; and
- Health and Safety Executive: HSG 38, 1997 - Health and Safety Guide 38 – Lighting at Work.

Additional Information

5.6.115 The DCO application for the proposed Boston project will include the elements described above. In addition, temporary works and associated infrastructure necessary for the construction and operation of the project will be included.

5.6.116 The draft DCO (document reference 2.1) also details the proposed stopping up of footpaths. During construction and continuing into operation, the following footpath sections would be permanently closed: BOST/14/4, BOST/14/10 and BOST/14/5. The closure would also affect the England Coast Path route which follows these footpaths, as does Macmillan Way (which follows a series of interconnected footpaths between Boston and Dorset). The diversion for these route closures would follow the route of an existing footpath, which follows the route of Roman Bank (also known as 'Sea Bank') along footpath sections BOST/14/11 and BOST/14/9. **Figure 5.3** which shows the footpath network and identifies the footpath sections to be closed.

5.6.117 A fenced public footbridge will be provided across the existing gap in the Roman Bank which will allow for increased pedestrian safety.

5.6.118 It is anticipated that surface water drainage systems will be sealed, and water will predominantly be used to supply the LWA facility. Any surplus surface water will be managed by discharge (under an Environmental Permit) into the drainage network or into The Haven for the section of the Principal Application Site that is river-side of Roman Bank.

Decommissioning

5.6.119 To facilitate assessment in the Environmental Impact Assessment (EIA), an assumption has been made that the Facility will have an operational lifetime of 25 years, which is a typical assumption for such facilities. A decision would be made at the appropriate time as to whether it would be 're-powered' after 25 years based upon an investment decision considering the market conditions and technical requirements prevailing at that time. If the operating life were to be extended the Facility would be upgraded and re-permitted in line with the legislative requirements at that time.

5.6.120 At the end of its working life, the Facility would be decommissioned and removed, and the Principal Application Site reinstated to an agreed condition.

5.6.121 For the purposes of the ES, any decommissioning phase is assumed to be of a similar duration to the construction phase.

5.7 References

ECUS Ltd (2009). Landscape Character Assessment of Boston Borough. Available at: http://www.southeastlincslocalplan.org/wp-content/uploads/2017/06/Landscape-Character-Assessment-of-Boston-Borough-July-2009.pdf [Accessed: 04/02/2019].

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