POWERFUEL

Portland energy recovery facility

Environmental statement

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Site description and development proposals

2 Site description and development proposals

Introduction

2.1 This chapter provides a description of the application site and surrounding area, outlines the development proposals and provides construction and post-construction information.

The application site

2.2 The 6.29 ha site lies on the north eastern coast of the Isle of Portland, within Portland Port, approximately 600 m east of the villages of Fortuneswell and Castletown (figure 1.1). The site comprises two elements: the 2.14 ha main site for the ERF buildings and 4.15 ha of cable routes to the electricity substation off Lerret Road and to the berths at Queens Pier and Coaling Pier. The proposed cable routes are discussed further in paragraphs 2.34 to 2.36 below.

2.3 The main part of the site is roughly triangular in shape and is largely covered with hardstanding. It has been vacant for several years, although there is a weighbridge towards the western point and vehicles are sometimes parked on parts of the land. It is relatively flat and approximately 5 m above Ordnance datum (AOD). As the site lies within the port, it is not currently publicly accessible. Vehicular access is from the west, through the main Portland Port complex, via Castletown, Castle Road, Lerret Road and the A354.

2.4 The main part of the site is bordered to the south west by Incline Road, which is a private road within the port that is actively used by port traffic, and a former railway embankment. Cliffs supporting grassland, scrub and woodland habitats lie to the south west of the embankment and rise steeply to approximately 125 m AOD. HM Prison The Verne is approximately 430 m to the south west of the site. The eastern site boundary is formed by the shingle shoreline and overland fuel pipes from Portland Bunkers, which are fuel bunkers in the nearby cliffs used for marine bunker fuel supply. Beyond these lies Balaclava Bay. Existing operational port development lies to the north and north west of the site. Photographs of the site and its immediate surroundings are provided in figure 2.1.

2.5 The original naval port at Portland was constructed between 1837 and 1890 to provide a Harbour of Refuge and coaling station for the steam navy. Portland and its harbour were designated as HM Naval Base Portland in 1923 and the base played prominent roles in both World Wars and the Cold War. From 1958, Portland was home to Flag Officer Sea Training. During this time, the site area was dominated by a weapons research establishment building in the south east, with other buildings dedicated to mechanical repair facilities for military vehicles. The naval base and two major weapons research establishments were closed in 1995/96 and the transformation into a commercial port began.

2.6 After privatisation, the buildings on site were progressively demolished to create cargo storage space when they were not used by tenants. The last vacated buildings, used by UMC, Portland Shellfish and Permavent, were demolished in 2014 and 2017. In 2016/17, the main road leading to Incline Hill was realigned along the base of the hill / scree, creating the open development area on site. The last of the demolition rubble was cleared from the site in 2018.

2.7 The site lies within a regionally important geological and geomorphological site (RIGGS), which covers the whole of the Isle of Portland. There are no national or international environmental designations within the site itself, but several in close proximity (figure 2.2). The cliffs to the immediate south west of the site form part of the Isle of Portland to Studland Cliffs Special Area of Conservation (SAC) and Isle of Portland Site of Special Scientific Interest (SSSI) and there are several other designated nature conservation sites within 2 km of the site. These include the Nicodemus Heights SSSI 590 m to the south, Chesil and The Fleet SAC and SSSI and Chesil Beach and Stennis Ledges Marine Conservation Zone (MCZ) 1.3 km to the west, and Studland to Portland SAC 1.5 km to the south west. There are also several locally designated sites of nature conservation interest (SNCI) to the south and south west of the site (figure 2.2).

2.8 The Dorset and East Devon Coast World Heritage Site (WHS) wraps around most of the Isle of Portland, but excludes the area of coast in the vicinity of the site (figure 2.2). Chesil Beach to the north west of the island is also locally designated as heritage coast. There are several scheduled monuments in the vicinity of the main site to the south west, including a battery 135 m away, The Verne Citadel 340 m away, RAF Portland Rotor early warning radar station 570 m away and a heavy anti-aircraft battery 930 m away. Portland Castle scheduled monument is approximately 990 m to the north west.

2.9 The nearest listed buildings / structures to the site are the grade II listed breakwater adjacent to the north eastern boundary, Dockyard Offices to the north west, East Weare batteries to the south west and other batteries to the south. There are several other listed buildings / structures in the vicinity, including a cluster at the prison. Underhill conservation area is approximately 600 m to the west of the main site and contains a large number of grade II listed buildings.

2.10 The cliffs to the west and south of the site are designated as land of local landscape importance. The nearest nationally designated landscape is the Dorset Area of Outstanding Natural Beauty, 7.3 km to the north.

The surrounding area

2.11 The remainder of the Isle of Portland, which is approximately 6 km long by 2.7 km wide, comprises several villages separated by areas of open land, farmland and a number of quarries. The island is joined to the mainland by Chesil Beach and the A354 passes down the Portland end of the beach and then over the Fleet Lagoon by bridge to the mainland. The resort town of Weymouth is approximately 8 km to the north of Portland.

The future of the site in the absence of the proposed development

2.12 While the site has extant planning permissions for the development of an energy plant fuelled by vegetable oil and waste rubber crumb from end-of-life tyres, which could be implemented in the absence of the proposed development, for the purposes of the EIA the site is assumed to be undeveloped in the future baseline. This will ensure that all potentially significant effects associated with the proposed development are assessed in full.

Proposed buildings and structures

Main ERF building and stack

2.13 The layout of the proposed ERF is shown in figure 2.3. It has been designed to treat 183,000 tonnes of refuse derived fuel (RDF) per year, with a circa 10% design tolerance to treat up to 202,000 tonnes should this be necessary in response to changes in calorific value, in order to maintain the efficiency of the plant. It should be noted that, for this reason, while the nominal capacity is 183,000 tonnes per year, the EIA has been based on a maximum throughput of 202,000 tonnes per year.

2.14 The main ERF building will be 201 m long, 51 m wide in the north, narrowing to 24 m wide in the south, and 47 m high in the north, reducing to 19 m high in the south. Its primary axis will run north west – south east. Incline Road will run along the building's western edge, with Balaclava Road running along its eastern edge and Canteen Road to the north. Floor plans of the proposed building are shown in figures 2.4a-c, elevations are shown in figures 2.5a-b and longitudinal sections are provided in figures 2.6a-b.

2.15 The plant consists of the following: waste reception, fuel delivery, boiler, flue gas treatment, flue stack, residue handling systems, steam turbine, heat take-off for district heating, primary substation and ancillary equipment.

2.16 The waste reception area will comprise areas for baled RDF and loose RDF. The area for bales will be sized to store a full cargo delivered by sea. This will be delivered to the waste pit through a de-baler and conveyors. Loose RDF will be delivered by HGV, either directly into the waste pit or into an area for short term storage prior to delivery into the waste pit. Fuel will be moved from the waste pit into the main boiler bunker by a waste feed crane and grab, which will also feed the boiler feed hopper with waste from the bunker. Combustion air will be drawn from the waste reception area, so that odours are drawn into the boiler line and will not escape to atmosphere.

2.17 The boiler will consist of a grate, furnace (primary combustion chamber), auxiliary burners fuelled by an auxiliary fuel such as kerosene and a high temperature secondary combustion zone. The boiler will have flue gas treatment plant, a single stack with emissions control and monitoring systems, residue handling systems and a feed water treatment system.

2.18 The 80 m high stack will be situated approximately 10 m to the north of the building and will be painted battleship grey to minimise visibility. The height of the stack was determined following emissions modelling. The stack will have an outside diameter of approximately 2 m. It has been structurally designed to meet all predicted climatic conditions and will be suitably protected from lightning strike. It will have an external access ladder (with a safety hoop or safety rail) and platforms for sampling points for manual measurement and connections for continuous emissions monitoring equipment. Appropriate obstruction lighting will be fitted to the top of the stack to ensure aviation safety.

2.19 Super-heated high pressure steam will be delivered to a steam turbine that generates approximately 18.1 MW of electricity. Approximately 15.2 MW of this will be available for export to the local grid, with the remainder used within the

plant. Air cooled condensers will be used to cool unused steam to water to return to the feed water system. The site will also have a sprinkler system, including a sprinkler tank. A standby generator will provide electricity during grid outages and its fuel oil will be stored in an external fuel tank. Auxiliary burner fuel will be stored in a separate external fuel tank.

2.20 The roof of the ERF building, above the RDF storage area, will be fitted with 3,389 m^2 of photovoltaic panels, which will generate electricity for use within the plant or for export independent from the plant. The roof will be constructed from a dark coloured, curved fibre cement roof sheet.

2.21 As shown on figures 2.4a-c and 2.6a-b, the air cooled condensers will be located above the turbine hall wing at the north eastern end of the building, while the eastern end will contain the technical room, above which will be an office and store and then the control room.

2.22 The massing of the building means that the RDF store and turbine hall and the boiler and exhaust air filtration room form two distinct volumes, as shown in figures 2.5a-b. The taller volume containing the boiler house will be clad in a light grey profiled metal sheet with angled façade panels. These will be configured in a series of horizontal bands of various heights and shades to reflect the appearance of the exposed limestone cliff face at the top of East Weare.

2.23 A continuous louvred external envelope will be provided around the lower 6 m of the building to enable ventilation of service areas and air supply to the boiler room. The lower volume, which wraps across the front of the boiler house, will be clad in a heavy duty PVC mesh, which will be printed with a high resolution image of the East Weare escarpment.

Office building

2.24 A separate two-storey office building will be constructed to the north east of the main building. This will be 54 m long, between 11 m and 23 m wide and between 6 m and 17 m in height. It will include a reception area, general office space, management offices, meeting rooms, plant room, stores and welfare facilities, including changing rooms. Floor plans of the proposed building are shown in figure 2.7, elevations are shown in figure 2.8 and a longitudinal section is provided in figure 2.6b.

2.25 The ground floor of the office building will be largely clad in the same light grey profiled metal sheeting as the boiler house, while the first floor will be clad in the printed PVC mesh. The eastern and southern elevations of the ground floor will be full height glazing. The eastern wing of the office block steps down to a single storey and a roof terrace will be provided on top of this area.

Transformer compound

2.26 The transformer compound will be located to the north west of the main ERF building and will contain the transformer, switchrooms and battery / control room. It will be 15 m by 17 m and 4 m high and have a similar louvred façade to the main ERF building.

Access

Vehicular access and circulation

2.27 The proposed vehicular access arrangements are shown on figure 2.9. All vehicles will access the site through the main vehicular entrance to Portland Port, from Castletown. Access will be controlled via the port's existing gatehouse. Vehicles will use the port's existing road system to reach the site via the Castletown and Dock Road one-way system and Main Road.

2.28 A one-way system for HGVs will operate within the site. HGVs delivering RDF will enter the site from Main Road in the north, pass through the weighbridge, pass along Canteen Road and through a raised arm barrier that will be used to prevent unauthorised access, and travel southwards between the ERF and office buildings to the new road adjacent to Balaclava Road. Vehicles will enter the RDF store through a roller shutter door on the ERF building's eastern elevation. Once in the building, loose RDF deliveries will reverse directly back to the RDF pit on the north of the circulation route. Baled RDF deliveries will reverse back beneath the overhead crane to the south of the circulation route. Once unloaded, all RDF delivery vehicles will exit the building onto Incline Road through a further set of roller shutter doors on the building's western elevation. They will leave the site using Incline Road, passing through the weighbridge again on the way out.

2.29 HGVs delivering process materials or removing residues will circulate clockwise on the one-way system around the ERF building onto Incline Road and then turn right into the service yard to the west of the building. On arrival, the gated access will be opened by a site operative and the vehicle will manoeuvre to the appropriate silo or collection point. Vehicles will pass through the service yard and exit back onto Incline Road at the yard's northern end. Prior to leaving the port, all delivery and collection vehicles will be re-weighed at the weighbridge.

2.30 Deliveries of RDF by ship will normally be offloaded at the berth on the Inner Breakwater, to the north east of the site, unless port operational needs require an alternative berth be used, and brought into the site by HGV along Inner Breakwater Road and Old Depot Road, joining the main flow of traffic on Main Road and then entering the site (figure 2.9). The HGVs will then follow the same delivery protocol as those bringing RDF in by land, before recirculating back around to the Inner Breakwater to reload.

Weighbridge

2.31 All vehicles carrying RDF, residues or process materials will be required to weigh in and out of the facility. The existing weighbridge on the site will be used and access will be managed from a control room to the north of this weighbridge (figure 2.3). A second weighbridge will be installed on the road between the ERF and office buildings.

Parking

2.32 Twenty-eight car parking spaces will be provided in the north east of the site (figure 2.3) for use by employees and maintenance contractors or visitors, which will be accessed from Canteen Road. Three of these (10%) will be fitted with

electric charging points to encourage the uptake of electric vehicles, and the remaining spaces will be fitted with ducting to facilitate future installation of cabling and charging units as required. Access to a further eight spaces adjacent to the weighbridge is provided for within the ERF lease agreement with the Port to provide occasional parking for contractors or shift changeovers.

2.33 The proposals include a secure cycle store. This will provide storage for eight bicycles in the form of ground-mounted Sheffield stands.

Utilities

Electrical distribution

2.34 The ERF will export power to the national grid under conditions imposed by an export agreement. The specific performance requirements of the grid connection will be addressed through a formal grid connection application process. The cable route to the electricity substation will run from the transformer compound, through the port along Main Road and out of the port along Castletown and Lerret Road. It will then run through the car park of the Victoria Park workshops and connect to existing cables supplying the existing electricity substation. The process will be overseen by SSE, who will adopt the cables in due course.

2.35 Cables will also be provided to the berths at Queens Pier and Coaling Pier to allow the provision of power to moored ships. These will provide 33 kV connections from the main ERF substation to new connection points at substations at the berths, where the power will be stepped down to 11 kV. Power cables will run from the main ERF substation to the shore power system main switchgear substation, which will be located in a fenced compound in the north west of the main site, adjacent to Old Depot Road. The compound will also contain power converters and transformers. The main switchgear substation will be a 12 m long, 3 m wide and 3 m high shipping container.

2.36 Cables will run from the main switchgear substation to ship connection substations in fenced compounds on the piers, which will also contain a transformer. The ship connection substations will be 6 m long, 3 m wide and 3 m high shipping containers. Up to 15 MW of power will be available for berthed ships, depending on requirements, although the maximum demand is only likely to be reached when a large cruise ship is docked.

Surface water drainage

2.37 The proposed development will give rise to surface water runoff from the roads within the site, buildings, vehicle parking areas and other hardstanding areas. It is proposed that the surface water runoff from buildings is collected via gutters and rainwater downpipes. Surface water runoff from roads and other areas of hardstanding (including car parking and the service yard) will be collected by linear drainage channels and external gullies and will be routed via a swale and an oil bypass separator to provide treatment prior to discharging into the sea. Clean roof runoff will be discharged directly to the sea. The existing drainage outfalls into the sea will be used, with clean roof runoff discharging into Balaclava Bay to the east and treated runoff discharging into Portland Harbour to the north.

2.38 To ensure all runoff from roads and hardstanding is routed via the proposed treatment systems prior to discharge, the drainage systems will be designed to accommodate the runoff from a 1-in-100 year storm, plus a 40% allowance for climate change. Any flows beyond this will be stored in the swale and open hardstanding areas before passing through the drainage network. The existing outfalls will be surveyed prior to construction and any defects will be remedied to ensure that they are in a suitable condition to serve the proposed development.

2.39 The proposed surface water drainage system will be designed and maintained in accordance with CIRIA (2015) *C753: The SuDS Manual*. Further details on the proposed drainage strategy are set out in the flood risk assessment submitted in support of the planning application.

Wastewater

2.40 Process effluents, including boiler blow-down and wash down waters from internal process areas, will be discharged to a foul sewer in accordance with a trade effluent consent, which will be obtained from Wessex Water. The foul water system will include collection tanks with the capacity to hold sprinkler discharge to enable the rate of flow to Wessex Water's sewer to be limited.

2.41 Subject to formal approval from Wessex Water, it is proposed to discharge all foul water from the proposed development, which will principally be from domestic sources, to Wessex's Water's sewer. The below ground foul water drainage system will be separated into domestic systems and trade effluent. This will ensure that liquid waste produced by the industrial processes is separated from the domestic system to enable sampling to comply with any requirements for trade effluent licences that may be imposed by Wessex Water. Domestic foul and trade effluent flows will be combined after passing through the sampling chamber, prior to connection with Wessex Water's sewer.

Potable / mains water

2.42 Wessex Water distribution water mains run east-west through the north of the site and north west-south east through the centre. The incoming water supply will need to be separated into industrial water, emergency fire-fighting water and potable water.

Other ancillary development

Security

2.43 Where the building does not form the site boundary, a boundary fence for the ERF will provide perimeter security. This will be a 2.4 m high palisade fence and will extend around the outer perimeter of the site to prevent unauthorised access to the facilities. The fence will merge into the building and the exposed building will have Armco protective barriers.

2.44 Vehicle access points into the building will be electrically operated and will remain closed except during vehicle access. Pedestrian access will have automatic closing mechanisms and, if on the site perimeter, access control. Vehicle access into the site boundary will be controlled by electrically operated

barriers. Vehicle egress will be controlled with traffic management systems, in addition to electrically operated barriers.

2.45 CCTV will monitor the site perimeter and entrances. Black infra-red will be used for night-time vision to avoid interference with wildlife.

Lighting

2.46 The ERF lighting design is based on the use of appropriate lighting to provide safe working conditions in all areas of the site, while minimising light pollution and the visual impact on the local environment. A mixture of wall mounted, bollard and column mounted luminaires will provide lighting to walkways, roads, the service yard and car parking areas. The following measures have been incorporated into the lighting design to minimise the impact on both human and ecological receptors:

- The use of luminaires with very low or no upward distribution to minimise the contribution to 'sky glow'. Light will be tightly controlled and considered to avoid light spill
- Selection of minimum design criteria illumination levels to allow the safe operation of the facility at night
- The use of lighting equipment at an appropriate scale will limit mounting heights of equipment to both reduce visibility from a distance at night and visibility of lighting equipment during the day
- Selection and positioning of equipment so that it is orientated towards the centre of the site where possible will limit the visibility of sources from outside the site and maintain the function of the lighting
- The use of zero tilt and provision of accessories that will limit upward light spill, with the use of flat glass lanterns and back shields to further mitigate light spill beyond the intended areas
- Application of a zoned lighting control will limit unnecessary lighting of areas outside operational hours

2.47 Further details are set out in the lighting strategy that accompanies the planning application.

Landscaping

2.48 Small areas of landscape planting will be created around the weighbridge and parking area in the north west of the site, to the north of the main ERF building, to the north, east and south of the administration building, and around the parking area in the north east of the site (figure 2.10). These will incorporate the proposed swale to the north of the buildings and the north eastern car park, which will comprise a combination of stone-filled gabion sides and maritime grassland slopes. The landscape planting will create a range of habitats, including:

- 0.064 ha of bare sand / shingle / pebble / boulder habitat, planted with native coastal / maritime species
- 0.062 ha of open mosaic habitat
- 0.14 ha of gabion walls filled with Portland stone and planting substrate

The energy recovery process

2.49 The main inputs and outputs for the ERF are shown in figure 2.11 and a generic flow diagram of the energy recovery process is provided in figure 2.12.

RDF delivery and storage

2.50 RDF will be delivered by sea in the form of wrapped bales and / or by road in loose or baled form in HGVs. The storage capacity for bales will be suitable for a full ship cargo (approximately 2,500 tonnes). The footprint of the storage area will be approximately 1,555 m^2, which will allow approximately 781 bales to be stored per layer. Depending on the height of the bales, there will be capacity for between four to six layers of storage. The majority of loose RDF will be delivered directly to the pit, where there will be short term storage space in an area of approximately 247 m^2. A crane grab will take the waste from the pit to the bunker, which will have an area of approximately 545 m^2.

Combustion

2.51 A crane grab will transfer the waste from the bunker into a hopper to feed the combustion chamber. The chamber will use a moving grate to agitate the fuel bed and promote good burnout of the waste, ensuring a uniform heat release. Primary combustion air will be drawn from the waste reception area and fed into the combustion chamber beneath the grate. This will maintain negative pressure in the waste reception area. Secondary combustion air will be injected into the flame body above the grate to facilitate the combustion of waste on the grate.

2.52 In the flue, above the combustion zone, ammonia will be injected to react with oxides of nitrogen (NO_x) formed in the combustion process. The ammonia will reduce the concentration of NO_x in the flue gas to achieve required emission limits, as discussed in more detail below.

2.53 The combustion chamber will be provided with auxiliary burners. These are used during start-up to ensure the combustion chamber temperature reaches the required 850°C prior to feeding of waste into the combustion chamber. Interlocks will prevent the charging of waste until the temperature within the combustion chamber has reached 850°C. During normal operation, the burners are not used unless the temperature falls below 850°C. The auxiliary burners will typically operate for up to 16 hours during a start-up event and up to two hours during a shut-down.

2.54 Bottom ash will fall from the end of the grate into a discharger, comprising a water bath. The water will act as an ash quench and make it possible to remove cooled bottom ash without dust generation. The ash will then be transferred to a dedicated incinerator bottom ash (IBA) storage area.

Energy recovery

2.55 Heat will be recovered from the flue gases by means of a water tube boiler integral with the furnace. The heat will be transferred through a series of heat exchangers. The hot gases from the furnace will first pass through evaporators that raise the steam, which then passes into the boiler.

2.56 Superheated steam will be supplied to a high efficiency turbine that, through a connecting shaft, will turn a generator to produce electricity. To generate the pressure-drop necessary to drive the turbine, the steam will be condensed back to water. The majority will be condensed in the air-cooled condenser following the turbine at a pressure well below atmospheric.

2.57 There will be the opportunity for steam and / or low temperature hot water to be recovered for delivery to an off-site district heating network, when available. The space and necessary valves to enable connection to make the heat available will be included within the plant. However, the district heating network itself is not part of this application, although work is underway to identify usable heat off-takers and it is intended that the heat network will be proactively pursued.

Flue gas treatment

2.58 Flue gases generated from the combustion process will be cleaned before being released into the atmosphere to the appropriate standards required to protect human health and the environment. The flue gas treatment systems will be designed to comply with the requirements of the Waste Incineration Best Available Techniques reference document (BREF).

2.59 The abatement of NO_x will be achieved by careful control of combustion air and a NO_x abatement system. NO_x will be formed in the boiler at high temperature from nitrogen in the waste and in the combustion air. The NO_x abatement system will use a NO_x reagent (ammonia), which will be injected into the flue gas stream to minimise emissions of nitrogen dioxide (NO_2). The acid gas abatement system will use lime as a reagent to reduce concentrations of acid gases, such as sulphur oxides (SO_x) and hydrogen chloride (HCl), in the flue gas stream.

2.60 Powdered activated carbon (PAC) will be used as an adsorbent to remove volatile metals, dioxins and furans. Both PAC and lime will be held in dedicated storage silos and injected into the flue gas stream. The flue gases containing the reagents will pass through a reaction chamber and into a bag filter arrangement, where reaction products and unreacted solids will be removed from the flue gases. The residue, referred to as air pollution control residue (APCr), will accumulate on the outside of the filter bags. The filter bags will be periodically cleaned by a reverse jet of air displacing the filtered residue into chutes beneath.

2.61 The APCr collected by the bag filters will be held in a silo. As fresh reagents are added, an equivalent concentration of residues collected from the bag filters will be removed. The cleaned gas will be monitored for pollutants and discharged to atmosphere via the flue stack.

Residues and ashes

2.62 The process will result in two separate ash streams: IBA and APCr. IBA is a recyclable non-hazardous waste that will be stored in a designated area. The area will be equipped with an overhead crane that will unload the IBA onto the IBA removal trucks. The IBA will be transported to a company that will use it to make sustainable aggregates suitable for construction projects and road construction. It is intended that 100% of the IBA will be used for secondary aggregate production. The IBA will either be taken to a facility at Avonmouth by road in sheeted trailers or by ship to a facility in Greenwich. For removal by ship,

the IBA would be loaded into a sheeted trailer and transported to the quayside, where it will either be tipped into a containment bay or steel container or directly loaded into the vessel using a grab machine. The maximum capacity of the container would not be exceeded. Any spillage of the inert IBA would be dealt with promptly and appropriately. If an interim lighter vessel is used, the collecting geared ship would come alongside and transfer the IBA to the ship's hold using a grab. Transport would be undertaken in accordance with the Maritime and Coastguard Agency's (2014) *Marine Guidance Note 512: Solid Bulk Cargoes* and Lloyd's Register, UK P&I Club and Intercargo (2016) *Carrying solid bulk cargoes safely.*

2.63 APCr is classed as hazardous because of its elevated pH and requires either treatment or specialist disposal. The APCr generated by the proposed ERF will be sent to a company in Avonmouth for treatment and used to create a lightweight, high quality, sustainable carbon negative aggregate that is used to make carbon negative building blocks, as well as in other construction material products. The APCr will be removed from the site in enclosed tankers.

Emissions monitoring

2.64 Emissions from the stack will be continuously monitored using a continuous emission monitoring system (CEMS) for the following pollutants:

- Particulates
- Sulphur dioxide
- Hydrogen chloride
- Carbon monoxide
- NO_x
- Ammonia
- Volatile organic compounds (VOCs), expressed as total organic carbon

2.65 There will be a single CEMS system and an installed back-up. In addition, periodic monitoring will be undertaken of pollutants that are not able to be monitored continuously, such as hydrogen fluoride, metals, and dioxins and furans. The performance of the ERF in terms of its emissions will be overseen by the Environment Agency under the facility's Environmental Permit, which is the subject of a separate ongoing application.

Raw materials handling and storage

2.66 In addition to the RDF that will be tipped into the bunker, the following raw materials will be required for process operations:

- Dry lime: used to react with acid gases in the flue gas treatment process, which will be stored in silos on site
- PAC: used for the adsorption of volatile heavy metals and organic components and will be added with the lime in the flue gas treatment process. The PAC will be stored in silos and delivered via tanker
- Ammonia: used in the NO_x abatement system, ammonia will be delivered in liquid form and stored in tanks on site

- Water treatment chemicals: used in the water treatment plant that provides feed water to the boiler. The chemicals will be stored in a bunded area within the water treatment plant
- Auxiliary fuel: used for the primary and auxiliary support burners, the emergency generator and mobile plant and equipment. The fuel will be stored in bunded storage tanks

2.67 In addition to the raw materials described above, various maintenance materials will be stored in an appropriate manner and used in small quantities. These will include hydraulic and silicone-based oils, greases, insulants, refrigerant gases for the air conditioning plant, glycol / antifreeze for cooling, welding gases, CO_2 and foam agents for fire-fighting, electrical switchgear and gas emptying and filling equipment.

Operations

Operating hours

2.68 The ERF will normally operate 24 hours a day, seven days a week, with deliveries at any time, although there will be periods of annual maintenance when RDF processing is reduced. It is estimated that the facility will operate for an average of 8,000 hours per year over the operational lifetime of the facility.

Staff

2.69 It is envisaged that between 30 and 35 staff will be employed directly on site and the ERF will operate in a three-shift pattern of eight-hour shifts. The assessments have been based on the appropriate worst-case assumption of staffing numbers. Working hours, shift patterns and rotas will be set to meet the needs of the plant and will be regularly reviewed with members of each team to ensure optimum working conditions are maintained.

Vehicle movements and trip distribution

2.70 The plant will require an estimated 548 tonnes of RDF per day for continuous operation, when processing 22.83 tonnes per hour, although this will vary according to the calorific content of the RDF up to an estimated 606 tonnes per day. In order to provide a worst-case estimate of vehicle deliveries, it has been assumed that the RDF would arrive loose in a covered walking floor HGV wagon carrying 24 tonnes per vehicle. If all the waste was delivered by road, 25 deliveries of RDF would need to occur per day, with a further 10 HGVs removing ash and one HGV providing consumables, giving a total of 36 HGV trips each way (72 HGV movements in total). To allow for variations in the total amount of RDF required per day, and therefore ensure a realistic worst-case assessment, the EIA has been based on a total of 40 HGV trips each way (80 HGV movements in total).

2.71 All HGVs travelling to and from the site will use the A35(T), the A354 Weymouth Relief Road, the A354 Weymouth Way, the A354 Portland Road, the A354 Portland Beach Road, Lerret Road and Castletown. Dorset Council has implemented a one-way system through Weymouth for HGVs, which runs between the A354 Weymouth Way / B3157 Granby Way and the A354 Buxton Road / A354 Portland Road / B3156 Portland Road (Foord's Corner)

roundabouts. This means that HGVs travelling south towards the site will continue along the A354 Weymouth Way, which becomes the A354 Westwey Road and then the A354 Buxton Road until they reach the Foord's Corner Roundabout and join the A354 Portland Road. HGVs travelling north away from the site will continue north from Foord's Corner Roundabout on the B3156 Portland Road and will then travel along Chickerell Road, the Chickerell Link Road, Hampshire Road and the B3157 Granby Way until they reach the roundabout with the A354 Weymouth Way.

2.72 There will also be an estimated 19 staff vehicle trips each way per day (38 vehicle movements in total).

2.73 It is envisaged that RDF delivered to the site by sea will be transported in ships with an estimated 2,500-tonne payload. If all the waste was delivered by sea, in the worst-case assessment scenario of potential shipping impacts, 81 deliveries by ship would be required per year. Data from Portland Port show that 794 ships called at the port in 2019. The estimated maximum increase of up to 81 ships associated with the proposed development therefore represents approximately 10% of the total number of ships that used the port last year and equates to fewer than two additional ships per week, which the port has the capacity to accommodate. The exact routes of the shipping deliveries will depend on the source of the RDF, but it is envisaged at this stage that a proportion of the existing RDF deliveries passing through the English Channel will be diverted to the proposed ERF.

Maintenance

2.74 The ERF will operate a detailed maintenance programme to ensure systems and equipment operate safely, effectively and reliably. The maintenance programme will aim to improve overall efficiency, minimise emergency repairs, minimise unscheduled equipment shutdowns and the duration of such shutdowns, minimise process faults or reduced performance due to equipment problems, and extend the useful life of equipment, repairing and adapting it where necessary.

2.75 Individual items of plant and equipment, such as nozzles, filters, electric motors etc, will have a defined frequency of inspection, checking, cleaning, adjustment and servicing. Maintenance of large items of equipment at the ERF (e.g. the boiler, steam turbine, flue gas treatment equipment, grate, hopper and ash handling) will require the line to be shut down. Except due to the need for urgent maintenance, breakdown or grid electricity outage, there will be a single shut down period per year. The length of shut down will vary, depending on the extent of maintenance required that year.

Spillages

2.76 Due to the proposed nature of operations at the site, there is the potential for a range of spillages involving significantly different materials. A number of spill procedures will be produced for each potential spillage event identified, including spillage of raw material inputs to the plant, ready use consumables, and waste material outputs. Suitable and sufficient equipment will be maintained on site, such as spill kits, in order to deal with the predicted scale of possible spillages of materials. Staff will receive training in the use of the spill kits and will regularly

practise as part of the normal operation of the facility. Under all circumstances, priority will be given to the potential environmental and health and safety impacts of spillages. Engineering controls will be employed where these would reduce the potential for spillage (or minimise the impact of spillage), such as bunded areas for fuel storage above ground.

Abnormal operating conditions

2.77 Procedures and training will be put in place for dealing with abnormal operating conditions (e.g. failure of an auxiliary burner, flue gas treatment bag, CEMS or electricity supply). The ERF has been designed to avoid the need for regular shut downs, but if any incident endangers, or is likely to endanger, personnel, or there is a risk of serious damage to the facilities, or a complete power failure, an emergency shut down would be necessary. A standby generator will be present on site to support the safe shut down of the facilities at any time. A full set of procedures will be developed and implemented on site for an emergency shut down. These will be published in an emergency plan. Appropriate drill and training exercises will be undertaken at regular intervals to ensure that all plant operatives are aware of, and are competent to identify and respond to, plant emergencies.

2.78 The facility will be equipped with comprehensive fire protection and detection systems, which will comply with the requirements of the National Fire Protection Association's recommended practice for fire protection for electricity generating plants and high voltage direct current converter stations (NFPA 850). Automatic fire alarm detection will be provided throughout specified areas, as well as manual fire alarm 'break glass' call points.

2.79 A sprinkler system will be used throughout the building. An underground fire main will encircle the ERF plant facilities, which will supply a number of fire hydrants and will spur off at strategic points to supply the water-based fire protection system.

Nuisance control

Dust and odour control

2.80 Combustion air will be drawn from the waste reception area so that odours and airborne dust are drawn from the waste reception area into the boiler line, thus preventing their escape to atmosphere. External doors to the waste reception area will remain closed except for access and egress of vehicles and pedestrians.

2.81 Waste feed hoppers will be designed to ensure that emissions of dust and odours are minimised. By ensuring that the hopper dimensions exceed those of the grab, the potential for stray RDF to accumulate on the floor and for dust and RDF to be blown from the hoppers will be minimised. Potential emissions of dust and fumes from the bottom ash discharger will be minimised by the quenching process and storage systems proposed.

2.82 As part of ongoing occupational health protection, dust level checks will be carried out on a regular basis in operational areas of the facility where high dust

levels may be present. This will provide an early warning of increasing dust levels, at which point action would be taken to reduce dust levels.

2.83 Daily olfactory checks will be carried out around the perimeter of the site to check for odours. In the event of a plant shut down, which might result in RDF being held in the bunker for a period of time, fresh RDF will be used to cap older RDF in order to minimise odours.

Noise control

2.84 Most noisy plant items will be installed inside the ERF building rather than outside and equipped with noise insulation if necessary. The air-cooled condensers have been designed to reduce noise and tonal components. Vehicle and pedestrian doors will be kept closed when not in use to prevent noise egress. A sound attenuator will be fitted to the exhaust of the flue gas induced draft fans. Vehicle movements at night will be limited and plant will be regularly maintained.

2.85 Mobile plant for the site will comply with the most up-to-date standards, including noise emissions. All mobile plant will be operated and maintained in accordance with the manufacturers' instructions. Mobile plant that does not comply with the agreed operating noise limits will be taken out of service until compliance is achieved.

2.86 Noise level checks will be carried out on a regular basis in operational areas of the ERF where high noise levels may be present. Early warning of increasing noise levels will result in a noise reduction or mitigation programme.

Pest control

2.87 RDF will only be stored in the designated areas of the building and any spillage of RDF will be recovered in accordance with specific, time-limited procedures. This will reduce the potential for feeding patterns to be established by vermin and therefore discourage infestation. The design of the waste bunker for the ERF will ensure that the bunker is watertight and this will prevent access to the contained RDF by burrowing pests such as rats or squirrels. The bunker will be enclosed and internal, thereby reducing access to RDF for birds, and the waste reception area has been designed to eliminate roosting points for birds.

2.88 Routine cleaning and good housekeeping will reduce the potential for the facility to provide an attractive environment for vermin and this will be implemented through the maintenance programme. If pests are identified, an action plan will be developed to eliminate or reduce the potential for nuisance to neighbours.

2.89 Daily visual checks will be undertaken of the waste storage area and ERF tipping hall / waste bunker area, as well as the site generally. If pests are reported, appropriate measures will be taken and pest control specialists utilised where necessary. In addition to these measures, the tipping hall will be washed periodically and standard pest control methods will be implemented.

Litter control

2.90 All vehicles carrying RDF into or IBA / APCr out of the ERF will be covered or sheeted, thereby ensuring the potential for litter to escape is minimised. The delivery and storage of all RDF within the main building further minimises the potential for wind-blown litter to occur. A daily check will also be made in key areas of the site (e.g. the tipping hall) to identify any build-up of RDF. These combined measures will ensure that control of litter is maintained at all times.

Certifications

2.91 It is intended that the ERF operator will implement an environmental management system certified to ISO14001, a quality management system certified to ISO 9001 and an occupational health and safety management system certified to ISO 45001. This will ensure that the facility achieves the highest practical standards of quality, occupational health and safety and environmental control and performance.

Community relations

2.92 A local liaison group will be established, which will meet on a regular basis to discuss the operation of the ERF and any potential issues or queries from members of the local community. It will provide a forum for community stakeholders to be informed and consulted regarding site operations and procedures. Liaison group members will include local residents and representatives from Portland Town Council, Dorset Council, the Environment Agency, and other stakeholders as appropriate.

2.93 Access to the ERF will be encouraged for managed groups, such as trips from local schools.

Construction

Construction programme

2.94 A construction contractor will be appointed to design and build the ERF. The total site preparation and construction programme is expected to last for approximately 30 months (early to mid-2021 to late 2023), with 24 months of construction and six months for cold and hot commissioning.

2.95 The 24-month construction period will consist of site preparation (including set-up of contractor's compound, preparing lay-down areas and site security), civil works (including site levelling, foundations, drainage and underground utilities and services), delivery and installation of large plant items (including boiler, steam turbine and air cooled condensers), construction of building structure, installation of plant and equipment, building fabric construction, and external and soft hard finishes.

2.96 The six-month commissioning period will include testing and commissioning of systems (cold testing), setting to work and commissioning of complete process (hot testing) and a plant proving test.

Site preparation and construction activities

2.97 An initial advance enabling works contract to create the site base and initial retaining works, on-site access, utilities and drainage connections is expected to form the first six to nine months of the construction period. The off-site grid connection, requiring approximately 900 m of cable, will be installed beneath the public highway. The other site enabling works will comprise the following tasks:

- Secure the site inside the Port estate
- Site strip and initial earthworks
- Construct surface water drainage outfall connections
- Construct foul sewer connection
- Construct other utility duct routes (communications, water etc)
- Construct site compound, on-site roads and car parking areas
- Piling for boiler plant and flue gas treatment hall slab
- Construct boiler house and flue gas treatment hall slab
- Retaining walls to RDF pit
- Retaining walls to RDF storage hall
- On-site substation compound
- Construct foundations and base slabs for all buildings

2.98 It is anticipated that any excavation arisings that cannot be re-used on the site will be transferred to another location within the port to minimise construction traffic movements. Piling activity to create the base slab for the boiler plant and turbine hall is expected to require piles of around 600 mm diameter to depths of around 25 m, which would normally be formed using bored piles in reinforced concrete. Reinforced concrete retaining walls are expected to be of traditional construction, with excavation, temporary retaining structures, reinforced concrete wall construction and backfill to the wall.

2.99 Following the completion of the enabling works, construction of the plant areas will commence with additional reinforced concrete structures as required and the majority of main plant elements being brought to site in small elements for on-site fabrication. Creation of the various levels of the plant areas and offices will also require steelwork before the whole building is covered with an overarching steel frame and clad when the internal mechanical works are complete.

2.100 Following the construction of the principal plant and building frames, there will be several months of mechanical and electrical installation, which typically includes small-scale ductwork, piping and wiring, as well as large-scale plant items.

Construction employment

2.101 The number of people employed on site at any one time will vary considerably but, based on experience of similar projects elsewhere, it is estimated that up to 300 people will be employed on site during the construction process.

Construction traffic

2.102 It is envisaged that all HGV construction traffic will access and depart the site using the same routes set out in paragraph 2.71. Based on experience of

similar projects elsewhere and the construction activities discussed above, it is predicted that up to 37 HGV deliveries a day will be required to the site during construction (74 HGV movements in total). Details of the calculations behind this figure are set out in technical appendix L2.

2.103 Plant items such as the main boiler, steam turbine, transformer, stack or flue gas treatment plant may require abnormal load delivery due to their size, so the potential for delivery of these large items to the port by ship will be investigated. Materials delivered by ship will be unloaded and stored within the port until required, in accordance with the port's existing procedures.

2.104 As discussed above, it is estimated that up to 300 people will be employed on site at peak times during the construction process. Typically, construction employees will arrive on site in a minibus or crew van that has collected staff at pick-up points along the route to the site. Highly labour intensive tasks may require contractors to use site buses to bring crews to work. As a result, it is anticipated that there will be up to 22 construction staff traffic movements each way per day during the peak construction period (44 movements in total). Details of the calculations behind this figure are set out in technical appendix L2.

Construction working hours

2.105 The standard working hours for construction activities will be from 07:00 to 19:00 Mondays to Fridays and 08:00 to 13:00 on Saturdays. There will be no noisy working outside these hours (including Sundays and Bank Holidays), other than special works (such as concrete pours, which need to be continuous), which will be subject to prior agreement with Dorset Council.

Procedures for storing, handling and management of construction waste

2.106 A draft site waste management plan has been submitted in support of the planning application, which sets out procedures for the storage, handling and management of construction waste. The principal contractor will introduce good on-site practice to ensure waste is managed effectively. Reduction of waste will be the highest priority and waste produced will be segregated to facilitate re-use and recycling. The waste stream colour-coding developed by the Institute of Civil Engineers to raise waste awareness will be considered.

2.107 The principal contractor will nominate a designated waste champion at all stages of development and will provide general information on waste, and specific information relating to the site waste management plan, in site inductions and toolbox talks. This training will include information on the segregation strategy and recovery targets in place at the site. Agreements will be established with sub-contractors for the management of waste. Monitoring and measurement of waste will be undertaken on a regular basis by the principal contractor and the results will be included in regular site meetings.

Environmental protection measures during construction

2.108 The framework construction environmental management plan (CEMP) set out in technical appendix C outlines the standard best practice approaches to construction and all the relevant mitigation measures identified by the EIA process and set out in this ES. This will be used to produce a detailed CEMP

prior to the commencement of construction works, which will cover all construction activities.

2.109 The project will be registered with the Considerate Constructors Scheme, which will continuously monitor the impact of the development on its neighbours and allow refinements and improvements to be made throughout the construction period.

Commissioning

2.110 Commissioning / testing of the ERF will commence following completion of the civil works and the erection and installation of all equipment, and is likely to take approximately six months. A written commissioning programme will be agreed with the Environment Agency, which will also describe the commissioning protocols with regard to meeting regulatory requirements, such as noise monitoring, emissions monitoring and the calibration / verification of CEMS equipment.

2.111 Commissioning will take place in two stages: cold and hot commissioning. Cold commissioning of the facility involves confirming that all items of plant and equipment function as intended. This will include line checking, rotation checking, electrical testing, calibration etc. It will also include testing of any computer control systems, validation of safety systems and interlocks, and interfaces with external services. Cold commissioning will occur before RDF is delivered to the ERF. Hot commissioning will involve operating the ERF with RDF and verifying that the treatment technologies achieve their desired aims.

2.112 As part of hot commissioning, the ERF will then undergo plant proving testing to verify that it achieves its contractual performance requirements. On satisfactory completion of the proving tests, the facility will be presented for independent certification. Once the tests are complete and the certificate issued, the facility will be deemed ready for full service commencement.

Major accidents

2.113 The site lies within the consultation distance of an oil storage facility operated by Portland Bunkers, which is a site that is subject to the requirements of the Control of Major Accident Hazards (COMAH) Regulations 2015 (as amended). The Health and Safety Executive (HSE) was consulted on the proposed development via its online land use planning advice website (https://pa.hsl.gov.uk/), which confirmed that the HSE does not advise against granting planning permission for the proposed development on safety grounds.

2.114 The proposed development itself will not store sufficient quantities of hazardous materials to be designated as a COMAH site.

2.115 The Coaling Pier, which is included within the application boundary and lies to the north of the main ERF site, serves as the operational berth at Portland for nuclear submarines. The pier has therefore been designated under the Radiation (Emergency Preparedness and Public Information) Regulations 2019 (REPPIR) as a REPPIR off-site emergency planning area by the Ministry of Defence. This is an area for which the local authority must prepare an off-site emergency plan that is adequate to restrict exposure to the public, as far as

reasonably practicable, in the event of a reasonably foreseeable radiation emergency.

2.116 The main site lies within the detailed emergency planning zone identified in Dorset Council's (2020) *Portland Port Off-Site Reactor Emergency Plan*, which extends 1.5 km from the berth and so includes much of the port, as well as residential properties. The plan notes that the probability of countermeasures being required in this zone in the event of an emergency is very low in absolute terms. However, appropriate measures are identified within the plan.

Climate change adaptation and greenhouse gas emissions

2.117 The proposed ERF includes the following measures to reduce its greenhouse gas emissions and minimise its vulnerability to climate change:

- The ERF will generate energy through the combustion of RDF and effectively represents a low carbon energy source. The generation of low carbon energy can assist in the reduction of greenhouse gas emissions by displacing more carbon-intensive energy sources such as coal and natural gas
- The provision of low carbon electricity to ships berthed at the port will also replace the use of more carbon-intensive marine fuel oil while ships are docked
- The ERF will have the capacity to export heat, in the form of steam or hot water, should a suitable off-site user be identified in future
- The roof of the ERF building, above the RDF storage area, will be fitted with 3,389 m^2 of photovoltaic panels, which will make a further contribution to renewable energy generation at the site
- 10% of the proposed car parking spaces will be fitted with electric charging points to encourage the uptake of electric vehicles, and the remaining spaces will be fitted with ducting to facilitate future installation of cabling and charging units as required
- The ERF will use LED lighting, which will reduce electricity use
- IBA will be used to make aggregates suitable for construction and road projects, while the APCr will be recycled into carbon negative aggregate that will be used to make carbon negative building blocks, resulting in reduced use of primary resources for aggregate production
- Powerfuel Portland Ltd is committed to using verified carbon offsets to ensure that the process operations are 'net zero' over the lifetime of the plant
- The site is in flood zone 1 and is largely at very low risk of surface water flooding, although there is small area of low risk in the north west. The surface water drainage strategy will accommodate the 1-in-100 year storm event and incorporates a 40% allowance for climate change. These measures will ensure that the proposed development will not be at increased risk of flooding as a result of climate change

2.118 Further information on the proposed ERF's greenhouse gas emissions is provided in chapter 5.

Alternatives

Alternative sites

2.119 Policy 4 of the adopted Bournemouth, Christchurch, Poole and Dorset Waste Plan 2019 states that proposals for waste management facilities on unallocated sites will only be permitted where *"there is no available site allocated for serving the waste management need that the proposal is designed to address or the non-allocated site provides advantages over the allocated site."* As the application site is not allocated in the waste plan, a comparative assessment was undertaken of the waste sites allocated in the plan against the application site. This review comprised a qualitative comparative analysis against a set of operational, planning and environmental criteria and then a more detailed examination of the potential for the sites to deliver the proposed ERF.

2.120 The sites were firstly analysed against a range of criteria and ranked according to their performance in this analysis. A qualitative form of analysis was used, with sites categorised as 'meeting', 'partially meeting' or 'not meeting' each criterion. This approach is considered to be more objective and robust than the use of weighted, multi-scored analysis, as the use of weighting and a greater range of potential scores introduces a higher potential for subjectivity into the process. The criteria used in the assessment are summarised below and full details are set out in the Assessment of Waste Local Plan Allocated Sites report submitted in support of the planning application:

Operational criteria:

- Site size
- Potential to be served by sea
- Proximity to the primary road network
- Potential for combined heat and power
- Potential to contribute to meeting Portland's electricity needs
- Potential for co-location with other complementary uses

Planning and environmental criteria:

- Re-use of previously developed land
- Development of green belt land
- Compatibility with surrounding land uses
- Potential for effects on aerodrome safeguarding
- Proximity to designated ecologically sensitive areas
- Potential for landscape and visual effects (protected landscapes)
- Potential for landscape and visual effects (views)
- Potential for effects on the historic environment
- Potential for effects on water resources
- Proximity to areas likely to flood
- Presence of public rights of way

2.121 The detailed analysis of the sites against the assessment criteria is set out in the Assessment of Waste Local Plan Allocated Sites report and the results are summarised in table 2.1. The rankings are based on the number of criteria that are fully met. The site that fully meets the most criteria is ranked number 1.

Where more than one site fully meets the same number of criteria, the one that partially meets more criteria is ranked highest of this group, and so on. A joint ranking is awarded if scores are identical.

Rank	Site	Criteria met	Criteria partially met	Criteria not met
1	13. Application site (Portland Port, Portland)	13	2	2
2	9. Land at Mannings Heath Industrial Estate, Poole	11	3	3
3	2. Land south of Sunrise Business Park, Blandford	11	1	5
4	4. Land at Blackhill Road, Holton Heath Industrial Estate	10	4	3
5=	3. Area of Search at Brickfields Business Park, Gillingham	10	1	6
5=	10. Binnegar Environmental Park, East Stoke	10	1	6
7	1. Area of Search at Woolsbridge Industrial Estate, Three Legged Cross	9	3	5
8.	6. Old Radio Station, Dorchester	8	2	7
9.	8. Land at Canford Magna, Poole	7	5	5
10.	11. Bourne Park, Piddlehinton	7	4	6
11.	5. Loudsmill, Dorchester	6	7	4
12.	7. Eco Sustainable Solutions, Parley	6	4	7
13.	12. Maiden Newton Sewage Treatment Works	6	3	8

Table 2.1: Summary ranking of the sites

2.122 A more detailed review of the ability of the sites to deliver the proposed ERF was then undertaken. The first stage was to consider the size of the sites. While all sites were included in the initial analysis for completeness, in reality some would be too small to accommodate the scale of building needed to deliver an ERF plant of the required scale. Initial layout studies undertaken for the proposed ERF indicated that a minimum site of 2 ha is required to accommodate the ERF building, ancillary buildings and structures, HGV circulation space and car parking. The following sites were therefore excluded from further consideration on the basis that they have an area of less than 2 ha and therefore do not have the potential to deliver the proposed ERF:

- Site 4: Land at Blackhill Road, Holton Heath Industrial Estate (0.56 ha)
- Site 5: Loudsmill, Dorchester (0.92 ha)
- Site 9: Land at Mannings Heath Industrial Estate, Poole (1.6 ha)
- Site 11: Bourne Park, Piddlehinton (0.90 ha)
- Site 12: Maiden Newton Sewage Treatment Works (0.38 ha)

2.123 The second stage of the review was to consider the expectations of the waste plan in relation to the allocated sites. Policy 3 of the plan does not allocate all sites as strategic waste management sites with the potential to accommodate an ERF. Some are identified as suitable only for local facilities and / or suitable only for other types of waste management facility. The following sites were therefore excluded from further consideration on the basis that they are not allocated for the type of strategic facility proposed at Portland:

- Site 1: Area of Search at Woolsbridge Industrial Estate, Three Legged Cross
- Site 2: Land south of Sunrise Business Park, Blandford
- Site 3: Area of Search at Brickfields Business Park, Gillingham

- Site 6: Old Radio Station, Dorchester

2.124 A more detailed review was undertaken of the following remaining sites, taking account of the development considerations specified in the adopted waste plan and any other relevant material considerations:

- Site 7: Eco Sustainable Solutions, Parley
- Site 8: Land at Canford Magna, Poole
- Site 10: Binnegar Environmental Park, East Stoke

2.125 The review concluded that all three sites are subject to significant constraints. In addition to proximity to European designated nature conservation sites (all three sites), sites 7 and 8 are also constrained by aerodrome safeguarding and green belt considerations, which together would preclude the development of the large scale buildings and tall stacks typically associated with ERFs (the latter being required to mitigate against potential adverse impacts on the European designated sites from gaseous emissions).

2.126 The three allocated residual waste treatment sites are also subject to other potential constraints, such as landscape and visual (all three sites), flood risk (site 7), lack of combined heat and power opportunities (all three sites) and proximity to sensitive receptors (site 7). They are less well located in terms of access to water transportation (all three sites) and proximity to the primary road network (sites 7 and 10). The review therefore concluded that none of the three allocated sites are considered to be suitable or appropriate for the construction and operation of an ERF of the type and scale proposed at Portland.

Alternative technologies

2.127 As discussed in chapter 1, planning permission was granted in early 2010 for an energy plant on the site, which would be fuelled by vegetable oil. This process would have involved pre-treatment of imported vegetable oils to create a fuel, using a power oil production plant, which would then be combusted to produce electricity. The planning permission was varied in 2013 to enable waste rubber crumb from end-of-life tyres to be used as an alternative fuel source. The rubber crumb was to undergo thermal treatment similar to pyrolysis in an advanced conversion technology, rather than being directly combusted, producing oil, gas and carbon black. The oil and gas were intended to be combusted in generators for power generation.

2.128 The use of RDF as a fuel source is a more energy efficient, robust and widely used technology for the recovery of energy from waste than the technologies proposed in the consented applications.

Alternative designs

2.129 The design of the proposed ERF has evolved over time and has been subject to a number of iterations following consultation with Dorset Council and other stakeholders and the findings of the baseline environmental studies. The main aspects of the design where alternatives were considered are set out below. Further details of the evolution of the design and the rationale behind this process can be found in the design and access statement submitted in support of the planning application.

Approach to building design

2.130 The initial approach was to provide a landmark building, including vertical louvres stepped up to surround the stack and create a 'sail-like' composition when viewed from the harbour. This approach was considered to visually detract from the enjoyment of the public using the coastal path through the AONB and so was rejected.

Building layouts and massing

2.131 A series of building layouts and massings were considered, which evolved into the final design. The first was a series of square blocks that followed the minimum clearance requirements around the plant, large areas of plant and equipment remaining outside the building, and the offices as a stand alone block. This option was rejected because it did not reflect the surrounding landscape and the plant items were highly visible.

2.132 The next option comprised a single cohesive building, including the offices, with the internal plant reconfigured into ascending height order and a folded form to help conceal and diminish the scale of the building when viewed from the east. The built envelope was amended to screen the air cooled condensers and all remaining silos and plant were moved adjacent to Incline Road, where the building provides screening. The building footprint was increased to incorporate all vehicle movements within the building, but this option was rejected because maintenance access needed to be retained to the fuel pipeline to the east of the site.

2.133 The third option moved the vehicular access route outside the building to retain access to the fuel pipeline. This severed the office block from the main building, but the retained position and angular form of the offices still screened the base of the boiler house and provided greater articulation to the built form. A dedicated service yard was introduced to allow vehicles to pull off the main thoroughfare during deliveries / collections. The building envelope was further refined to include chamfered elevations to the north and south ends and gently sloping roofs to reflect the landscape forms of the East Weare cliffs behind. The angular wall of the north elevation enclosed the base of the stack, visually reducing its overall height. This option was rejected because separation was needed between the stack and building to improve the flow of clean air and ensure the suitable dispersion of the flue gases.

2.134 The chosen option incorporated this separation, pulling the building envelope back on its northern elevation to create a 10 m separation. In addition, the plant and silos that were previously enclosed on the western side of the boiler house were relocated externally to improve access and ease of delivery / collection. Improved vehicular and pedestrian segregation was also created across the site.

Stack height, location and colour

2.135 Detailed emissions modelling was undertaken to determine the proposed stack height and location to ensure that there will be no significant adverse effects on human health or sensitive ecological receptors. The original option tested was a 50 m high stack within the footprint of the proposed building. This was rejected because the modelling showed that the proximity of the stack to the building

and the adjacent cliff face would lead to turbulent air flow around the stack, affecting the dispersion of emissions.

2.136 To achieve a cleaner air flow, the northern edge of the building was moved back and the stack was placed 10 m clear of the building. The height of the stack was increased to 80 m to improve the dispersion of emissions and this was the option selected. A third option was tested that moved the stack further to the west of the proposed building, but this was rejected because it would lead to additional fan loading and energy consumption and had the potential to disrupt the use of the weighbridge by HGVs.

2.137 The colour of the stack was also reviewed to determine whether changes in colour could help to reduce the visual prominence of the stack, using visualisations. This exercise found that a neutral battleship grey would be the least visually prominent solution.

2.138 Further details on the emissions modelling are provided in chapter 4 and technical appendix D.

Façade materials

2.139 To help recess the building into the landscape behind when viewed from the AONB and WHS, it was determined that it should be partly clad in white to light grey cladding, reflecting the exposed limestone cliff faces, and partly green to reflect the green scrub vegetation of the lower escarpments. Two options were considered for the distribution of these materials.

2.140 The first was to place the green cladding on the taller rear volume of the building, making this recess into the escarpment, leaving only the lower grey-clad volume visible from long distance views. As the taller volume extends further north, the green cladding would appear to wrap down the right hand edge of the eastern elevation (as viewed from the AONB and WHS), which could create the separation of the grey volume from the other port buildings. This option was rejected because it would result in the visual elongation of the port when viewed across Weymouth and Balaclava Bay.

2.141 The second option was to place the green cladding on the lower front volume of the building, which wraps across the front of the boiler house and largely conceals the taller volume. This will group the more visually prominent grey cladding to the north, adjacent to the existing port buildings. Clad in the light grey, the top of the boiler house would be visible from long distance views within the AONB and WHS but, if detailed correctly, could resemble exposed limestone cliff face. The height of the boiler house coincides with a plateau halfway up the escarpment, providing further justification to this positioning as the chosen option.

2.142 It is proposed that the cladding of the boiler and exhaust air filtration hall will include an abstract interpretation of the limestone cliff faces. A range of options were considered for the cladding to reflect the horizontal bandings of varying depths that are visible in the exposed faces of the limestone on Portland. The preferred option was selected because it was considered to best represent the rock strata visible on the Portland cliff faces and stone quarries in terms of banding and colour changes.

2.143 Four options were considered for the green cladding. The first was a dark, matt green / brown cladding to pick up on the tones of the scrub vegetation in the area. However, this type of cladding lacks tonal variation, which would increase its visibility from the AONB and WHS, so this option was rejected. The second option was to use a living green wall comprising maritime plant species. While technically possible, this option was rejected because the harsh coastal environment could lead to issues establishing and maintaining plant growth, which would compromise the desired camouflage effect. In addition, the colour of suitable hardy maritime species would not be an ideal match for the lichen and scrub habitats on the East Weare escarpment. The initial capital expenditure and ongoing maintenance cost would also not be financially viable for a building of this type.

2.144 The third option was to create a camouflage effect using an array of folded, polyester powder-coated metal blades mounted on vertical rails fixed to the building's external envelope. These would accommodate a range of colours based on the East Weare cliffs and the variation of the blade angles and face colours would produce a dynamic façade that changes colour with the location of the observer. While this would create a dynamic camouflage effect, the arrangement of bent louvres could result in turbulent air coming off the building, which could disrupt the dispersion of gases from the stack. This option was therefore rejected.

2.145 The fourth option was to wrap the building in a heavy duty PVC mesh, printed with a high resolution image of the East Weare escarpment. This option was found to provide the best camouflage from long distance views in the AONB.

Roof treatment

2.146 Two potential options were considered for the proposed roof treatment. The first was the use of a green roof, primarily comprising sedum, which could contribute to reducing the visibility of the building and provide biodiversity benefits. However, the orientation of the building means that the roof is only likely to be visible from the sea and very limited viewpoints on the south eastern cliff face of Portland. From these viewpoints, the roof would be seen against the sky and sea respectively, meaning that a green roof would not reduce visibility. The roof is unlikely to be visible from the AONB.

2.147 In addition, there is the potential for a green roof to encourage bird nesting, which could create operational issues for the proposed building and the wider port, where helicopters are occasionally required to land in close proximity to the site. The limited visual benefits of a green roof and the potential operational issues meant that it was considered that the cost of a green roof would be better spent on optimising the effectiveness of the building's façade.

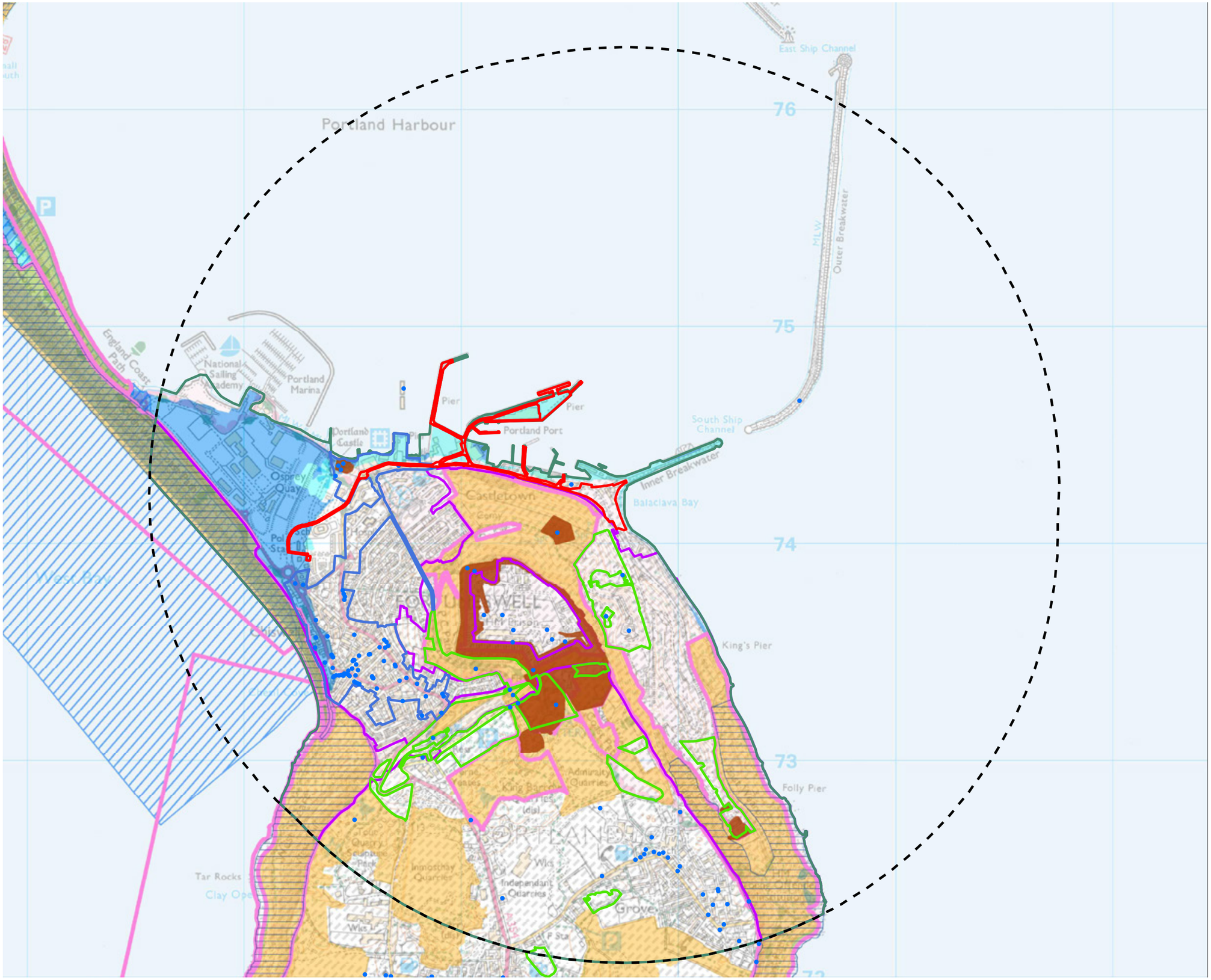
2.148 The second option, which was selected, was the use of a dark coloured, curved, fibre cement roof sheet. The darker colour will assist with reducing the building's visibility and the fibre cement panels will be non-reflective, ensuring there will not be any glint or glare. Over the life of the building, the panels will weather, allowing lichen and moss species to grow in the grooves of the panels.

View across the site looking east

View back along the breakwater towards the coaling shed, with HMP The Verne at the top of the cliff above

Two views along the lower level of the breakwater showing the coal storage casements

View along the upper level of the breakwater



- Site boundary
- 2km study area
- Listed buildings
- Scheduled monuments
- World Heritage site
- Special Area of Conservation
- Site of Special Scientific Interest
- Heritage coast
- Flood Zone 2
- Flood Zone 3
- Area of archaeological potential
- Land of local landscape importance
- Sites of county/local importance for nature conservation
- Regionally important geological and geomorphological sites
- Conservation areas

0 425 m

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Figure 2.2
Sensitive receptors in the vicinity of the site

POWERFUEL

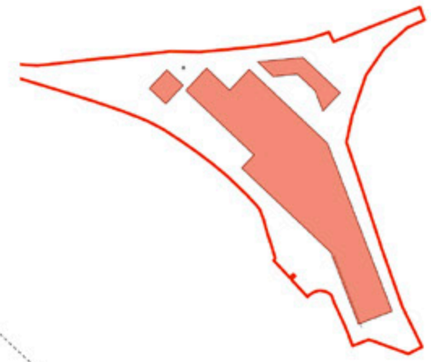
0 10 20 30 40 50 M

Scale to be used for planning purposes only

Figure 2.3
Proposed site plan

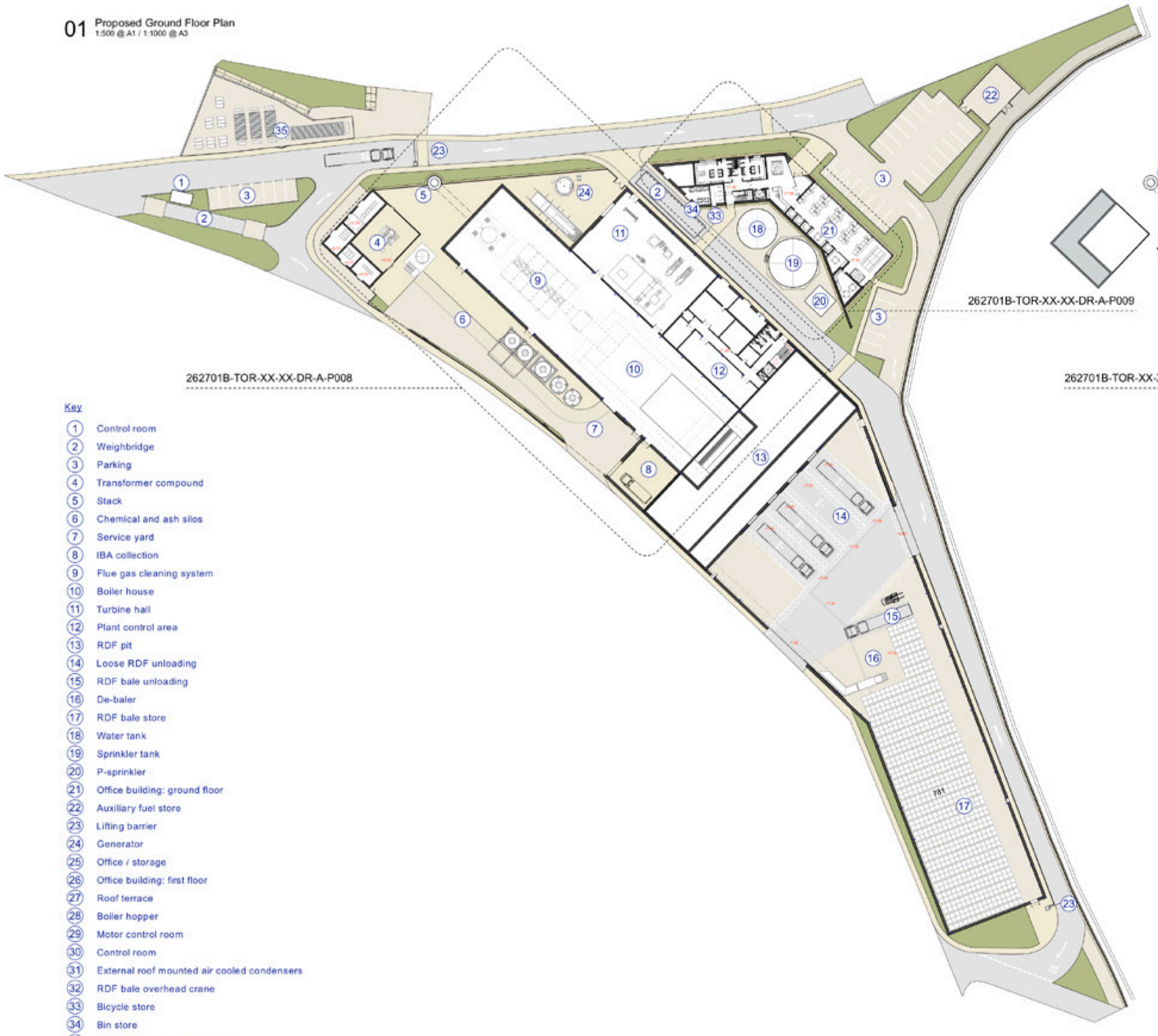
POWERFUEL

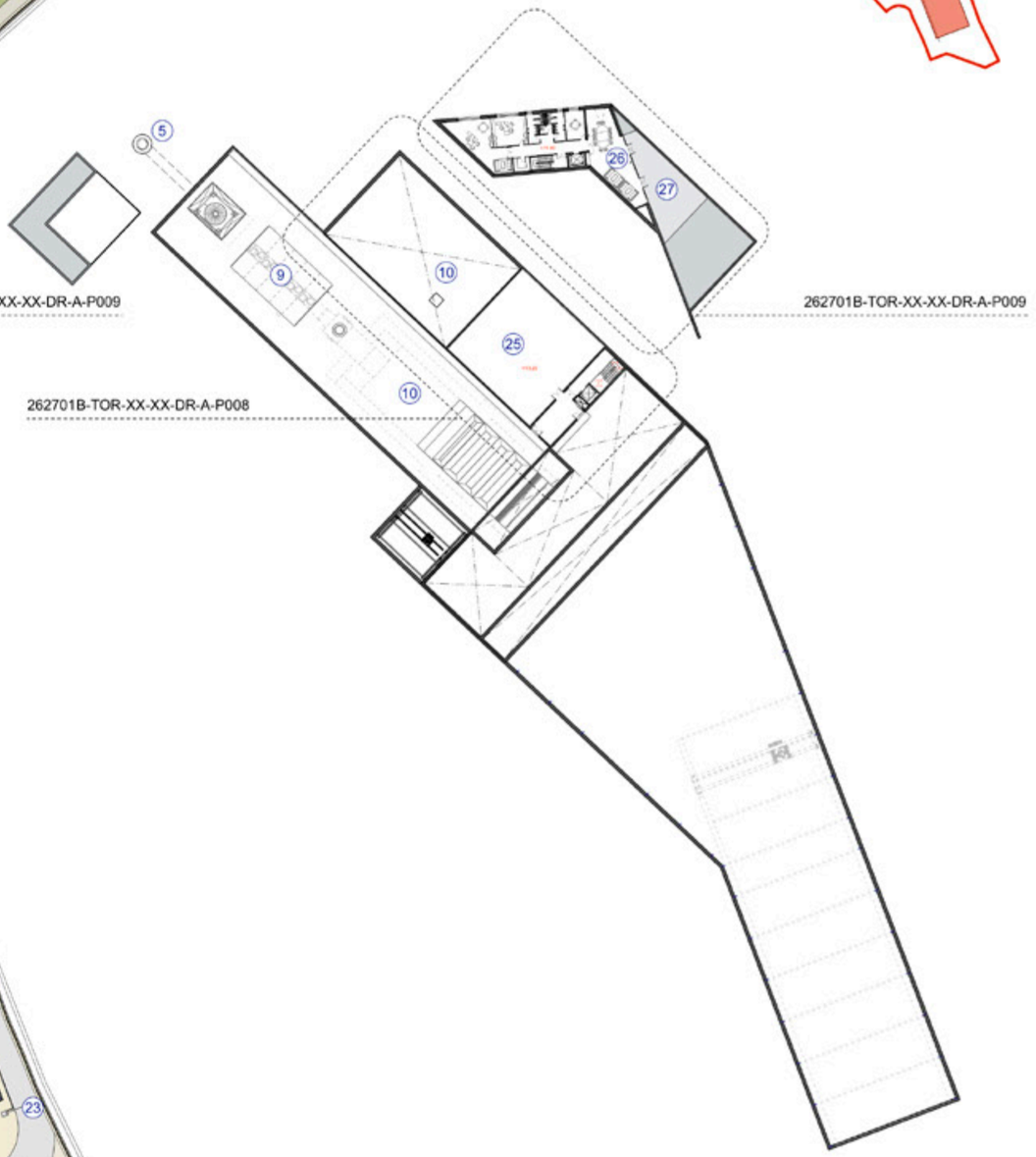
Location plan key
NTS



01 Proposed Ground Floor Plan
1:500 @ A1 / 1:1000 @ A3

02 Proposed First Floor Plan
1:500 @ A1 / 1:1000 @ A3





Key

1. Control room
2. Weighbridge
3. Parking
4. Transformer compound
5. Stack
6. Chemical and ash silos
7. Service yard
8. IBA collection
9. Flue gas cleaning system
10. Boiler house
11. Turbine hall
12. Plant control area
13. RDF pit
14. Loose RDF unloading
15. RDF bale unloading
16. De-baler
17. RDF bale store
18. Water tank
19. Sprinkler tank
20. P-sprinkler
21. Office building: ground floor
22. Auxiliary fuel store
23. Lifting barrier
24. Generator
25. Office / storage
26. Office building: first floor
27. Roof terrace
28. Boiler hopper
29. Motor control room
30. Control room
31. External roof mounted air cooled condensers
32. RDF bale overhead crane
33. Bicycle store
34. Bin store
35. Shore Power main switchgear

0 10 20 30 40 50 M

Scale to be used for planning purposes only

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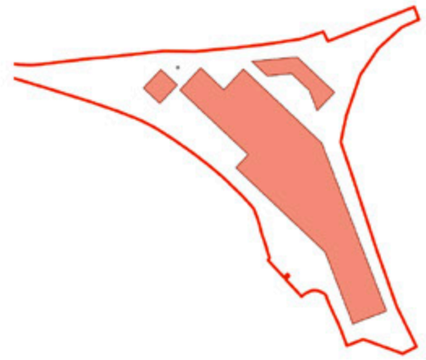
Figure 2.4a
Proposed floor plans: ERF building ground and first floors

POWERFUEL

Location plan key
NTS

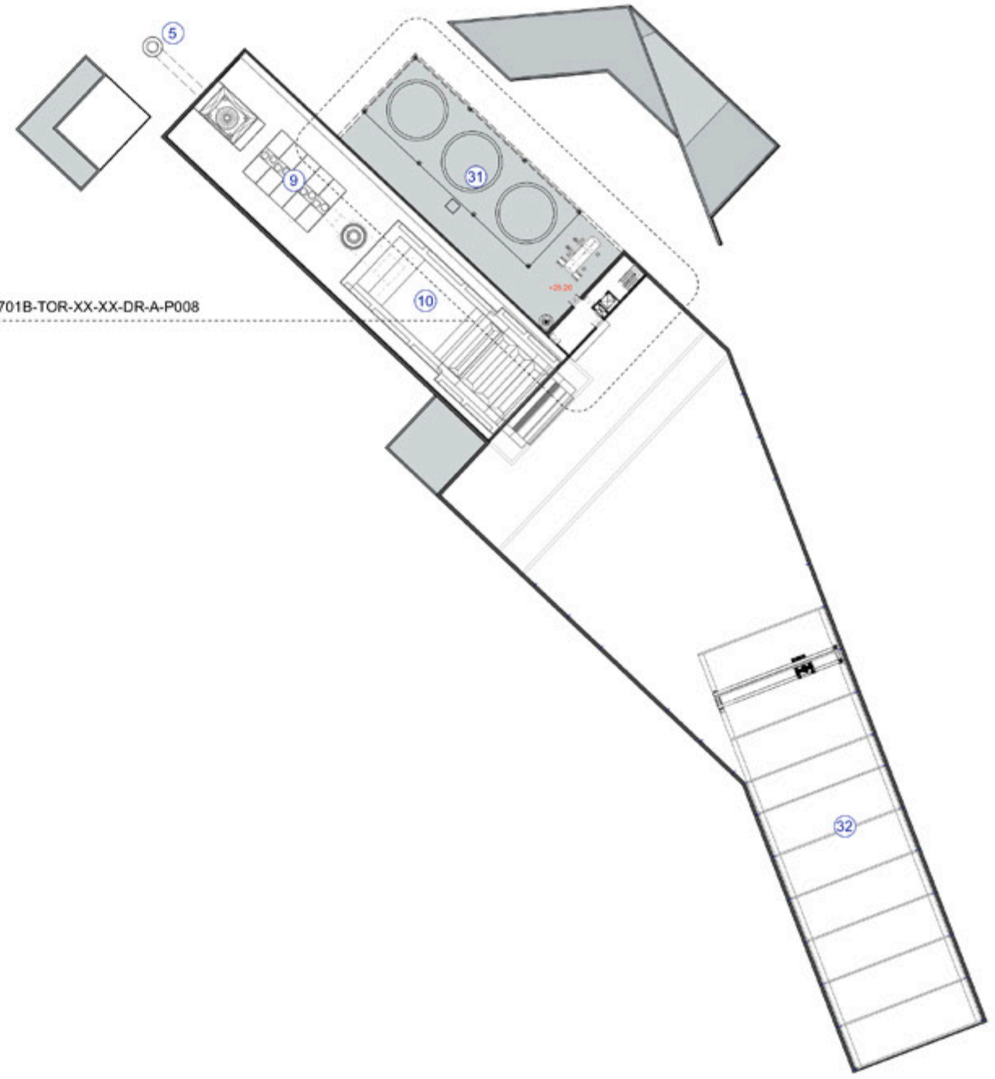


03 Proposed Second Floor Plan
1:500 @ A1 / 1:1000 @ A3

Key

1. Control room
2. Weighbridge
3. Parking
4. Transformer compound
5. Stack
6. Chemical and ash silos
7. Service yard
8. IBA collection
9. Flue gas cleaning system
10. Boiler house
11. Turbine hall
12. Plant control area
13. RDF pit
14. Loose RDF unloading
15. RDF bale unloading
16. De-baler
17. RDF bale store
18. Water tank
19. Sprinkler tank
20. P-sprinkler
21. Office building: ground floor
22. Auxiliary fuel store
23. Lifting barrier
24. Generator
25. Office / storage
26. Office building: first floor
27. Roof terrace
28. Boiler hopper
29. Motor control room
30. Control room
31. External roof mounted air cooled condensers
32. RDF bale overhead crane

04 Proposed Third Floor Plan
1:500 @ A1 / 1:1000 @ A3



0 10 20 30 40 50 M

Scale to be used for planning purposes only

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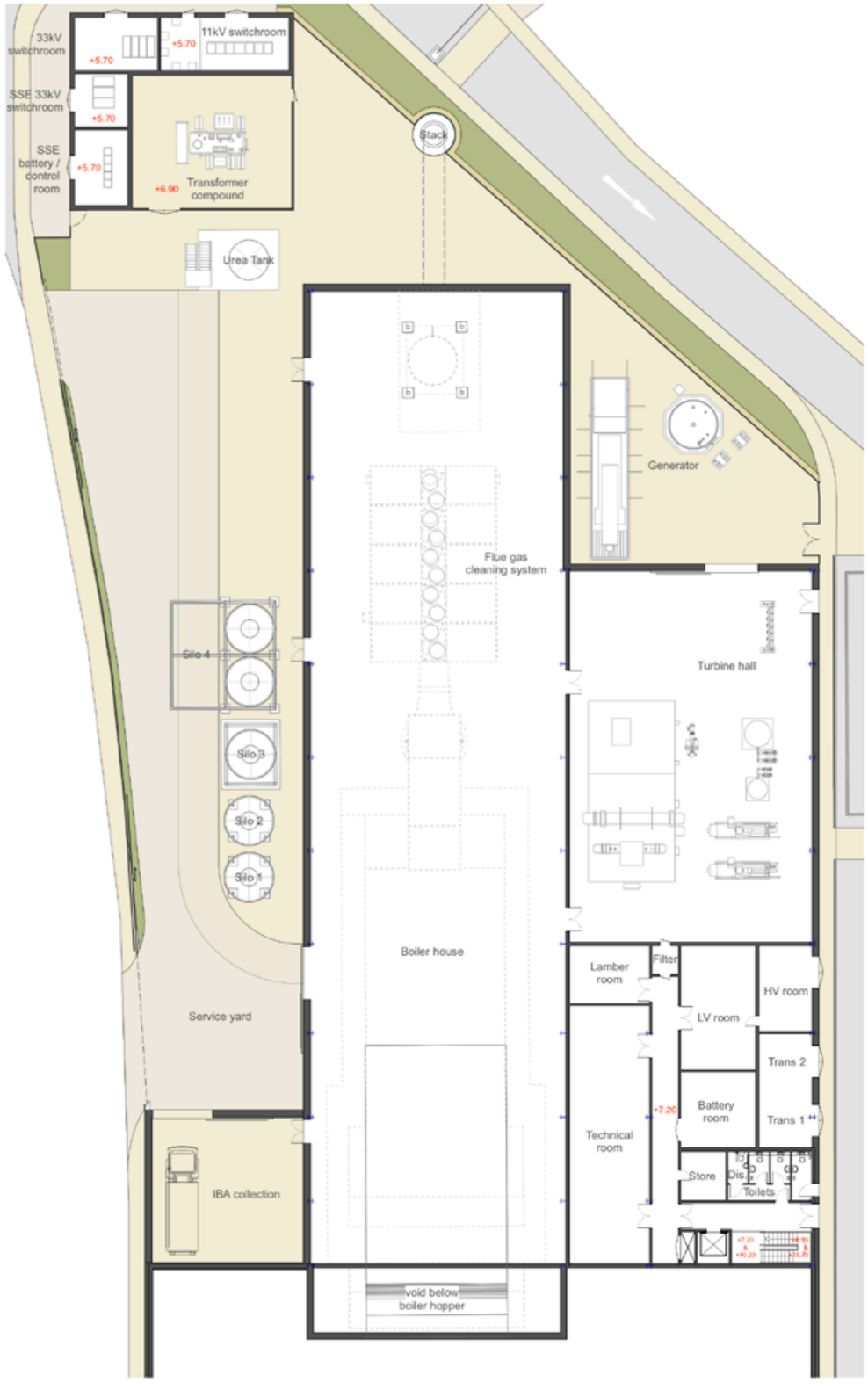
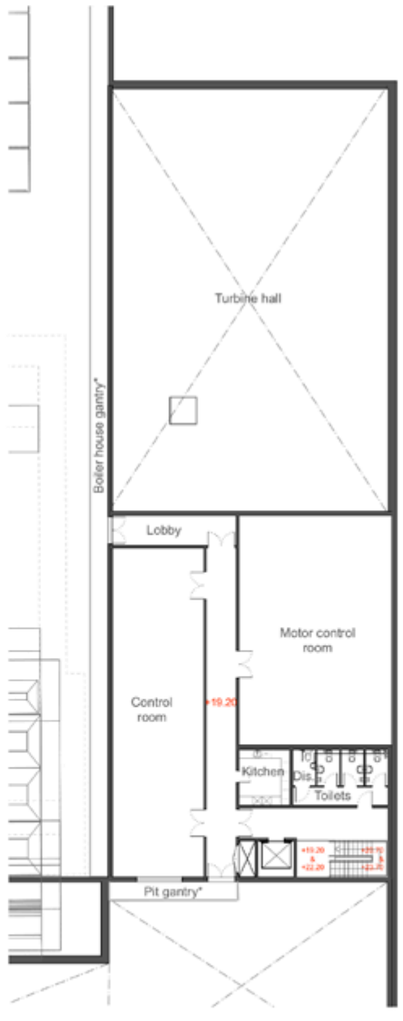
Figure 2.4b
Proposed floor plans: ERF building second and third floors

POWERFUEL

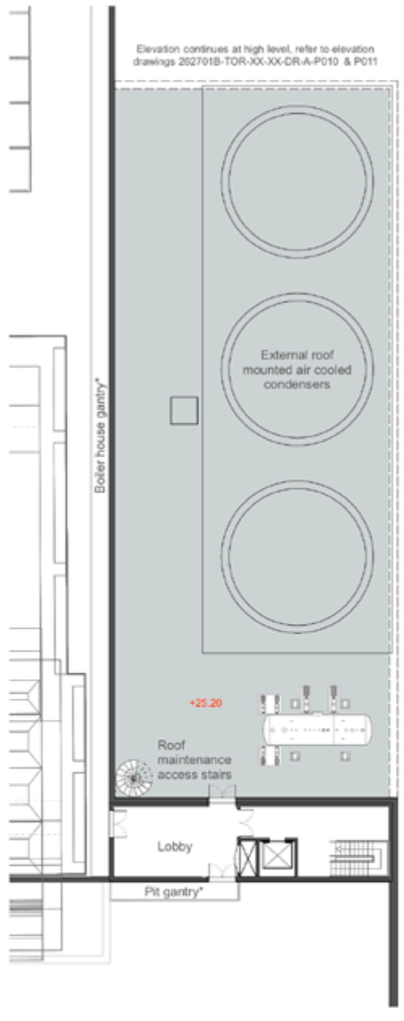


01 Proposed Ground Floor Plan
1:200 @ A1 / 1:400 @ A3

02 Proposed First Floor Plan
1:200 @ A1 / 1:400 @ A3



03 Proposed Second Floor Plan
1:200 @ A1 / 1:400 @ A3



04 Proposed Third Floor Plan
1:200 @ A1 / 1:400 @ A3

Location plan key
NTS

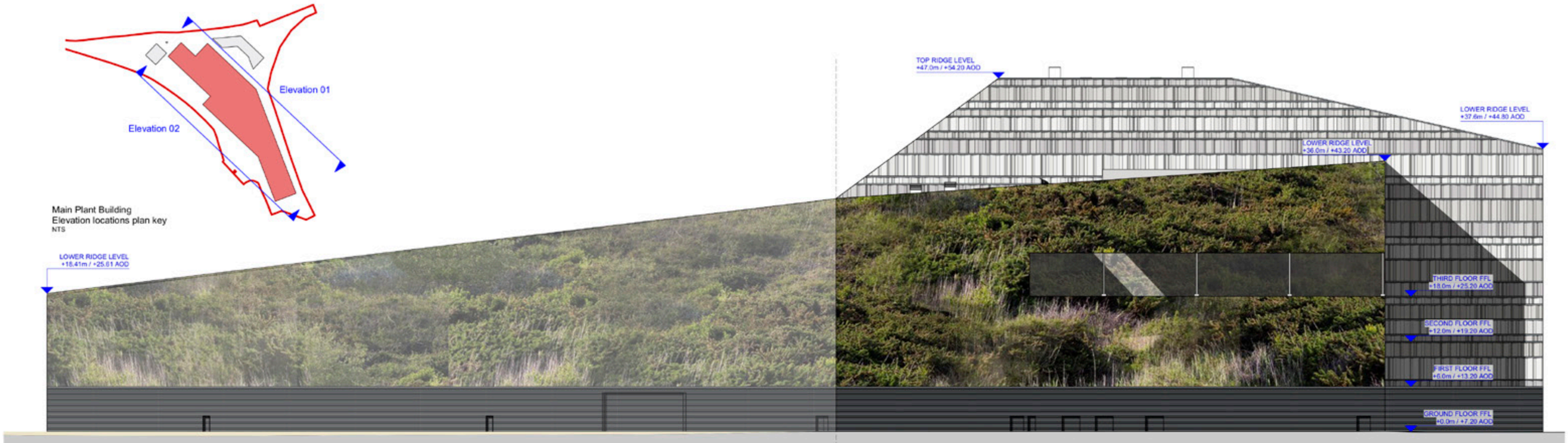
*Gantry heights subject to final plant selection / operator

0 5 10 15 20 M

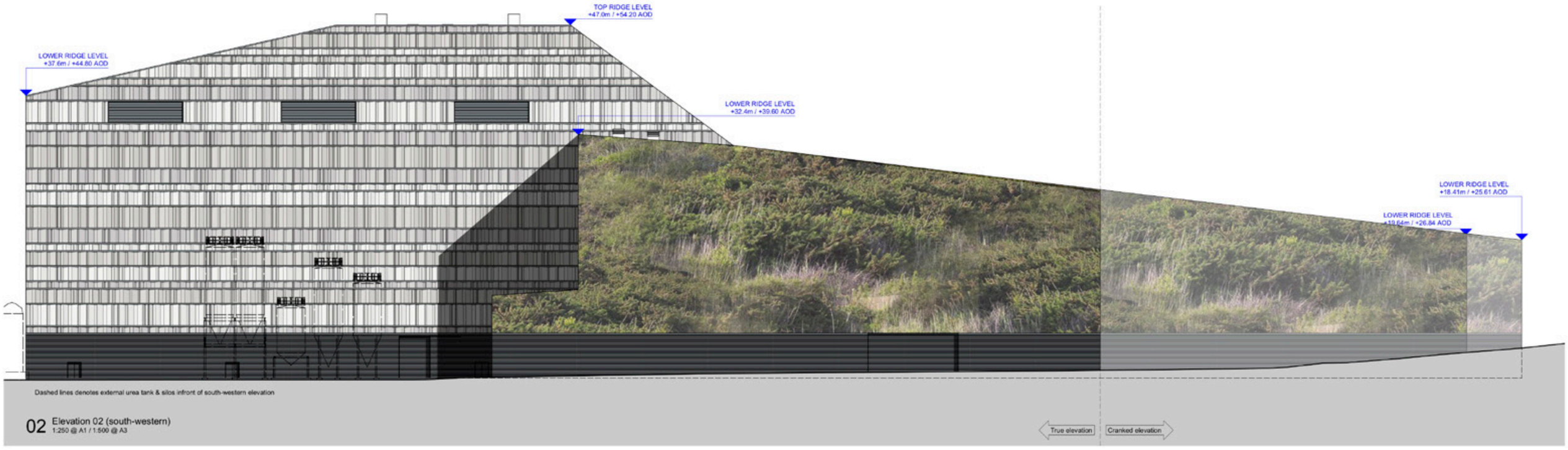
Scale to be used for planning purposes only

Figure 2.4c
Proposed floor plans: ERF building plant control area

POWERFUEL



01 Elevation 01 (north-eastern)
1:250 @ A1 / 1:500 @ A3



02 Elevation 02 (south-western)
1:250 @ A1 / 1:500 @ A3

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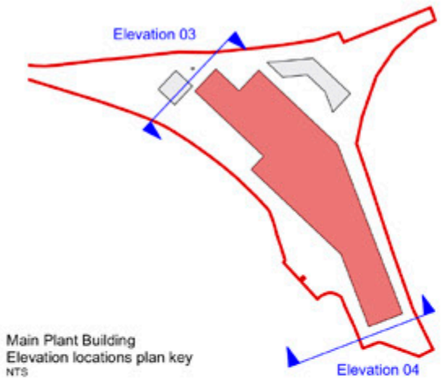
0 5 10 15 20 25 M
Scale to be used for planning purposes only

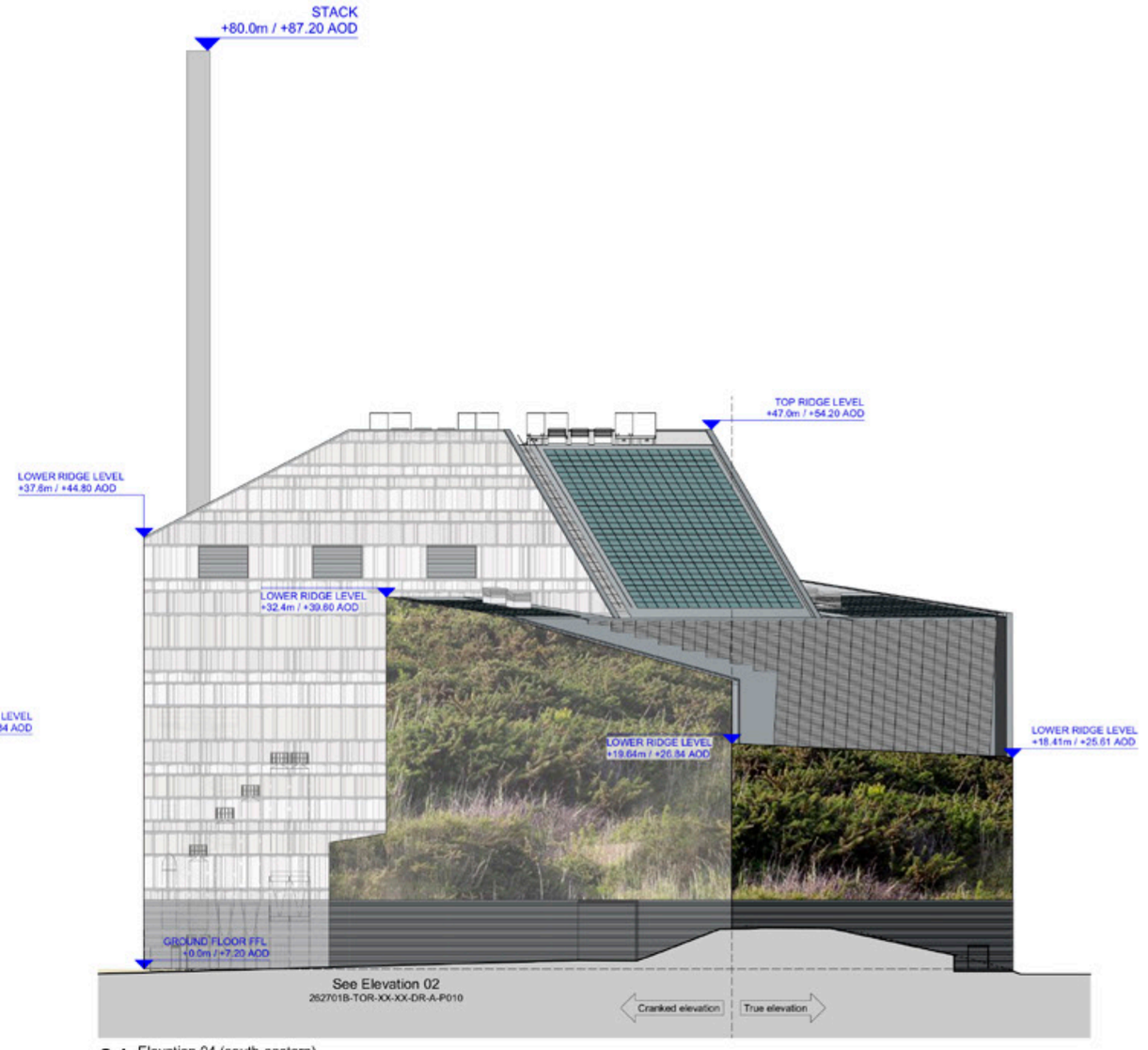
Figure 2.5a
Proposed elevations: ERF building north eastern and south western

POWERFUEL

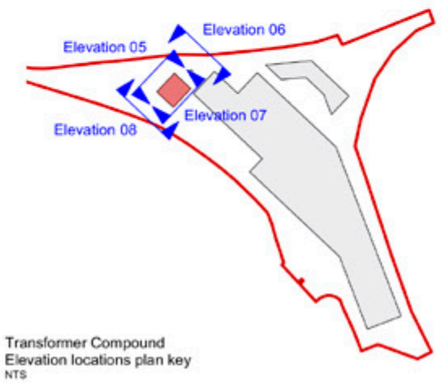


Main Plant Building
Elevation locations plan key
NTS

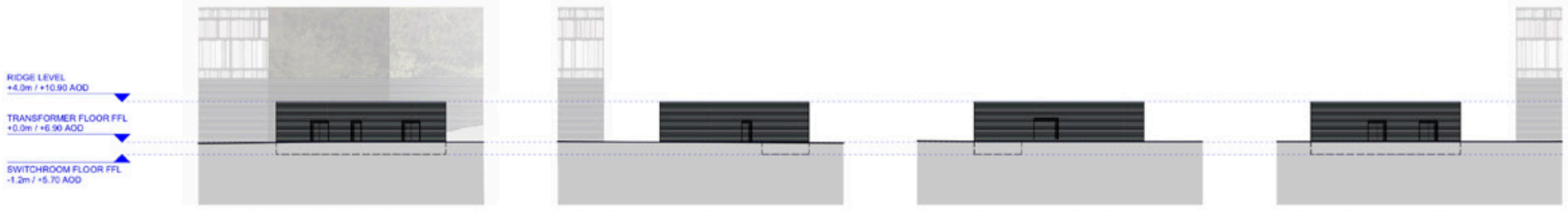
03 Elevation 03 (north-western)
1:250 @ A1 / 1:500 @ A3



04 Elevation 04 (south-eastern)
1:250 @ A1 / 1:500 @ A3



Transformer Compound
Elevation locations plan key
NTS



05 Elevation 05 (north-western)
1:250 @ A1 / 1:500 @ A3

06 Elevation 06 (north-eastern)
1:250 @ A1 / 1:500 @ A3

07 Elevation 07 (south-eastern)
1:250 @ A1 / 1:500 @ A3

08 Elevation 08 (south-western)
1:250 @ A1 / 1:500 @ A3

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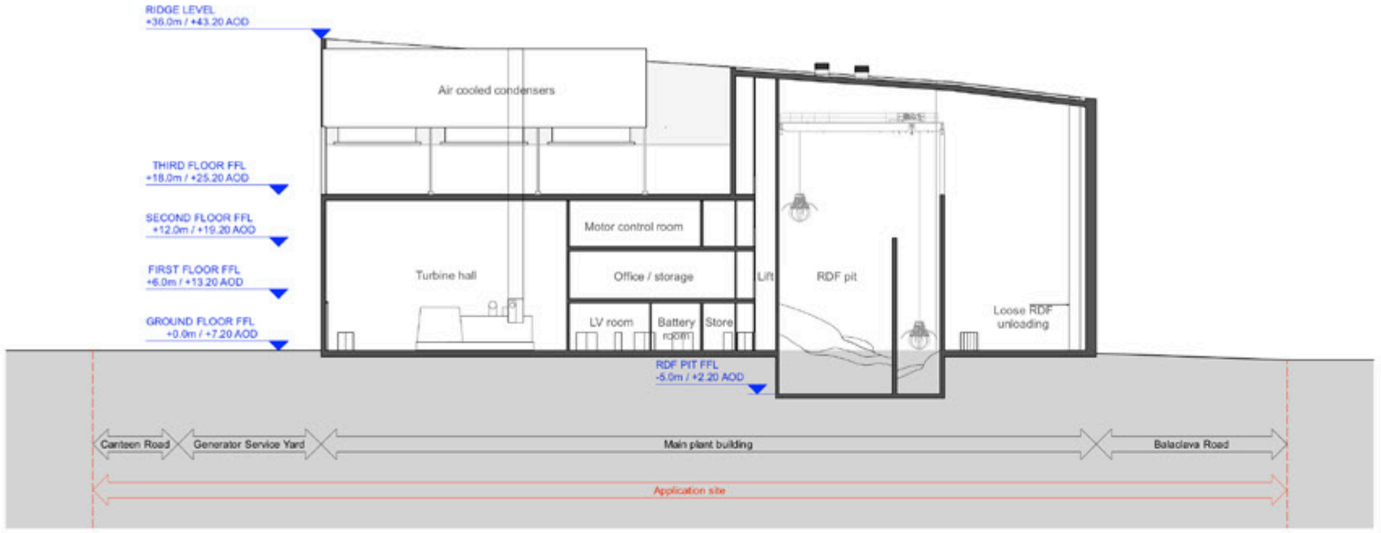
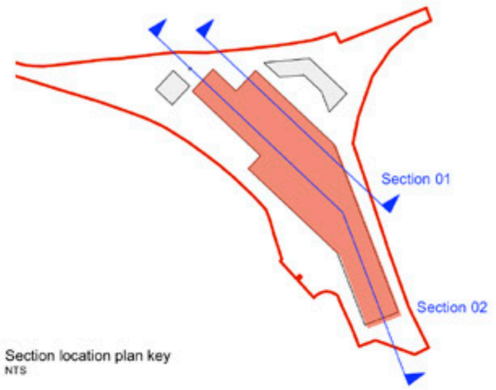
0 5 10 15 20 25 M
Scale to be used for planning purposes only

Figure 2.5b Proposed elevations: ERF building north western and south eastern and transformer compound

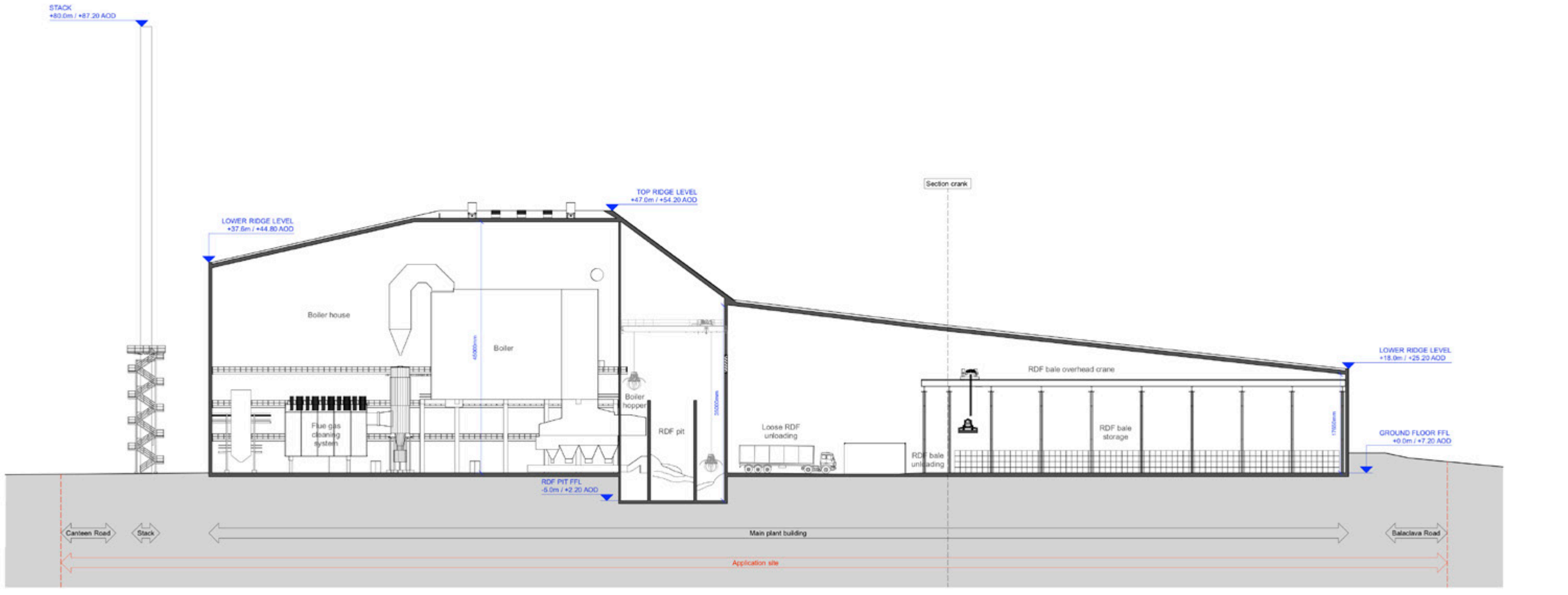
POWERFUEL



01 Section 01 (Long section through turbine hall and RDF pit)
1:350 @ A1 / 1:700 @ A3



Section location plan key
NTS



02 Section 02 (Long section through boiler house, RDF pit and RDF store)
1:350 @ A1 / 1:700 @ A3

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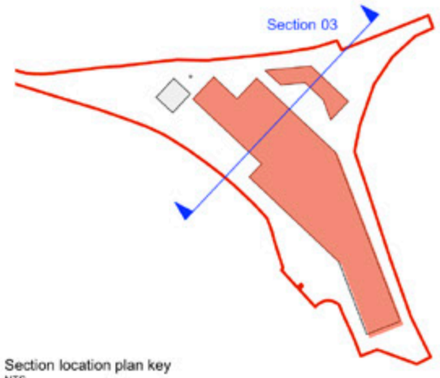
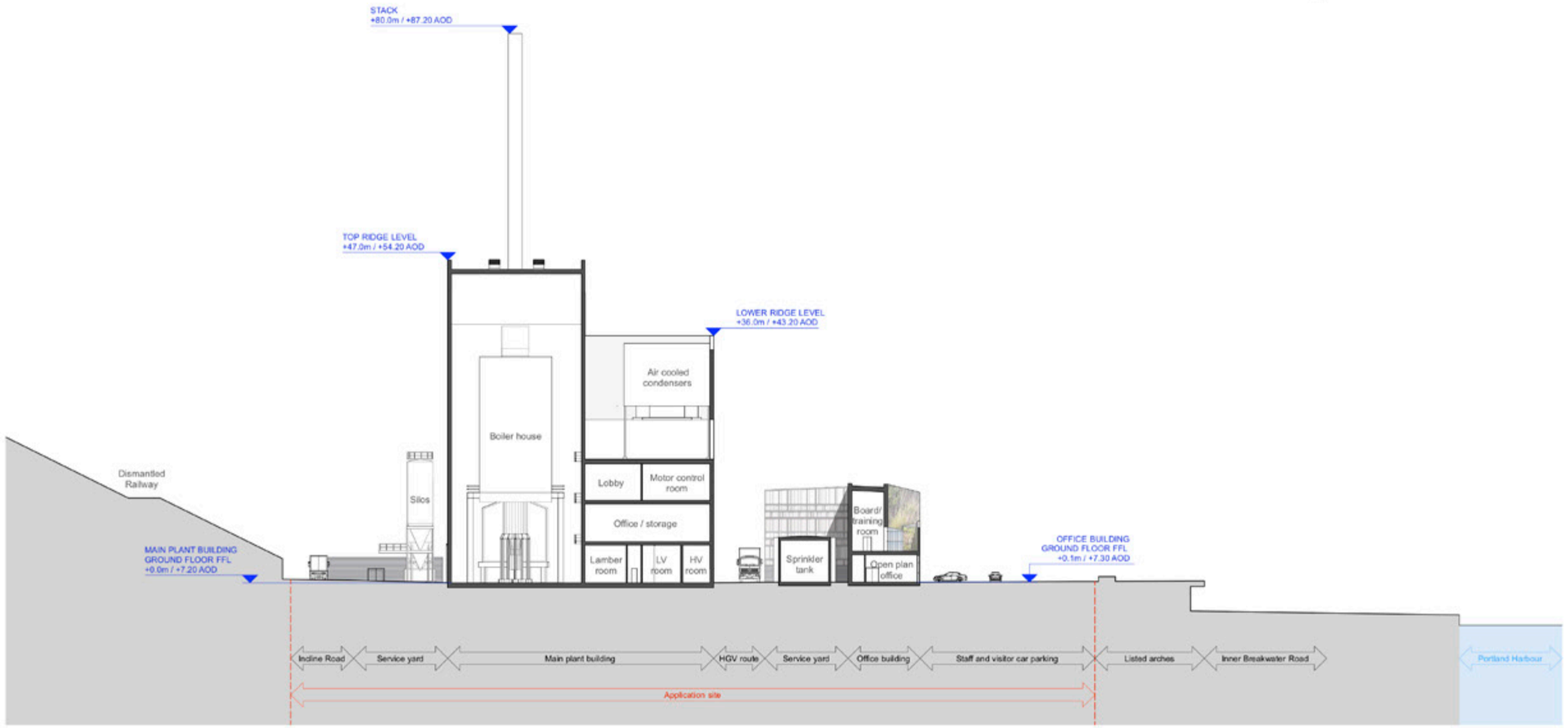
0 10 20 30 M
Scale to be used for planning purposes only

Figure 2.6a Proposed sections through the turbine hall and RDF storage and through the boiler house and RDF storage

POWERFUEL



Section location plan key
NTS



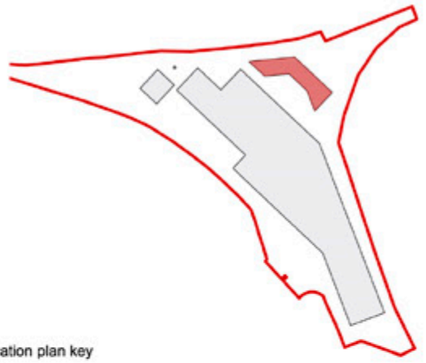
03 Section 03 (Cross section through Main Plant and Office Building)
1:250 @ A1 / 1:500 @ A3

0 10 20 30 M
Scale to be used for planning purposes only

Figure 2.6b
Proposed sections through the main plant and office building

01 Proposed Ground Floor Plan
1:100 @ A1 / 1:200 @ A3

02 Proposed First Floor Plan
1:100 @ A1 / 1:200 @ A3

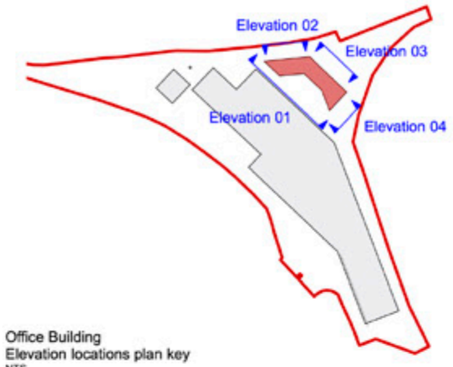


Location plan key
NTS

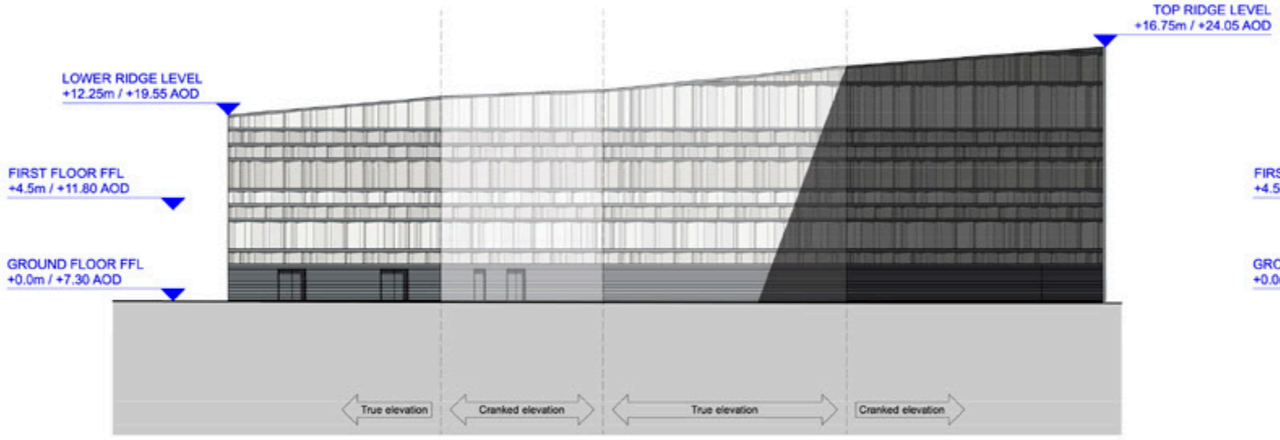
0 2 4 6 8 10 M

Scale to be used for planning purposes only

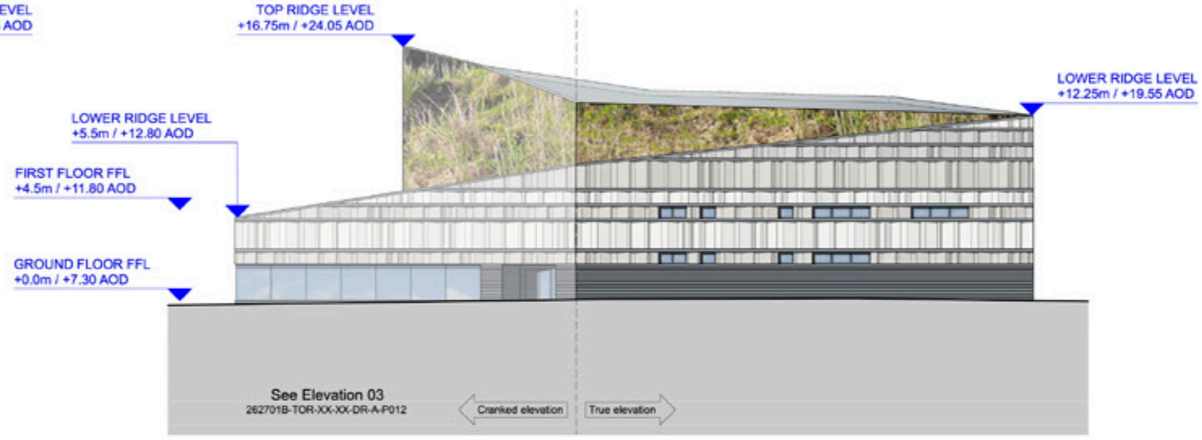
Figure 2.7
Proposed floor plans: office building



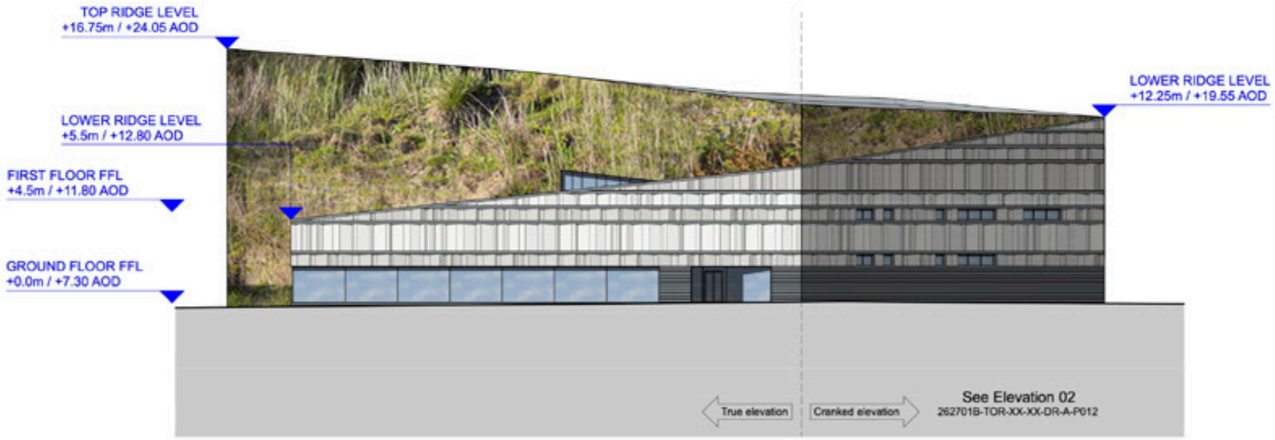
Office Building
Elevation locations plan key
NTS



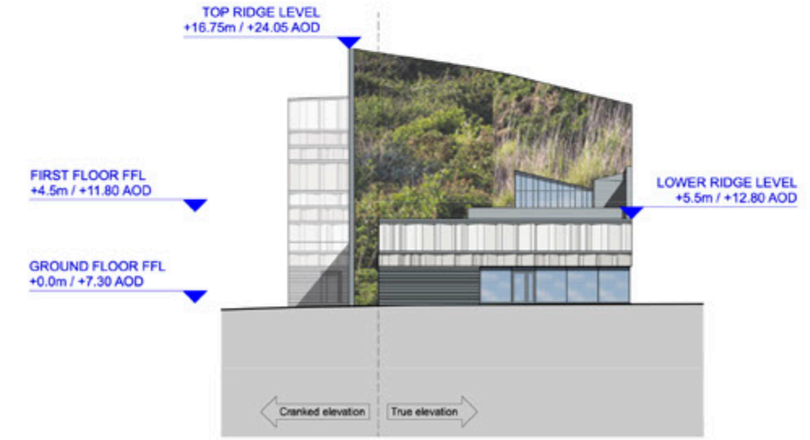
01 Elevation 01 (south-western)
1:200 @ A1 / 1:400 @ A3



02 Elevation 02 (northerm)
1:200 @ A1 / 1:400 @ A3



03 Elevation 03 (north-eastern)
1:200 @ A1 / 1:400 @ A3



04 Elevation 04 (south-eastern)
1:200 @ A1 / 1:400 @ A3

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0 5 10 15 20 M
Scale to be used for planning purposes only

Figure 2.8
Proposed elevations: office building

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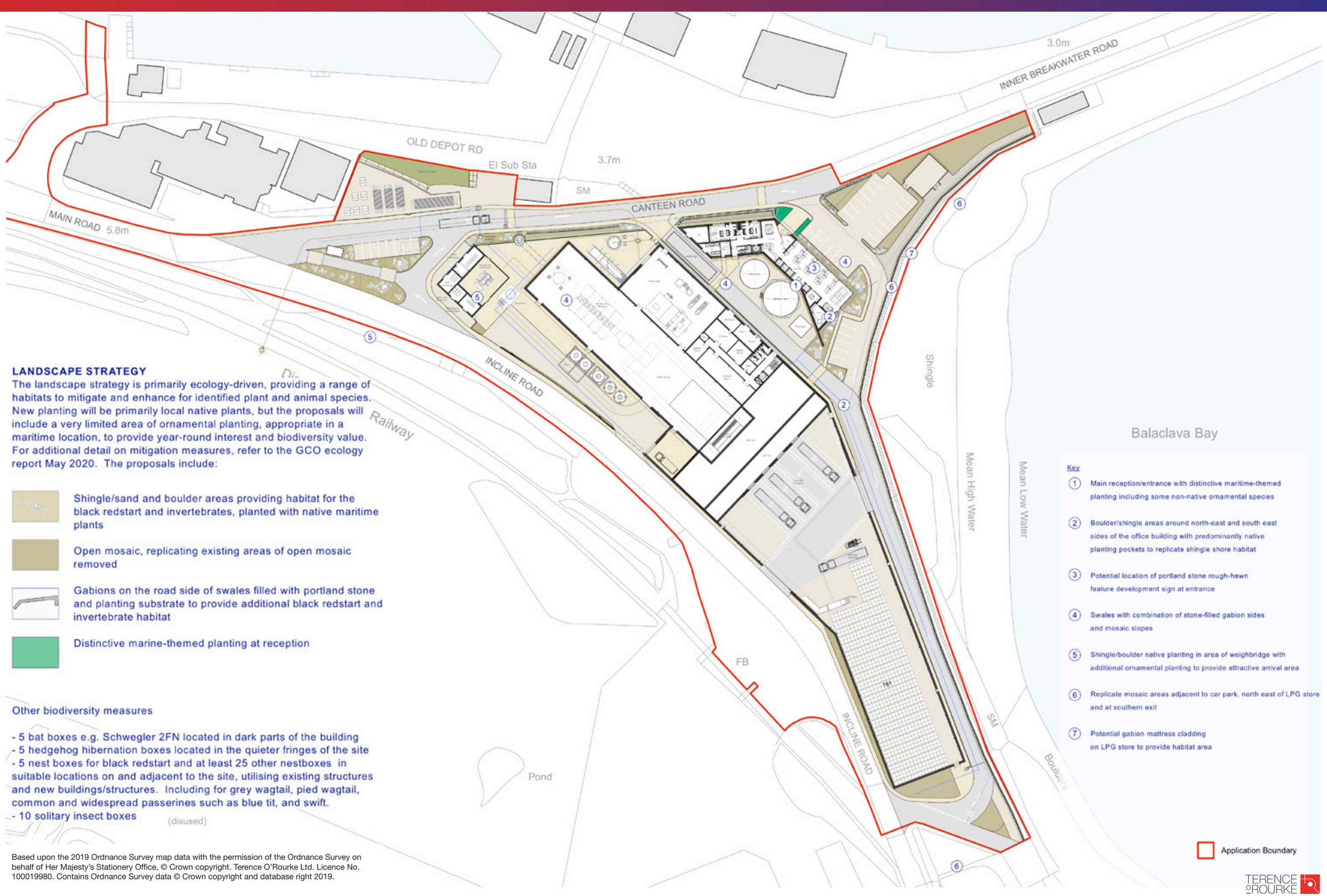
Figure 2.9 Proposed vehicular access arrangements



LANDSCAPE STRATEGY

The landscape strategy is primarily ecology-driven, providing a range of habitats to mitigate and enhance for identified plant and animal species. New planting will be primarily local native plants, but the proposals will include a very limited area of ornamental planting, appropriate in a maritime location, to provide year-round interest and biodiversity value. For additional detail on mitigation measures, refer to the GCO ecology report May 2020. The proposals include:

- Shingle/sand and boulder areas providing habitat for the black redstart and invertebrates, planted with native maritime plants
- Open mosaic, replicating existing areas of open mosaic removed
- Gabions on the road side of swales filled with portland stone and planting substrate to provide additional black redstart and invertebrate habitat
- Distinctive marine-themed planting at reception

Other biodiversity measures

- 5 bat boxes e.g. Schwegler 2FN located in dark parts of the building
- 5 hedgehog hibernation boxes located in the quieter fringes of the site
- 5 nest boxes for black redstart and at least 25 other nestboxes in suitable locations on and adjacent to the site, utilising existing structures and new buildings/structures. Including for grey wagtail, pied wagtail, common and widespread passerines such as blue tit, and swift.
- 10 solitary insect boxes

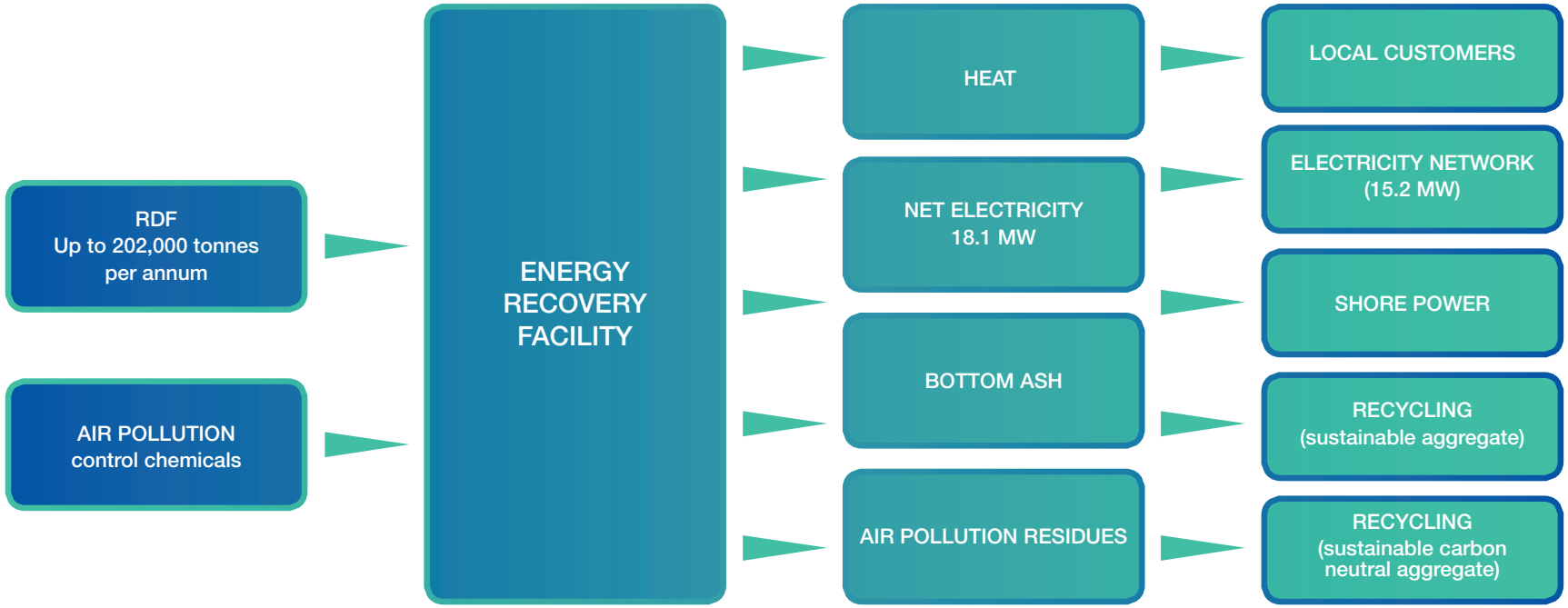
Key

1. Main reception/entrance with distinctive maritime-themed planting including some non-native ornamental species
2. Boulder/shingle areas around north-east and south east sides of the office building with predominantly native planting pockets to replicate shingle shore habitat
3. Potential location of portland stone rough-hewn feature development sign at entrance
4. Swales with combination of stone-filled gabion sides and mosaic slopes
5. Shingle/boulder native planting in area of weighbridge with additional ornamental planting to provide attractive arrival area
6. Replicate mosaic areas adjacent to car park, north east of LPG store and at southern exit
7. Potential gabion mattress cladding on LPG store to provide habitat area

0 10 20 30 40 50 M

Scale to be used for planning purposes only

Figure 2.10
Proposed landscape planting



* Quantity may vary depending upon waste composition

Figure 2.11
ERF inputs flow diagram

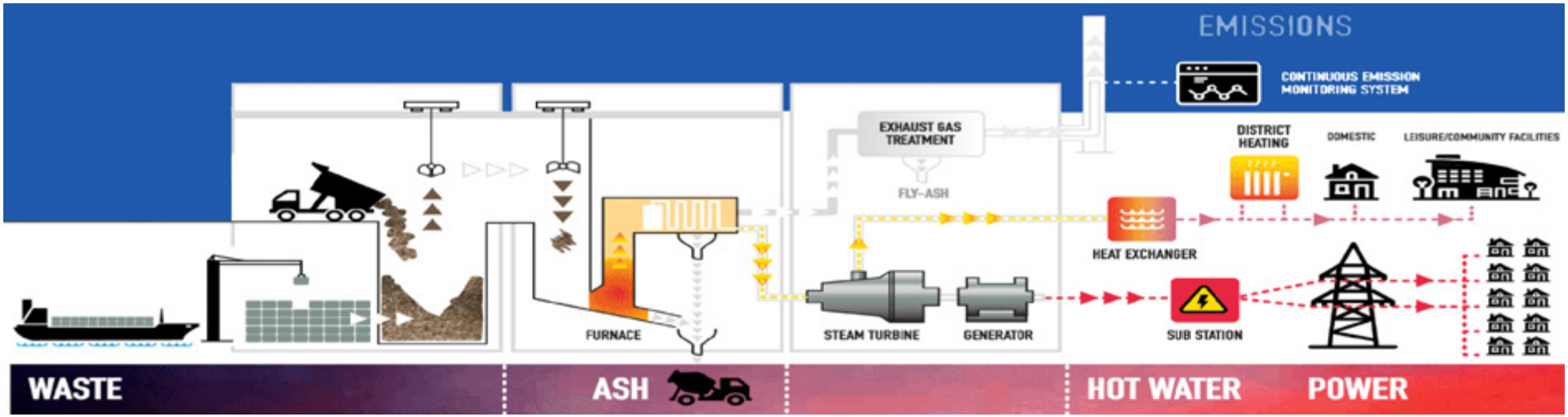


Figure 2.12
ERF process flow diagram