

Design Evolution Document

Tees Valley Energy Recovery Facility

Grangetown Prairie, Dorman Point

Prepared on behalf of Viridor Tees Valley Limited

March 2023

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1.0 DEVELOPMENT OVERVIEW

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1.1 Objectives

This document sets out the design evolution for a new energy recovery facility (ERF) to be located on the Grangetown Prairie site, Redcar. The site is part of the wider South Tees Development Corporation (STDC) Regeneration Master Plan (see later sections for further descriptions of the master plan), and already benefits from outline planning consent (see next page for details).

This document explains the key design decisions, main influences and parameters that have informed and underpinned the solution for the reserved matters application.

1.2 Scope of Application

Viridor Tees Valley Ltd are applying for approval of reserved matters. This includes - details relating to layout, access, appearance, landscape and scale.

The site area is shown highlighted red on the plan and shown indicatively on the aerial image to the right. The full development including, process buildings, ancillary structures such as office/admin building, air cooled condenser, substation, servicing tanks, etc. and all external hard and soft landscaping are included within this area.

The development area is 8.87 hectares (95,5119 ft²).

The building structure footprint (including ancillary buildings) is 24,406m² (26,2704ft²).



Site Location

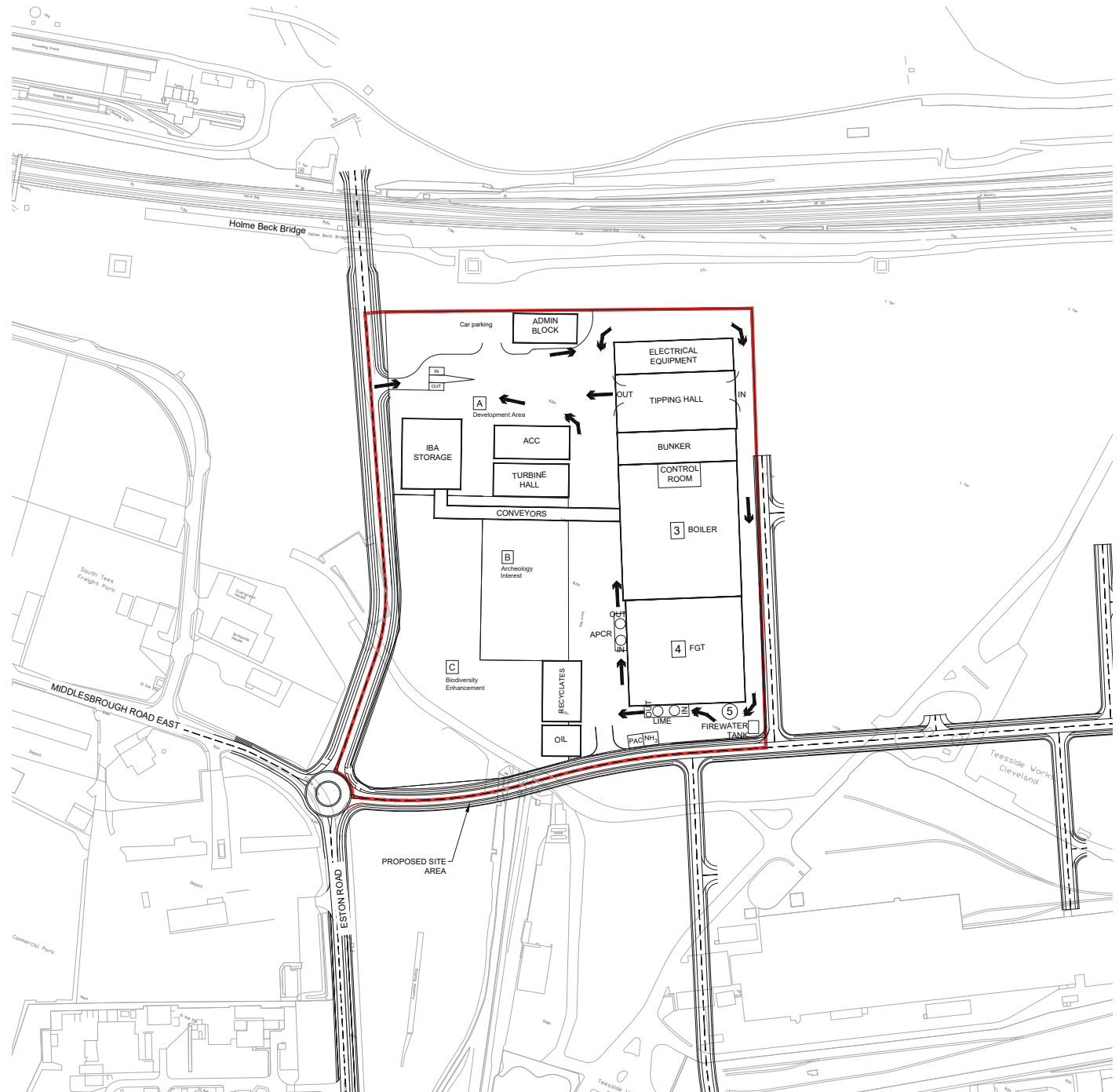
1.0 DEVELOPMENT OVERVIEW

1.3 Outline Planning Permission

Outline planning permission (Ref: R/2019/0767/OOM) for the ERF was granted on July 24th 2020. The adjacent plan shows the layout presented in the outline planning application.

The original constraints of the site are considered throughout the design process. This includes but is not exhaustive of; areas for ecological enhancement, areas of archaeological interest, constraints of the lease boundary being smaller in area to that of the outline boundary, a maximum building height (50 metres) and a stack height (80 metres).

The following sections describes the development of the proposals beyond the outline scheme, explaining the revised site layout and building design.



1.0 DEVELOPMENT OVERVIEW

1.4 Site Location

The site is located on the area know as Grangetown Prairie, Redcar, on land east of Eston Road, within the Dorman Point development parcel forming part of the wider Teesworks area owned by STDC.

1.5 Client Brief

Viridor Tees Valley Ltd. propose to develop and operate an Energy Recovery Facility (ERF).

The ERF approved in the outline permission will have the capacity to manage residual waste and the ability to export power to the national grid.

The facility will operate on a 24 hour / 7 day a week basis with 2/3 shift patterns. Across all shift patterns, the facility would employ up to 54 staff.

Ancillary facilities for use by staff and visitors as appropriate, would include changing rooms, welfare facilities, offices, meeting rooms and a visitor centre.

There will be parking for staff and visitors arriving by car or coach; the provision of electric vehicle charging points as well as covered motorcycle and cycle parking.

The design of the facility has also had to take account of criteria required by the client, which is influenced by the waste contract with the combined authorities, the ultimate customer of the site. These include:

- Strict turnaround times for the waste delivery vehicles
- Welfare facilities to be provided for drivers
- Contract office and welfare facilities

- Automated vehicle recognition technology
- Visitors centre facilities
- EV charging points

This is in addition to the parameters of the outline planning permission in terms of maximum building heights and stack heights.

Initially the design also had to include areas identified for ecological enhancement, archaeological protection and the outline consent also identified access to be in the North West boundary.

The development within Teesworks is also guided by the design guideline that have been produced to ensure design of a particular quality, is compatible with adjacent lots and provides for a consistent approach.

1.0 DEVELOPMENT OVERVIEW

1.6 STDC Design Guide Requirements

Having reviewed the requirements set out in the STDC Design Guide we are confident that the current proposals adhere to the general requirements and aspirations.

We have scheduled the Design Guide requirements below so that these can be considered as appropriate when reviewing the current proposals.

Overview:

The Dorman Point area is scheduled for (amongst other uses) energy generation and waste management zoning.

Gateway plots to have buildings set away from the primary frontages – allowing the areas external to the site to be developed as hub access points to Teesworks.

Reinforcement of primary routes by greening, planting, water management, and habitat creation is encouraged.

Perimeter landscape and boundary treatment to control views and manage impact of large developments on the public realm need to be considered

High quality and well designed industrial district is part of the vision.

More specifically the Design Guide identifies the following parameters as important control measures for forthcoming design proposals:

Plot Arrangement and Access

- Does the plot layout relate well to the surroundings
- Is the plot accessible and easy to move around
- Does the layout and arrangement form a coherent structure
- Separate access points
- Gatehouses

- Secure cycle parking
- Separate pedestrian and cycle routing integrated with public realm
- Easily accessible staff and visitor parking
- Parking segregated from operational traffic
- Large areas of parking to be avoided and broken up by landscaping
- Service and loading areas away from main frontages
- Building orientation to adhere to key axes
- Articulation of key building elements
- Avoid plot over-development
- Accommodate use expansion on plot
- Corner plots to address both frontages
- Car parking to be located away from frontages on gateway plots

Boundaries and Landscapes

- Do boundary treatments relate well to the surroundings
- Do the proposals screen security fencing and areas of open storage from the public realm
- Does the landscape setting enhance the proposed buildings

Building Form and Materials

- Are the buildings and materials functional and attractive
- Are the proposals adaptable and robust
- Expression of building form and massing
- Separate treatment of different functions
- Variation in texture of materials
- Material palette to be appropriate to typology
- High quality durable materials
- Roof forms to offer visual interest and expression of function
- Rooftop plant to be screened on gateway plots
- Glazing to offer views and to relate to key routes

- Glazing / translucent materials can demonstrate functionality
- Entrances to be easily identifiable and expressed through architectural form
- Building features such as external stairs and bridges
- Tall / large structures can be developed as landmark beacons using light and colour
- Limited palette of materials used to create a unifying group

Colour, Lighting and Signage

- Does the proposal create a distinctive sense of place
- Are colours and signage used in a coherent way
- Neutral grey and/or black backdrop with colour reserved for features
- Feature lighting to highlight primary frontages
- Light pollution to adjacent habitat areas to be minimised
- Signage appropriate to scale of building and elevational design
- Signage as part of landscape design
- Large scale 'super' graphics appropriate to large facades

1.0 DEVELOPMENT OVERVIEW

1.7 Fletcher-Rae Design Philosophy

Our aim is to develop a design solution for a large scale industrial process facility that integrates with the Teesworks regeneration area in such a way that it benefits the area in the following ways:

- Provision of process facility containing all required accommodation, equipment, plant and infrastructure within the prescribed development boundary.
- Creation of an iconic development that visually stimulates regeneration of the area and can be seen as an identifying beacon at the western edge of Teesworks.
- Create a comfortable fit of the large building mass with potentially smaller surrounding developments all working in visual harmony; adhering to maximum building and stack heights as stated in the client brief.
- Siting of the development to facilitate connection to the existing power grid network for transfer of surplus generated energy.
- Development of a site layout that can operate within the strict turn around times for tipping vehicles, making the site efficient and effective.
- Integration of the building design and site landscape with the wider landscape and developing area of regeneration.
- Offer educational opportunity that demonstrates the waste management process and the wider benefits.
- Creation of a design solution that achieves the aspiration set out in the STDC Design Guide for Teesworks.

1.8 Design Team

Client:	Viridor Tees Valley Ltd.
Architect:	Fletcher Rae (UK) Ltd
Planning Consultant:	Terence O'Rourke Ltd
Landscape Architect:	Terence O'Rourke Ltd
Process Engineering:	Fichtner Consulting Engineers Ltd.
Planning Authority:	Redcar & Cleveland Council

1.0 DEVELOPMENT OVERVIEW

1.9 Design Strategy

In order to meet the parameters set out in the Client Brief, Design guidelines and our Design Philosophy the design solution aims to achieve the following criteria:

- Location of the main building back from the southern boundary of the site with all buildings pushed back from the south western approach to Teesworks
- Pushing the main body of the building into the site away from the primary frontages
- Positioning of the main stack in the north eastern corner of the site
- Location of the Turbine Hall and transfer substation in proximity to the external offsite grid connection position
- Positioning of the raised ACC units away from the main site frontages and more sensitive noise receptors
- Incorporation of onsite sustainable drainage solutions
- Provision of dedicated areas for education and learning that are safe to access and allow first hand viewing of the waste management process taking place on site
- Provision of a specific design response that addresses all of the key requirements set out in the STDC Design Guide
- Integration of effective landscaping that is part of the overall site design and creates positive integration of the site with the overall Teesworks redevelopment area
- Separation of operational vehicles from staff and visitor private vehicles at the earliest opportunity within the site area
- Containment of waste vehicle queuing within the site and off the public highway
- Clear and safe onsite traffic management flow that directs staff and visitors to a safe parking location away from operational traffic routing

To enable us to achieve the above targets we have considered and reviewed multiple design options both with regard to the site layout and the building positioning, and also the conceptual architectural massing for the building with consideration of how each concept would be perceived from differing viewpoints.



2.0 CONTEXT & CONSTRAINTS

2.1 Wider Context

The STDC Regeneration Master Plan provides details of the history of the Grangetown Prairie site which has a long history of iron and steel works. The site is situated within an industrial area and was once extensively occupied with buildings and freight rail infrastructure associated with such works that were cleared in the 1980's.

Former uses included the Cleveland Iron and Steel Works, where the heavy end operations (coke ovens, iron making and steel making) were located along the western periphery of the site, with mills dominating the central and eastern zones. The Torpedo Ladle Workshop was previously home to open hearth furnaces.

Industrial heritage



Potential Development Illustrative Plan



site location

2.0 CONTEXT & CONSTRAINTS



Redcar Blast Furnace



Redcar Coke Ovens



Redcar Sinter Plant



Steel House



Lackenby Steelmaking Complex



Torpedo Ladle Workshop



Pulverised Coal Injection Plant at Redcar Blast Furnace



South Bank Coke Ovens



Redcar Materials Handling

2.0 CONTEXT & CONSTRAINTS

2.2 Existing Site

The site is relatively flat brownfield land and was once dominated by industrial buildings at the heart of the steel making industry on Teesside. This site itself has been cleared. Some industrial buildings / plant still surround the Grangetown Prairie site to the south, east and western boundaries. Initially in the design process, the site was also to provide an ecological area and an area set aside to provide archaeological protection to, what was thought to be, important foundations to the original blast furnaces. After remediation and proposed off site ecological compensation, neither area is now required.

2.3 Immediate Site Context

The Torpedo Ladle Workshop, as shown on the adjacent aerial photographs, was located to the south of the site. This building has since been demolished. Lackenby steelmaking complex is situated to the east. South Tees Freight Park lies to the west. South Bank Coke Ovens are located to the north east.

The site is well defined by existing infrastructure corridors such as the Tees Valley Railway Line, which runs along the north of the site, beyond which is an existing landfill and waste management facility. The A66 is located south of the site. A national walking/cycle route follows the route of the rail line adjacent to the north of the site.



Site Location
Design Evolution Document



View across STDC to North Sea

2.0 CONTEXT & CONSTRAINTS

2.4 Site Analysis - Opportunities & Constraints

The following list of site constraints were considerations on the design development. Whilst not always seen as being ideal in aiming to optimise a development, the constraints do create a specific solution bespoke to the site. We believe that all known constraints have been successfully considered and the design proposals developed as a positive response to these parameters. Through the course of the design development some of these constraints have been removed.

- Retention of the existing archaeology area incorporating the original Bessemer boilers for the steel smelting process (this was an original requirement that over the design period is no longer applicable)
- Provision of extensive ecological enhancements (this was an original constraint that over the design period is no longer applicable)
- Access into the site from the south west corner within the extent of now constructed public highway (the original concept located the access to the northwest corner due to site constraints which has since omitted)
- Sustainable drainage system to connect to the relocated Holme Beck along the western boundary
- Electrical grid connection to the external infrastructure at the mid-point of the northern boundary
- Containment of the buildings and site road infrastructure within the overlap of the Outline Planning permission red line boundary and the reduced development boundary
- Location of the ACC units at the northern end of the site away from more sensitive receptors
- Location of the main stack in the north eastern corner of the site

- Site access point
- Existing access roads (indicative)
- ⋯ Future access roads (indicative)
- ||||| Railway line
- STDC Area boundary
- Application boundary
- Area of archaeological interest (now no longer needed)
- Area for ecological enhancement (now no longer needed)
- National footpath
- Development Boundary
- - Outline Boundary



3.0 THE TECHNOLOGY SOLUTION

3.0 THE TECHNOLOGY SOLUTION

3.1 The Process Technology

The project involves the development of a new residual waste treatment facility which will process non hazardous residual waste materials which will be diverted from landfill. The technology is a specific linear process with particular requirements on internal site circulation, building form and scale to fully enclose the technology.

Raw materials are delivered into an enclosed tipping hall and fed by crane grab from a bunker into the hopper. Waste is fed into the moving grate furnace, where it then combusts at a minimum of 850 °C. The heat given off is used to generate steam through a pipe circulation system. The boiler is generally the largest component in height of the overall development.

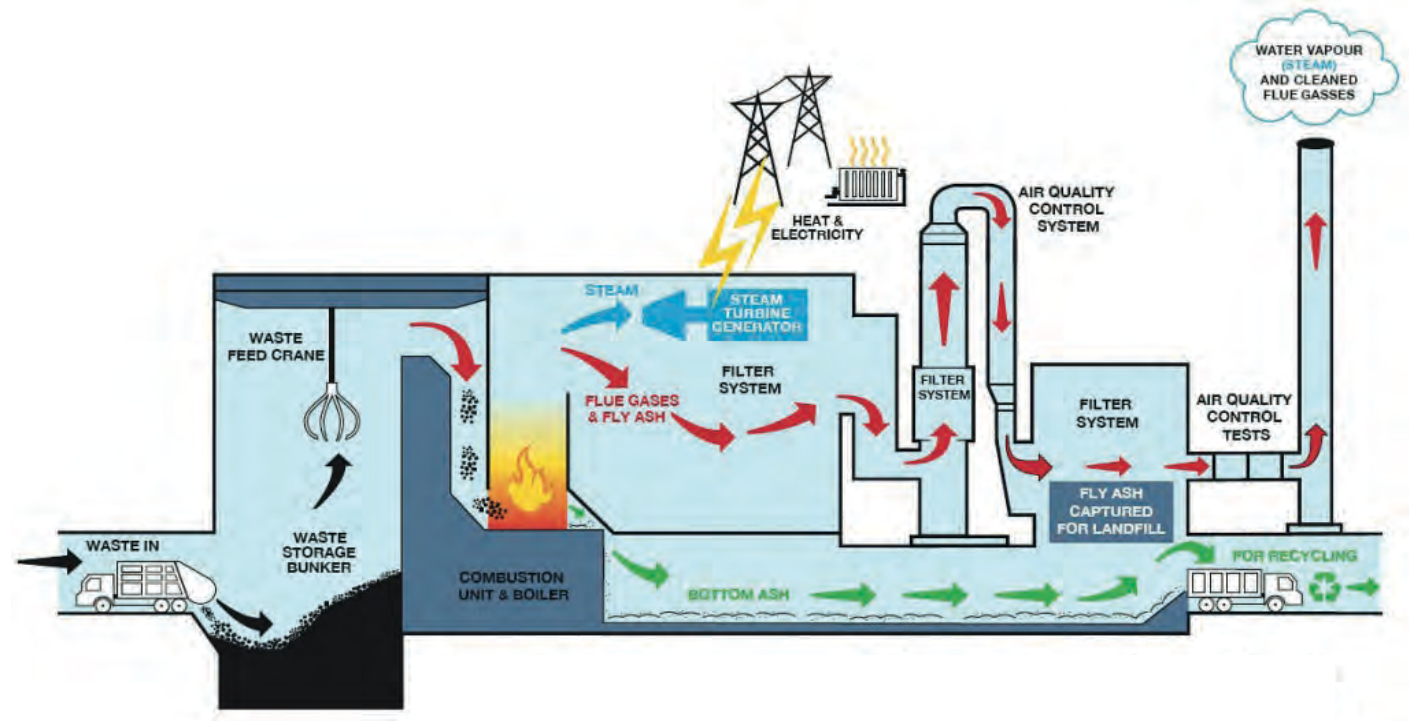
The steam is fed to a turbine in a turbine hall which generates electricity. Some of the electricity is used to operate the plant, the rest is fed to the local electricity distribution network. A heat off-take system will allow heat to be exported to off site users for heating, cooling or in manufacturing processes.

The ash which remains following the combustion of the waste (Bottom Ash) would be collected and transferred off site to enable it to be used as an aggregate in road construction and/or concrete block manufacture.

The flue gases are passed through a series of chemical treatment and filtration processes before passing to the external flue stacks. The flue gas treatment is a well proven technology that operates high standards of efficiency. Flue gases are constantly monitored and regularly checked by the Environment Agency.

The stacks are the tallest component of the development. Based on local air dispersion models the stack will be 80 metres high, as allowed for in the outline planning permission.

Externally there are associated air cooled condensers, water tanks, switch gear compounds, water and filter tanks which require access to the entire perimeter of the building.



3.0 THE TECHNOLOGY SOLUTION

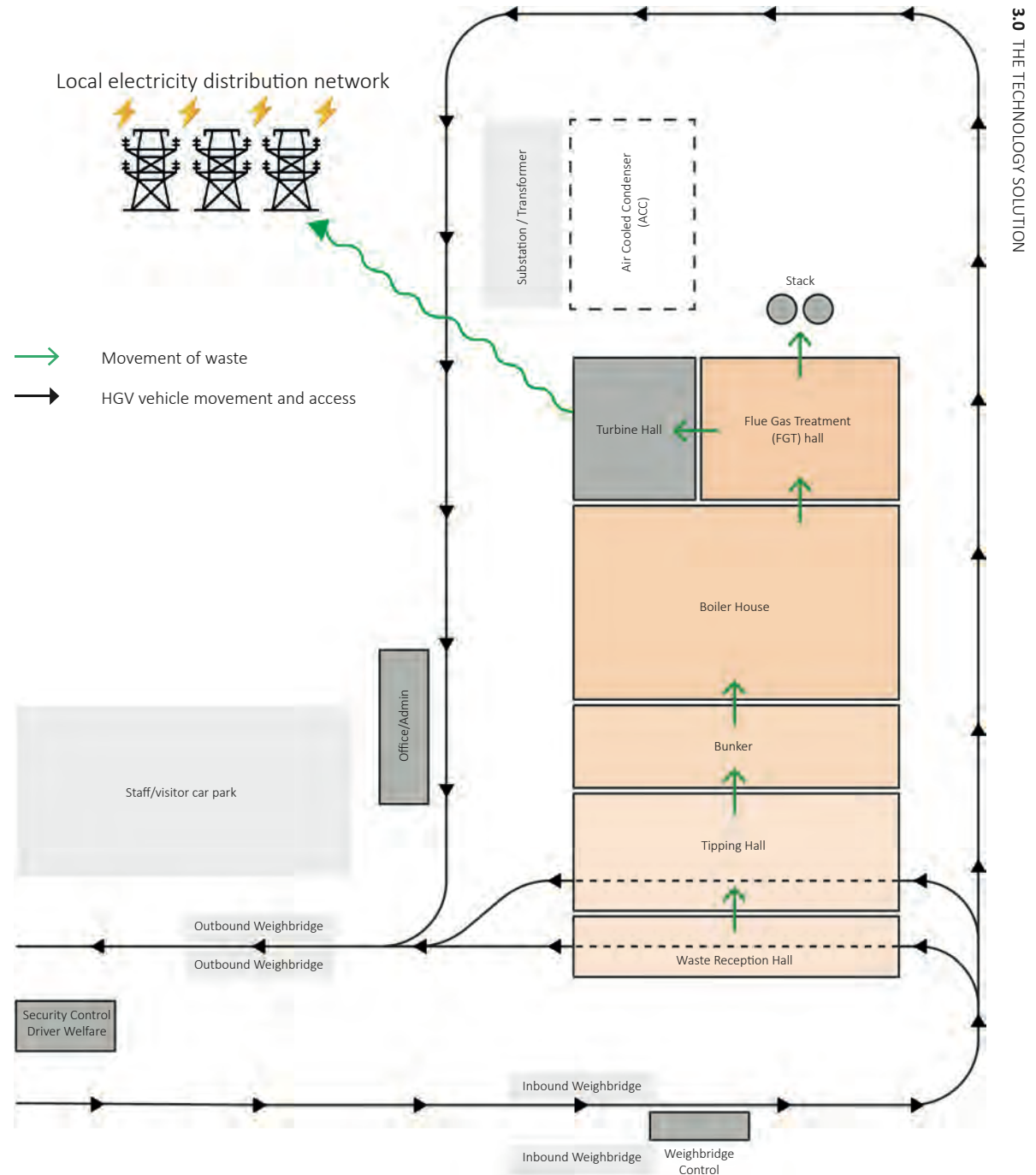
Ancillary functions such as offices and visitor access require careful segregation from the operational functions of the facility.

Considerations regarding technology solutions generated some specific benefits to the potential design solution. Viridor agreed at an early pre-design stage to accept certain principal technology considerations in order to mitigate development impacts as a result of the contextual analysis;

1. The tipping hall was to be at ground level with the waste bunker excavated into the ground. This limits visual impacts in comparison to a design with an elevated tipping hall which would have increased the building height and included vehicle ramps, and supporting structures.
2. It was recognised that a twin line solution rather than single line for the same capacity would produce a more effective and compact, lower building height and optimise site utilisation for building, site circulation and hard standings.
3. The two stacks were to be of a clean and proportionate form without significant visible structural support and gantries. An overall stack height of 80 metres was determined by an air dispersion modelling exercise for this specific location, and governed by the outline planning permission.

3.2 The Plan

The diagram adjacent illustrates the proposed waste treatment facility arrangement (not to scale).



3.0 THE TECHNOLOGY SOLUTION

3.3 Height and Volume Requirements

The clear internal heights for each area of the building are based on the detailed process engineering plant requirements established from the Team's experience and knowledge on projects of this nature.

The heights allow for the plant to be constructed simultaneously with the building and also for future maintenance to be undertaken.

3.4 Ancillary Facilities

The bulk of the process equipment is contained in the main building. There are a number of ancillary structures that support the process and services requirements external to the main building, but all aspects of the process are contained within the secure site.

These facilities include the following:

- Sub-station and transformer compound
- Security gatehouse(s)
- Office/Admin building
- Outage village area
- Cycle and motorcycle shelters
- Office waste collection area
- Electrical vehicle charging points
- Weighbridge gatehouse
- Fire water tank and pump house
- Emergency generators

4.0 ORIENTATION & COMPARATIVE IMPACTS

4.1 The Key Viewpoints - Existing

A site visit was undertaken to capture a number of photographs of the site from the surrounding landscape, to provide a greater appreciation for the context of the site. An extensive impact study was included in the outline planning application, which demonstrated the low level impact of the development on the surrounding landscape.

Here, four principal viewpoints have been chosen to test the proposals during various stages of the design process.



4.0 ORIENTATION & COMPARATIVE IMPACTS

4.2 Operational Organisation - Layout

Whilst a north/south orientation had been approved as part of the outline planning consent, further options were tested in order to arrive at the most suitable solutions. As a result, an east/west orientation was also developed. 3D modelling was used to further investigate the merit of each option, taking into account the street-view impact and general massing.

Archaeological Constraint

During the early design stages, all plan options addressed the archaeological constraints on site.

A Historic Environment Desk Based Assessment was undertaken in November 2019 by Robin Daniels of Tees Archaeology. The assessment identified that although the site has been cleared of structures and plant of the more recent steel works, a number of features relating to the previous use of the site and more significantly the bases of the Bessemer Blast Furnaces are intact, including their related hot air stoves, cooling towers and related equipment.

The assessment concluded that the surviving bases of the late 19th and 20th century blast furnaces should be retained on site and consideration be given to their proper preservation and interpretation. Recommendations were provided within the assessment which included further archaeological works including surveys, trial trenches and monitoring.

The design and layout of the proposed ERF was initially strategically sited to avoid disturbance of the remains, and the setting aside of this area as a 'heritage gain'.

Ecological Enhancement Area

Within the outline consent, another area was also identified and safeguarded for ecological enhancement. This is shown on the far adjacent diagram. Both the archaeological and ecological safeguarded areas in the original outline consent are no longer required, but these heavily influenced the initial design parameters.

The outline consent also indicated access was to be from the north western boundary, but this also changed to be from the south western boundary due to external road design.

- Area of Archaeological interest
- Ecological Enhancement Area

Option 1: North/South orientation



Option 1: East/West orientation

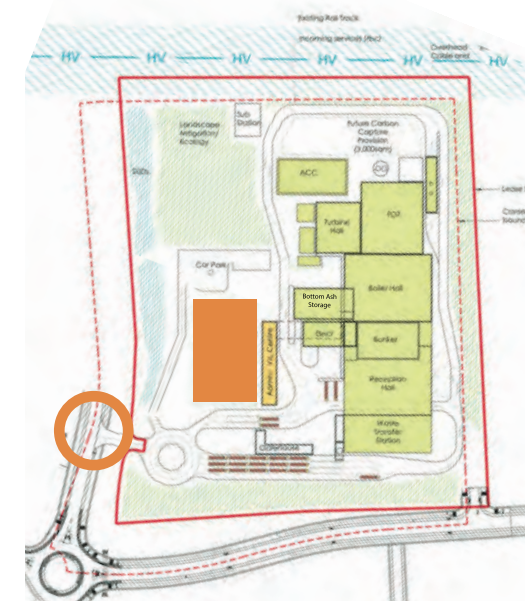
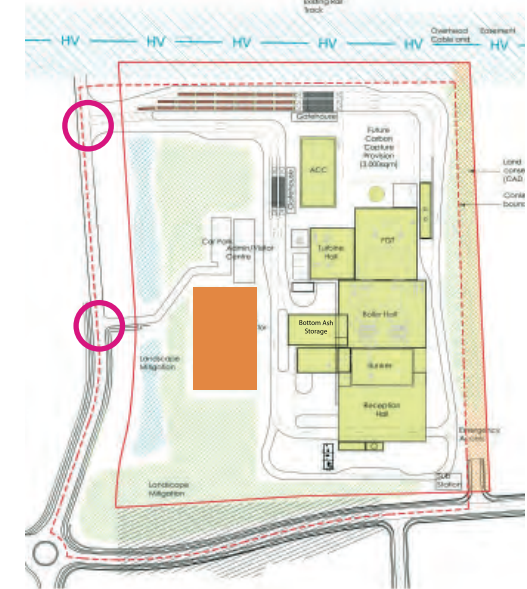
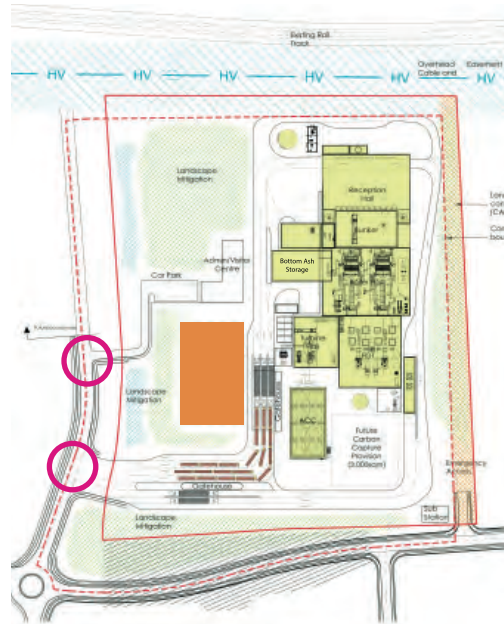


4.0 ORIENTATION & COMPARATIVE IMPACTS

With the involvement of both the design and operations team, yet more layout iterations were developed. The plans adjacent, show the various options, exploring both east/west and north/south orientations, with shared or separate vehicle access points (for on site vehicle circulation considerations). Each option also included a suitable amount of landscaping to the site, to soften the impact of the proposals.

Following feedback from the wider team, the north/south orientation (with the stack adjacent the existing railway line) was preferred, for further design development.

- previously advised area of archaeological interest
- Separate vehicle access point
- Shared vehicle access point



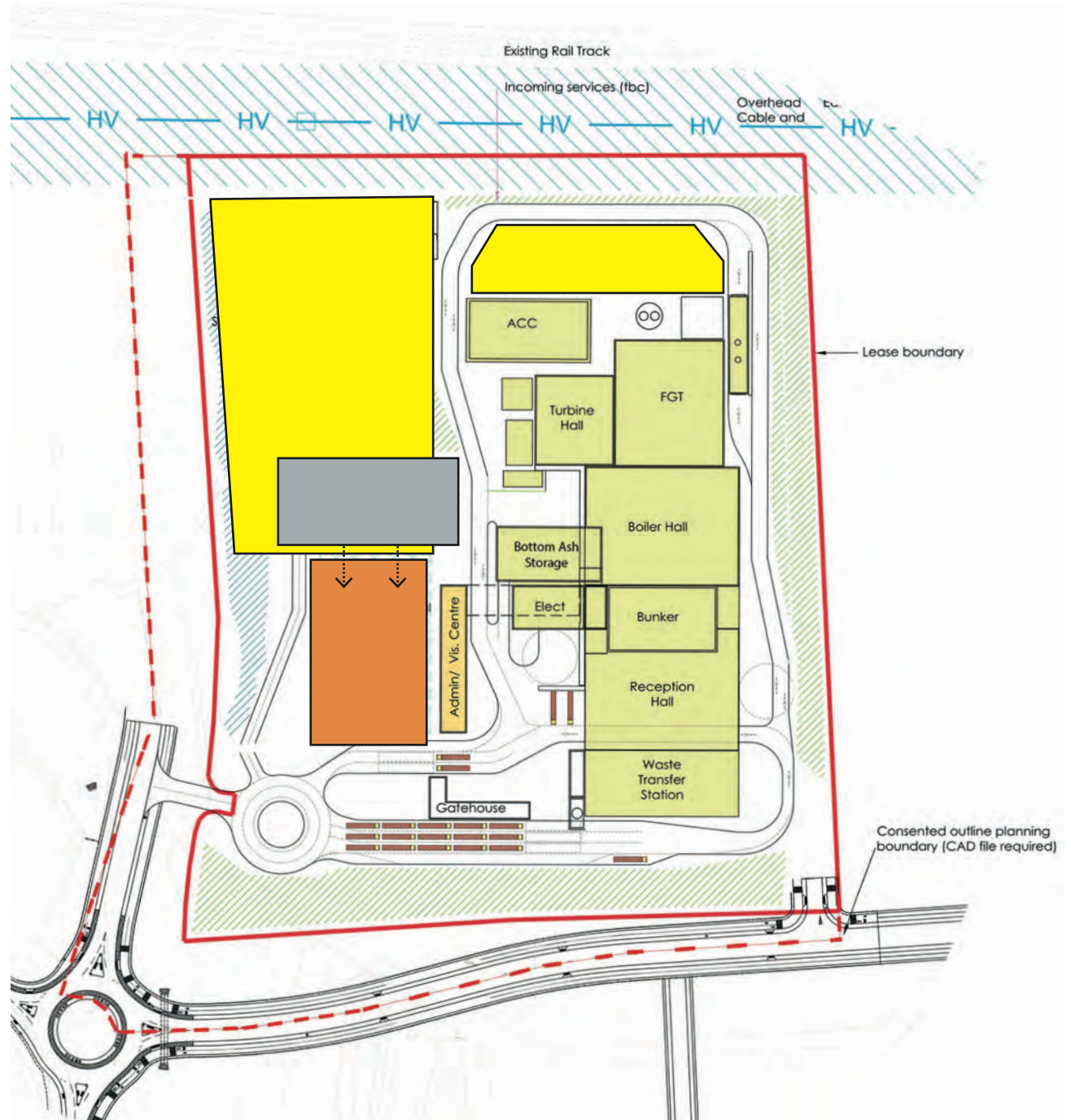
4.0 ORIENTATION & COMPARATIVE IMPACTS

4.3 Future Capacity

As stated above, following further surveys and investigation, it was deemed that the area of archaeological interest could be developed as the archaeological significance of the blast furnace foundation was no longer considered suitable for insitu preservation. Similarly the ecological area was also no longer needed to be specifically used for this purpose. As such the layout underwent further adjustments. The plan diagram adjacent, explains the former area of archaeological interest becoming occupied by the staff/visitor car park.

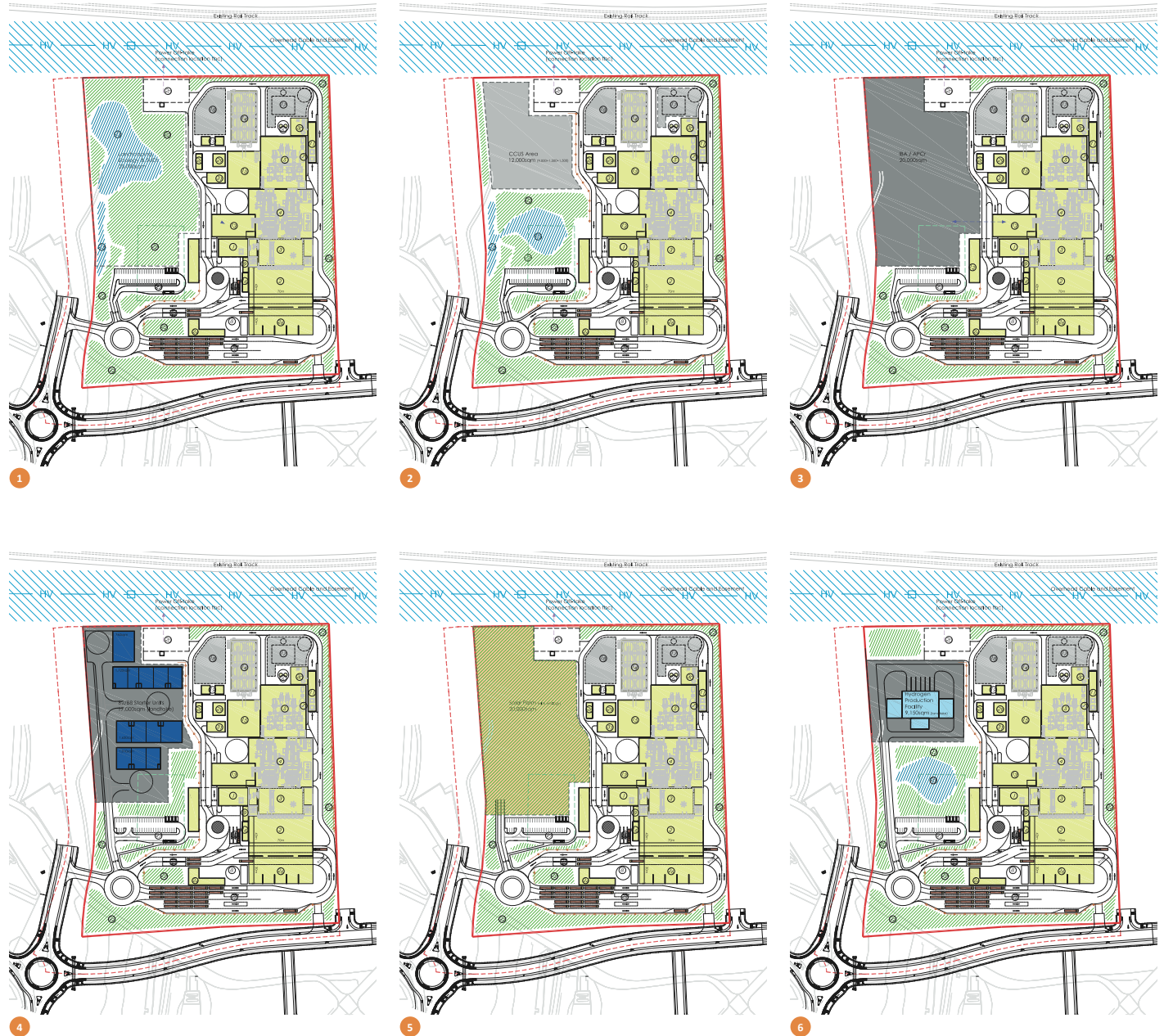
As a result, the area highlighted in yellow would offer sufficient space for future site expansion, such as carbon capture. It was decided that the CCUS (carbon capture) potential was of greater importance for the future of the development than other suggested uses. As a result this space remains as a safeguarded area. The following page depicts the various options tested on site, for design team feedback.

- Area of archaeological interest
- Area for future expansion
- Proposed staff/visitor car park location
- Historic lease boundary
- Outline planning boundary



4.0 ORIENTATION & COMPARATIVE IMPACTS

In total, six future use options were explored (see below for key), before settling on the most appropriate solution at this moment in time, as deemed by the wider design team and client - Carbon Capture Usage & Storage (Option 2- CCUS).



- 1 Landscaping, ecology & SUDs
- 2 CCUS area
- 3 Bottom Ash / APCR
- 4 B2/B8 starter units
- 5 Solar farm (with ecology)
- 6 Hydrogen production facility

4.0 ORIENTATION & COMPARATIVE IMPACTS

4.4 Chosen Orientation

The location of the tipping hall to the south of the development plot benefits the scheme by reducing the visual impact of the stack on the STDC development at the same time places the externally mounted ACC's and associated external process equipment to the north to further reduce the visual and acoustic impacts at the site entrance.

This arrangement presents a major benefit to the proposals by placing the tipping hall and weighbridge in close proximity of the site entrance. This minimises the time spent on site by the waste vehicles reducing the on site travel distance.

Separation of commercial vehicles from staff & visitors plays a pivotal role in the safe organisation of the facility. At the site entrance operational vehicles are separated from the staff & visitor traffic. The staff & visitor car park is located to the immediate north of the site roundabout and west of the Office & Administration block.

Space to the north of the car park and west of the main facility is made available for the future provision of carbon capture.



Proposed site plan diagram

5.0 DESIGN DEVELOPMENT

5.0 DESIGN DEVELOPMENT

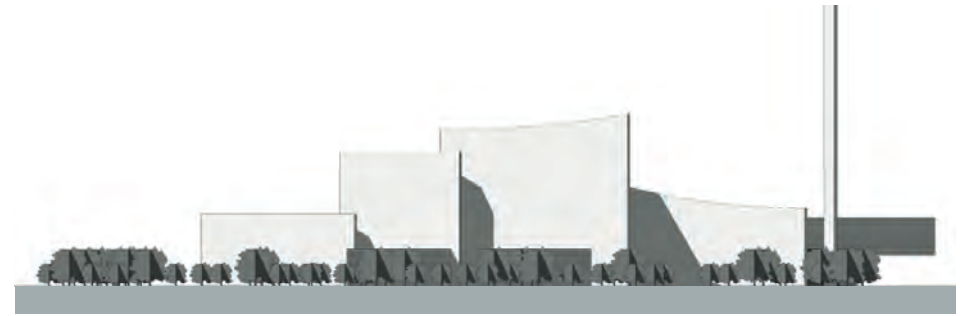
5.1 Form Options

While it can be acknowledged that the overall massing and form of the process is very prescriptive, how the process is enclosed influences the overall visual impact of the proposals.

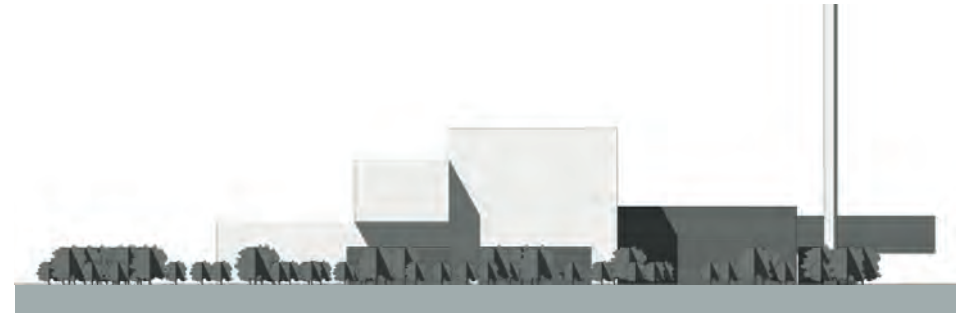
Various alternatives of form where explored.

- “SHIELD”** Articulating the component parts with three dimensionally curved walls.
- “STACKED”** Expression of form using simple articulation of massing, overhangs and projections.
- “WALL”** Strong emphasis towards a single element to provide design separation.
- “WAVE”** Cloaking of the massing to express the linear progression of the process.

‘SHIELD’



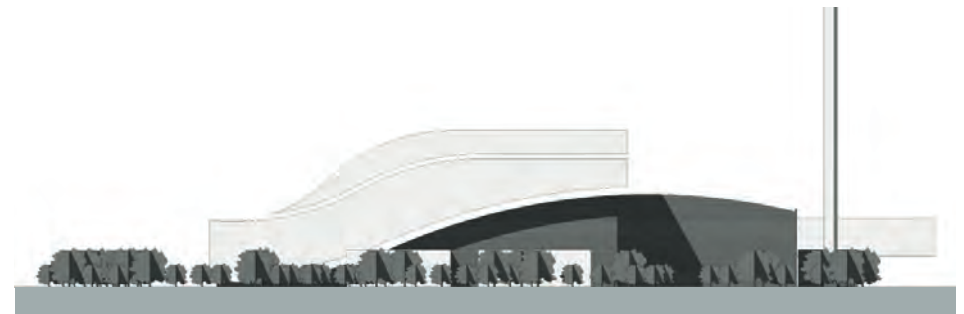
‘STACKED’



‘WALL’



‘WAVE’

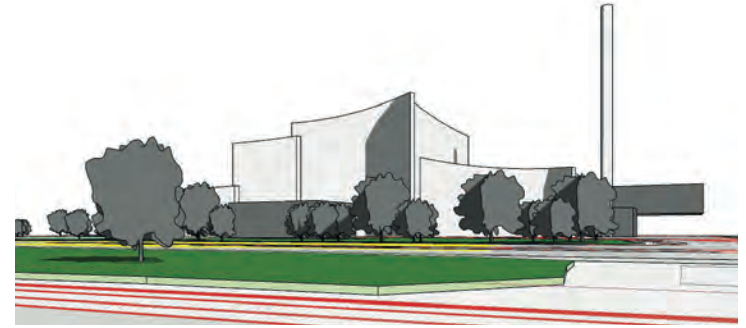
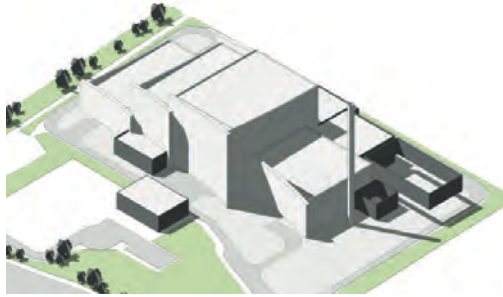


5.0 DESIGN DEVELOPMENT

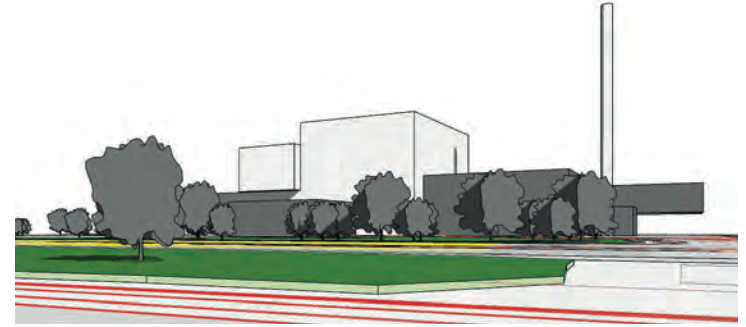
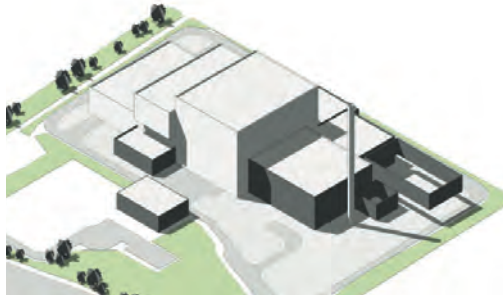
The various options were developed in 3D to understand their overall form and impacts on their surrounding context.

The design approach offered by the “stacked” option and the “wave” form present a reduced visual impact when viewed from both close and distant visual receptors when compared with the other design alternatives, and as such it is these two options that were chosen for further design development.

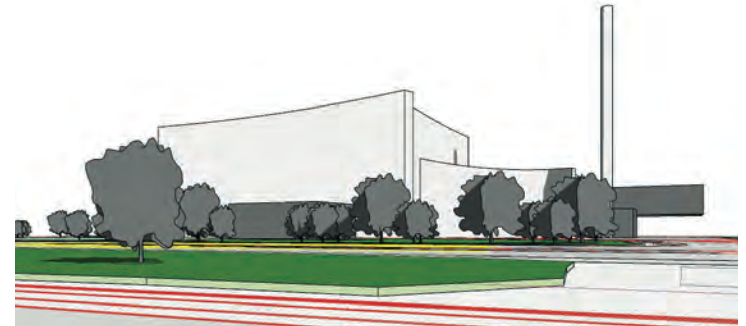
‘SHIELD’



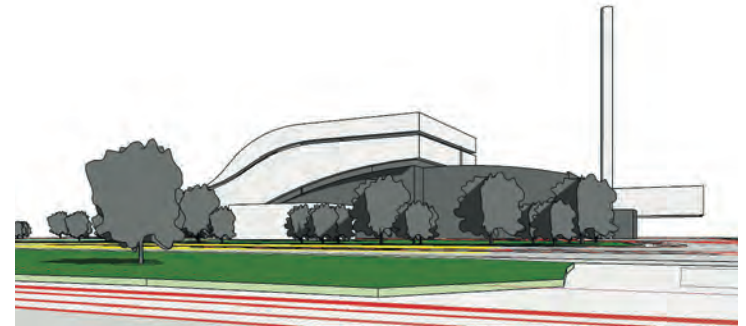
‘STACKED’



‘WALL’



‘WAVE’



5.0 DESIGN DEVELOPMENT

5.2 Form Development

The following pages explore two preferred form options in greater detail.

Stacked Form

This concept articulates the overall mass of the building into fragmented components in a manner that is as true to the individual element volume as possible. The strength of the concept then comes from how a limited palette of materials and the overhang is used to emphasise this fragmentation of the holistic form. To maintain control over the multitude of elements the limited material palette application is a key consideration as there needs to be both restriction on the extent of materials used and also not too few materials applied which would otherwise just create a single monolithic volume.

Wave Form

This concept takes the overall building profile defined by the individual volumes and merges specific elements in a manner that reduces the extent of fragmentation utilised in the Pure Form concept. The application of the limited palette of materials is further assisted in this concept through the development of specific larger merged forms that allow the building functionality to be visually integrated, specifically in relation to the linear articulation of the waste management process.

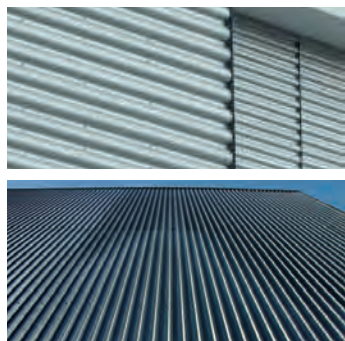
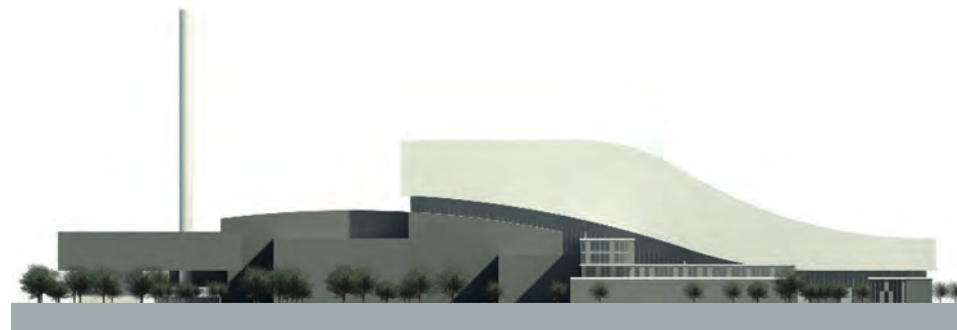
palette



Stacked Form



Wave Form



5.0 DESIGN DEVELOPMENT

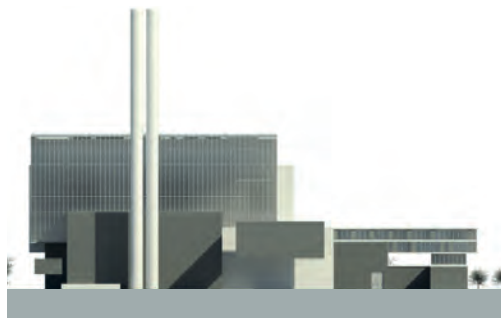
Key views were considered for the preferred options to assess the visual impact of both designs to establish how each option respond to their context.

The “stacked” option increasingly presented a reduced visual impact to that of the “waved” form.

It was established that separating the mass of the Bunker and the Boiler Hall as described in the “stacked” option presented a far less imposing visual response. This fragmentation helped to break down the overall mass and form of the building to express the component parts of the process honestly.

The amalgamation of the Bunker and Boiler Hall in the “wave” form created a more imposing mass leading to a convoluted understanding of the process within.

For these reasons the “stacked” option was taken forward for further refinement.

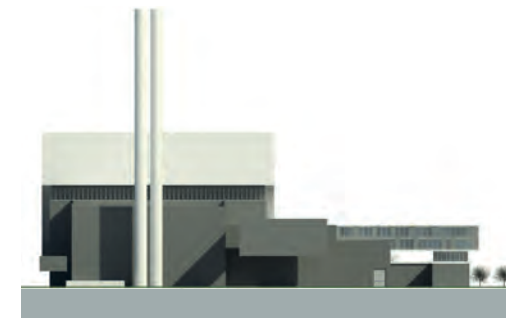


North Elevation



South Elevation

Stacked Form

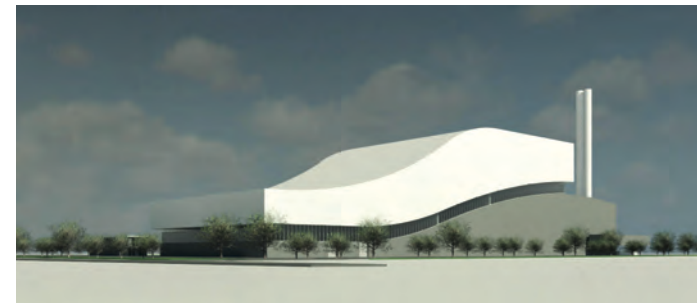
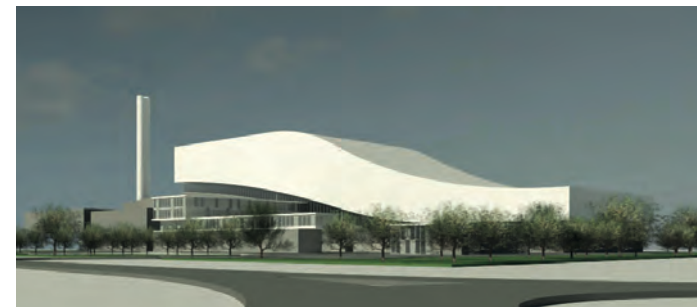


North Elevation



South Elevation

Wave Form



5.0 DESIGN DEVELOPMENT

Consideration has been given to the relationship between the built form and its immediate context to root the proposals in its landscape. This is achieved by linking together the lower elements of the massing using a continuous dark solid material palette.

This plinth becomes the platform from which the larger massing of the Bunker and Boiler Hall sit.

This simple articulation generates an easily digestible combination of building elements, each with its own material palette to further simplify the articulation. The consequence of this is a building that is easy to read as a selection of simple stacked forms sitting on a dark plinth.

The office element expresses itself as a projected form separate from the main mass of the larger ERF connecting back to the control room via an elevation link bridge.

Early development image



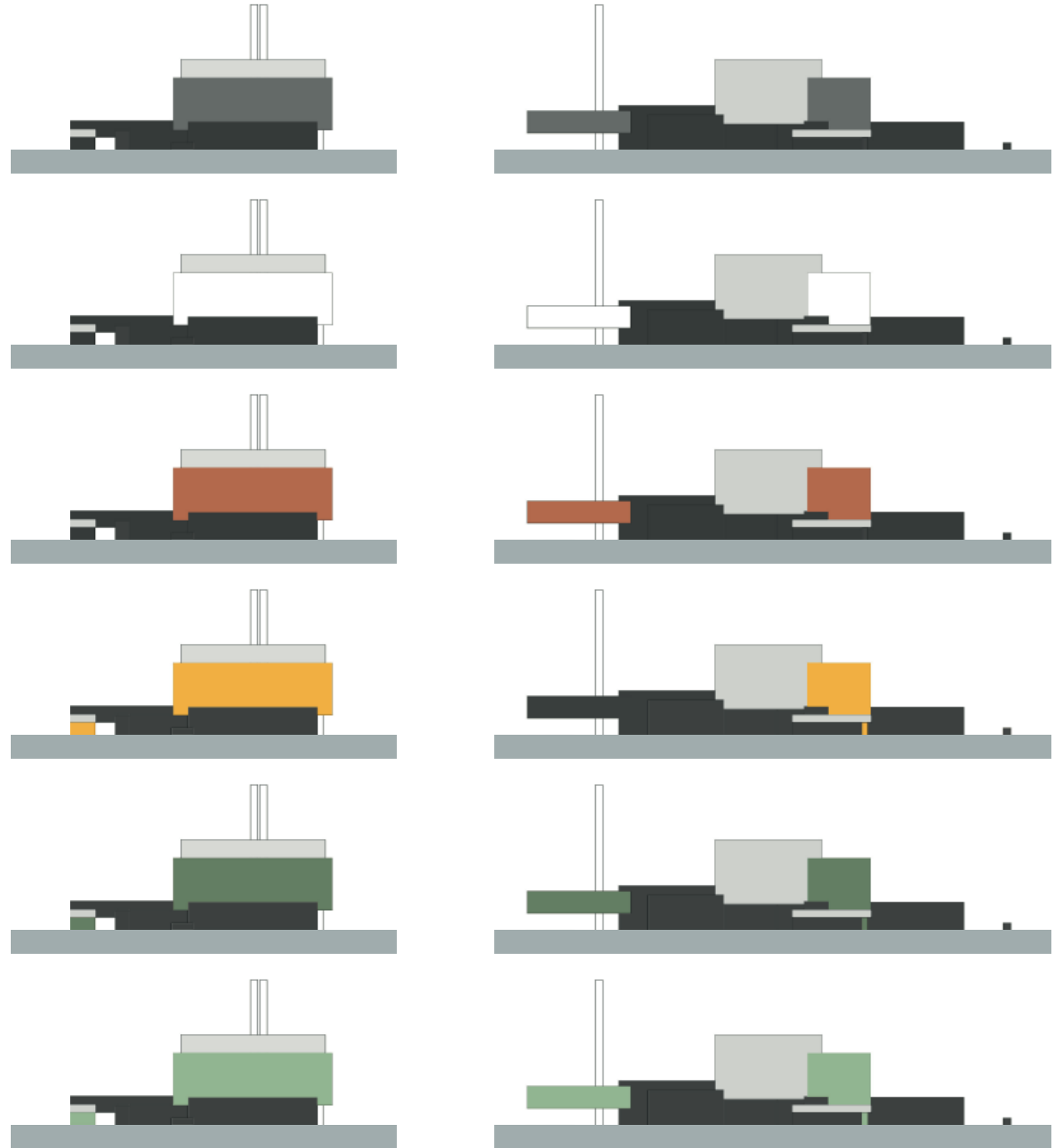
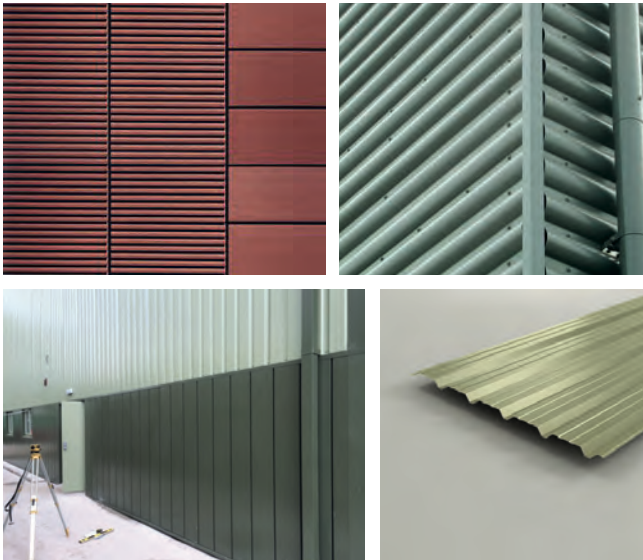
5.0 DESIGN DEVELOPMENT

5.3 Colour & Finish

Exploration in colour and materiality of the building envelope is established to ensure every effort is afforded to create a balanced and coherent design solution.

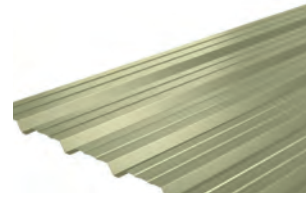
With different combinations of colour and tone layered to throw emphasis to different building elements, the design process begins to establish a hierarchy required to ground the mass of the building. Stronger tones to the tipping hall brings down the visual balance helping to lower the visual centre of gravity. The larger mass of the Boiler Hall can crown the building to sit lightly at its pinnacle.

early development image



5.0 DESIGN DEVELOPMENT

To articulate the Boiler Hall the use of transparency was introduced with the use of polycarbonate panels to oppose the solid monolithic treatment of the bunker.



Subtle changes in colour were challenged through the 3D model. Muted tones responded more favourably than primary colours. It was determined that the muted tonal greys represented a softer palette to assist with the contextual response to the proposals.

White



Moorland green



Terracotta

