Riverside Energy Park

Design and Access Statement

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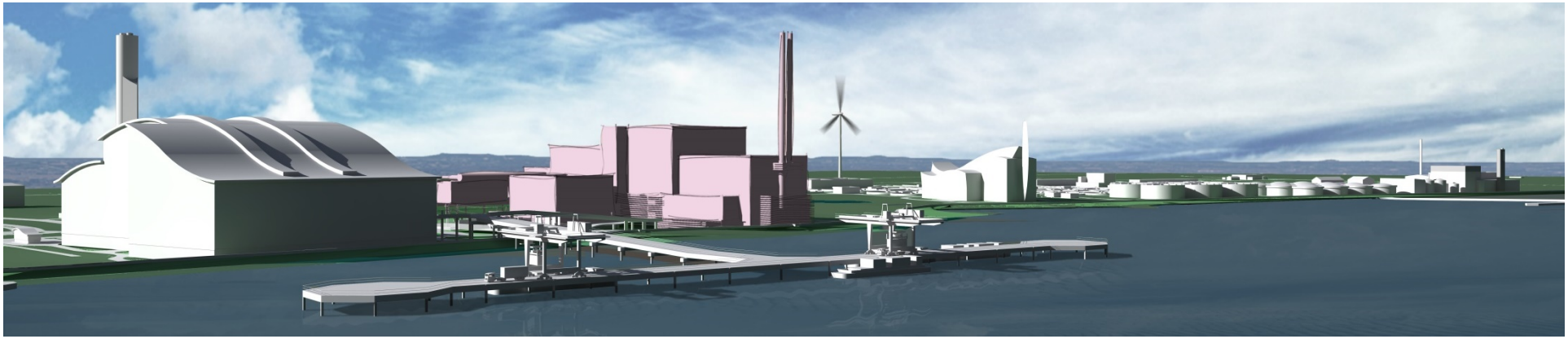
CORY
RIVERSIDE ENERGY



Contents

Summary

This Design and Access Statement (DAS) documents the process which the Applicant has followed to deliver optimum design proposals for the main Riverside Energy Park (REP) building. It includes an analysis of the site context, an appraisal of what informed and constrained the design process to date, and the subsequent evolution of design proposals. The DAS identifies the various factors that were taken into account in arriving at a final building form which, through the application of subsequent Design Principles, will secure the best outcome in respect of mitigating effects on key receptors whilst maximising low carbon energy generation.

1.0 Introduction

1.1 Introduction

Cory Environmental Holdings Limited (trading as Cory Riverside Energy) (Cory or the Applicant) is applying to the Secretary of State under the Planning Act 2008 (PA 2008) for powers to construct, operate and maintain an integrated Energy Park, to be known as Riverside Energy Park (REP). The principal elements of REP comprise complementary energy generating development and an associated Electrical Connection (together referred to as the 'Proposed Development').The Proposed Development comprises:

- REP, located to the north of Belvedere, off Norman Road, in the London Borough of Bexley ('LBB');
- Electrical Connection, running underground between REP and the Electrical Connection Point at Littlebrook substation, Dartford;
- Main Temporary Construction Compound; and
- Other Cable Route Temporary Construction Compounds.

The main elements of REP would be as follows:

- An Energy Recovery Facility (ERF;
- An Anaerobic Digestion facility;
- Solar Photovoltaic Installation;
- Battery Storage; and
- On Site Combined Heat and Power (CHP) Infrastructure: to provide an opportunity for local district heating for nearby residential developments and businesses.

1.1.1 Cory Riverside Energy

Cory is a leading recycling, energy recovery and resource management company, with an extensive river logistics network in London. Cory secured consent for, constructed and operates the existing Riverside Resource Recovery Facility (RRRF) adjacent to the Proposed Development. RRRF is a key element of London's energy and resource management infrastructure and has been operating highly successfully since 2011.

The City of London has a population approaching 9,000,000 people who produce around 22,000,000 tonnes of waste every year. As one of the largest operations of its kind in the UK, RRRF generates c.525,000 MWh of electricity each year from processing c.750,000 tonnes of residual waste, which powers the equivalent of approximately 160,000 households.

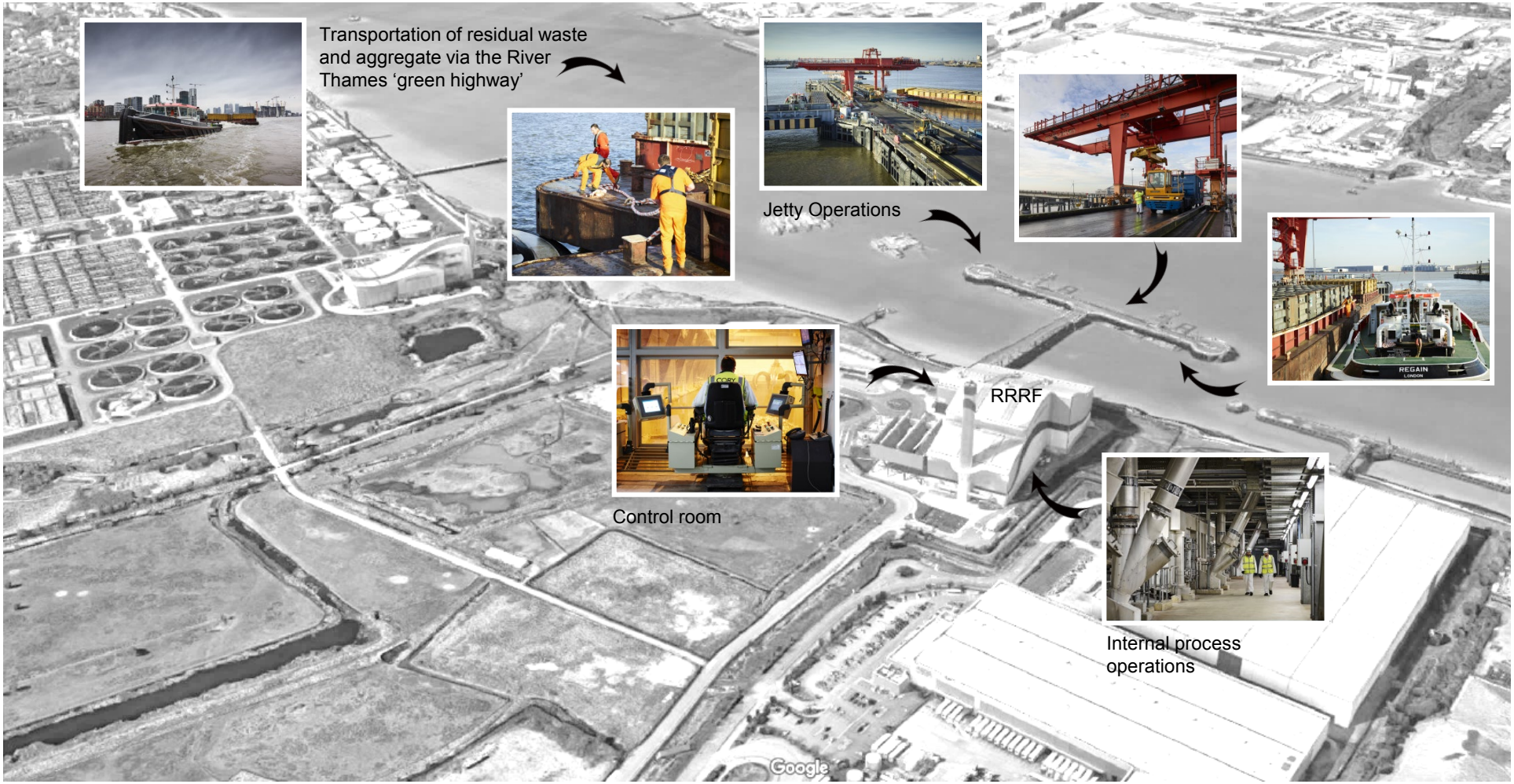
By generating electricity from domestic and commercial residual waste, after recycling, Cory is improving resource efficiency, avoiding London's use of landfill, and achieving greater sustainability as part of London's circular economy.

The River Thames is used as a 'green highway' to move the waste from the city to RRRF using Cory's fleet of tugs and barges, removing around 100,000 lorry movements a year off the capital's congested roads.

It is with this business philosophy that Cory is now progressing plans for REP to maximise the use of its existing infrastructure and land holding, and to further meet the needs for resource recovery and energy generation.

REP will optimise the use of Cory's existing energy and river infrastructure in London, including its operational jetty, tugs and barges. REP will help meet London's pressing need for further waste management, resource recovery and energy generation infrastructure.

1.1.2 Riverside Resource Recovery Facility (RRRF)



1.2 Purpose of the Design and Access Statement

The legislative framework for design and access statements is set out at Part 3, s.9 of the Town and Country Planning (Development Management Procedure) (England) Order 2015 (the GDPO 2015). Such a statement is not required for a DCO application submitted under the Planning Act 2008, however the Applicant has chosen to prepare this Design and Access Statement (DAS) in response to policy requiring more sustainable and better quality development. This DAS illustrates the design evolution associated with the Proposed Development and explains the logic underpinning design decisions.

The Overarching National Policy Statement for Energy EN-1 ('NPS EN-1') establishes the criteria for good design for energy infrastructure. At paragraph 4.5.1, it makes the follow overarching statement:

'The visual appearance of a building is sometimes considered to be the most important factor in good design. But high quality and inclusive design goes far beyond aesthetic considerations. The functionality of an object – be it a building or other type of infrastructure – including fitness for purpose and sustainability, is equally important. Applying "good design" to energy projects should produce sustainable infrastructure sensitive to place, efficient in the use of natural resources and energy used in their construction and operation, matched by an appearance that demonstrates good aesthetic as far as possible. It is acknowledged, however that the nature of much energy infrastructure development will often limit the extent to which it can contribute to the enhancement of the quality of the area'.

Given the importance that the Planning Act 2008 places on good design and sustainability, NPS EN-1 paragraph 4.5.3 states that the Secretary of State 'needs to be satisfied that energy infrastructure developments are sustainable and, having regard to regulatory and other constraints, are as attractive, durable and adaptable (including taking account of natural hazards such as flooding) as they can be.' In so doing, the Secretary of State should be satisfied that 'the applicant has taken into account both functionality (including fitness for purpose and sustainability) and aesthetics (including its contribution to the quality of the area in which it would be located) as far as possible'.

It continues, recognising that 'whilst the applicant may not have any or very limited choice in the physical appearance of some energy infrastructure, there may be opportunities for the applicant to demonstrate good design in terms of siting relative to existing landscape character, landform and vegetation.'

The purpose of this DAS is, recognising the priorities within NPS EN-1 and NPS EN-3, to assist the Secretary of State and others in:

- Understanding the site, its neighbourhood and wider context;
- Understanding the process that has led to the chosen design; and
- How the proposals have been designed to be attractive, durable, adaptable, functional, and to minimise visual intrusion.

2.0 The Proposed Development

2.1 Overview

REP would be constructed on land immediately adjacent to Cory's existing RRRF, within the LBB and would complement the operation of the existing facility. It would comprise an integrated range of technologies including: waste energy recovery, anaerobic digestion, solar panels and battery storage.

The main elements of REP would be as follows:

- Energy Recovery Facility (ERF): to provide thermal treatment of Commercial and Industrial (C&I) residual (non-recyclable) waste with the potential for treatment of (non-recyclable) Municipal Solid Waste (MSW);
- Anaerobic Digestion facility: to process food and green waste. Outputs from the Anaerobic Digestion facility would be transferred off-site for use in the agricultural sector as fertiliser or as an alternative, where appropriate, used as a fuel in the ERF to generate electricity;
- Solar Photovoltaic Installation: to generate electricity. Installed across a wide extent of the roof of the Main REP Building;
- Battery Storage: to store and supply additional power to the local distribution network at times of peak electrical demand. This facility would be integrated into the Main REP building; and
- On Site Combined Heat and Power (CHP): Infrastructure: to provide an opportunity for local district heating for nearby residential developments and businesses. REP would be CHP Enabled with necessary on site infrastructure included within the REP site.

Electrical Connection

REP would be connected to the electricity distribution network via a new 132 kilovolt (kV) underground electricity cable connection..

This DAS focuses on the development of the REP site in Belvedere, whilst acknowledging that the Electrical Connection extends beyond this area.

Delivery of waste to REP

The majority of waste would be delivered to REP by barge from Waste Transfer Stations (WTS) along the River Thames, utilising the existing jetty as per the existing RRRF. The remainder would be delivered by road.

Removal of by-products from REP

Incinerator Bottom Ash (IBA) would be transported by river to the existing IBA Facility at the Port of Tilbury for treatment/recycling, and then onward use as secondary aggregate in the construction sector. Air Pollution Control Residues (APCR) would be taken off-site by road in sealed containers to be recycled.

Digestate from the Anaerobic Digestion facility would be exported by road, whilst the recovered biogas would be passed through a gas-upgrading system (biogas to biomethane), suitable for Compressed Natural Gas (CNG) production and/or for injection into a local gas network.

2.2 Key Components of the Proposed Development

2.2.1 The Energy Recovery Facility

The key components required for REP are described further below. Each element is connected to, or has a relationship with, other elements of the Proposed Development. A detailed explanation of each of the components is provided in Chapter 3 of the ES (Document Reference 6.1). An illustrative layout is indicated in the figure opposite and over the page.

Tipping Hall - Residual and food waste deliveries from the River Thames and road network would be taken to an enclosed Tipping Hall at an elevated level.

Solid Fuel Storage Bunker and Combustion Chamber - From the Tipping Hall the waste would be transferred to the Solid Fuel Storage Bunker where a crane grabs the waste and places it into the feed hopper. It would then drop down a feed chute onto the grate. The action of the moving grate would turn the waste, allowing it to fully combust.

Steam Turbine Hall - The thermal energy released from the combusted waste is used to convert water to steam. At high pressure, this steam drives a turbine to generate electricity for export to the distribution network, via the external Transformers, Switchyard and Electrical Connection.

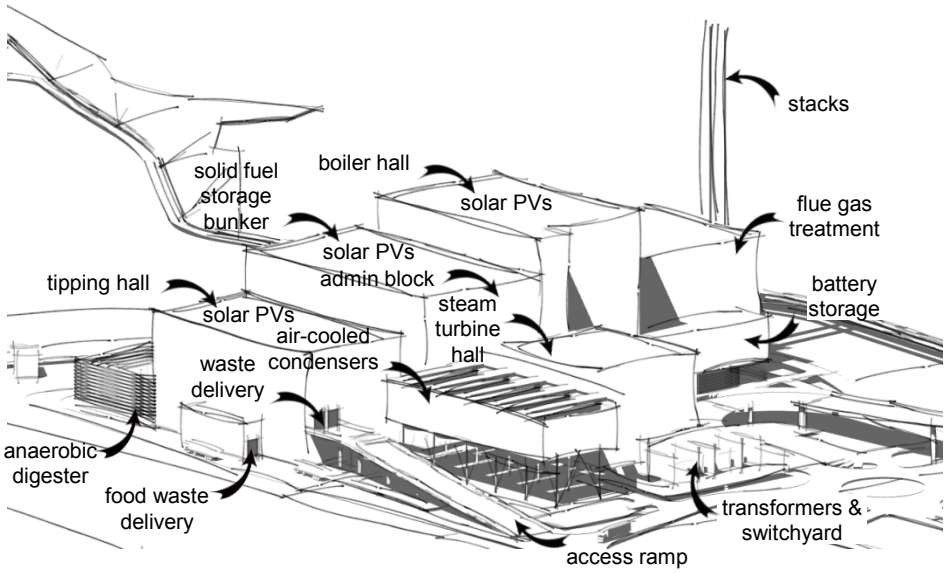
Air-Cooled Condensers - After leaving the turbine, steam passes through Air-Cooled Condensers (ACC) and is condensed back to water, which is then treated and reused in the boiler to produce more steam in a closed loop system. The ACC has to be located as close as possible to the Steam Turbine Hall, but elevated with free air on all 4 sides.

Combined Heat and Power Equipment - Steam from the turbine can also be used for CHP. REP would be 'CHP Enabled', containing all the necessary infrastructure, on site, to enable the heat generated to be supplied via a potential district heating network to local homes and businesses.

Flue Gas Treatment - The gases from the combustion chamber would go through an extensive flue gas cleaning process including chemical treatment and filters. The resulting material, known as Air Pollution Control Residue, would be sent for specialist treatment or recycling.

Stack(s) - The cleaned gases are finally released to the atmosphere via stack(s).

Bottom Ash Hall - The residual ash would be cooled and carried along a conveyor to the Bottom Ash Hall. The ash is sent to the existing IBA Facility at the Port of Tilbury for treatment and recycling for use in road building and construction. Ferrous and non-ferrous metals are also extracted for recycling, which in the case of the RRRF occurs off-site at Tilbury.



Illustrative REP Layout Concept Southeast View

2.2.2 Anaerobic Digestion Facility

Food waste would be processed in the Anaerobic Digestion facility. The Anaerobic Digestion facility will create a biogas, a wholly renewable fuel, and a digestate. Through processing onsite and/or offsite, the digestate can be transported off-site for use in the agricultural sector for use as a fertiliser. Should this not be possible, it would be used as a fuel for REP to generate electricity.

2.2.3 Solar Photovoltaic Panels

Solar panels would be located on the Main REP Building roof areas. Inclusion of solar PV generation would increase renewable energy generated from REP which can also be used to offset power required to run the facility as a whole.

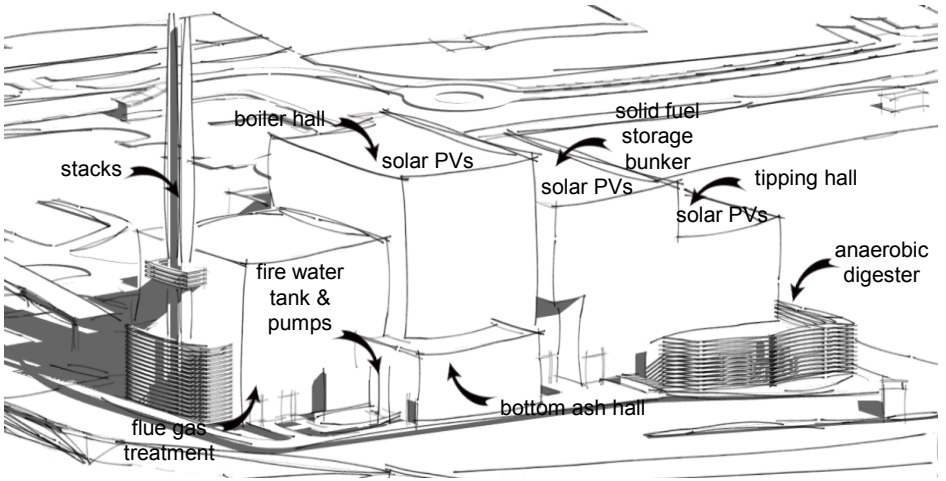
2.2.4 Battery Storage

The battery storage facility of REP would supply additional power to the offsite distribution network at times of peak electrical demand. This facility would be integrated into the Main REP Building. The battery storage system would increase the operational performance and reliability of REP and provide an enhanced balance of supply and demand. Such energy storage benefits the entire power value chain through generation, transmission and distribution to all users.

2.2.5 Other Elements

Other elements of the development required to support the successful operation of REP would include associated staff accommodation, office and meeting rooms, welfare facilities, an administration block incorporating a control room, ,crane drivers, monitoring systems and associated electrical process equipment and servers.

A permanent onsite contractor's area would also be provided to accommodate welfare facilities during planned maintenance outages.



Illustrative REP Layout Concept Northwest View

3.0 Site Overview

3.1 Site Location

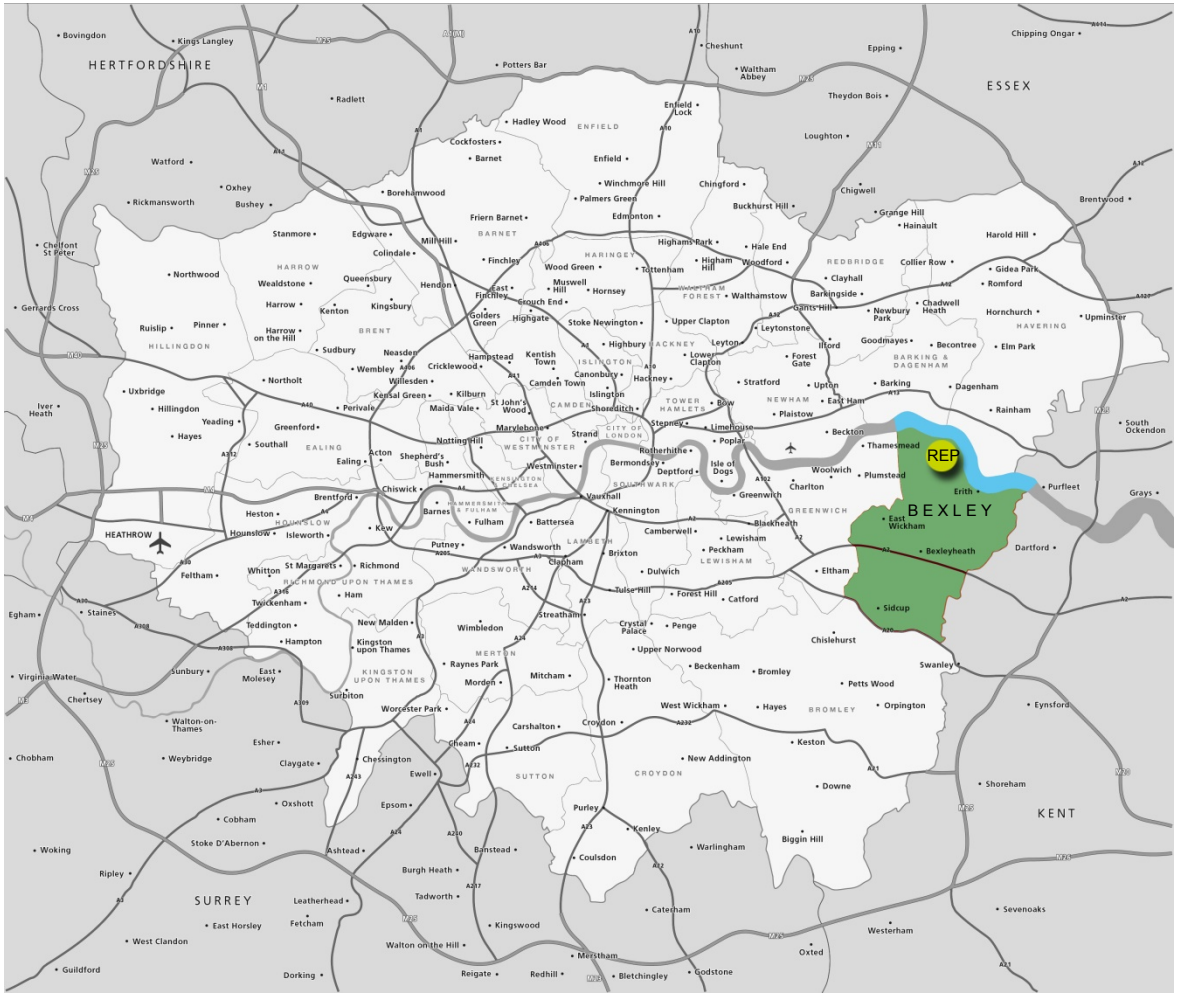
The Proposed Development would be located in Belvedere in the LBB and Dartford Borough Council (DBC) area within Kent County Council (KCC).

REP would be sited adjacent to RRRF which is currently operated by Cory, as indicated in the following section 3.1.2 Application Boundary.

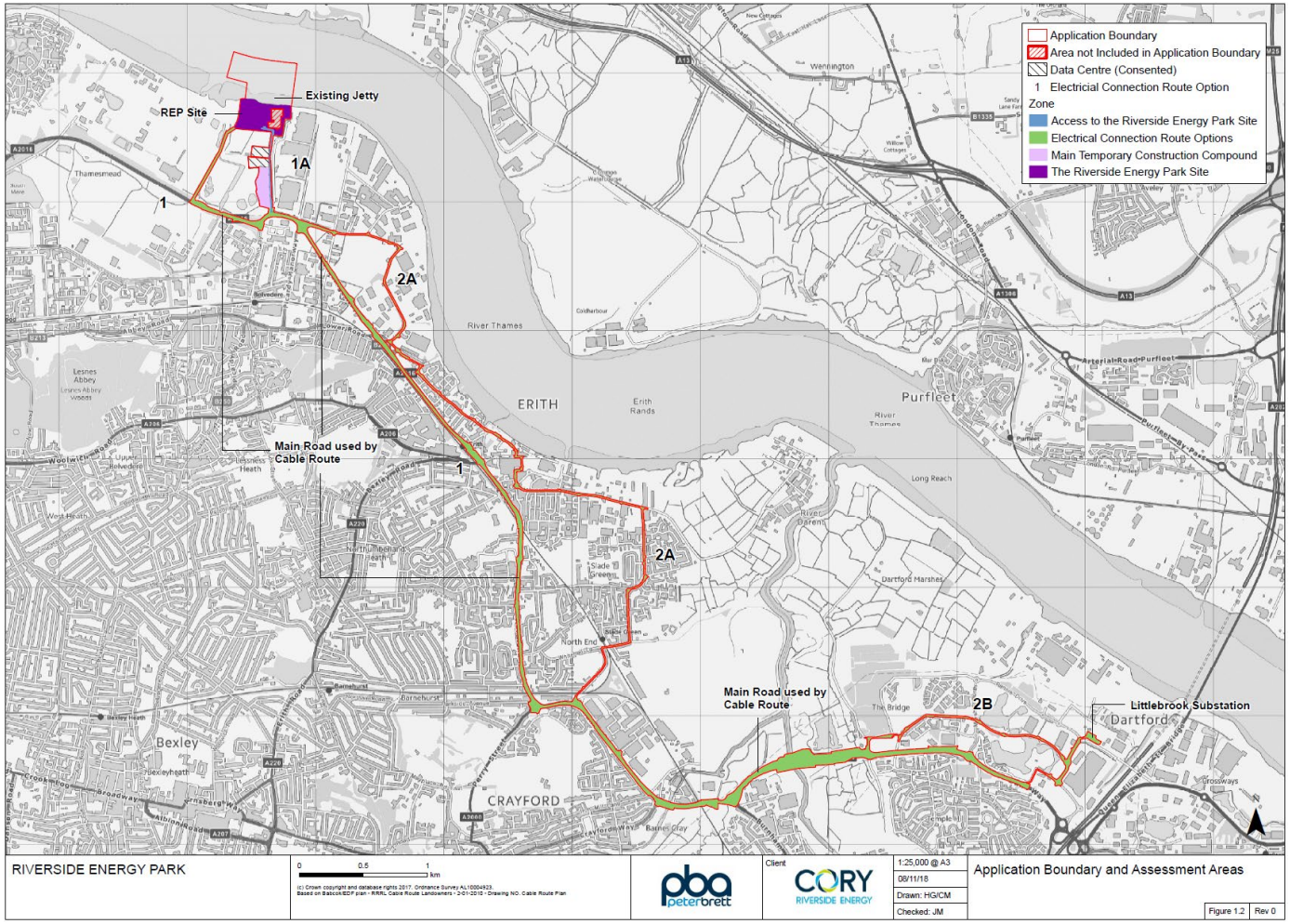
The Electrical Connection would be secured via new 132 kilovolt (kV) electricity cables installed to the Electrical Connection Point at Littlebrook substation, Dartford.

REP would occupy an important and strategic site for sustainable energy recovery and waste management. The Proposed Development would make optimal use of a site already in use for waste management, integrating river freight, and providing complementary technologies to recover renewable/low carbon energy. As demonstrated in the CHP Assessment (Document Reference 5.4) there is a viable and substantial local heat demand, including from social housing. The waste management and heat demands, and the ability to use river transport at the REP site, provide clear and unique advantages in developing REP in this location.

In addition, the Anaerobic Digestion facility within REP provides LBB with an in-Borough solution for its green and garden wastes, and doing so would meet the Mayor of London's challenge to increase municipal waste recycling.



3.1.1 Application Boundary



3.2 REP Site Description

The current context of the site is for the most part formed by the main buildings of RRRF, located to the East of the REP site. Beyond this and stretching down the eastern side of Norman Road are the industrial buildings forming the Norman Road Industrial Estate.

To the north of the site is the River Thames which forms a physical boundary; the Thames River path provides views across the site. RRRF has a ramp and jetty projecting into the Thames for use by barges bringing waste in. On the opposite side of the River are the industrial buildings of the Ford Cars Dagenham Plant and various other industrial facilities such as Barking Reach Power station.

To the west of the site is a sludge thermal treatment facility which forms part of the Crossness Sewage Treatment Works. Beyond this, along the river bank, are further industrial facilities in the form of the Enhanced Sludge Digestion building and the Crossness Pumping Station.

Immediately to the south of the site is the Crossness Nature Reserve and alongside the western side of Norman Road, Cory has an existing consent to construct a Data Centre and another mixed use industrial unit.

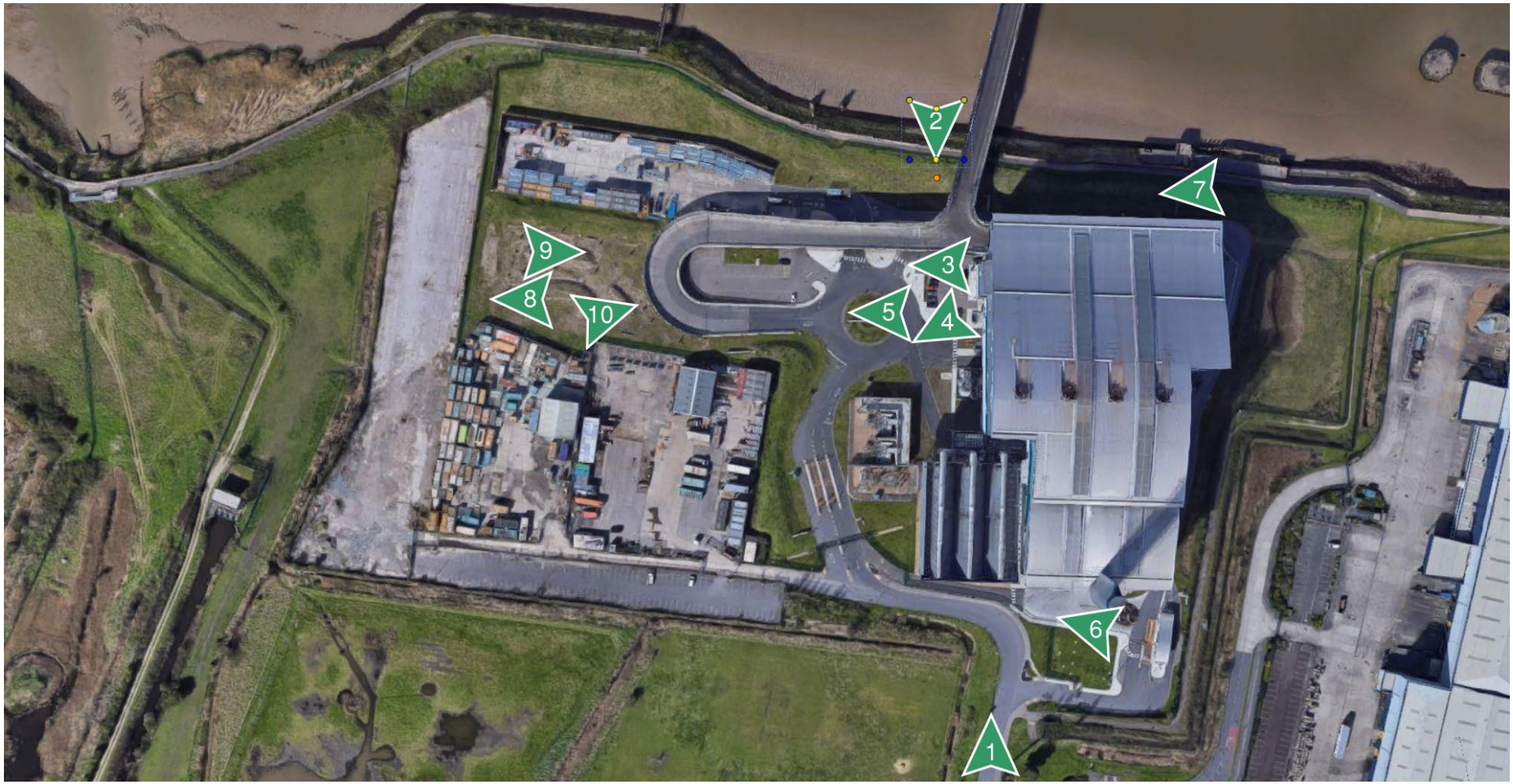
Existing uses of the REP site includes: ash storage containers; boundary fencing and associated lighting; circulation roads; compounds for the maintenance of operational plant machinery; car parking; and an on-site non-designated Wasteland Habitat Area (WHA).

3.2.1 Surrounding Area

1. The River Thames & Jetty Access
2. Riverside Resource Recovery Facility
3. Crossness Sewage Treatment Works
4. Crossness Pumping Station
5. Enhanced Sludge Digestion Facility
6. Sludge Thermal Treatment Facility
7. Crossness Nature Reserve
8. Consented Riverside Data Centre
9. Mixed Use Industrial Unit
10. Iron Mountain Records Management
11. ASDA CDC
12. ASDA XDC

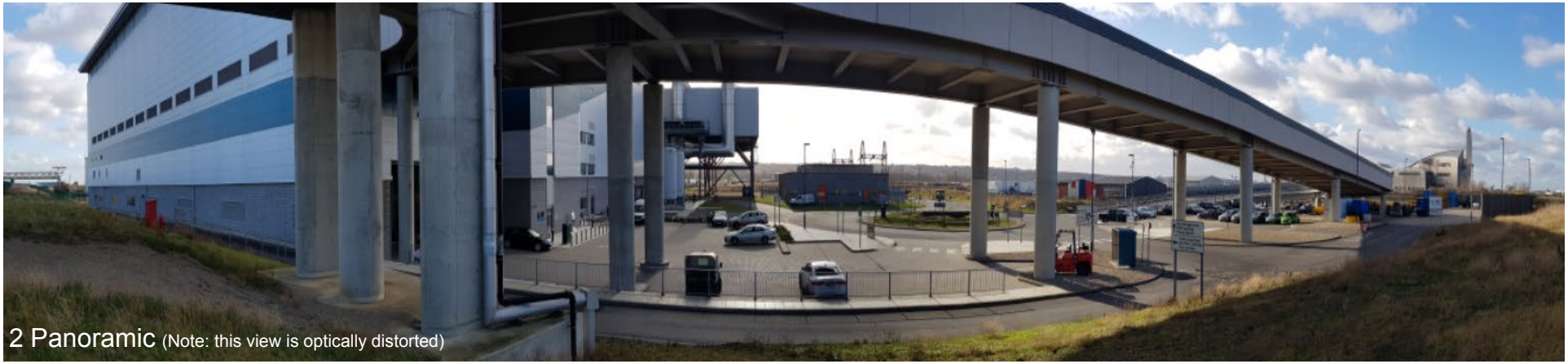
3.2.2 Aerial View

3.2.3 Site Photographs – Location Plan



3.2.4 Site Photographs

1 Panoramic (Note: this view is optically distorted)



2 Panoramic (Note: this view is optically distorted)

3.2.4 Site Photographs


3 (Note: photo taken from 7th floor of RRRF)


4 (Note: photo taken from 7th floor of RRRF)


5


6

3.2.4 Site Photographs


7


8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3.3 Site History

A detailed history of the site can be seen in Appendix F.1 Heritage Desk Based Assessment within the Environmental Statement (ES) (Document Reference 6.1).

The area, which was once reclaimed marshland, has been developed into its current form since the 19th century when a manure works was constructed on the site now occupied by RRRF. By the end of the 19th century the area had been further industrialised. The Belvedere Mills and Belvedere Fish Guano Works were built and eventually taken over by the chemical manufacturer Borax, consolidated in 1899, which transported borax by river. The works had its own power generation plant from 1926.

Borax production ended in 1990. Manor Wharf, an L-shaped jetty, was originally constructed for the Belvedere Fish Guano Works in 1908 and was rebuilt in 1946. Terraced housing lines Norman Road to the south, which is presumed to have been constructed to house workers employed at the various industrial sites.

The Erith Marshes remained absent of large scale development until the 1950s. Following the decision to sell off parts of the Woolwich Arsenal estate by the Ministry of Defence in 1953, and the availability of other land within the marsh, new areas of land were able to be opened up and exploited for urban expansion. This was needed to combat the demand for new housing and new jobs, amid wide spread run-down housing clearance in the post-war era.

The Crossness Pumping Station is a former sewage pumping station designed by the Metropolitan Board of Works' Chief Engineer Sir Joseph Bazalgette and architect Charles Henry Driver, as part of Bazalgette's redevelopment of the London sewerage system between 1859 and 1865. It features spectacular ornamental cast ironwork that Pevsner described as "a masterpiece of engineering – a Victorian cathedral of ironwork".

3.4 Site Analysis

3.4.1 REP Site

The immediate context within which the REP site exists is already historically industrialised in terms of character and appearance. The site is very much dominated by the existing RRRF and Crossness Sewage Treatment works which includes the Sludge Thermal Treatment Facility and the Enhanced Digestion Facility. The skyline in this area is punctuated by large industrial buildings, tall stacks and wind turbines which provide a mixture of flat, curved and stepped profiles providing visual interest.

There are a number of advantages and opportunities in locating the REP facility on this site:

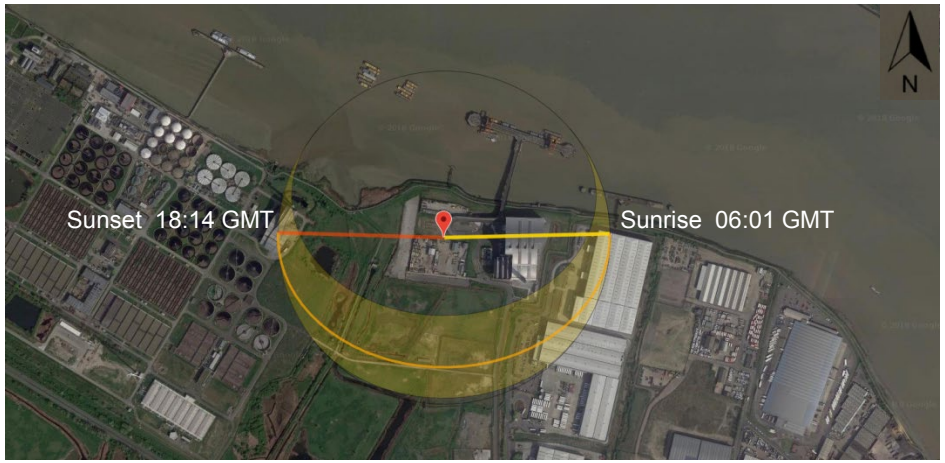
- Optimises existing onsite waste management use and river infrastructure in London, including Cory's operational jetty, tugs and barges. REP will help meet London's pressing need for further waste management, resource recovery and energy generation infrastructure.
- Shared infrastructure with RRRF is available to limit duplication and thereby provide a sustainable location.
- Existing road /footpath network can be used for transportation and access requirements
- Existing River Thames access via the jetty can be utilised to promote increased use of river transport.
- Provides additional heat source for new district heat network, which could connect to social housing development.

There are also a number of factors that have been, and will be, addressed as the design progresses:-

- Ensuring RRRF operational requirements are maintained during construction of the Proposed Development.
- Recognising the extent of the Thames Flood defences (embankment to the Northern Boundary) encroaching into the site.
- The continued use of the Thames Riverside path and pedestrian use.
- Mitigating the impact on the Crossness Nature Reserve to the South
- Considerations around vehicular access from Norman Road e.g.
    - termination and access turning point at the head of Norman Road;
    - access to administration block and visitor car park; and
    - integration of vehicle access routes.
- Maintenance/re-use of existing drainage and ditch systems.
- Implication of prevailing wind direction on stack requirements.

Sun path analysis indicates the location and influence of the sun on a site as it moves across the sky at different times of the day and through the year. It can be used to inform our understanding of shadowing effects from new development. The sun path analysis undertaken has been used in the Solar Panel Outputs and Locations study reported at section 3.4.2 of this DAS.

3.4.2 Sun Path Analysis



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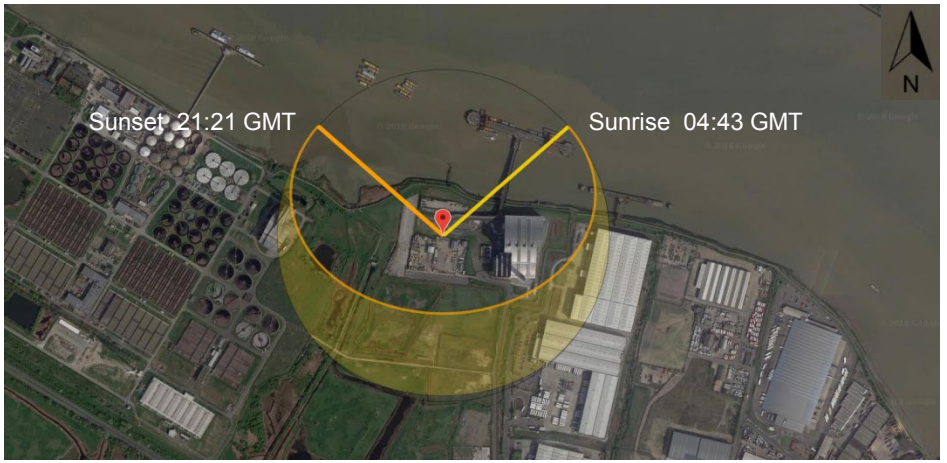

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21st September

21st December

3.4.3 Access

The REP site has existing vehicular and pedestrian access from the south via Norman Road plus a vehicular link to the River Thames for site-based waste vehicles accessing the jetty.

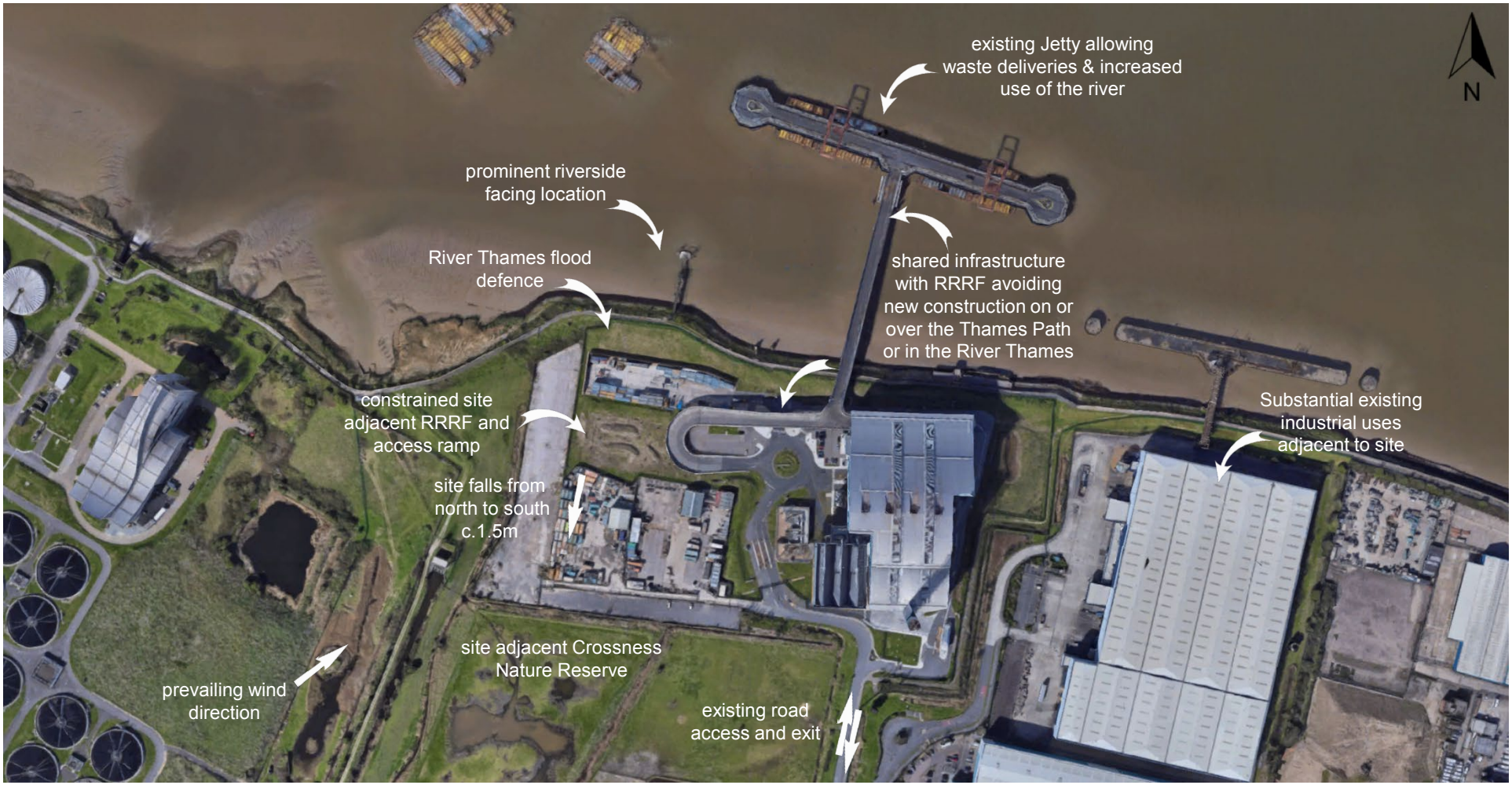
The Proposed Development would have:

- landside access;
- vehicular access for waste vehicles, employees and visitors etc.;
- spaces for car and motorcycle parking;
- cycle stands accommodating 10 bicycles under shelter;
- pedestrian and cycle access;
- public transport facilities close-by; and
- river access.

REP is designed to comply with the requirements of the Inclusive Access and Equality Act 2010.

A full access strategy will be prepared in due course to discharge both Building Regulations Part M and the Inclusive Access and Equality Act 2010. This will be prepared in close liaison with the relevant authorities to determine any future requirement for disabled car parking.

3.4.4 Site Opportunities and Constraints

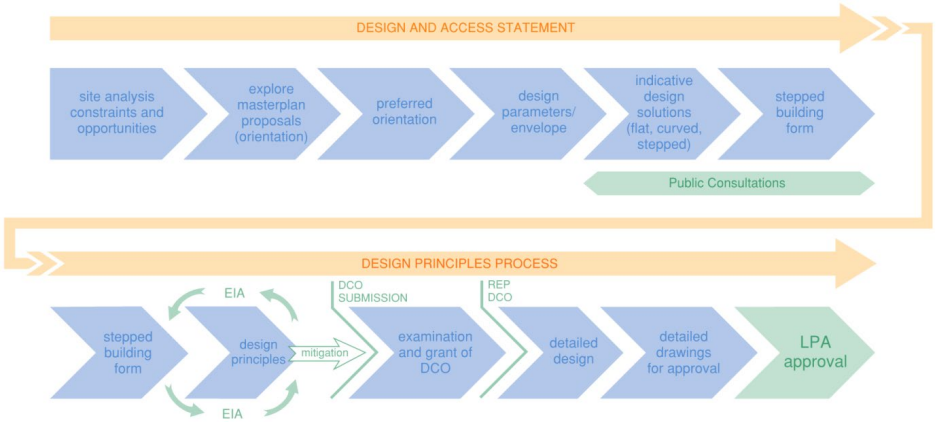


4.0 Design Process

4.1 Overview of the Design Process to date

The flow diagram opposite illustrates how both the DAS and Design Principles (Document Reference 7.4) documents have been developed during the pre-application stage and design development process. This process would continue following granting of development consent as the detailed design is finalised and submitted to the Local Planning Authority.

Consultation has been undertaken throughout preparation of the DCO Application and is reported in the Consultation Report (Document Reference 5.1).



4.2 Good Design Principles

There are several important principles underpinning good design. These broadly include robustness or durability; usefulness or efficiency; and an atheistically pleasing appearance. Whilst style, taste and fashion are generally subjective considerations, the three broader principles above can be broken down into tangible criteria to review buildings and public spaces against:

- are they useful, built to last and easy to care for;
- can you find your way and move around easily, regardless of whether or not you are disabled, in a place in which you feel safe;
- do they relate well to the place where they are built;
- are they environmentally efficient;
- are they effective to use; and
- do they have identity and character within their context?

The relationship between these elements is illustrated in the graphic opposite.

This demonstrates how factors other than the appearance of the building, will feed into the overall ‘good design’ of a project.

5.0 Illustrative Masterplan

5.1 Introduction

The site masterplan has been developed cognisant that there are limitations to the site and plant layout given the need for the components of REP to fit together in a process driven way. Different masterplan options have been considered so that the built form of the Proposed Development both minimises impacts and enables efficient operational processes (for example, smooth movement of waste through the plant, or safe pedestrian and vehicle movements).

Maximum parameters have been applied and assessed in the design of the Proposed Development, to enable a precautionary assessment to be undertaken, in accordance with the principles of the Rochdale Envelope. However, in the final layout, to be prepared under a set of Design Principles, the proposals would consider matters of:

- Building, Siting, Composition and Mass;
- Materials and Use of Colour;
- Context Colour Analysis;
- Integrated Biodiversity and Landscaping; and
- Safety, Signage and Wayfinding.

During initial illustrative masterplanning, the design team considered layouts that were not orientated along the more obvious lines of north to south or east to west. These layouts were considered but discounted as having physical constraints and not having a positive design contribution to the grouped massing of RRRF, Crossness Sewage Treatment Works and future REP.

Masterplan proposals were consequently prepared based on a north to south and east to west orthogonal configuration. Alternative stack locations were considered alongside the orthogonal arrangement, enabling four illustrative layouts to be produced. A Strengths, Weaknesses Opportunities, Threats (SWOT) analysis was undertaken, enabling a definitive building orientation to be concluded.

5.2 Illustrative Masterplan Proposals

5.2.1 Illustrative Masterplan Proposal 1 - North to South - Stack South

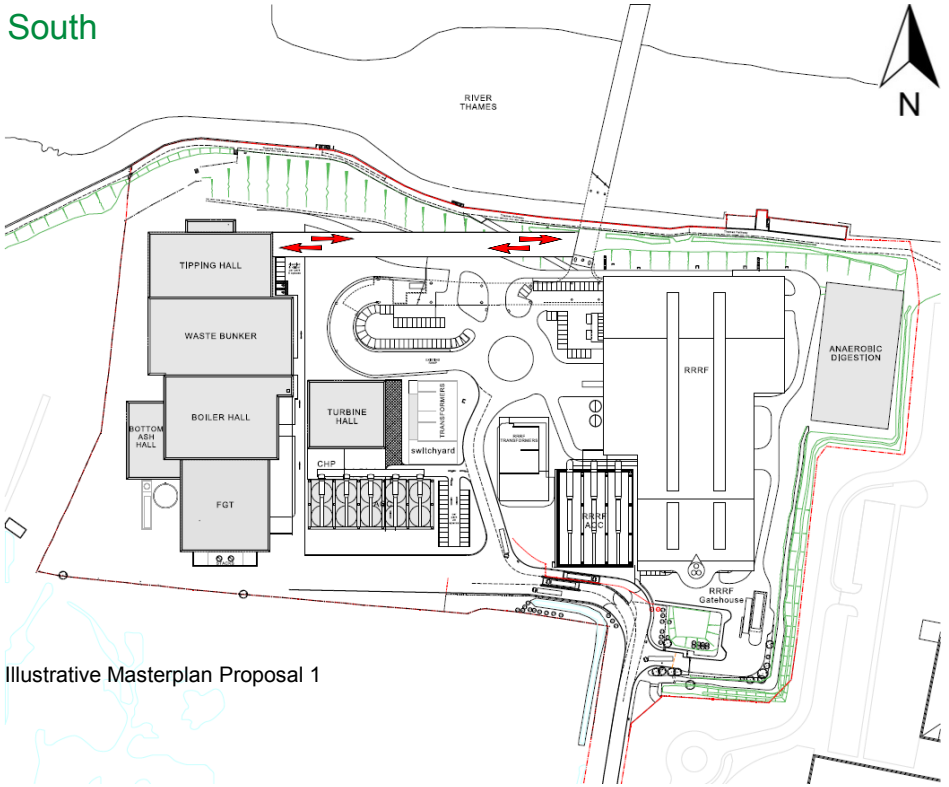
This option orientates the Main REP Building in a north south orientation with the stack at the southern end of the site.

Advantages

- Layout provides a ‘balanced formal architectural’ setting with the Main REP Building a mirror of RRRF.
- North south orientation minimises loss of view of the River Thames from elevated positions in Belvedere.
- Orientation sets up a family of landmarks along the River Thames.
- Distance from jetty to tipping hall is reduced.
- Noise generating elements (ACC) located furthest from Thames Path.

Disadvantages

- Waste deliveries to the tipping hall that arrive by road would conflict with RRRF traffic and would require further travel from the public highway in comparison to other options.
- Potential for shadow caused to solar photovoltaic panels from the stack and boiler hall.
- The ramp extending roughly parallel to the Thames Path may result in increased impacts including overshadowing and increased noise levels.
- The Anaerobic Digestion facility would be divorced from the Main REP Building and as such would lose significant benefit of shared delivery and bunker facilities and would also displace the current pond area to the east of RRRF.



Illustrative Masterplan Proposal 1

5.2.2 Illustrative Masterplan Proposal 2 - North to South - Stack North

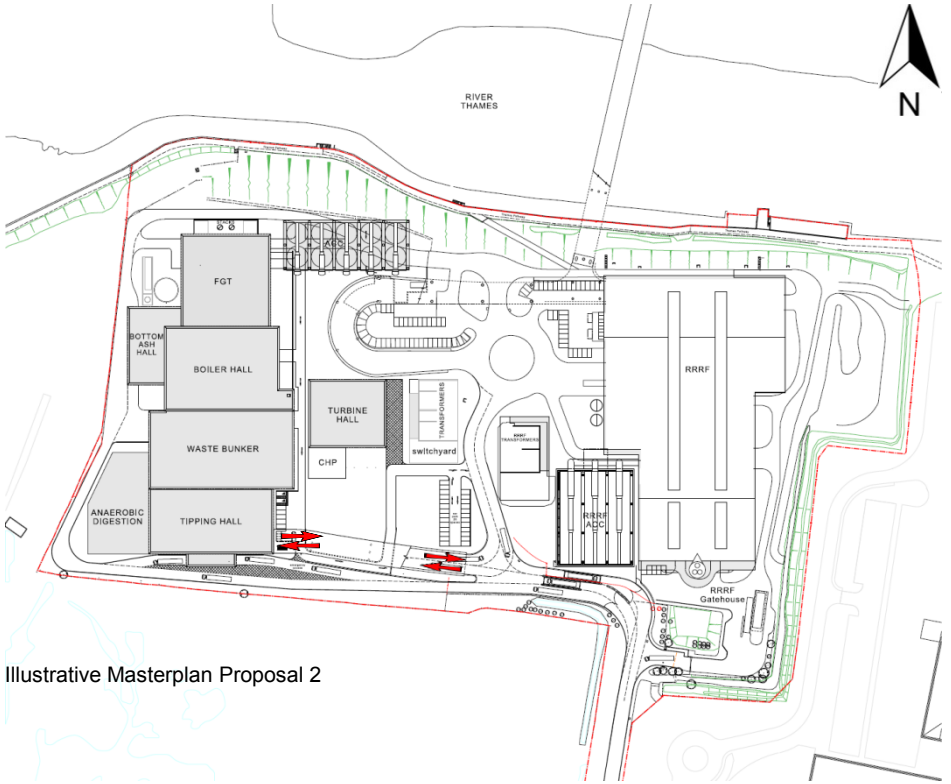
This option orientates the Main REP Building in a north south orientation with the stack at the northern end of the site.

Advantages

- Layout provides a 'balanced formal architectural' setting with the Main REP Building a reflection of RRRF.
- North south orientation minimises loss of view of the River Thames from elevated positions in Belvedere.
- Orientation sets up a family of landmarks along the River Thames.
- Layout enables efficient delivery of waste to the tipping hall.
- The only layout option with the potential opportunity to explore co-location of the Anaerobic Digestion facility with the Main REP Building to allow shared delivery and bunker facilities.
- Massing of facility maximises solar energy generation potential.

Disadvantages

- Extended route for waste arriving from the jetty to the tipping hall.
- ACC closer to the Thames Path may result in increased noise levels relative to the ACC being located at the southern boundary.



Illustrative Masterplan Proposal 2

5.2.3 Illustrative Masterplan Proposal 3 - East to West - Stack West

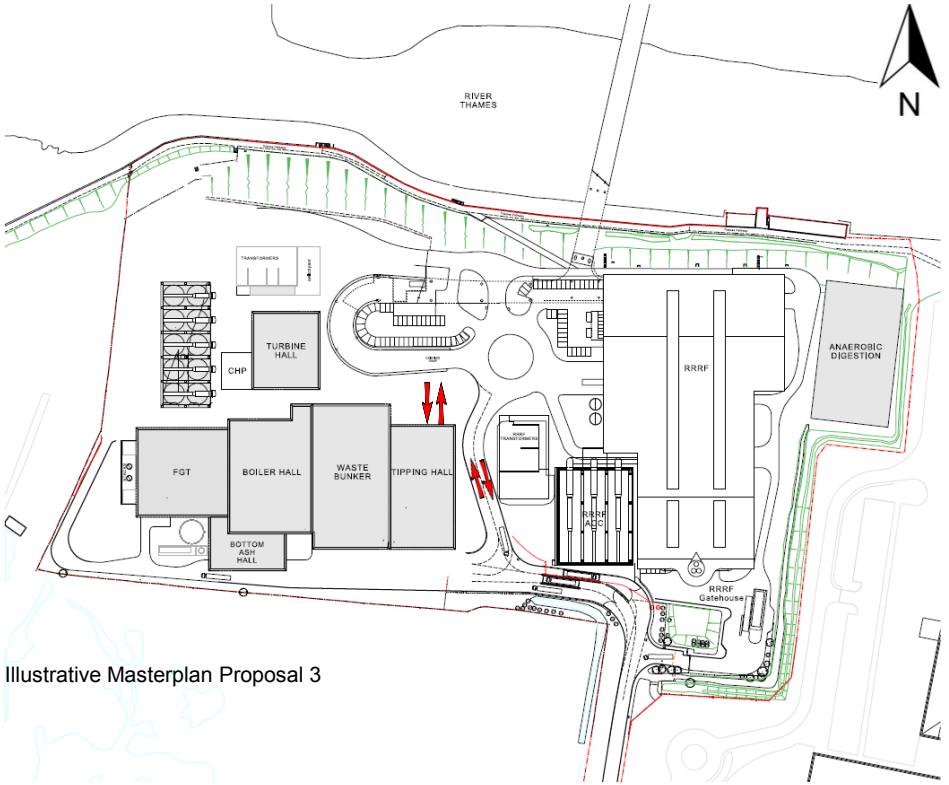
This option orientates the Main REP Building in an east west orientation with the stack at the western end of the site.

Advantages

- Main facilities located away from the Thames Path.
- ACC located furthest away from the Thames Path.

Disadvantages

- Vehicle congestion and conflict of movements at entry to the tipping hall.
- Little potential to incorporate a ramp to elevate the tipping hall.
- No queuing space for waste vehicles on the approach to the tipping hall.
- Complex route and manoeuvre for waste vehicles arriving by road.
- Export route for energy landlocked from existing routes and infrastructure.
- East west orientation creates a wall of buildings and increases visual impact when viewed from elevated positions in Belvedere (reduces views of the river) and becomes increasingly imposing to Crossness Nature Reserve and the Thames Path.
- The Anaerobic Digestion facility would be divorced from the Main REP Building and as such would lose significant benefit of shared delivery and bunker facilities and would also displace the current RRRF pond wetland area to the east of RRRF.



Illustrative Masterplan Proposal 3

5.2.4 Illustrative Masterplan Proposal 4 – East to West - Stack East

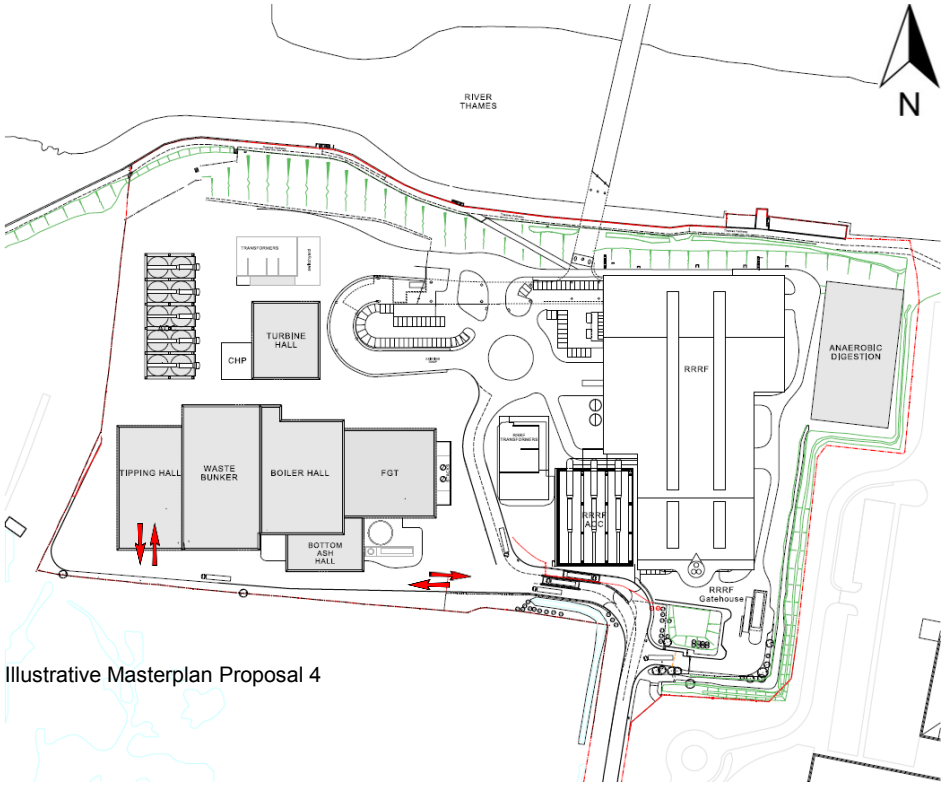
This option orientates the Main REP Building in an east west orientation with the stack at the eastern end of the site.

Advantage

- Main facilities located away from the Thames Path.

Disadvantages

- Constricted access for vehicles between the existing ramp and REP.
- Complex route and manoeuvre for waste vehicles arriving by road.
- Export route for energy landlocked from existing routes and infrastructure.
- East west orientation creates a wall of buildings and increases visual impact when viewed from elevated locations in Belvedere (reduces views of the river) and becomes increasingly imposing to Crossness Nature Reserve and the Thames Path.
- The Anaerobic Digestion facility would be divorced from the Main REP Building and as such would lose significant benefit of shared delivery and bunker facilities and would also displace the current pond area to the east of RRRF.



Illustrative Masterplan Proposal 4

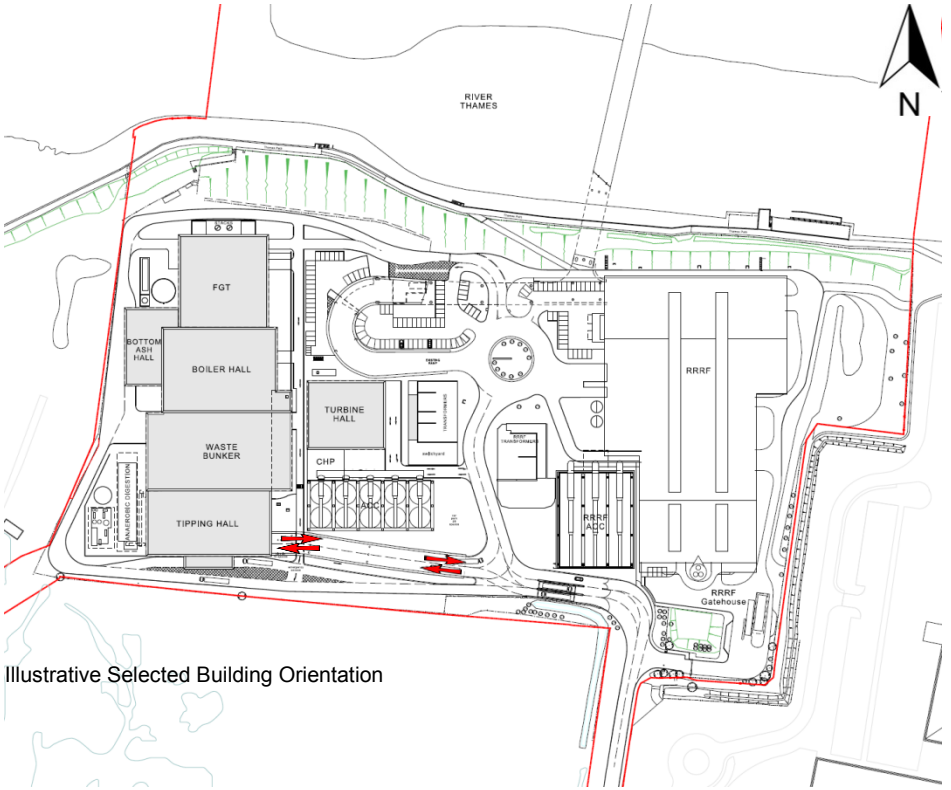
5.2.5 Selected Building Orientation - North to South - Stack North

The selected building orientation was concluded following an analysis of the illustrative masterplan layouts identifying key advantages and disadvantages. Layout 2, which would orientate the Main REP Building north to south with the stack at the northern end of the site, was considered to provide a balance between operational requirements, the constraints of the site and mitigating anticipated visual and landscape effects.

The illustrative layout has evolved further to enable:

- Placing the Anaerobic Digestion facility next to the ERF so the plant can share the tipping hall and minimise energy losses.
- Relocation of the ACC away from the Thames Path.
- Incorporating the infrastructure for a CHP connection for heat export.
- Using a ramp to enable the tipping hall floor to be elevated to reduce excavation for the bunker and mitigate potential flood risk.

The selected building orientation steers the footprint of the Main REP Building layout and associated infrastructure design. It has been used to derive the location of Work areas forming the Rochdale Envelope, the indicative design solutions considered in section 6.0 of this document , and in the EIA presented in the Environmental Statement (Document Reference 6.1).



Illustrative Selected Building Orientation

5.3 Selected Building Orientation - Illustrative Site Plan

- Existing Jetty allowing waste deliveries & increased use of the river, existing weighbridges utilised.
- Existing road access via Norman Road.
- Road layout realigned adjacent to RRRF entrance to allow turning head for articulated vehicles not requiring entry to either RRRF or REP.
- Bypass road created adjacent to the weighbridges to allow for segregated staff/visitor exit.
- The dyke adjacent to the Crossness Nature Reserve remains in situ.
- Clockwise travel around REP allowing access to Tipping Hall, AD Maturation Hall, Bottom Ash Hall, Workshop Stores, Silos, Fuel and Ammonia Tanks.
- Anti-clockwise visitor access via RRRF gatehouse.
- RRRF car park can be accessed via main road island or northern road giving access to existing car park and new parking area accessed below the main jetty ramp.
- Additional car park spaces have been accommodated below the main jetty access.

5.4 Selected Building Orientation - Illustrative Aerial View

5.5 Design Parameters

5.5.1 Introduction

The building envelope should provide sufficient flexibility to allow for changes in technology and process requirements during the design process.

While flexibility in design is required, a level of detail appropriate to the submitted application, and satisfying the concept of the Rochdale Envelope, has been set out, assessed and presented within the Environmental Statement (Document Reference 6.1). This ensures that a robust assessment of the likely significant environmental effects of REP has been undertaken.

This has involved defining maximum ('reasonable worst case') design parameters for the elements of REP where flexibility needs to be retained. These parameters have then been used for the purposes of the assessments undertaken in the EIA. One such example is the need to consider stack height and formation, another is the need to allow for two different potential boiler configurations, such as:

- a horizontal boiler layout that requires lower and wider buildings; and
- a vertical boiler layout that requires higher and longer buildings.

5.5.2 Design Parameters Table

Maximum Heights

Building Description	Height above 1m AOD	Referenced height AOD
Main Process Building	64m	65m
Anaerobic Digestion	42m	43m
Associated Process Buildings and Infrastructure	37m	38m
Stacks	112m	113m

Note:

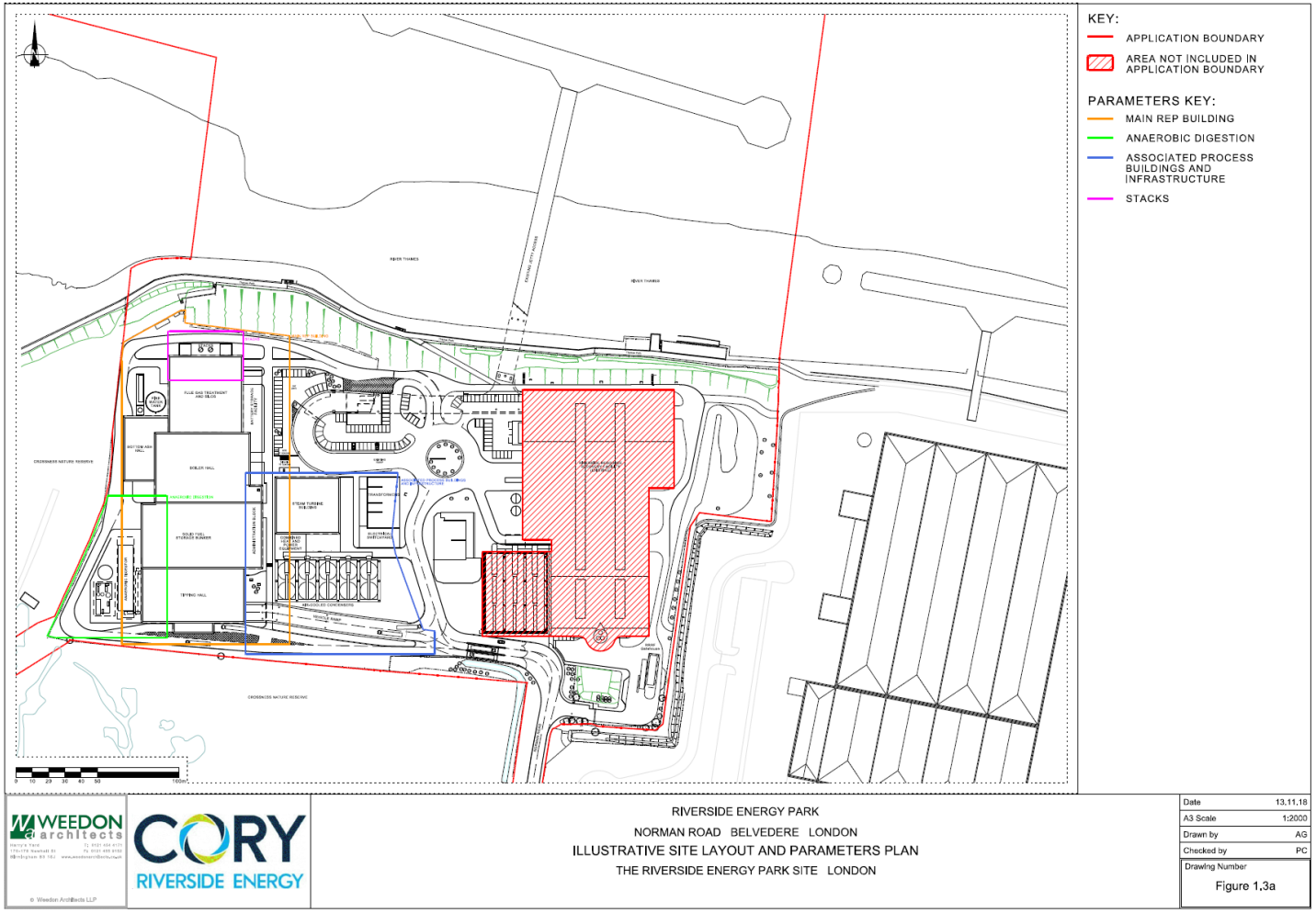
Referenced heights taken from +1.000m AOD being the lowest external ground level around the building.

The average ground level around the building is defined as +2.000m AOD.

The minimum finished floor level of the flood sensitive process equipment is +2.970m AOD based on the Flood Risk Assessment, but for the purposes of these drawings is taken as +3.000m AOD.

The design parameters table covers key elements of the main REP building to enable the principle of the Rochdale Envelope to be applied. Smaller process elements required for the function of REP would be designed in accordance with the Design Principles outlined in Document Reference 7.4.

5.5.3 Illustrative Plan Showing Design Parameters



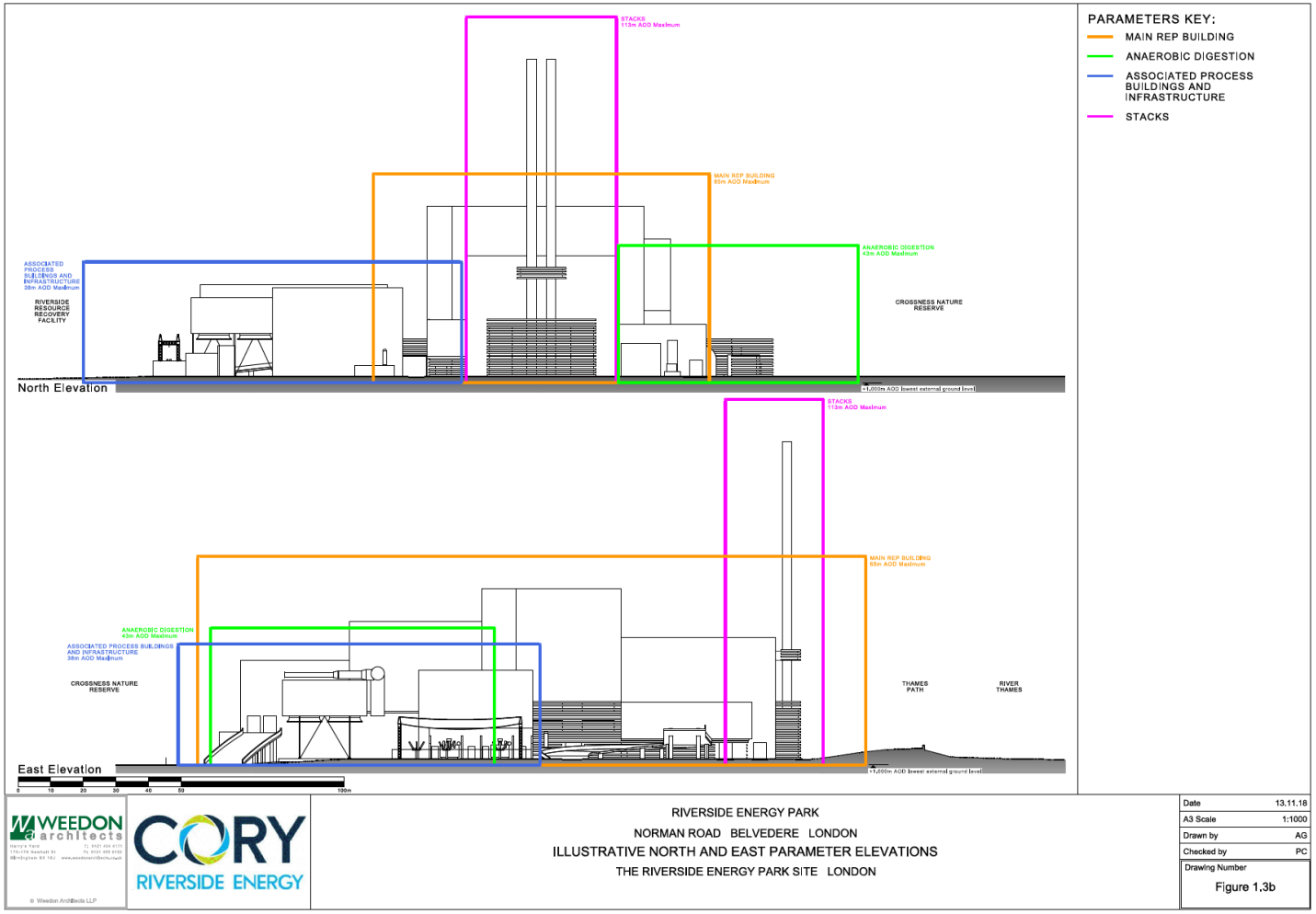
Read in Conjunction with 5.3.1.

Design Parameters Table

Key:

- Main REP Building
- Anaerobic Digestion
- Associated Process Buildings and Infrastructure
- Stacks

5.5.4 Illustrative North and East Elevations Showing Design Parameters



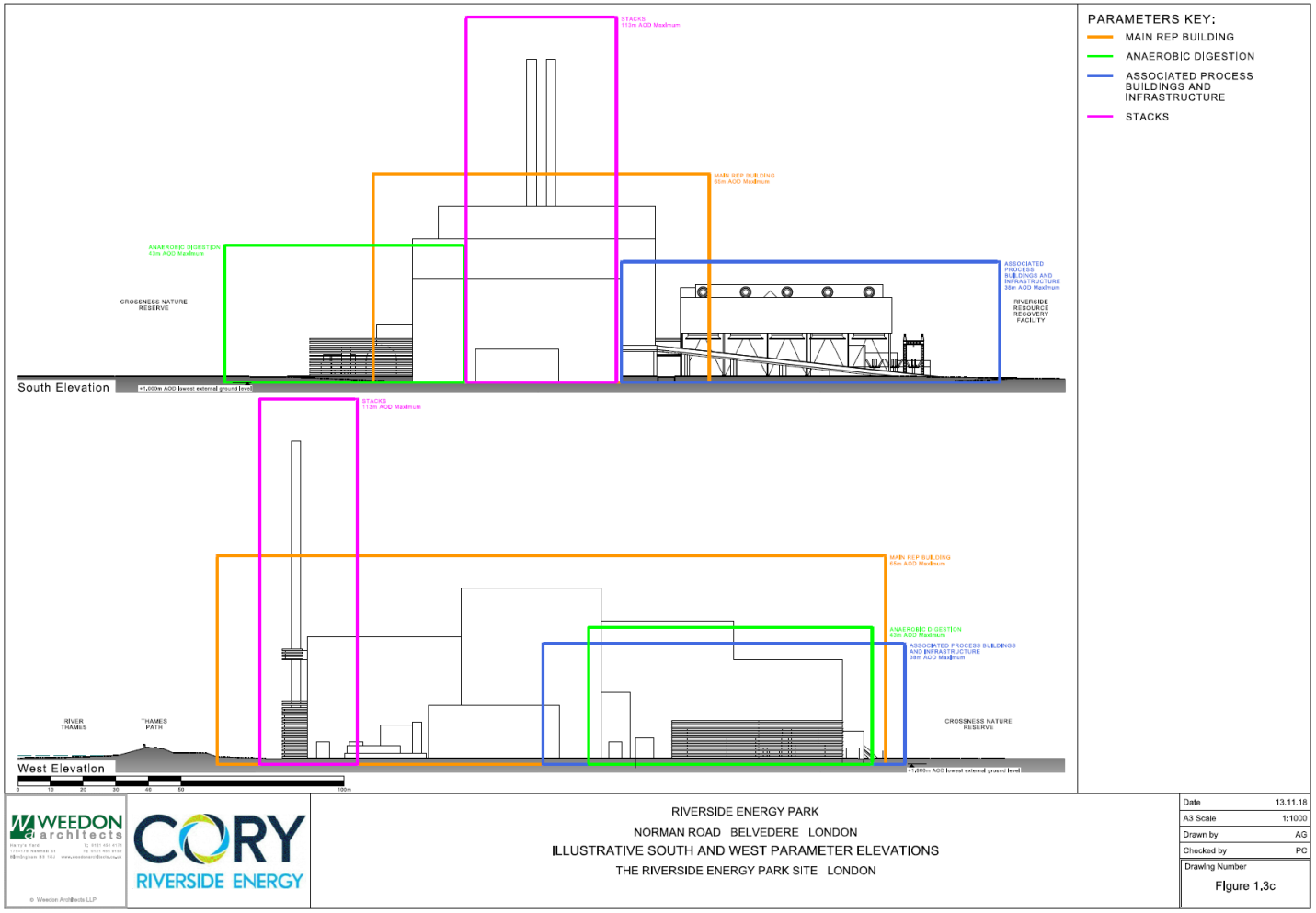
Read in Conjunction with 5.3.1.

Design Parameters Table

Key:

- Main REP Building
- Anaerobic Digestion
- Associated Process Buildings and Infrastructure
- Stacks

5.5.5 Illustrative South and West Elevations Showing Design Parameters



Read in Conjunction with 5.3.1.

Design Parameters Table

Key:

- Main REP Building
- Anaerobic Digestion
- Associated Process Buildings and Infrastructure
- Stacks

6.0 Approach to Design Principles

6.1 Design Approach and Evolution

As the continual review of various engineering options progresses through early design development stages, the necessity for design flexibility is a primary consideration.

Where flexibility in design is sought, it is important that appropriate mechanisms are put in place to ensure the detailed design of the development can be secured and controlled, such that the resulting development is in accordance with the set Design Principles.

The design of REP has followed an iterative process based on environmental assessment work, engagement with contractors and equipment suppliers, consultation with the public and stakeholders, and has also been shaped by the lessons learned from the evolution and construction of RRRF.

The illustrative masterplanning exercise informed the strategic locations of the various plant and buildings. The design consequently evolved to consider matters of: scale and mass; shape of the key components; solar analysis; and optimum design for recovering solar energy. Through these considerations, a preferred built form has been identified.

6.1.1 Scale and Mass

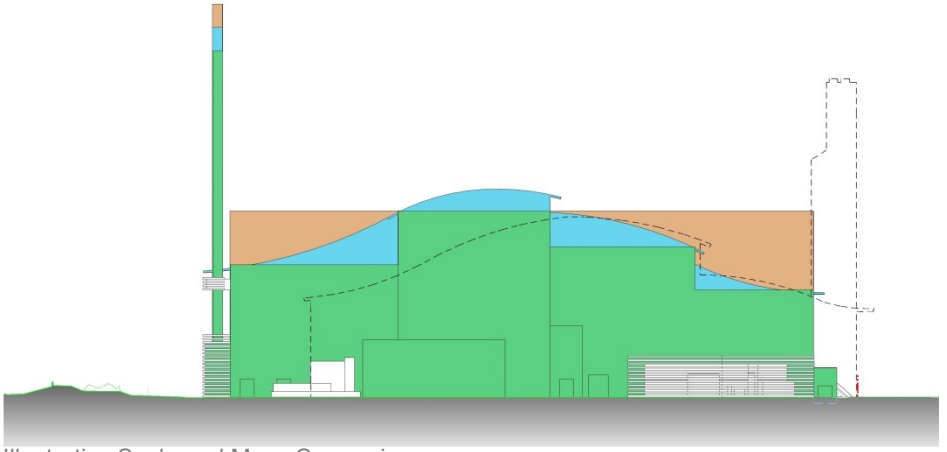
The final scale and massing of the Main REP Building would be determined by the process elements as described within 2.2 Key Development Components.

To reduce the mass of the facility within the Rochdale Envelope, the buildings would be configured to respond to individual process components. This helps to lessen the mass of the facility and minimise its visual impact from key viewpoints.

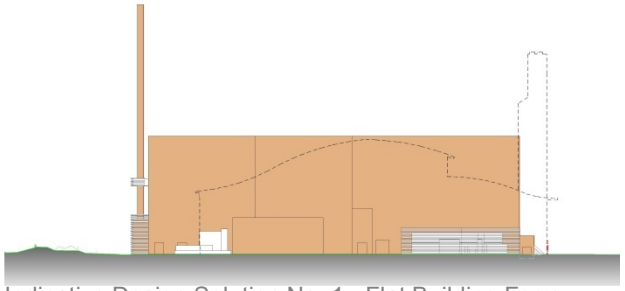
The tallest component is the stack. Whilst this is referred to as an individual item, further design and assessment will be undertaken to determine the best configuration, which may comprise one stack of one or more flues, or more than one stack each containing an individual flue, or one or more flues supported by a brace. The overall intention is to find an optimal balance between the environmental and engineering requirements, and the most aesthetic design. The initial expectation is that this can be achieved through the use of two adjacent slender stacks or flues, thereby minimising the visual impact that a greater diameter stack would have, whilst also allowing individuality to be brought to the design. The relevant height of the stack(s) would be determined through air dispersion modelling.

Three indicative design solutions have been considered from the outset: flat building form; curved building form; and stepped building form. Design solutions Nos. 1 and 2, presented in this section, also present indicative stack height increases resulting from the effect of the building form on air dispersion modelling.

RRRF is shown dotted in all images.

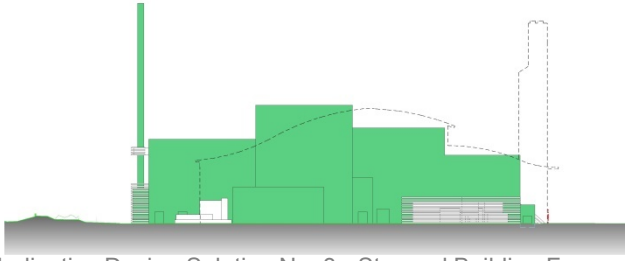


Illustrative Scale and Mass Comparison



Indicative Design Solution No. 1 - Flat Building Form

Indicative Design Solution No. 2 - Curved Building Form

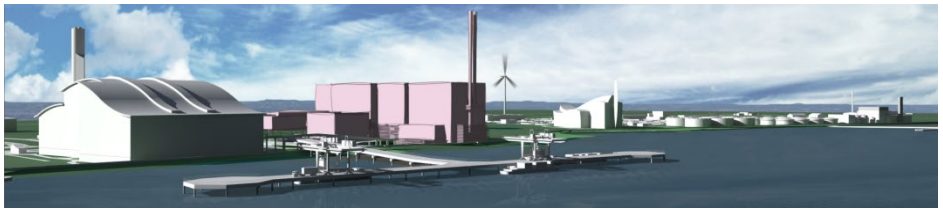


Indicative Design Solution No. 3 - Stepped Building Form

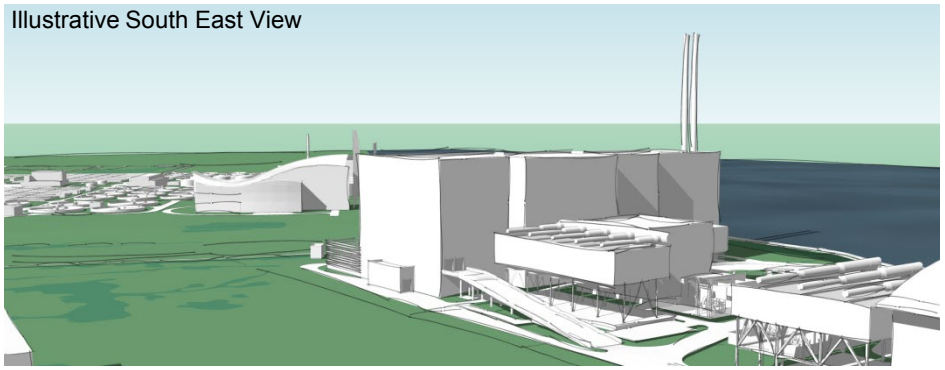
6.1.2 Solar Studies

A series of solar studies have been undertaken using the sun path analysis introduced at section 3.4.2 of this DAS. The solar studies consider the roof locations available for the solar panels across each of the Indicative Design Solutions and the resultant potential energy output that could be achieved.

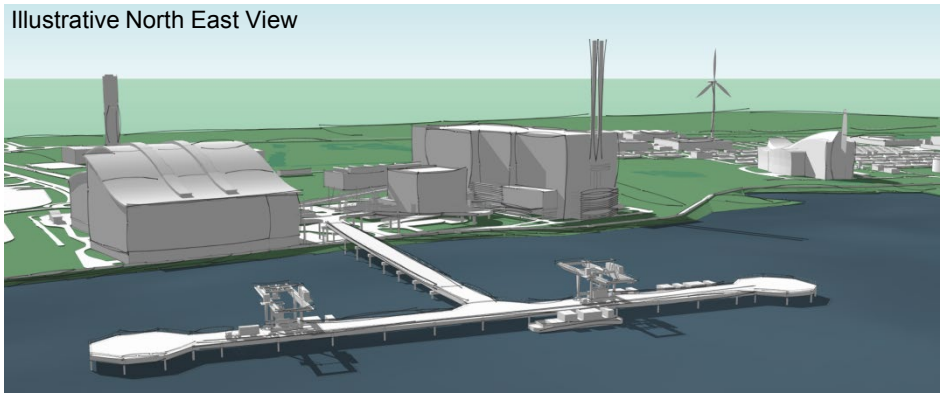
6.2 Indicative Design Solution No. 1 - Flat Building Form



Illustrative South East View



Illustrative North East View



Indicative Design No. 1 is the most simplistic design, implementing the required footprint needed to accommodate the internal operations, whilst maintaining vertical flexibility in the volume of the building.

The resulting solution achieves optimal provision for utilising solar panels as a form of renewable energy but in turn has a highly inefficient internal building volume that creates a dominant but simple building form to make a strong statement along the riverside.

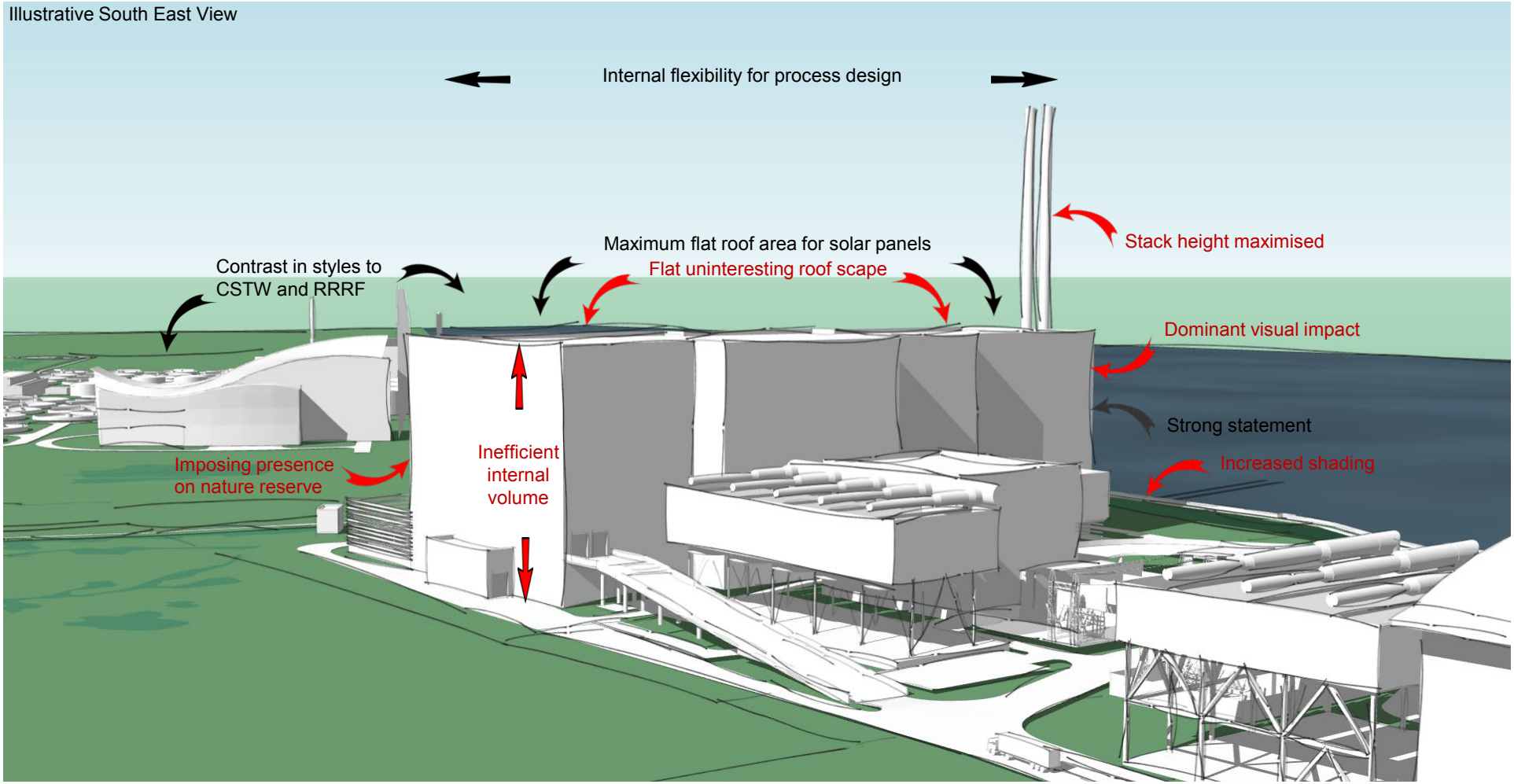
Advantages

- The flat roof form provides maximum useable roof area allowing increased solar panel potential. The solar studies are presented in the following graphics and at section 6.5 of this DAS.
- Maximum internal flexibility for process design.
- Contrast in style to RRRF and Crossness Sewage Treatment Works gives REP its own identity and provides a strong statement to the river frontage.

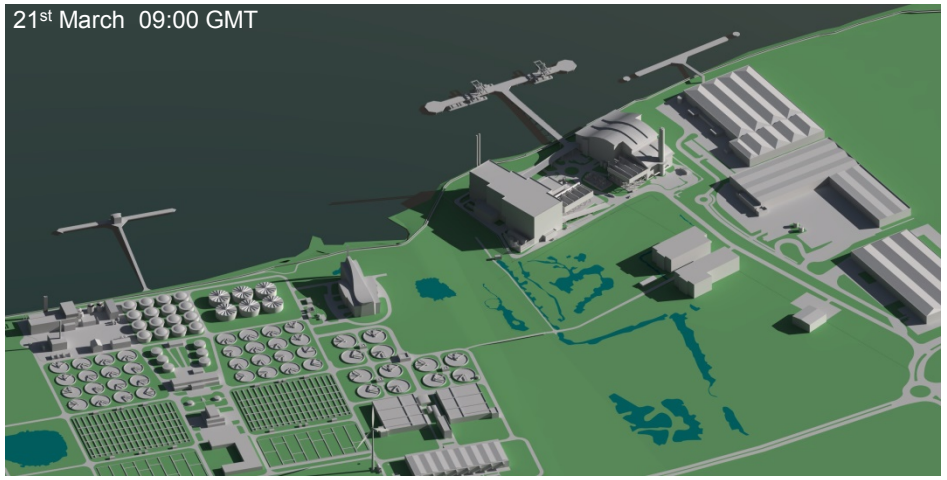
Disadvantages

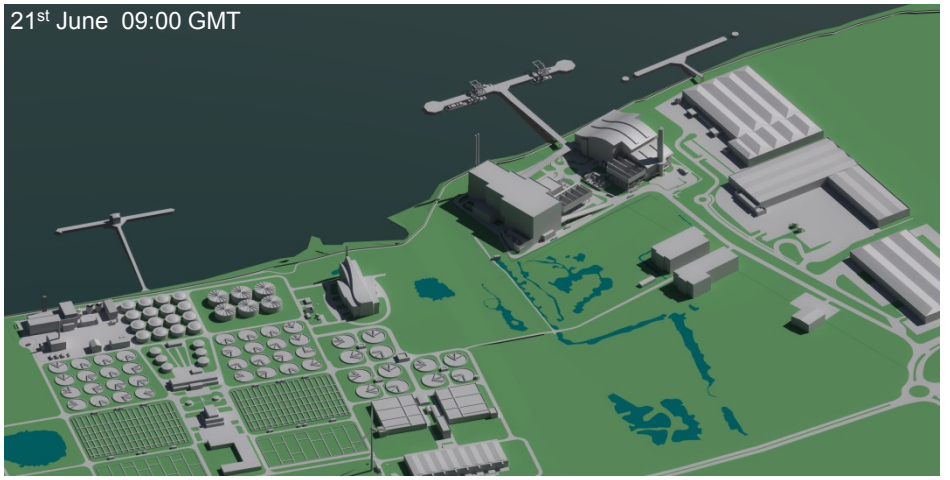
- Uncompromising building height increases shaded areas of the site, Thames Path and Crossness Nature Reserve.
- Flat and uninteresting roof scape for distant and River views.
- Height of stack(s) would be at its tallest.
- Dominant visual impact on Riverside view.
- Increased mass/scale adjacent to the nature reserve.
- Inefficient internal volume creating increased cost and wasted space.
- Limited architectural relief in external building form.

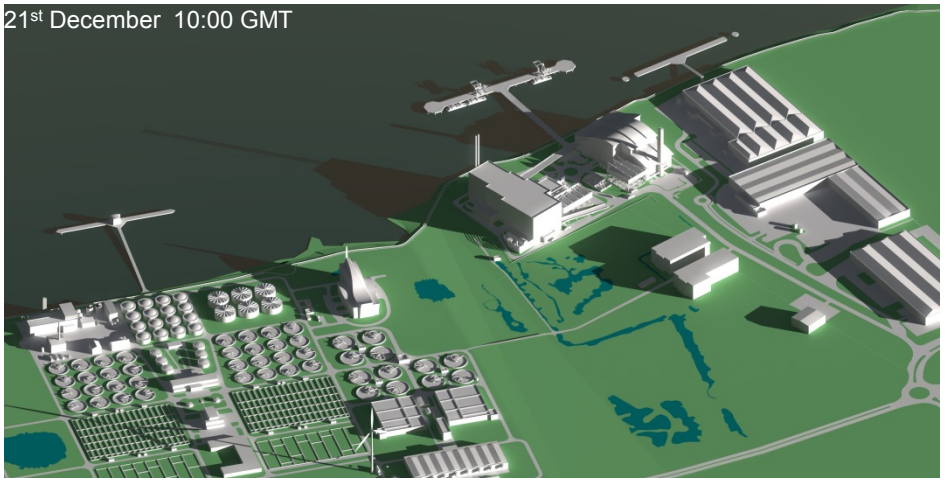
6.2.1 Illustrative View - Indicative Design Solution No. 1



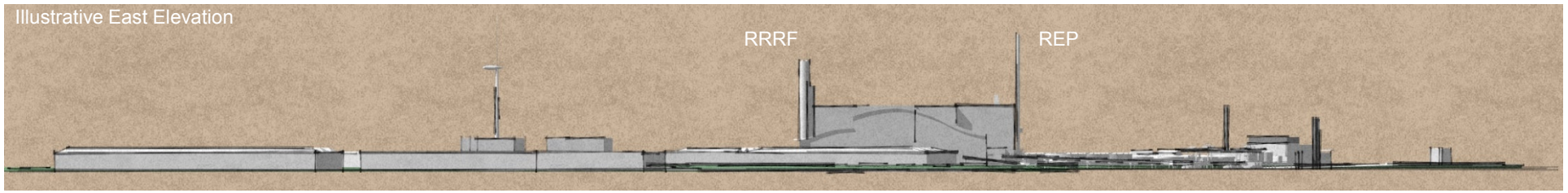
6.2.2 Solar Studies - Indicative Design Solution 1

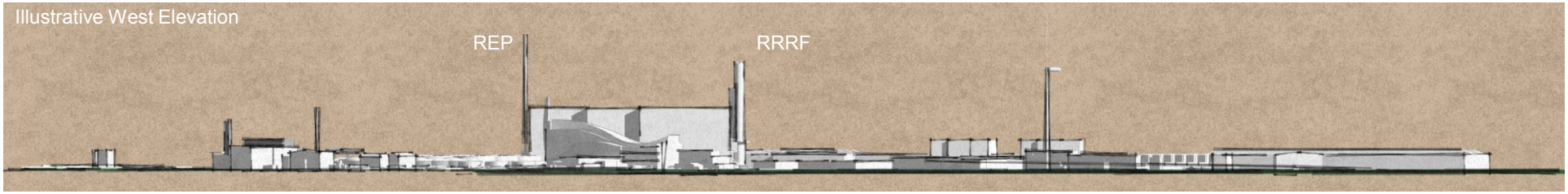




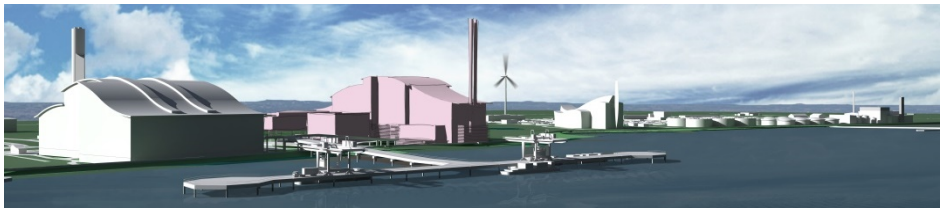


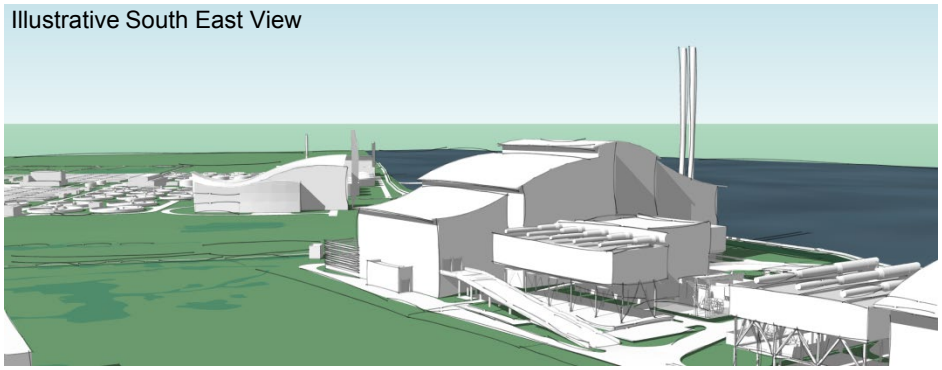
6.2.3 Site Wide Elevations - Indicative Design Solution 1



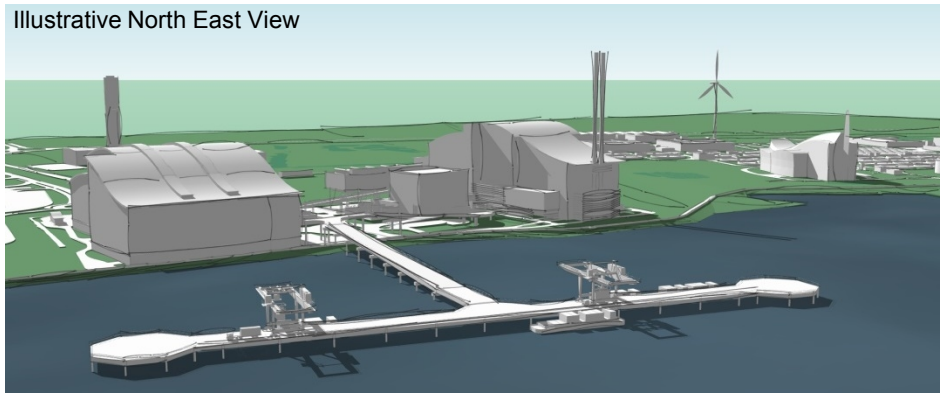


6.3 Indicative Design Solution No. 2 - Curved Building Form





Illustrative South East View



Illustrative North East View

Indicative Design No. 2 provides a solution that reduces the visual dominance of the building and creates a continuous synergy between the building form of RRRF and the Crossness Sewage Treatment Works. The resultant form does however limit the effective roof area available for solar panels.

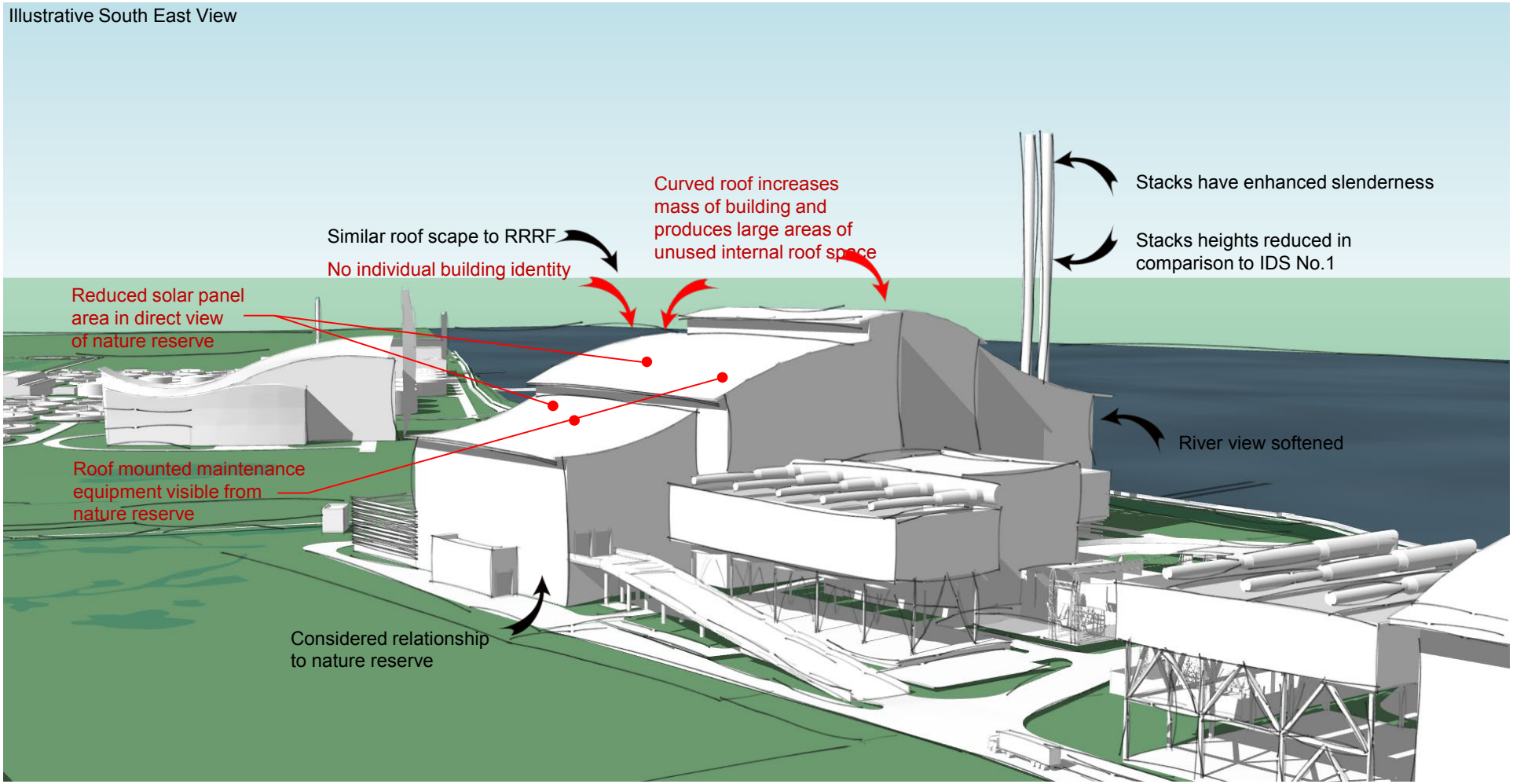
Advantages

- Similar roofscape to RRRF creating a familiar form alongside the Thames Path.
- Reduced stack height compared to Indicative Design Solution No.1.
- Reduced height provides a considered relationship to the nature reserve by stepping down and minimising visual impact.

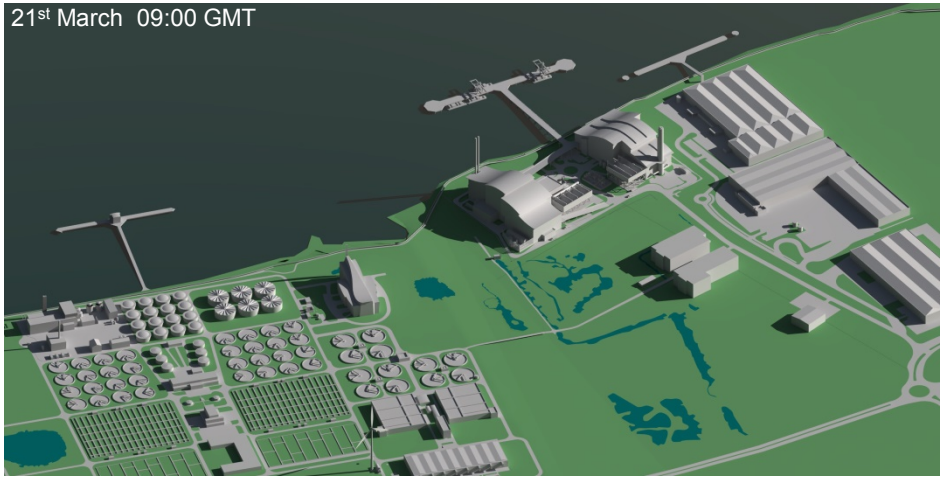
Disadvantages

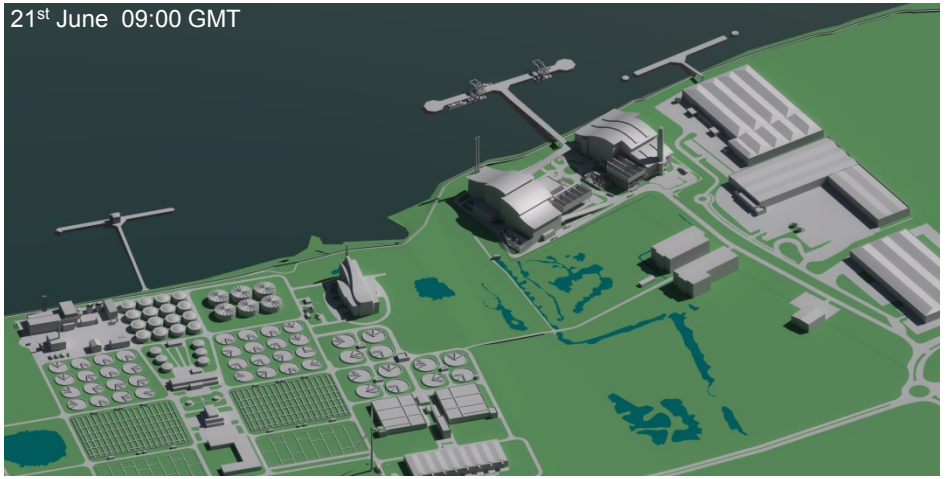
- Whilst reducing height, the curved roof increases the mass of the building by stretching its horizontal emphasis.
- No individual building identity; the curved form is too similar to RRRF and consequently competes for dominance.
- Minimised effective area for solar panels. The solar studies are presented in the following graphics and at section 6.5 of this DAS.
- Solar panels are in view from the nature reserve with potential adverse reflection effects.
- Large area of unused internal space due to minimum process height requirements and curved roof void areas.

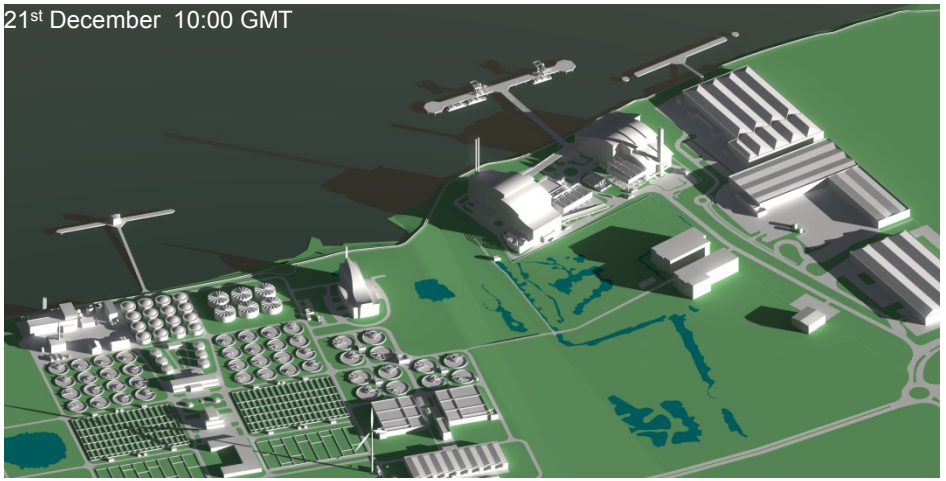
6.3.1 Illustrative View - Indicative Design Solution No. 2



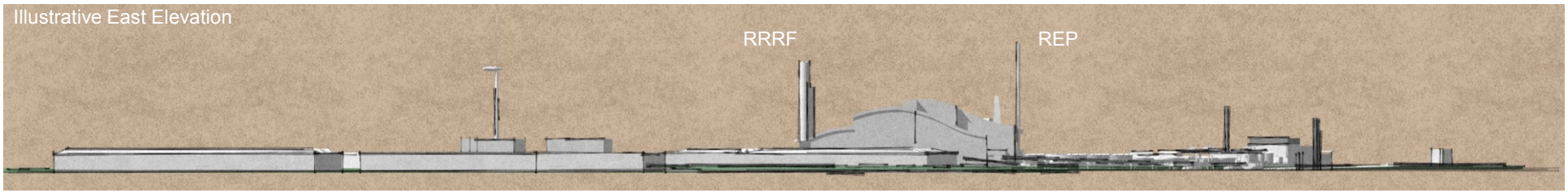
6.3.2 Solar Studies - Indicative Design Solution 2

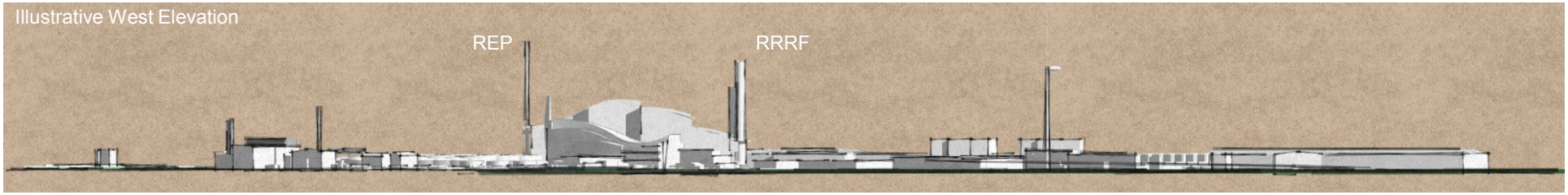




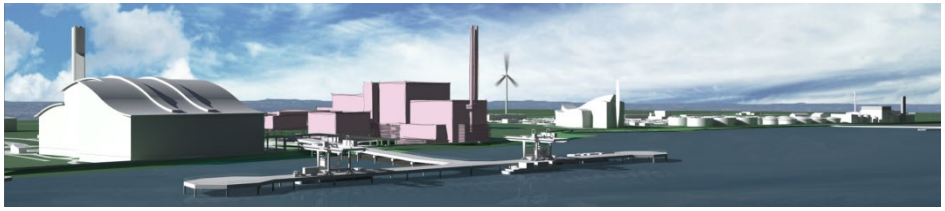


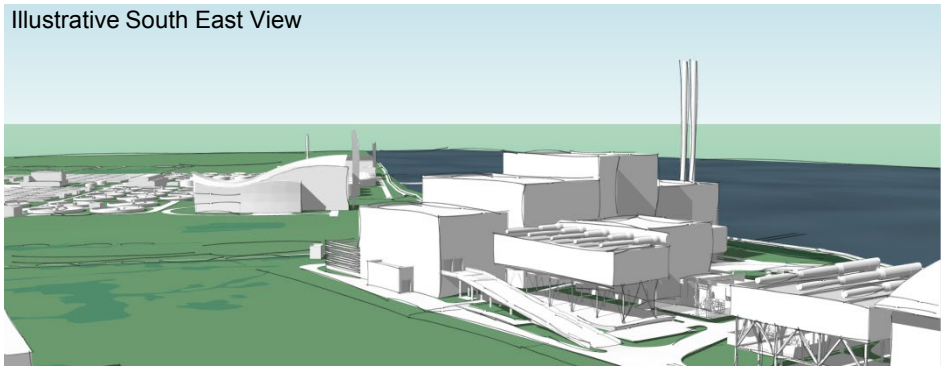
6.3.3 Site Wide Elevations - Indicative Design Solution 2



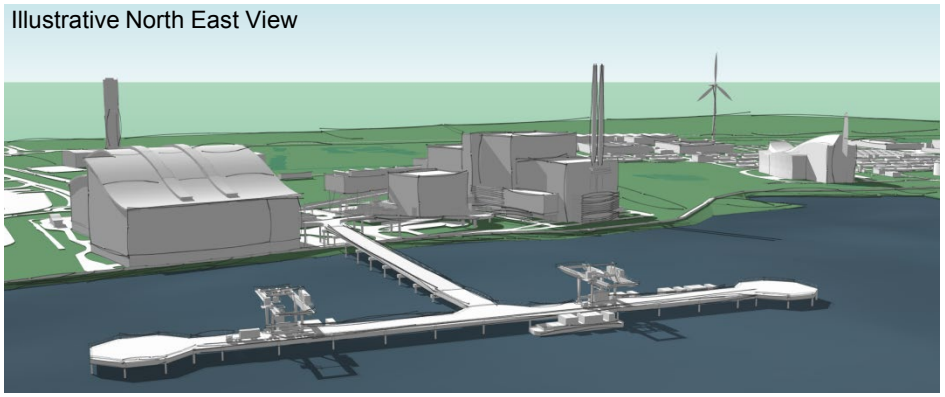


6.4 Indicative Design No. 3 - Stepped Building Form





Illustrative South East View



Illustrative North East View

Indicative Design No. 3 seeks to wrap the building more closely around the process requirements, whilst still providing opportunity for solar panel placement. A stepped building approach reduces the height and perceived mass of the building, providing a more human scale relationship to both the River frontage and nature reserve.

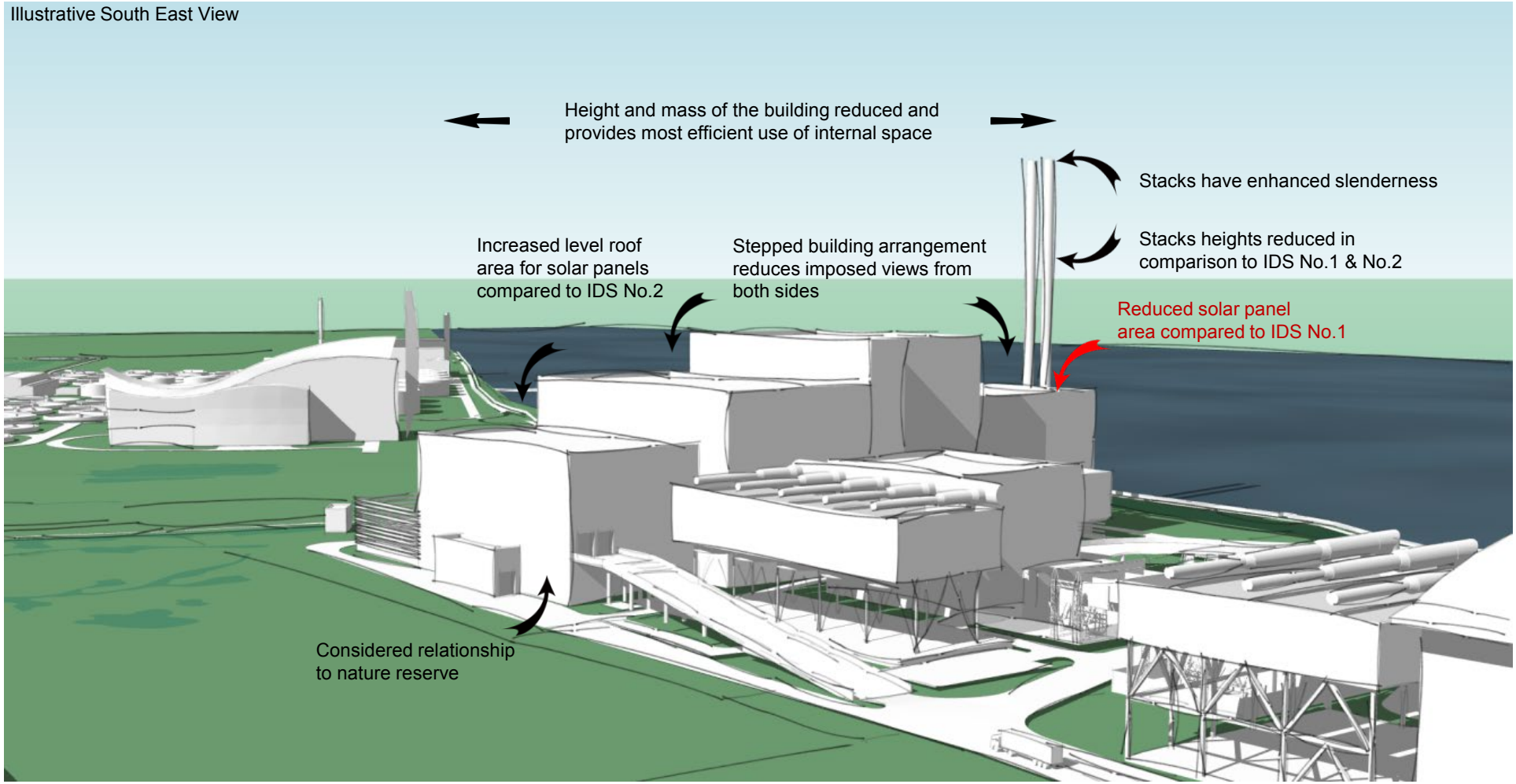
Advantages

- Similar to Indicative Design Solution No.1, the flat roof provides substantial opportunity for solar panel placement and effective energy recovery. The solar studies are presented in the following graphics and at section 6.5 of this DAS.
- The stepped approach to the building form allows the most positive relationship to the nature reserve and River Thames frontage and reduces the imposed view of the building from both sides.
- The River Thames view is enhanced by creating a distinct ‘brother and sister’ family of buildings along the River including RRRF, Crossness Sewage Treatment Works and the Enhanced Digestion Facility;
- REP gains its own identity and would be easily defined by its form and position.
- Architectural relief is provided by vertical and horizontal steps within the façade.
- The stepped roofscape reduces the overall height and mass of the buildings and has the most efficient use of internal space, whilst providing interest from distant views.

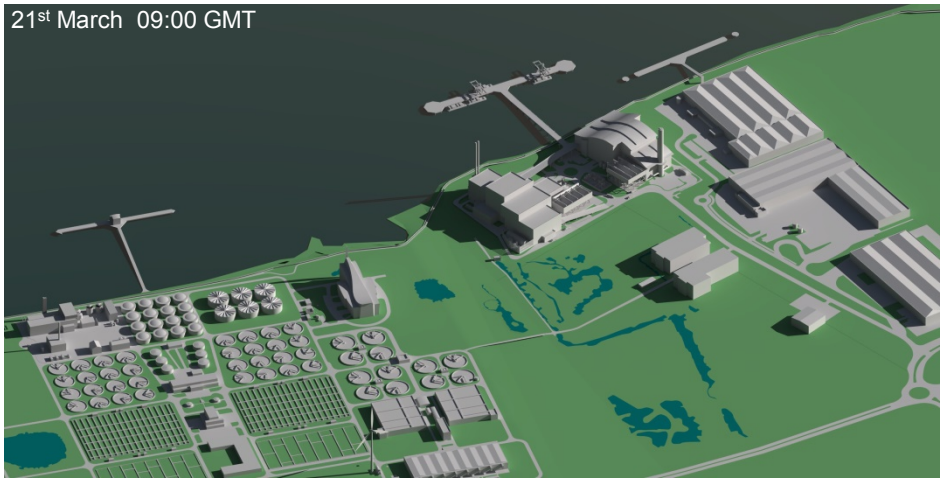
Disadvantages

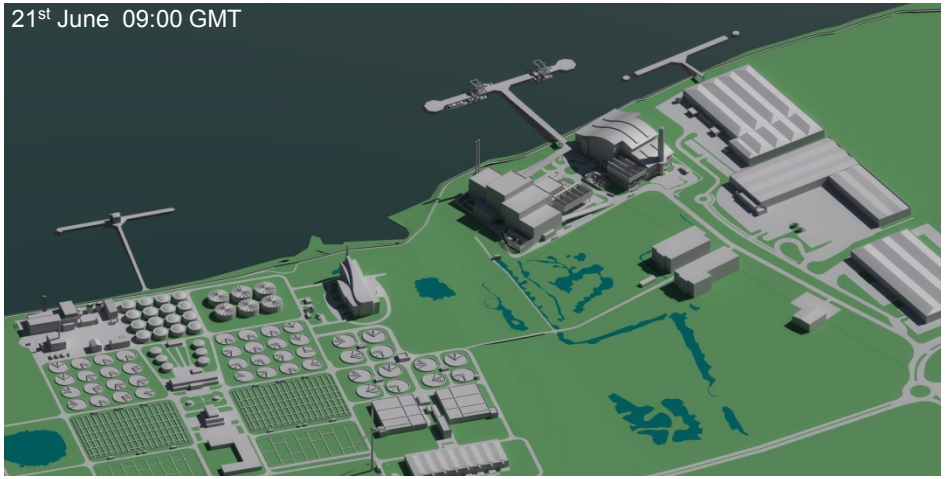
- Reduced area of efficient solar panels compared to Indicative Design Solution No.1.
- Alternative roofscape option creates a separate identity to RRRF, the buildings may not be seen as part of the same ‘family’.

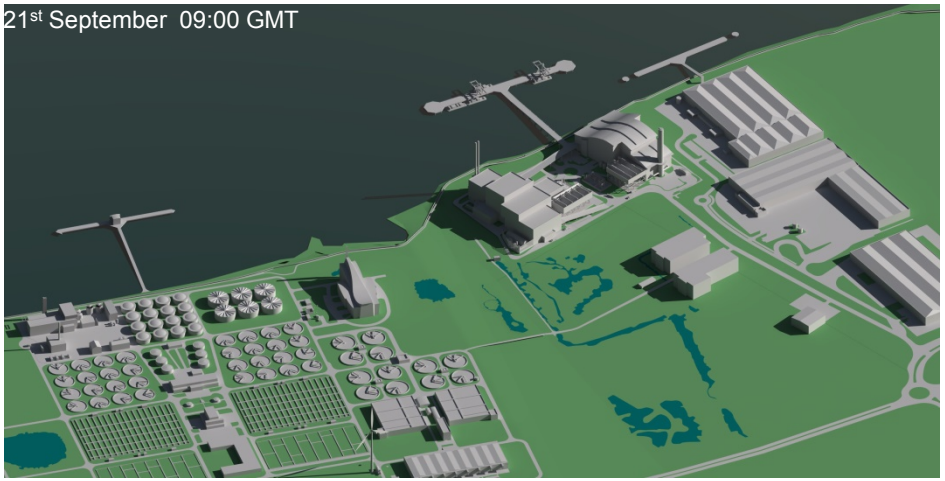
6.4.1 Illustrative View - Indicative Design Solution No. 3

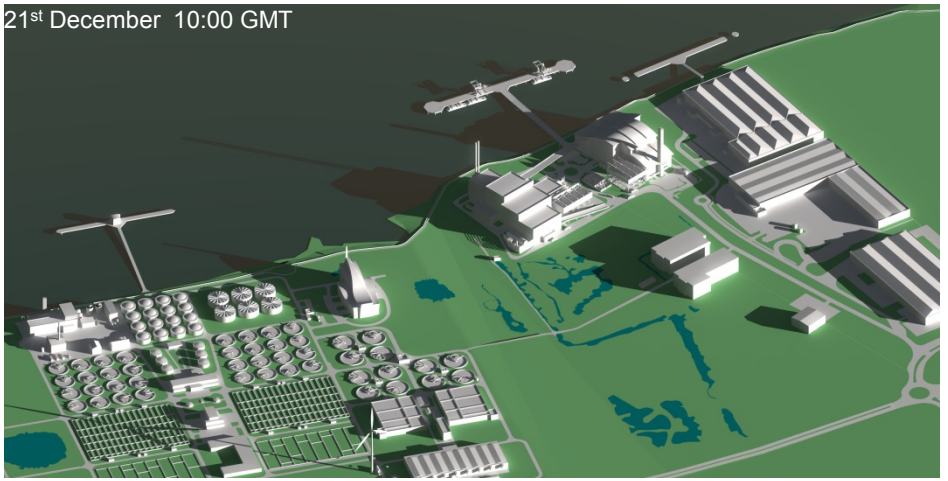


6.4.2 Solar Studies - Indicative Design Solution 3

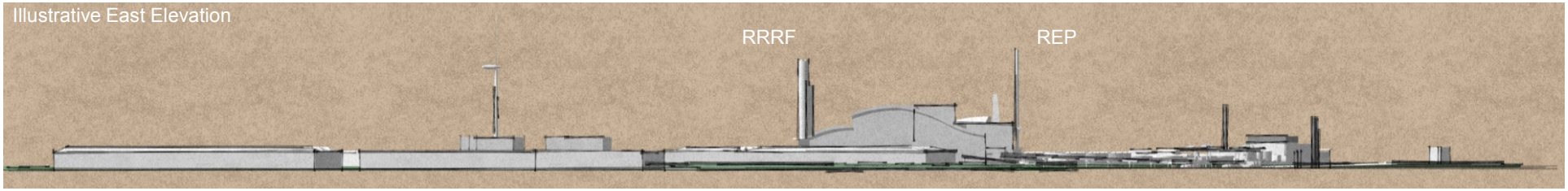


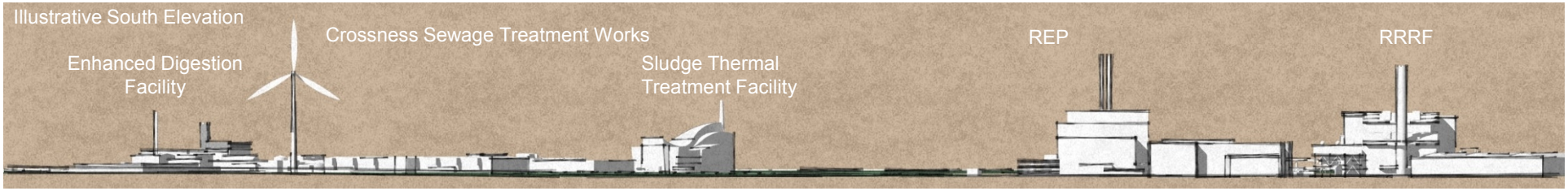


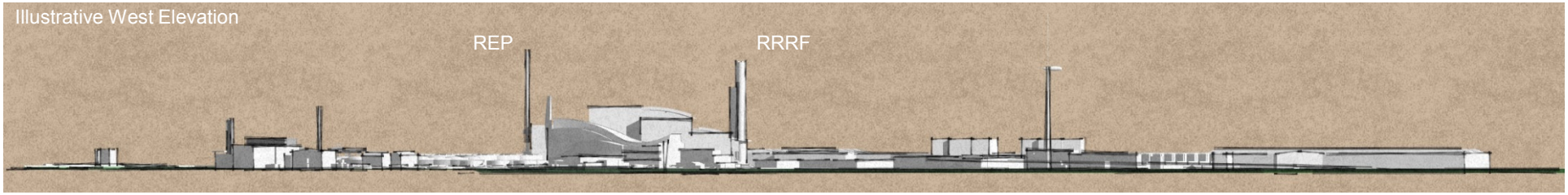




6.4.3 Site Wide Elevations - Indicative Design Solution 3







6.5 Solar Panel Outputs and Locations

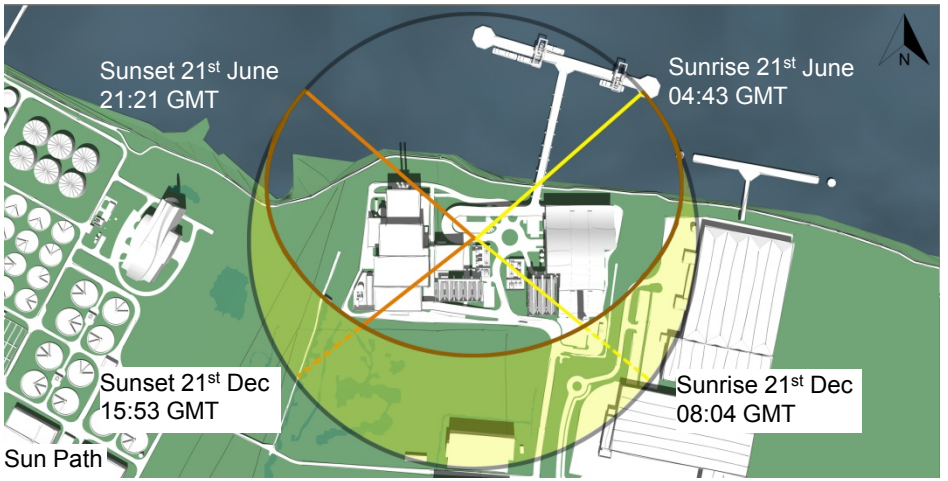
Each Indicative Design Solution has been studied to identify the potential for solar energy. Given the different designs, the amount of energy able to be recovered for each type of roof would be different.

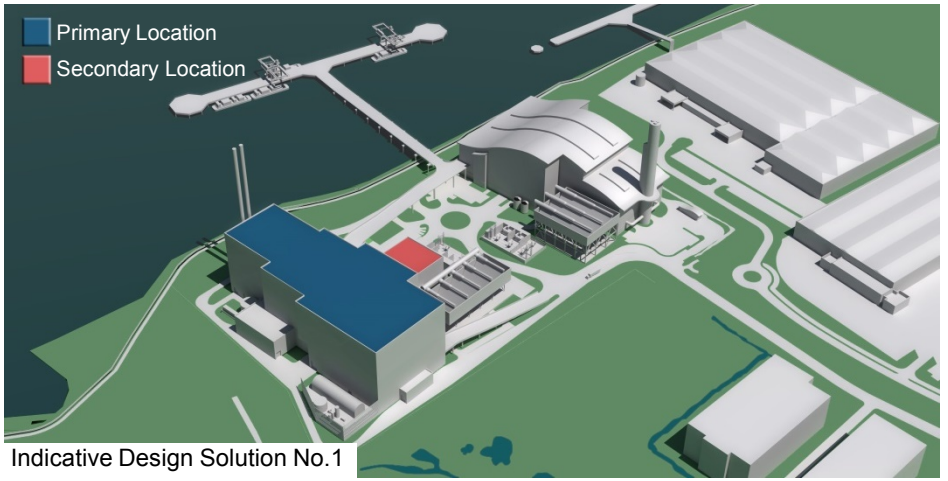
The energy output of the solar panels has been assumed as 160W/m2. Given the current technological evolution of solar panels, the energy efficiency may increase further between now and the scheduled construction phase.

The area calculations allow for a surface use of 75% of the suitable roof area allowing for access and maintenance walkways.

The energy output of the solar panels has only been calculated for Primary Areas of the roofscape. Secondary Areas of solar panels have been identified on the following images, although the energy output is yet to be calculated in detail. In order to achieve a like for like comparison between the Indicative Design Solutions, only the results from the Primary Areas have been reported.

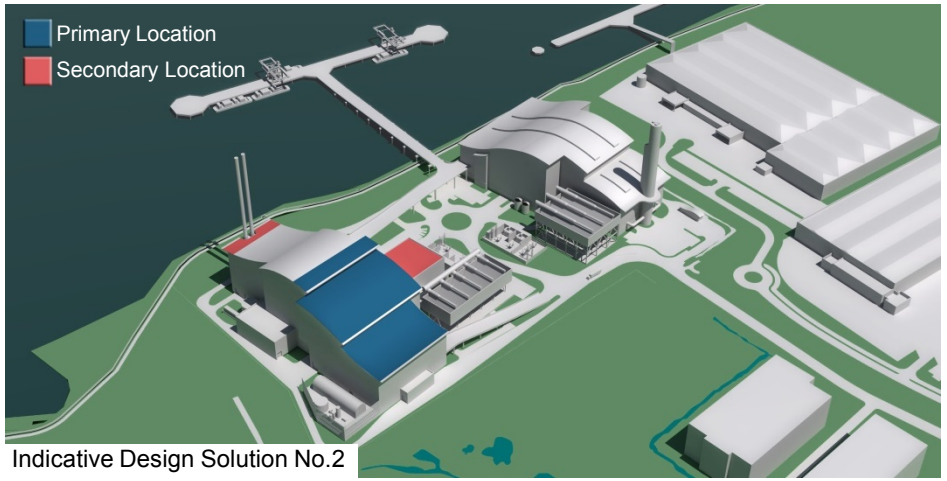
Indicative Design Solution No.1 allows the solar panels to be installed on the entirety of the main building, totalling c.7,500 m2. For the Primary Areas this would correspond to a potential output of 1,200kW (1.2MW).





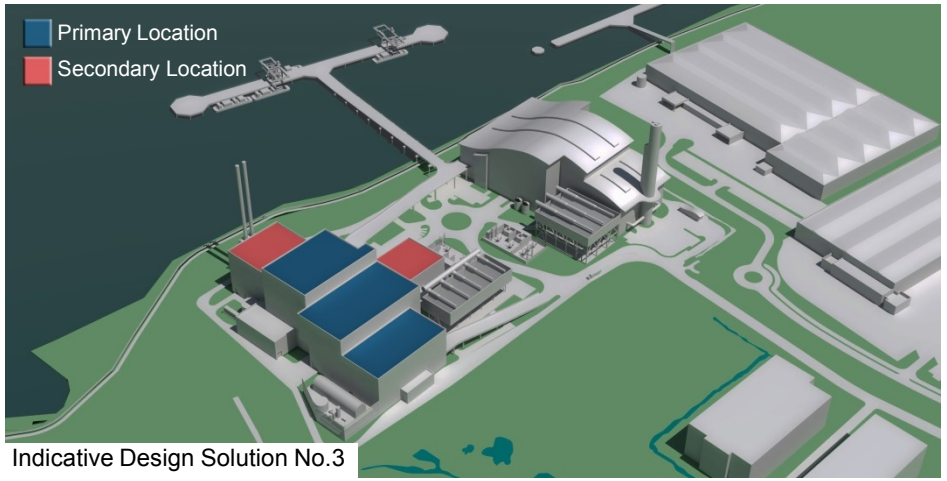
6.5 Solar Panel Outputs and Locations

Indicative Design Solution No.2 allows the solar panels to be installed on the Tipping Hall, Waste Bunker and partially to the southern leaning edge of the Boiler roof. For the Primary Areas this corresponds to c.4,000m2 of solar panels, achieving a potential energy output of 640kW (0.64MW).



Indicative Design Solution No.2

Indicative Design Solution No.3 allows the solar panels to be installed on the Tipping Hall, Waste Bunker and Boiler roof. For the primary location this corresponds to c.6,000m2 of solar panels, achieving a potential energy output of 960kW (0.96MW).



Indicative Design Solution No.3

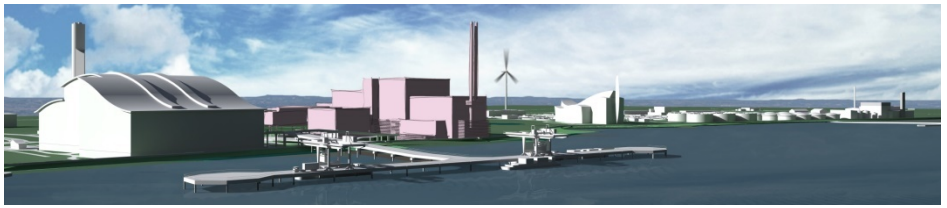
6.6 Selected Stepped Building Form

The selected stepped building form was based on an analysis of the three indicative design solutions identifying key advantages and disadvantages.

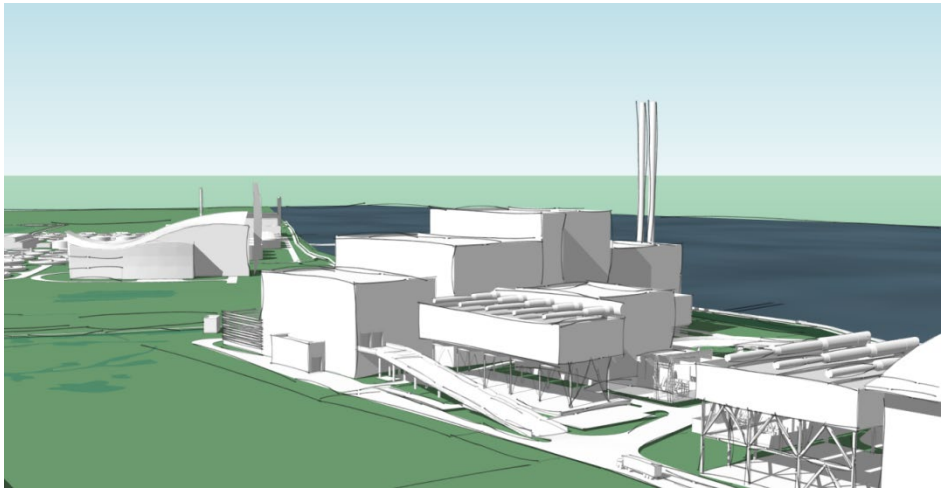
The design has evolved throughout the pre-application process as a result of engineering design development and the responses that Cory received following consultations that have been carried out. As documented in the Consultation Report (Document Reference 5.1) the consultation process has helped define the design concept approach to REP.

Indicative Design Solution No. 3 - Stepped Building Form is considered to provide a balance between:

- Establishing a separate and appropriate identity and character for REP
- Maximising renewable energy outputs
- Efficient operational and process requirements.
- Responding to the context of neighbouring land, building forms and property uses.
- Mitigating anticipated visual and shadowing effects to important neighbours.
- Requirements for safe routine maintenance and access throughout the life of the building.



Illustrative REP Concept Northeast View



Illustrative REP Concept Southeast View

7.0 Design Principles

7.1 Introduction

Throughout the design process, consideration has been given to a range of Design Principles which, where relevant and possible, have been informed by the environmental assessment work and consultation with stakeholders. As a result the design has evolved throughout the pre-application process.

.Design considerations and themes include:

- The proposed interlocking forms achieve a cohesive dynamic layout across the site, and provide the opportunity to further reduce the visual impact of REP. Interrupted views towards the site and beyond could be minimised by some elemental separation. This might be achieved, for example, through different materials used on the façade of buildings.
- Sympathy with the existing environment could be improved by humanising the scale of REP through sensitive material and colour choices on the elevations facing the Crossness Nature Reserve and Thames Path. This could also assist reducing long view visual impacts.
- REP embraces its industrial nature; the use of materials such as semi-solid screens would enable glimpses of process operations and further break down the building form. Lighting layouts could be designed to avoid impact on the surrounding area.
- The masterplanning has developed a safe and attractive site layout. The materials used in construction should be appropriate, durable and able to be readily maintained to retain an attractive appearance. This approach supports a positive public perception of the operations.
- Existing access and roads would be used where possible and the River Thames access would be utilised further. Vehicle parking, storage areas and smaller structures would be most effectively situated with effective screening, so minimising visual clutter.
- Materials for REP should be durable, functional and both appropriate for the purposes of the Proposed Development and sensitive to the site's location adjacent to the River Thames.
- Orientation of the building has been maximised for solar energy generation, in addition to responding to process requirements. These aspirations should continue to be optimised.
- Landscaping could be optimised to complement the local and wider setting, whilst minimising impacts on existing habitats and species.

NPS EN-1 states that 'good design' is also a means by which impacts can be mitigated. To ensure consistency with 'good design', whilst maintaining flexibility, the Applicant is committed to a series of Design Principles (Document Reference 7.4). The Design Principles play an important role in reducing residual impacts associated with the REP development where possible.

The Design Principles are informed by the design work undertaken to date and would apply within the constraints provided by the Works Plan(s) and the Requirements of the DCO. They provide sufficient details of the design intent, while allowing for appropriate flexibility to develop the detailed designs of the Proposed Development prior to its construction.

The Design Principles will be applied to guide the detailed design of the selected north to south orientation (concluded in section 5.2.5) and stepped building form (concluded Section 6.6).

7.2 Design Influences

7.2.1 Introduction

The intention for the detailed architectural design is that colour, materials and texture of buildings would be informed by features in the surrounding and distant landscape. This requires consideration of external cladding, in terms of scale, orientation and grades of colour, to ensure the materials used are appropriate to the local surrounding backdrop and harmonise long distance views.

A study of the landscape character with in the vicinity of the REP site has been undertaken to more closely understand the texture and mix of colour and tones in the environment that could then be translated onto the materials used for the building elevations. The mixture of tones and colours is also representative, as much as possible, of the changing seasons in and around the site.

Various surrounding and long distance photographs have been taken, then broken down to establish horizontal strata and bands of landscape and riverside colour. These have been modelled to represent colours from the foreground to the backdrop of the distant hills and sky.

From this analysis the predominant colours have been established, along with matching tones that could be tested in the façade cladding of the proposed buildings.

Highlight colours have also been identified and these, working alongside the Cory brand colours, may be appropriate to be used as accent colours, to contrast/harmonise with the main elements.

7.2.2 Landscape Colour Study

Landside Colours

Context Colour Palette


Seren Silver

Oyster (RAL 7035)


Seren Gold


Alaska Grey (RAL 7000)


Seren Copper


Slate Grey (RAL 7012)


Seren Black


Anthracite (RAL 7016)

Cory Accent Colours

7.2.3 Riverside Colour Study

Riverside Colours

Context Colour Palette

White Matt (RAL 9010)

Oyster (RAL 7035)

Sirius Matt (RAL 9006)

Alaska Grey (RAL 7000)

Orion Matt (RAL 9007)

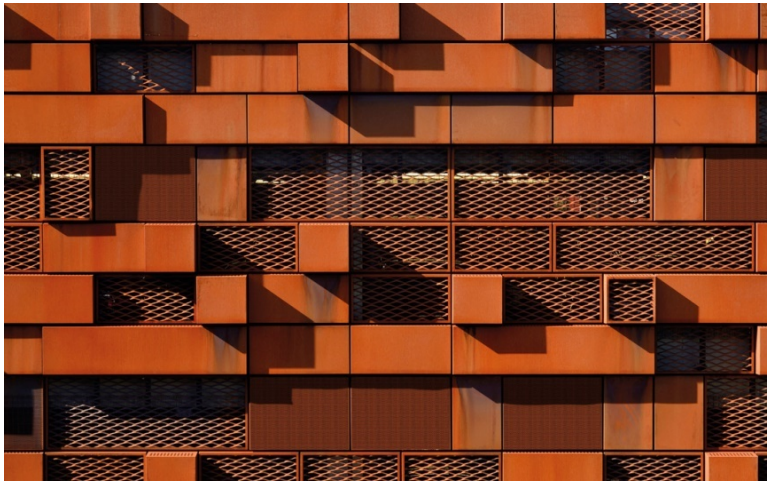
Slate Grey (RAL 7012)

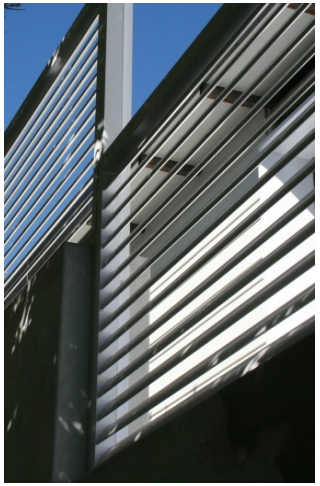
Zeus Matt

Anthracite (RAL 7016)

Cory Accent Colours

7.2.4 Cladding and Screening Study





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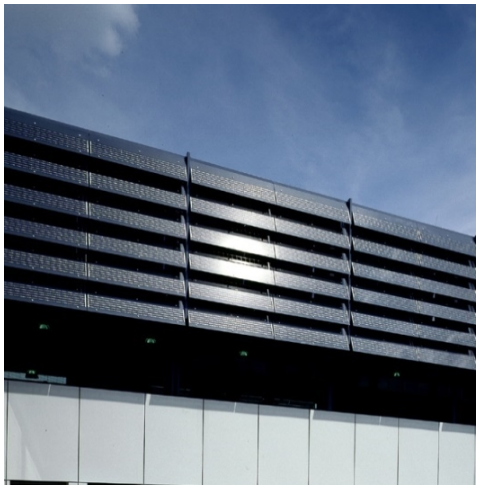

7.3 Landscaping

The REP site is spatially constrained. Safe and efficient operational design has been a priority, with the illustrative masterplanning exercise used to balance this with seeking to minimise adverse environmental effects. The constrained nature of the site leaves limited opportunity, beyond the existing flood embankment, for biodiversity enhancement and landscape provision. Furthermore, the site lies in a flat open estuarine riverscape, which is not characterised by dense planting.

The REP site consequently provides limited opportunity, or context, for structured or substantial planting within the site, either at low level or on the raised flood embankment to the north. Substantial new planting on the flood embankment would also be constrained by engineering priorities; the flood defences need to continue to work effectively as a priority over landscaping.

The Outline Biodiversity Landscape Mitigation Strategy (Document Reference 7.6) has consequently been developed to deliver the following objectives:

- Focus on maximising the biodiversity value through low level planting within areas that are not necessarily developed with buildings, infrastructure or hard landscaping.
- Link with adjacent, retained habitats, enabling them to be enhanced where possible.
- Integrate sympathetically into the existing RRRF soft landscape masterplan with the use of native and indigenous shrubs, supplemented with wildflower grasses providing an informal style planting suitable for the surrounding river and nature reserve areas.
- Incorporate high durability hard landscape materials for ease of maintenance.

7.4 Lighting

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8.0 Conclusion

This Design and Access Statement has been prepared to present how the design and access arrangements for REP have been developed. The approach used has been informed by the site's context and both the opportunities and constraints this presents for development. Whilst a decision on whether the Proposed Development is to be enjoyed visually will largely be a matter of subjective taste, the core principles of good design have been used to underpin its design journey, including: robustness or durability; usefulness or efficiency; and an aesthetically pleasing appearance.

The illustrative masterplanning and development of the design parameters provide a robust basis on which to base the EIA. The Rochdale Envelope has been applied to the maximum parameters, to ensure that the likely significant effects of the Proposed Development have been robustly assessed.

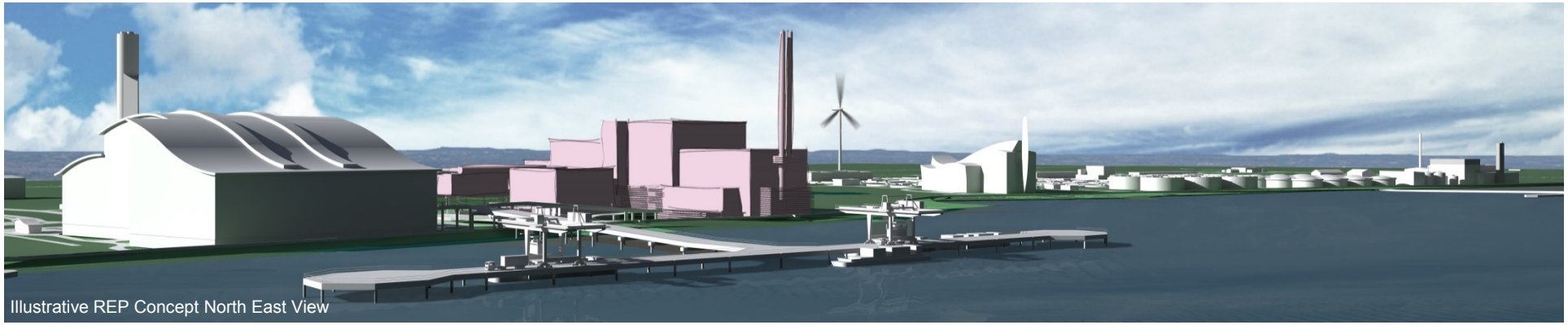
The design concepts (of building alignment and form) will be further developed through Design Principles set within the draft DCO Requirements. This positive approach enables an appropriate design concept to be established and demonstrated to be appropriate, whilst allowing the design details to be further developed over time, but still secured prior to the commencement of development.

This includes securing a number of sustainability measures, beyond the facility's primary function as a renewable energy generating station. These measures will ensure that the Proposed Development will be both resilient to the effects of climate change, whilst also making a positive contribution to achieving the Mayor of London's aspirations for a carbon free city.

The design has evolved throughout the pre-application process as a result of engineering design development and the responses that Cory have received following consultations that have been carried out. The final design of REP reflects its purpose to supply renewable energy and the industrial context within which it would sit.

In terms of siting and layout, opportunities have been taken to minimise the visual impact of REP by locating it close to the existing buildings and structures of RRRF while considering its building form, ensuring it would have its own identity.

In summary, it is considered that REP represents, and exceeds, 'good design' for the purposes of energy infrastructure and policy set out in the relevant National Policy Statements.



Illustrative REP Concept North East View