DESIGN FRAMEWORK

Drax Bioenergy with Carbon Capture and Storage

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Applicant: Drax Power Limited

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1. INTRODUCTION

1.1. The Proposed Scheme

1.1.1. Drax Power Limited (the Applicant) intends to install post combustion carbon capture technology on up to two of the existing 660-megawatt electrical ('MWe') biomass power generating units at the Drax Power Station in Selby, North Yorkshire

1.1.2. The Proposed Scheme is designed to remove approximately 95% of the carbon dioxide from the flue gas from these units, resulting in overall negative emissions of carbon dioxide.

1.1.3. By capturing carbon dioxide emitted as part of the combustion process, for storage in safe underground deposits, the process of biomass electricity generation becomes carbon negative, as more carbon dioxide has been removed from the atmosphere than has been added

1.1.4. The Proposed Scheme is made up of the following:

- **a.** Up to two Carbon Capture Plants (one associated with Unit 1 and one associated with Unit 2) (Work No. 1D as described in Schedule 1 of the **draft DCO**), each made up of:
    - i. Flue gas pre-treatment section (includes flue gas booster fans (Work Nos. 1D(v) and (vi)), Gas / Gas Heat Exchangers (Work Nos. 1D(v) and (vi)) and Quench Columns (Work Nos. 1D(i) and (ii)));
    - ii. One Absorber Column (Work Nos. 1D(i) and (ii));
    - iii. Solvent Regeneration System (to include up to two Regenerators) (Work Nos. 1D(iii) and (iv));
    - iv. Rich Solvent / Lean Solvent Heat Exchangers (Work Nos. 1D(iii) and (iv)); and
- **b.** Additional Common Plant infrastructure and modification works to the Drax Power Station that are required to support and integrate with one or both Carbon Capture Plants including:
    - i. Solvent Storage and Make-up System (comprising up to four bunded solvent storage compounds) (Work No. 1D(vii) in Schedule 1 of the **draft DCO**);
    - ii. Carbon Capture Wastewater Treatment Plant (Work No. 1D(viii) in Schedule 1 of the **draft DCO**);
    - iii. Carbon Dioxide Processing and Compression Plant (Work No. 1E in Schedule 1 of the **draft DCO**);
    - iv. Modification to the existing water pre-treatment plant (Work No. 1A in Schedule 1 of the **draft DCO**);
    - v. Modification, upgrade and extension of the existing cooling system and distribution of cooling water to the Proposed Scheme (Work No. 1B in Schedule 1 of the **draft DCO**);
    - vi. Modifications to existing electrostatic precipitators (Work No. 3 in Schedule 1 of the **draft DCO**);
    - vii. Modifications, upgrade and extension to existing power generating units, boilers and turbines for steam extraction and new steam processing infrastructure for distribution of process steam and electricity supply to the Proposed Scheme (Work No. 1C and Work No. 1F in Schedule 1 of the **draft DCO**); and
    - viii. Integral electrical connections within the existing generating station and Carbon Capture Plant including upgrades to the existing electrical infrastructure and new electrical infrastructure for the secondary electrical supply to the Proposed Scheme (Work No. 1F in Schedule 1 of the **draft DCO**);
- **c.** Infrastructure to transport compressed carbon dioxide from the Carbon Dioxide Processing and Compression Plant to storage and transport infrastructure operated by National Grid Carbon Limited (Work No. 2 in Schedule 1 of the **draft DCO**);
- **d**. Minor vegetation and street furniture management and other works to facilitate access during construction (Work No. 4 in Schedule 1 of the **draft DCO**);
- **e.** Additional supporting infrastructure and other works for the Proposed Scheme as set out in Section 2.2.49 (Work No. 3 in Schedule 1 of the **draft DCO**);
- **f.** Temporary construction laydown areas (Drax Power Station Site Construction Laydown Areas and the East Construction Laydown Area) (Work No. 5 in Schedule 1 of the **draft DCO**); and
- **g**. Habitat Provision Areas (Work No. 6 in Schedule 1 of the **draft DCO**).

1.2. Purpose and structure of the Design Framework

1.2.1. Drax Power Station is a prominent landmark within the open landscape of the Ouse and Aire valleys. It has from its inception been the subject of ambitious design strategies, with clear design objectives aimed at reducing the impact of this large-scale infrastructure upon the surrounding landscape. Such measures have included the careful siting and massing of its component elements, the creation of extensive surrounding green infrastructure and the consideration of its overall architectural appearance and visibility.

1.2.2. The Design Framework has been prepared in response to the **EIA Scoping Opinion** (document reference 6.3.1.2) received from the Planning Inspectorate, which stated the following:

'Site Design - I would support consideration of the original design intent as set out by AE Weddle's 1966 Landscape and Mitigation Report (para. 10.2.3). Given the scale of the existing Drax site and the significant changes that have taken place since the original report, I would like to see a clear revised design strategy for the site.

This strategy should explain how the current application achieves principles of 'good design' in context of the site as a whole, for the overall composition of site structures, massing, layout, colour and materials, aiming to reduce overall massing, visual coalescence and site clutter.'

1.2.3. This Design Framework describes these wider strategic aims for Drax Power Station and demonstrates how the Proposed Scheme design (by forming an integral component of the Power Station fabric) fits within this overall context. The Framework illustrates where principles of good design have been incorporated in compliance with legislative policy / guidance and provides further explanatory support for the primary mitigation measures as referenced in **Chapter 2 (Site and Project Description)** (document reference 6.1.2).

1.2.4. The Design Framework covers the following:

- A summary overview of the historic landscape / architectural vision for Drax Power Station, its continuing relevance and evolving design context in terms of new and ancillary infrastructure;
- The current functions of Drax Power Station and existing design parameters;
- The Proposed Scheme and its composition in respect of site structures and design measures for siting, massing, layout, colour and material selection (with supporting representational elevations and digital model renderings);
- Good practice design principles employed for Drax Power Station in its entirety, which form a basis of reference for any changes to Drax Power Station in the future.

1.2.5. The strategy document is not part of the Environmental Statement (ES) but is a supporting document to the DCO Application.

2. THE EXISTING POWER STATION

2.1. Overview

2.1.1. Drax Power Station was originally built, owned and operated by the Central Electricity Generating Board. It had a capacity of just under 2,000 megawatt ('MW') when Phase 1 was completed in 1975, increasing to 4,000 MW from six coal-fired units after the construction of Phase 2 in 1986

2.1.2. It is now owned and operated by Drax Power Limited (the 'Applicant').

2.1.3. Four of the six main generating units (units 1 to 4) run on biomass, making Drax Power Station the UK's largest single site renewable power generator.

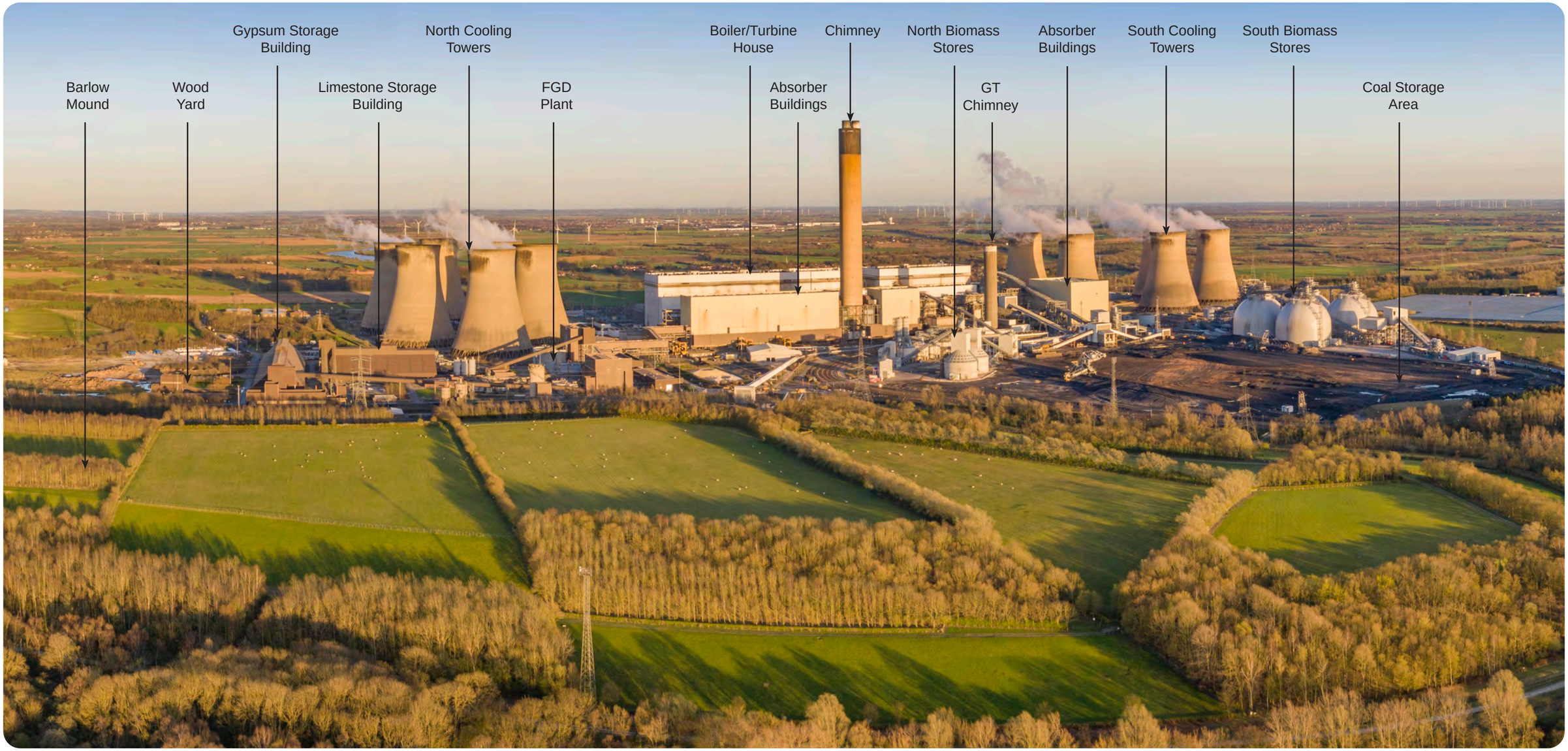


Fig.1. Drone Image of Drax Power Station looking east

2.2. Current functions of Drax Power Station

2.2.1. The station was originally designed to burn coal, however in recent years, to reduce CO_2 emissions, it has been modified to combust compressed wood pellets. The two remaining coal units (units 5 and 6) stopped generating electricity commercially in March 2021 and will cease operations entirely prior to works to construct the Proposed Scheme commencing.

2.2.2. The existing Drax Power Station is characterised by a number of large structures:

- The main generating station buildings housing the four biomass units (retrofitted sequentially at Drax Power Station since 2013) and two coal units;
- Flue Gas Desulphurisation Plant
- A main emissions stack of 259 m in height;
- 12 cooling towers each of 116.5 m in height (six to the north and six to the south of the generating station buildings);
- Offices and administration facilities;
- Storage buildings and structures (Including Biomass Stores);
- Ash handling facilities;
- Overhead electricity cables; and
- Rail infrastructure.

2.3. Historic Design Guidance

Background

2.3.1. Whilst the Site has no local landscape designations of any value, the original design of the power station and associated landscape is important in understanding the original ethos behind landscape and mitigation. A number of historic planning applications and consents have been reviewed and are summarised below:

2.3.2. Considerable effort went into the design, aesthetics and mitigation of the original 1960's Power Station as set out by A E Weddle in his *1966 Landscape and Mitigation Report* (Weddle,1966) (referred to as the original Weddle design); the setting and treatment of the buildings and structures was considered of utmost importance.

2.3.3. The original design focused on a reduction in visual coalescence. The layout and grouping of the cooling towers on either side of the turbine hall was deliberately designed to be symmetrical and simple in layout, utilising a large footprint in order to separate the cooling towers and create the opportunity for views between the towers based on their relative position.

2.3.4. A reduction in site clutter, particularly associated with smaller ancillary buildings was sought through the relative position of buildings, their grouping and use of on-site mitigation.

2.3.5. Building materials and colours were carefully considered to reflect the surroundings with lighter colours for taller structures, and at a lower level, darker materials were introduced to integrate the structures into their surroundings.

Original Consent and Reserved matters

2.3.6. Proposals to construct Drax Power Station were approved in a letter from County Council of West Riding of Yorkshire dated 6th April 1966 (and referred to within *1978 Clear Consent Matters Design*).

2.3.7. The approval was subject to a number of reserved matters, summarised below:

- The gas turbine exhausts should be enclosed in a single flue rather than remaining as six flues.
- Adequate provision should be provided for the parking of buses, if required, to carry employees to and from the power station.
- Overhead lines approaching the station should be simplified to reduce the clutter of angle towers in the vicinity which detract from the appearance of the station.
- Adequate screening should be approved to the east of the 400kv switchgear compound, between the compound and Drax village, if necessary, by off-site tree planting.
- Further off-site tree planting should be approved by agreement with the County Council and East Riding Council, including work in connection with the M62 motorway extension.

Design Development

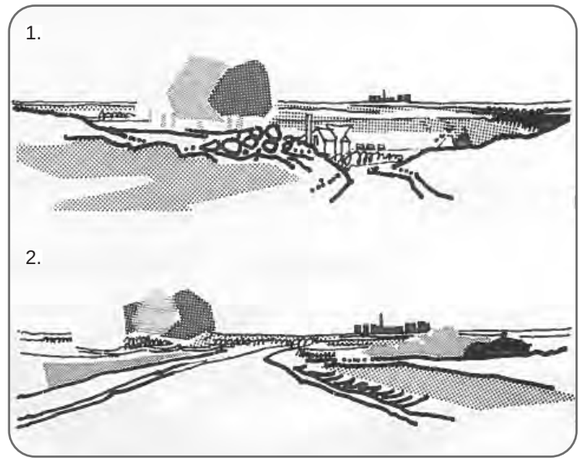
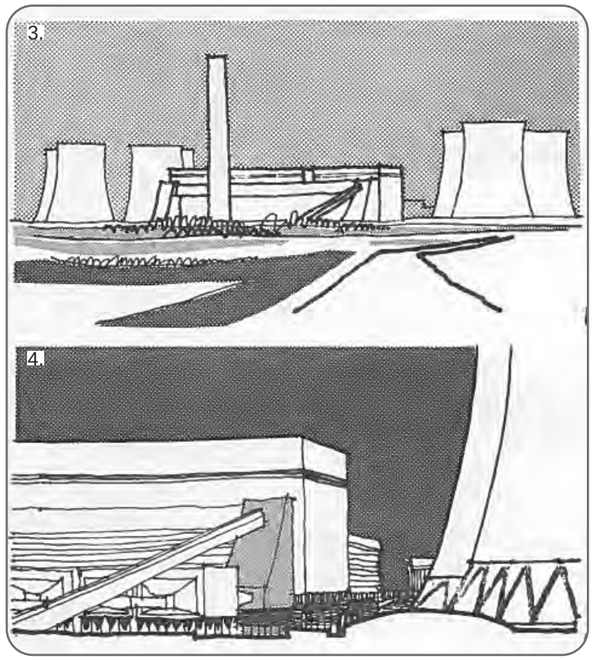


Fig.2. Sequential journey, approaching the site from the west, illustrating scale and massing. Taken from the *C.E.G.B. Northern Project Group. Power Station at Drax, West Riding, Landscape Consultant's Report (A.E.Weddle, 1966)*



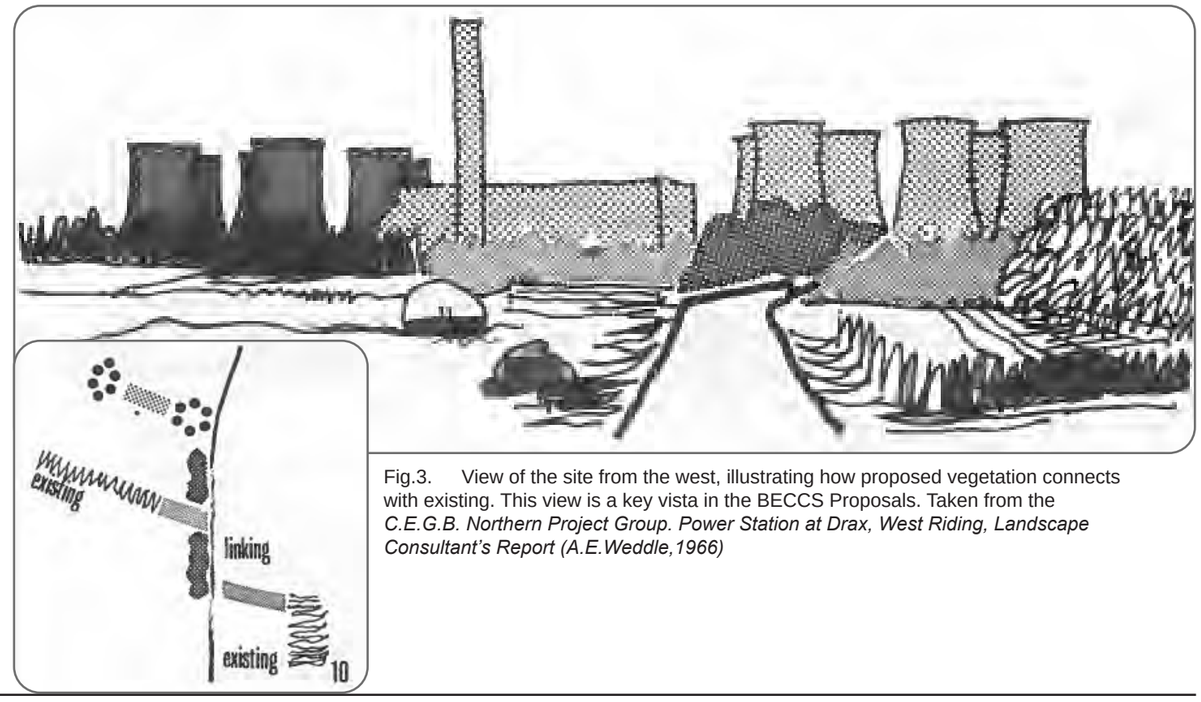


Fig.3. View of the site from the west, illustrating how proposed vegetation connects with existing. This view is a key vista in the BECCS Proposals. Taken from the *C.E.G.B. Northern Project Group. Power Station at Drax, West Riding, Landscape Consultant's Report (A.E.Weddle,1966)*

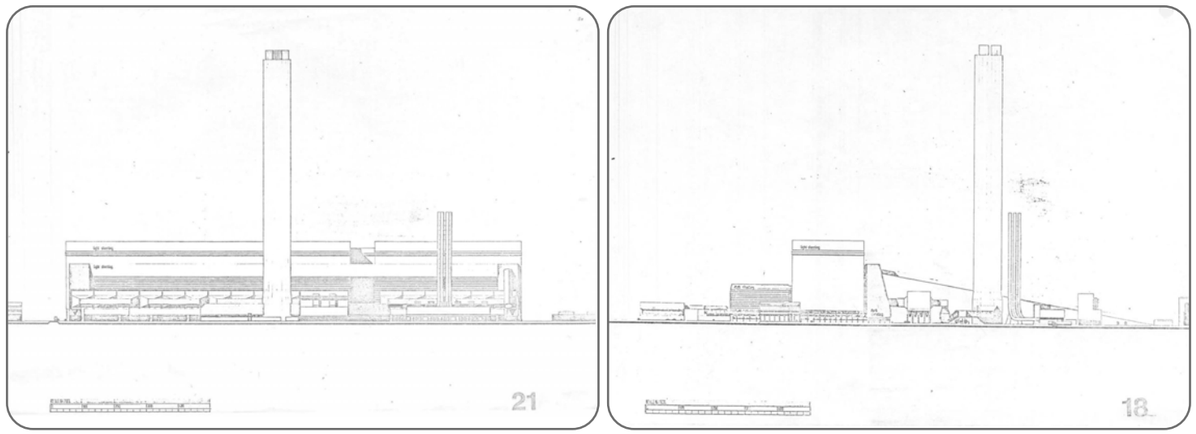


Fig.4. Images showing eastern and northern elevations of original Power Station layout taken from the *Joint Report of the Executive Architects and The Landscape Consultant (A.E.Weddle, 1966)*

2.3.8. The *Joint Report of the Executive Architects and Landscape Consultant*, (A E Weddle, 1966) which accompanied the 1966 letter of approval stated that the layout of buildings and structures at the Drax Powers Station Site was largely influenced by engineering requirements which resulted in:

- *'The circulating water pump houses and turbine house adjacent to each other and near to two groups of cooling towers.*
- *The 400 kv switchgear compound sited about the centre line of the turbine house.*
- *A physical link between the administration and control block and the turbine house.'*

2.3.9. The report noted that the complex *"will be visible over a vast area"*, and this, alongside nearby Eggborough and Ferrybridge "*will create an even greater impact on the countryside*" (the above now having been either demolished or changed dramatically through recent applications).

2.3.10. To respond to these issues, careful consideration was given to the aesthetics of the design, setting and treatment of the buildings and structures to achieve a symmetry, and the need to minimise visual coalescence.

2.3.11. The report states *"the setting and treatment of the buildings and structures are of utmost importance*" and in the grouping of the cooling towers careful consideration was "*given to the problem of visual coalescence, when from certain views towers can appear to merge and form an unbroken bulk of concrete*".

2.3.12. Colour and the use of specific materials were identified as key. The following extract from the report sets out the design considerations:

'Main Buildings - The Turbine House and louvred areas on the west elevation
Vinyl/Metal Laminate Box Rib Profile Sheeting in dark blue/grey (B.S. Colour No. 9.098).

The upper part of the Boiler House
Vinyl/Metal Laminate Box Rib Profile Sheeting in light grey (B.S. Colour No. 9.093).

The base of the Boiler House and the Turbine House
Dark warm-coloured brickwork punctuated by bright coloured door openings. Stretches of vertical patent glazing and louvres will be introduced where shown on the drawings together with picture windows at low level to give the staff the benefit of the prospect.

Administration, Control and Light Stores Block
In order that the scale of this building element be comparable with that of the main structures the cladding will be sculptured concrete punctuated by warm-coloured brickwork, the openings at ground floor level being of similar colour to those of the main buildings.

Ancillary Buildings
Warm-coloured brickwork relieved by precast concrete panels and vertical patent glazing.

Chimney Stack and Cooling Towers
A natural light-coloured concrete with a smooth shuttered finish.

Conveyors and Towers
The coal convevors will be clad in Vinyl/metal laminate sheeting of a different profile at right angles to the slope. They will be top lit by translucent profiled plastic sheeting. The towers and houses associated with the coal handling plant will be treated with sheeting and vertical patent glazing.

Gas Turbine Plant
Flue gases are discharged at a height of 350 ft. and the structural form of the flues has been designed to express their function so as not to compete with the Main Chimney.

Internal Roads
Roads should be edged with flush kerbs and not upstands and finished with a textured surface.

Landscape
A cornprehensive landscape survey was undertaken to examine those aspects which had contributed to the formation of the existing landscape. Zones of influence studies showed that the new station would be a dominant, visible for many miles, and indicated that the first aim should be to design a group of structures, clearly visible and acceptable in the landscape. Secondly, it would be desirable to introduce more tree planting into the area to reduce the number of completely open views from main roads and villages.

Finally
To seek agreement on siting of minor ancillary structures and to provide some screening close to the station and leave only the major structures in full view.'

Landscape Proposals

2.3.13. The overarching aims of the original landscape proposals were to:

- Design a group of structures, clearly visible and acceptable in the landscape.
- Introduce more tree planting into the area to reduce the number of completely open views from main roads and villages.
- Seek agreement for siting of minor ancillary structures and to provide some screening close to the station and leave only the major structures in full view.

2.3.14. Approximately 200 semi mature trees were transplanted, and further planting introduced within and around the perimeter of the existing Power Station.

2.3.15. *CEGB's Landscape Consultant's Report, 1979* (W.S. Atkins & Partners, Clifford Tee & Gale and Arnold E. Weddle, 1979) focuses action on off-site and on-site planting, recognising that mitigation close to the power station was limited by the wish to avoid taking excessive areas of valuable farmland and the time interval required before screening became effective.

2.3.16. Substantial off-site mitigation planting was introduced by the Applicant, at a scale reflective of the size of the original Power Station, as identified in *Landscape Management Report - July 1987 (revised May 1990)* (A E Weddle, 1987). Mitigation ranged from extensive plantations to hedgerows and avenues of trees to break up views at a local level. Planting was regimented and formal in approach and not necessarily reflective of surrounding landscape in terms of extent and structure.

2.3.17. Since Weddle's original design, there has been some erosion of the original symmetry, and a widening of the original footprint, increasing visual coalescence from some elevations and increasing visual clutter through an intensification of land use. This has been through incremental development on the Site prior to this application, including the introduction of the biomass co-firing units, the biomass storage domes as well as the more recent Lytag plant to the north west of the Order Limits.

2.3 Historic Design Guidance continued

Drax Power Station Landscape Management Report - July 1987 (revised July 1990) (A.E.Weddle, 1987)

2.3.18. The report makes recommendations in relation to management of the soft landscape aspects of the site. To simplify this process, it splits the original site layout and surrounding mitigation areas into zones as shown below:

- **ZONE 1 - Power Station - operational.**
  - Boiler House;
  - Turbine Hall;
  - CW Pumphouse;
  - Coal & Ash handling.
- **ZONE 2 - Power Station - operational services.**
  - North Cooling Tower Field;
  - South Cooling Tower Field;
  - Coal Store;
  - Transmission Switchgear.
- **ZONE 3 - On site ancillary.**
  - Sludge and ash lagoons;
  - Settlement tanks.
- **ZONE 4 - Site entrances, car park, administration.**
- **ZONE 5 - Site margins.**
- **ZONE 6 - Approach Road.**
- **ZONE 7 - Offsite operational.**
  - Purge line;
  - Make up line.
- **ZONE 8 - Offsite land holdings.**
  - Reclaimed construction soil tips;
  - Grazing, woodlands;
  - Disused caravan park.
- **ZONE 9 - Offsite secondary and tertiary developments.**
  - Tomato farm;
- **ZONE 10 - Railway Line.**
  - Disused Railway Line;
  - Brockhole Lake.
- **ZONE 11 - Barlow Ash Mound.**
  - Perimeter plantations, hedges;
  - Plantations, farmland.
- **ZONE 12 - West Barlow.**
  - Fentons Pond, wildflower meadow;
  - Tree seeding and planting area;
  - Hawthorn scrub and grassland;
  - Carr Dyke.
- **ZONE 13 - Sports Facilities.**
  - Camblesforth Sports Complex;
  - Golf course.
- **ZONE 14 - Farmland.**
  - Drax Abbey Farm, Northern ditches;
  - Whitehouse reed beds.

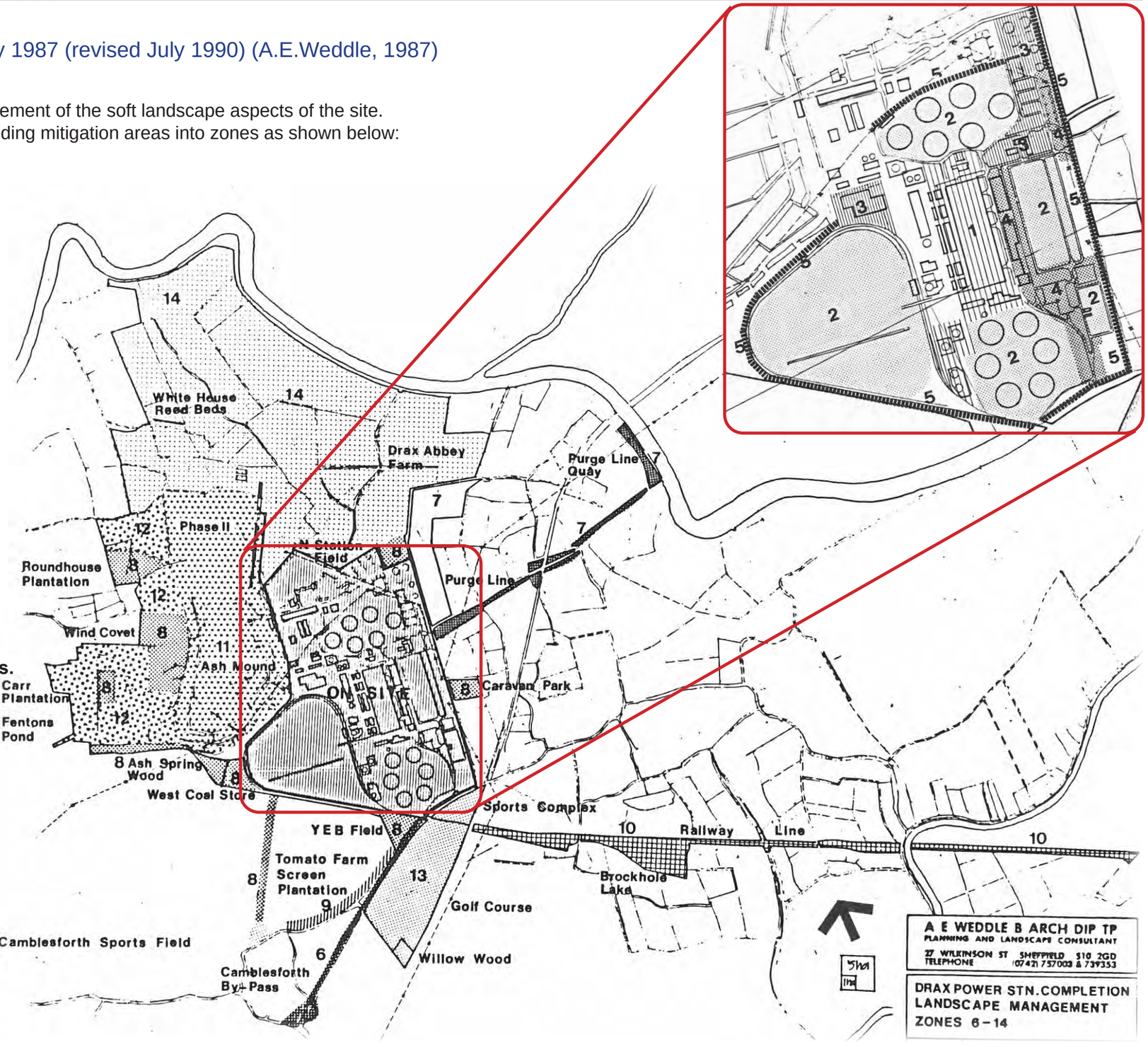


Fig.5. Site Plan showing historic landscape management proposals, taken from *Drax Power Station Landscape Management Report - July 1987 (revised July 1990) (A.E.Weddle, 1987)*

2.3 Historic Design Guidance continued

Drax Power Station Landscape Management Report - July 1987 (revised July 1990) (A.E.Weddle, 1987)

2.3.19. The following images from taken the report, when compared with current aerial photography (2020), clearly illustrate how the original Weddle designs of 1966 and subsequent management strategies have resulted in many areas of the site remaining largely unchanged in terms of soft landscape.

2.3.20. Whilst the report does not specifically deal with the area of the Proposed Scheme, the images suggest that the landscape framework throughout the Drax Power Station Site has been successful in delivering the original design principles, which supports the rationale for a continued strategic approach to planting and landscape management..

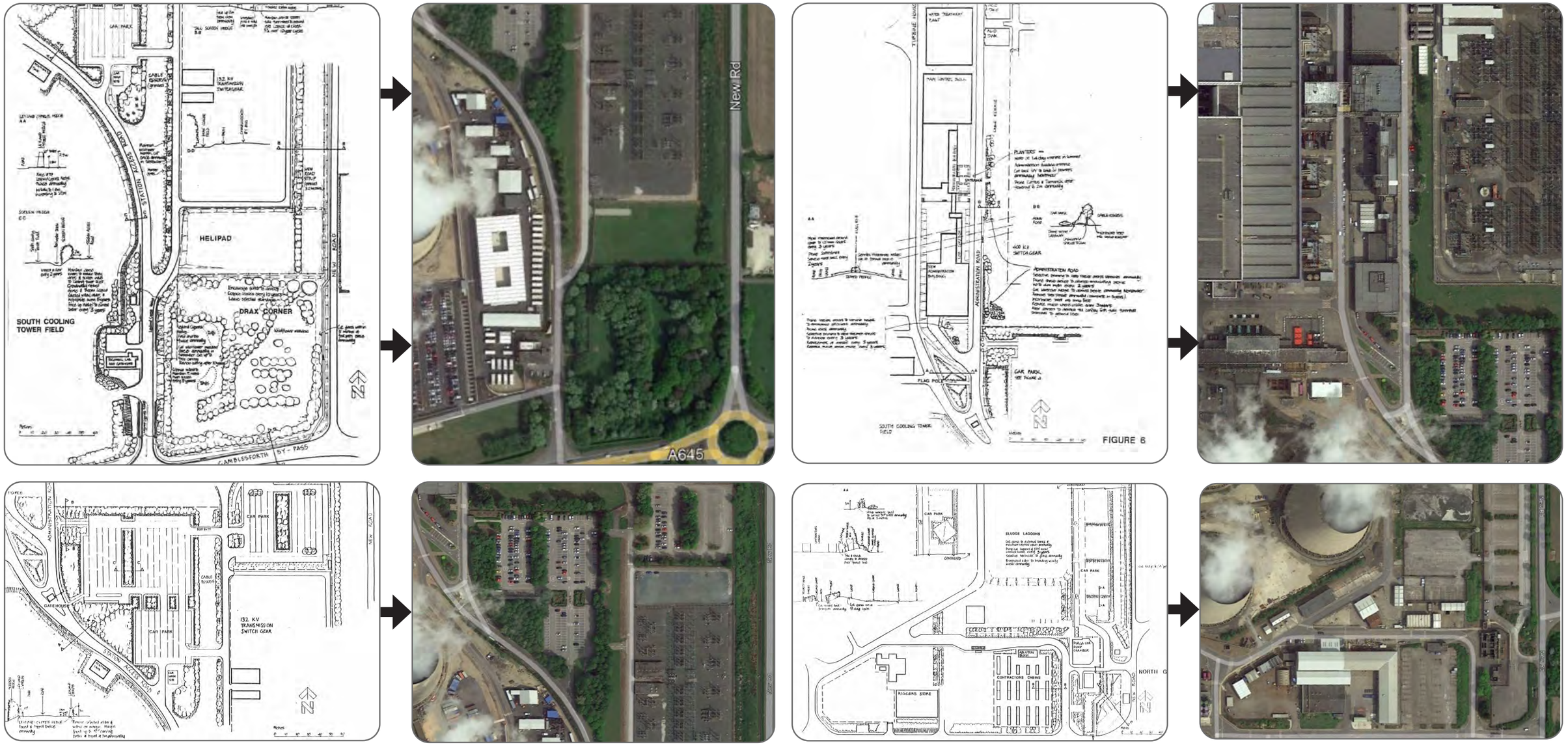


Fig.6. Images showing the development of the landscape estate at Drax Power Station over time. Images taken from *Google Earth* (2020) and *Drax Power Station Landscape Management Report - July 1987 (revised July 1990) (A.E.Weddle, 1987)*

2.3 Historic Design Guidance continued

Drax Power Station Landscape Management Report - July 1987 (revised July 1990) (A.E.Weddle, 1987)

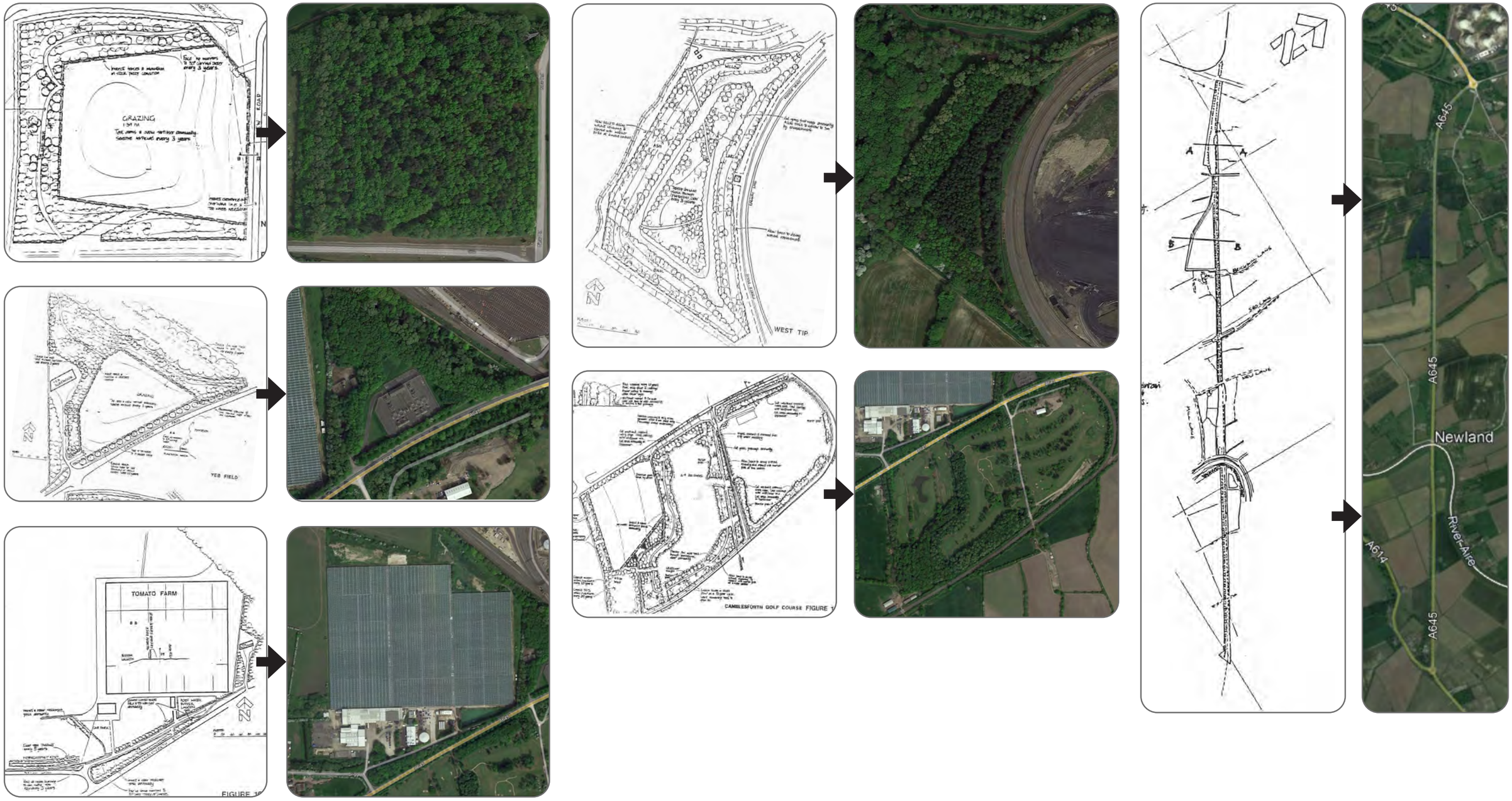


Fig.7. Images showing the development of the landscape estate at Drax Power Station over time. Images taken from *Google Earth* (2020) and *Drax Power Station Landscape Management Report - July 1987 (revised July 1990) (A.E.Weddle, 1987)*

2.3 Historic Design Guidance continued

Evidence of implementation of Drax Power Station Landscape Management Report - July 1987 (revised July 1990) (A.E.Weddle, 1987)

From the west, the landform of Barlow Mound and the mature landscape woodland planting create a prominent foil and partial screen to the power station.

The mosaic of extensive plantations to the east of the Power Station combine with hedgerows and the disused railway to create a solid framework of vegetation to views from Long Drax and Drax village

The more open land pattern and vegetation framework to the south west of the Power Station is weaker in terms of fully achieving the aims of the Weddle strategy. Larger extents of the power station when viewed from Camblesforth are visible at distance and at lower levels, particularly with the introduction of new infrastructure elements such as the biomass silos, which extend the influence of the power station westwards.

This area corresponds with original “Zone 8” area of off-site land holdings identified within the Weddle Landscape Report

Native plantation woodland and hedgerows to the north-east of the Power Station provide a considerable amount of screening to views from the Ouse, obscuring much of the visual clutter from the lower parts of the Power Station Site.

2.4. Existing Consents

Drax Repower - DCO Application

2.4.1. The Applicant has the benefit of a Development Consent Order ('DCO') (The Drax Power (Generating Stations) Order 2019), which allows it to repower up to two of the existing coal-powered generating units with new gas turbines that can operate in both combined cycle and open cycle modes (referred to as the Drax Repower Project).

2.4.2. The new units would have a new combined capacity of up to 3,600 MW in combined cycle mode (1,800 MW each).

2.4.3. The Applicant has publicly stated that it has no plans to progress the Drax Repower Project, and this is confirmed by a proposed article in the draft DCO submitted with the Application (document reference 3.1). As such, for the purposes of the Application for the Proposed Scheme, it has been assumed that the Drax Repower Project will not be built.

Barlow Mound

2.4.4. A planning application for the Phase 1 mining operations of Barlow Mound has been submitted in 2022. It should be noted that consent is already agreed for Phase 2a and Phase 2 of the mining works.

2.4.5. The works would include mining and harvesting of materials from the northern and southern face of Barlow Mound at approximately circa 3 million tonnes (mt) at Phase 1, 14mt at Phase 2 and 3.5mt Phase 2a.

2.4.6. The construction programme will include 24 hour working with the excavated material being removed by road and rail. It is anticipated that minimal woodland screening will be removed as part of the proposals and that the final ground levels will remain largely unchanged.

2.4.7. As part of the works Public Rights of Way to the south of Barlow Mound will be diverted

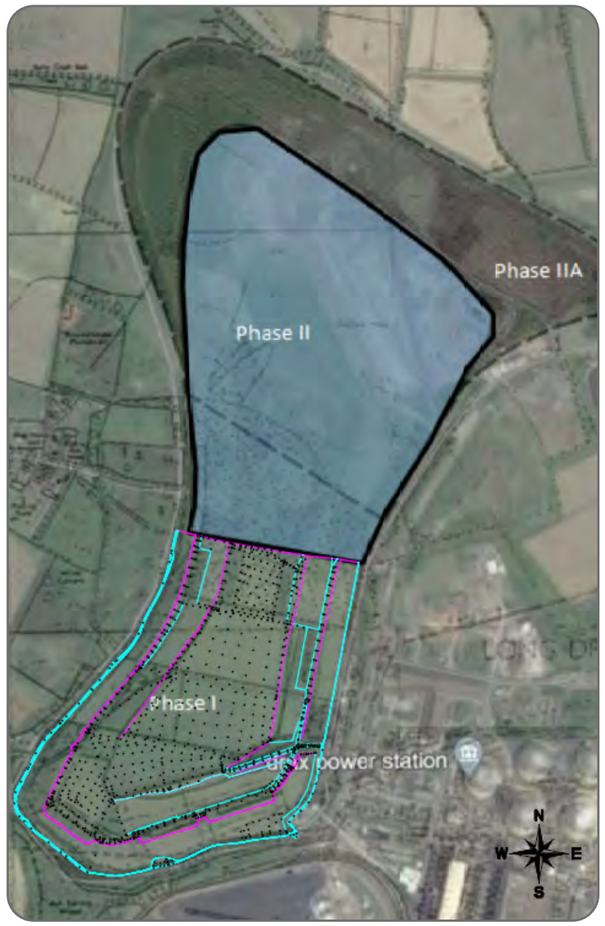


Fig.8. Barlow Ash Stock Phase 1, Collision Forensics Ltd

2.4. Existing Consents

Demolition of the Flue Gas Desulphurisation Plant - TCPA Application

2.4.8. The Applicant has full planning permission under the Town and Country Planning Act 1990 for the demolition of the redundant Flue Gas Desulphurisation ('FGD') Plant and associated restoration works at Drax Power Station.

2.4.9. The decommissioning and demolition works are scheduled to take place between 2022 and 2027.

2.4.10. The decommissioning and demolition works of Absorber Units 4, 5 and 6 are scheduled to take place prior to the start of the construction of the Proposed Scheme, whilst the demolition of Absorber Units 1, 2 and 3 are assumed to take place following the completion of the Proposed Scheme. Details of structures to be demolished are shown in Figure 9 below:

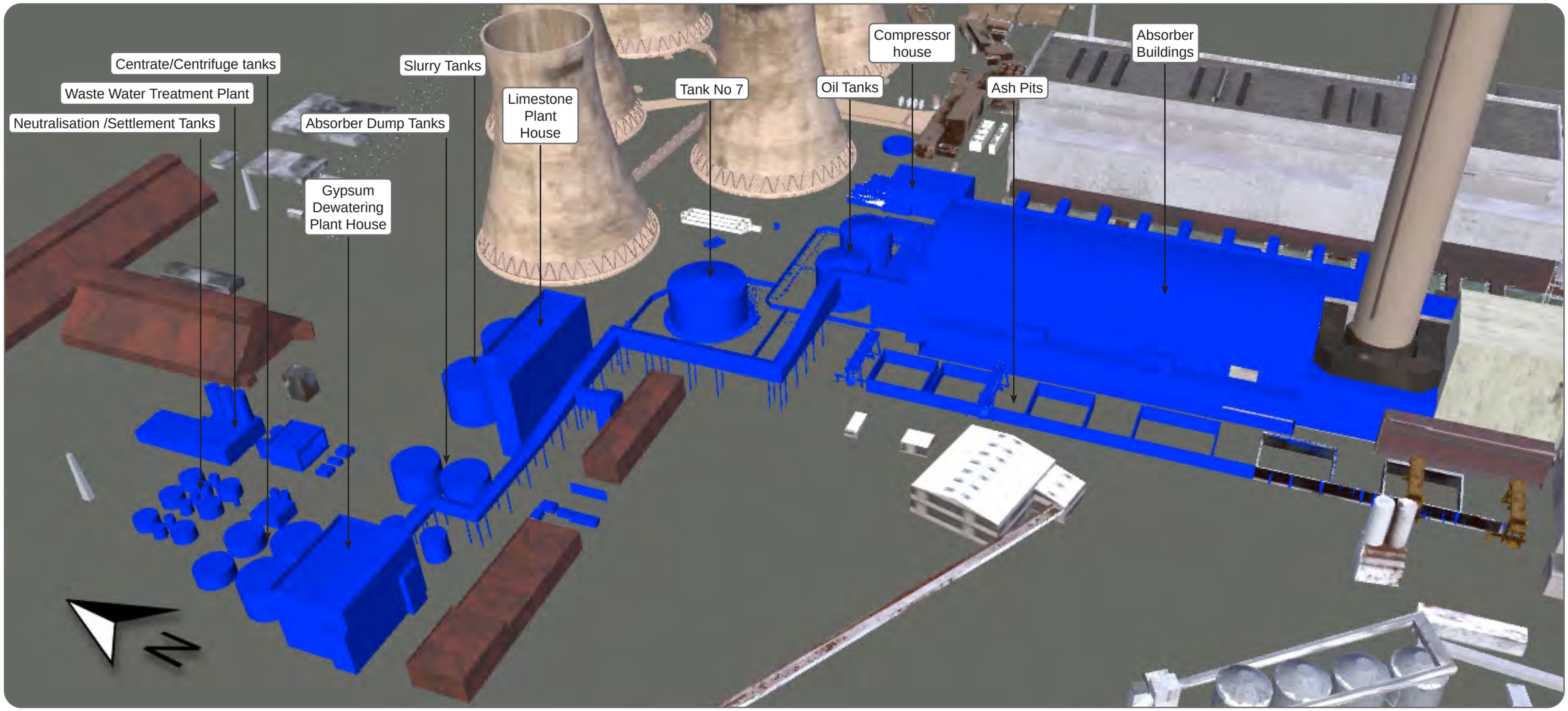


Fig.9. Overview of structures to be demolished

2.5. Existing Soft Landscape

Phase 1 Habitat Survey

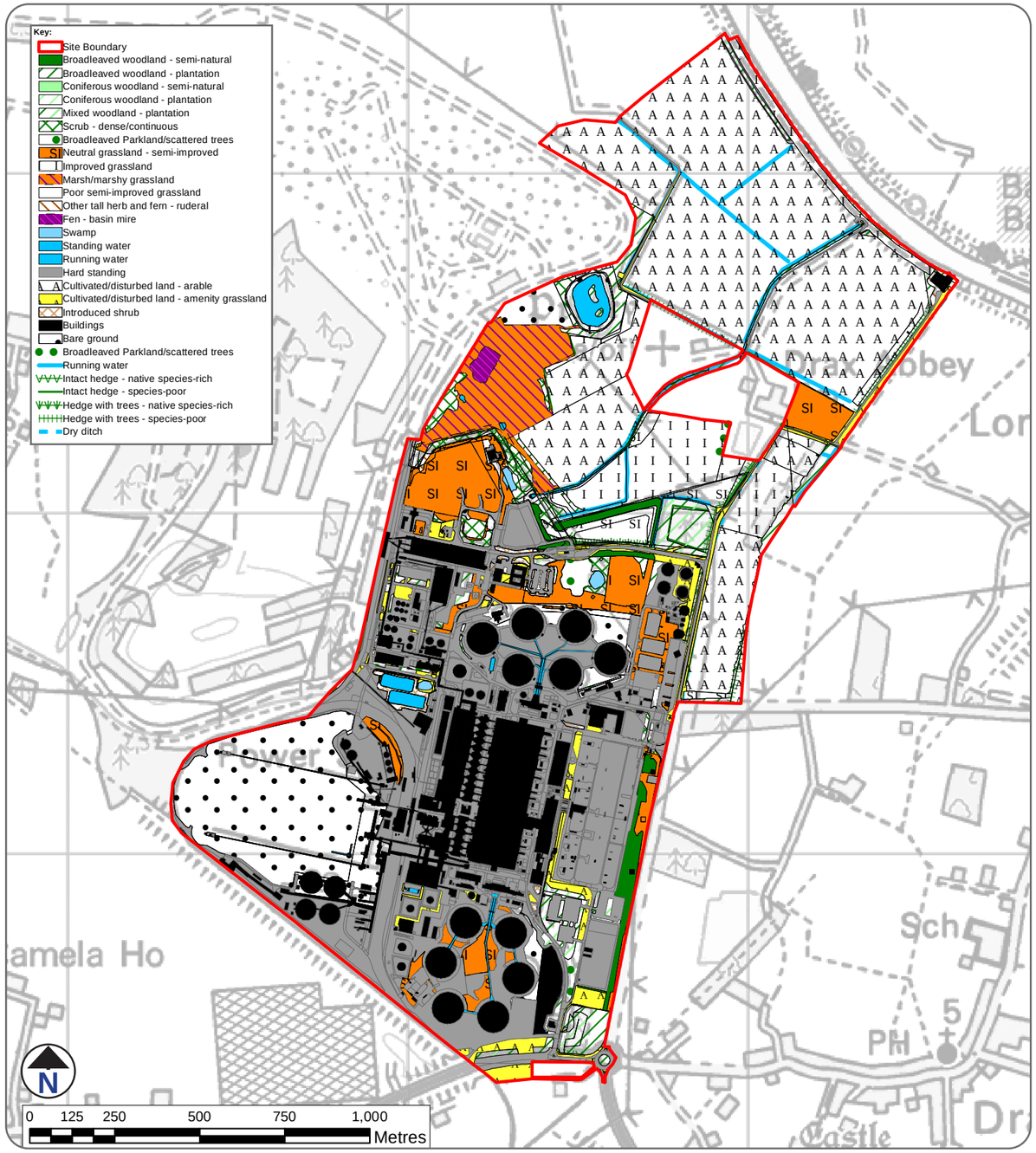


Fig.10. Image taken from: *Phase 1 Habitat Survey* - WSP Ltd

2.5.1. The Phase 1 habitat survey for the Drax Power Station Site (Figure 10) highlights distinct areas which are managed in accordance with the original Weddle design intent, and which function accordingly.

2.5.2. With the development of the power station over time, there are other areas where the landscape is less structured and not necessarily conforming of the original strategy. Some parts of the site area have become over-mature or outgrown, leading to a landscape appearance which no longer fulfils its original function.

2.5.3. The vegetation within the Power Station Site Order Limits largely comprises the following habitat types:

- Broadleaved woodland - plantation;
- Cultivated/disturbed land - amenity grassland;
- Scrub - dense/continuous;
- Introduced shrub.

2.5.4. The wider Site includes areas of farmland with associated boundary features and habitats located outside of the Drax Power Station Site

2.5. Existing Soft Landscape

2.5.5. A range of vegetation of differing value and condition has been observed during Site visits. Some examples are shown below:

Woodland and Specimen Trees

Birch, Scots Pine and Hornbeam

Grey Willow and Goat WIllow

Formal row of semi-mature Hornbeam

Mixed deciduous woodland screening

Mature trees providing screening for the Gypsum Plant

Semi-mature boundary vegetation

Hedgerows and Shrubs

Native hedgerow with gaps requiring replacement

Mixed amenity planting

Mixed amenity planting

Grassland

Grassland with mown verge

Mown grass bank

Grassland with mown verge

2.5.6. The images above illustrate how historic planting palettes and management strategies at Drax Power Station combine to deliver a species-diverse and generally successful vegetated environment.

2.5.7. Specimen trees in amenity areas, such as around car parks and administration blocks, are generally arranged in a more formal and uniform way. Management in these locations is more intensive, with arboricultural work including stem clearance evident.

2.5.8. Boundary vegetation and vegetation in less frequented areas is managed less intensively and allowed to grow more freely to perform a screening function and provide habitat networks.

2.5.9. Some hedgerows within the Site are in need of repair, with gaps evident.

2.5.10. Formal shrub borders and planting in amenity areas is managed intensively and has a tidy, well-kept appearance, although it provides little value in terms of habitat and biodiversity.

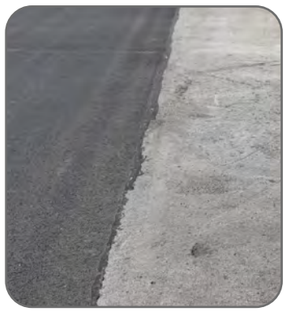
2.5.11. Grassland is managed more intensively in amenity areas, and areas adjacent to roads to maximise visibility for vehicles.

2.5.12. In areas away from the highway, and areas adjacent to the Site boundary, less intensive management strategies are evident. The sward is allowed to grow longer, providing habitatat for insects, small mammals and reptiles.

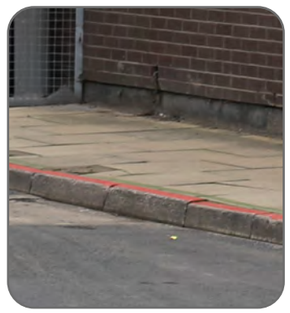
2.6. Existing Hard Landscape

2.6.1. Hard Landscape within the site is generally utilitarian in nature, largely responding to operational requirements as opposed to aesthetic or experiential qualities.

Paving, Surfaces and Kerbs


Asphalt and concrete


Kerb and pebbles


Concrete paving


Concrete block paving

Drainage features and Conduits


Concrete conduit


Steel surface


Drainage gully


Drainage gully

Walling and Fencing


Security fencing


Concrete walling


Steel Guardrail


Post & Rail Fence

Lighting and Street Furniture


Lighting module


Lighting module


Bollards and charging


Hardwood bench

2.6.2. Paving surfaces and finishes are generally fragmented and disparate, with limited design legibility

2.6.3. Boundary treatments are varied, largely responding to the functional requirements of phased development over time.

2.6.4. Drainage infrastructure is similarly varied, with a range of different solutions evident around the Site, defined by operational need.

2.6.5. A mixture of walling and fencing can be seen around the Site, ranging from simple wooden post and rail fencing to delineate boundaries, to substantial poured concrete walling units and barbed wire topped security fencing in areas where access is restricted.

2.6.6. Lighting within the Site also appears to be driven by functional requirements, ranging from small lighting bollards in pedestrian areas, to tall lighting modules and flood lighting in process areas.

2.7. Existing Colour Scheme

2.7.1. Built form within the Drax Power Station Site is varied, ranging from relatively small scale storage tanks, ancillary buildings and structures, to massive operational buildings and structures such as the Boiler House/Turbine Hall, the Cooling Towers and the Main Chimney Stack.

Buildings

Brown steel cladding

Grey steel cladding

Tanks and Storage Vessels

Grey Biomass Stores

Chimneys and Cooling Towers

Main Chimney Stack

Brown steel-clad structures associated with the Gypsum and Limestone Processing Plant

Grey storage tanks

Concrete Cooling Tower

Brown brick walling

Brown brick walling

Green storage tank

GT Chimney Stack

Turbine Hall and Boiler House Buildings

2.7.2. There is a vast variation of building scales and functions within the Site.

2.7.3. Some evidence of a design narrative is visible in the selection of colours for large buildings, particularly the Turbine Hall / Boiler House and the Gypsum / Limestone Plant.

2.7.4. Other areas are purely functional, cluttered, disparate and visually disruptive

Grey storage tanks

2.7.5. Storage tanks and vessels are varied, however they are more commonly a grey tone.

2.7.6. The cooling towers have a strong visual cohesion, with a sense of uniformity in colour and scale.

2.7. Existing Colour Scheme

2.7.7. Although Drax Power Station has evolved of a period of nearly 50 years, guidance from the original design proposals is still visible within the colour schemes throughouit the Site.

Fig.11. Image taken from Applicant CAD modelling, illustrating existing structures at Drax Power Station

2.7.8. A clear design language can be seen in Figure 11. The tallest buildings, which are likely to be visible from a distance against the sky, still adhere to the original design recommendations made in the *Joint Report of the Executive Architects and Landscape Consultant*, (A E Weddle, 1966). The upper parts of these buildings are light coloured, whilst the lower parts are a darker tone.

2.7.9. Buildings that are on a more 'human' scale such as those located within the FGD Plant and The Limestone and Gypsum Processing Areas follow the same rules, responding to where they are likey to be viewed from and what they are most likely to be viewed against.

2.7.10. This approach defines strong linear massing between all major buildings within the Scheme.

'Main Buildings - It is proposed to adopt modern prefabricated units for cladding the main buildings as recommended in the Joint Report of the Consulting Engineers and the Architects dated 12th July 1965. The large expanse of light colour suggested for the upper part of the main bulldings and towers will give a powerful yet restrained character to the whole scheme.'

'A contrasting colour will be used in the louvred treatment.of the Turbine House and the lower part of the Boiler House to form a podium for the main building, a strong link between the two lower groups and a background for the Administration and Control Blocks'

'Owing to the open nature of the site, the masses will always be seen against the sky. It follows that the setting and treatment of the buildings and structures are of utmost importance.'

Taken from: C.E.G.B. Northern Project Group. Power Station at Drax, West Riding, Landscape Consultant's Report (A.E.Weddle,1966)

3. THE PROPOSED SCHEME

3.1 Project Description

3.1.1. The Proposed Scheme would involve the installation of post-combustion carbon capture technology to capture carbon dioxide from up to two existing 660 megawatt electrical ('MWe') biomass power generating units at the Drax Power Station (Unit 1 and Unit 2).

3.1.2. The installation of this technology constitutes an extension to the biomass Units 1 and 2, and is referred to as post-combustion carbon capture as the carbon dioxide is captured from the flue gas produced during the combustion of biomass in Units 1 and 2.

3.1.3. The Proposed Scheme is designed to remove approximately 95% of the carbon dioxide from the flue gas from these two units. The carbon dioxide captured will undergo processing and compression before being transported via a proposed new pipeline (to be consented separately by other parties) for storage under the southern North Sea.

3.1.4. It is intended that core items of the existing infrastructure at the Drax Power Station are re-used by installing and integrating the Carbon Capture Plant with existing infrastructure including existing power generating units (Units 1 and 2) for extraction of steam, re-using the cooling water systems, Main Stack and electrical connections

3.1.5. A process block flow diagram showing a schematic of the Proposed Scheme is provided in Figure 12 below. To help describe the process, a Carbon Capture Plant associated with a single unit has been shown, alongside common plant which would support both a Carbon Capture Plant for each of Unit 1 and Unit 2.

3.1.6. The diagram is a schematic for illustrative purposes only, including the main process components and does not represent the scale or number of equipment items anticipated for the Proposed Scheme. Further information is provided in Chapter 2 of the Environmental Statement

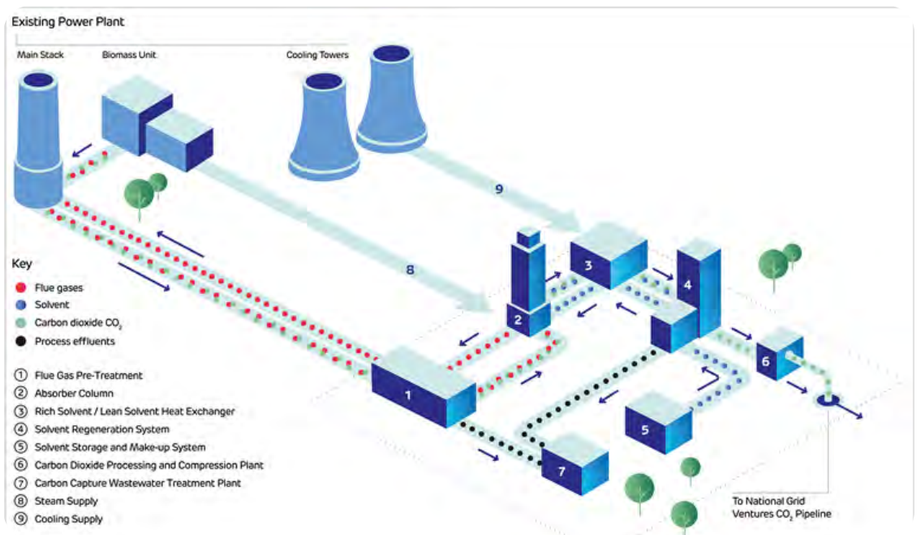


Fig.12. Process Block Flow Diagram for the Proposed Scheme

3.1.7. The Proposed Scheme comprises the following:

- Up to two Carbon Capture Plants (one associated with Unit 1 and one associated with Unit 2) (Work No. 1 as described in Schedule 1 of the draft DCO), each made up of:
  - Flue gas pre-treatment section;
  - One Absorber Column;
  - Solvent Regeneration System (to include up to two Regenerators);
  - Rich Solvent / Lean Solvent Heat Exchangers; and
- Additional Common Plant infrastructure and modification works to the Drax Power Station that are required to support and integrate with one or both Carbon Capture Plants including:
  - Solvent Storage and Make-up System (comprising up to four bunded solvent storage compounds);
  - Carbon Capture Wastewater Treatment Plant;
  - Carbon Dioxide Processing and Compression Plant;
  - Modification to the existing water pre-treatment plant;
  - Modification, upgrade and extension of the existing cooling system and distribution of cooling water to the Proposed Scheme ;
  - Modifications to existing electrostatic precipitators;
  - Modifications, upgrade and extension to existing power generating units for steam extraction and new steam processing infrastructure for distribution of process steam and electricity supply to the Proposed Scheme
  - Integral electrical connections within the existing generating station and Carbon Capture Plant including upgrades to the existing electrical infrastructure and new electrical infrastructure for the secondary electrical supply to the Proposed Scheme;
- Infrastructure to transport compressed carbon dioxide from the Carbon Dioxide Processing and Compression Plant to storage and transport infrastructure operated by National Grid Carbon Limited;
- Minor vegetation and street furniture management and other works to facilitate access during construction;
- Additional supporting infrastructure and other works for the Proposed Scheme as set out in **Chapter 2 (Site and Project Description)** (document reference 6.1.2);
- Temporary construction laydown areas (Drax Power Station Site Construction Laydown Areas and the East Construction Laydown Area); and
- Habitat Provision Areas.

3.2 Proposed Scheme Areas

3.2.1. For the purposes of this report, the Proposed Scheme has been split into 5 areas based on function and scale as shown in Figure 13 below.

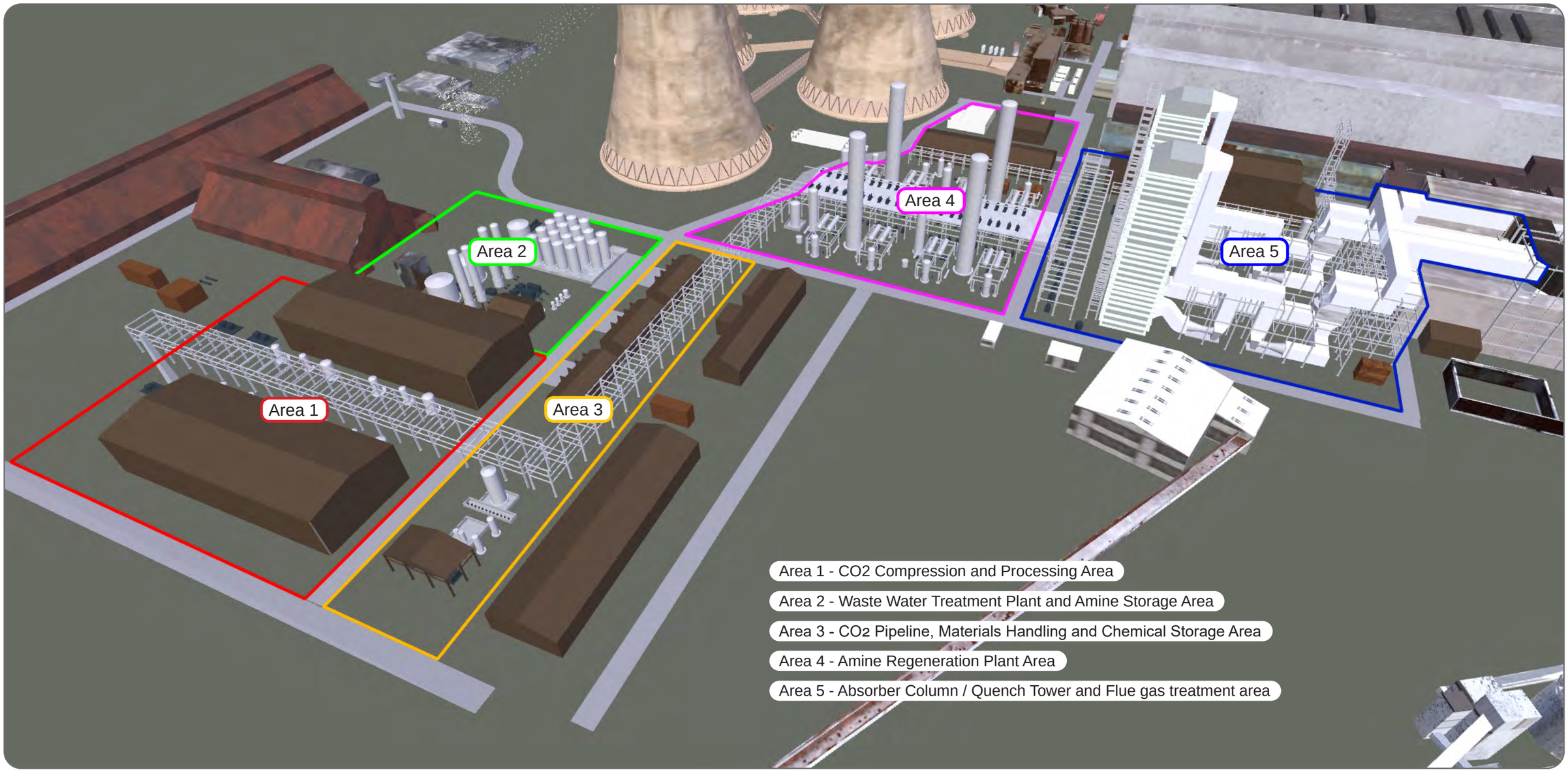


Fig.13. Overview of Proposed Scheme areas

3.3 Functions associated with the Proposed Scheme

Area 1 - CO_2 Compression and Processing Area

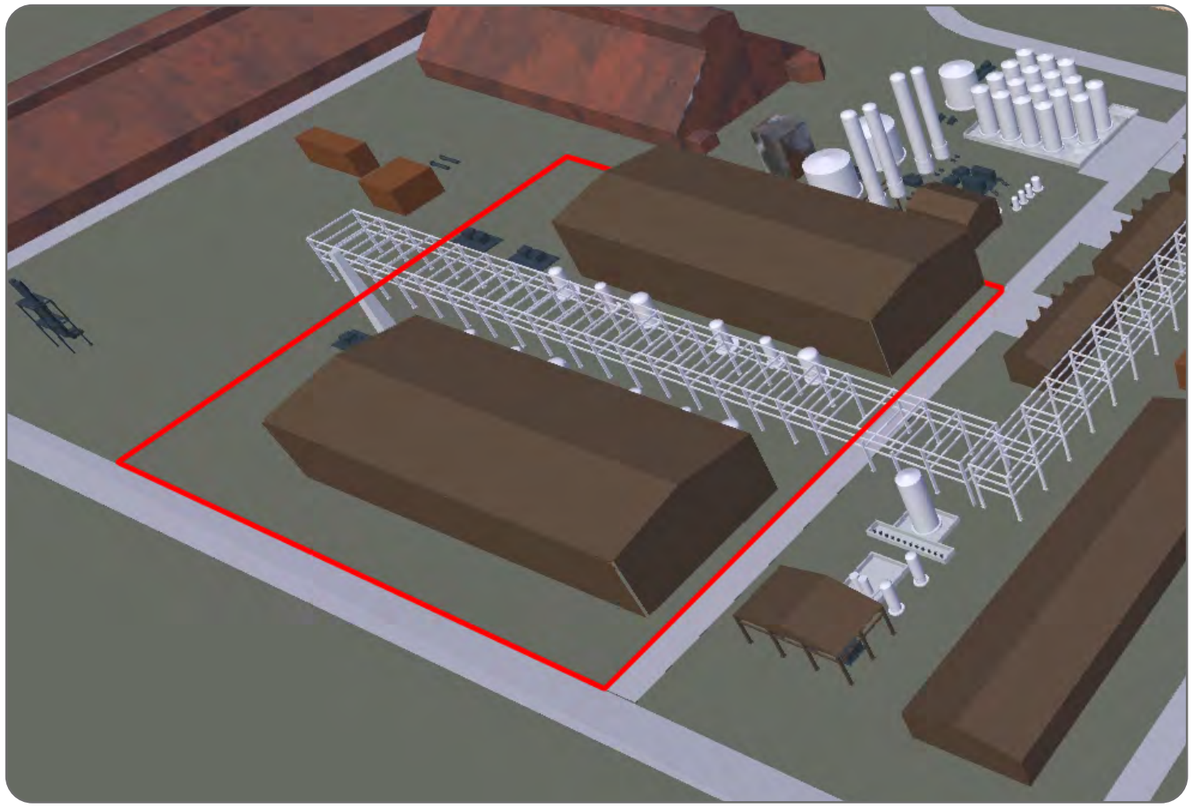


Fig.14. Area 1 - Proposed Scheme

3.3.1. Area 1 will be the location for the processing and storage of CO2 removed from the flue gases.

3.3.2. It is bordered to the north and east by Gypsum and Limestone Storage buildings and by the Materials Processing buildings to the south. The vegetated slopes of Barlow Ash Mound lie to the west.

3.3.3. The proposed structures in this area are low level, comprising a mixture of buildings and transmission and storage infrastructure.

Surrounding Context

3.3 Functions associated with the Proposed Scheme

Area 2 - Waste Water Treatment Plant and Amine Storage Area

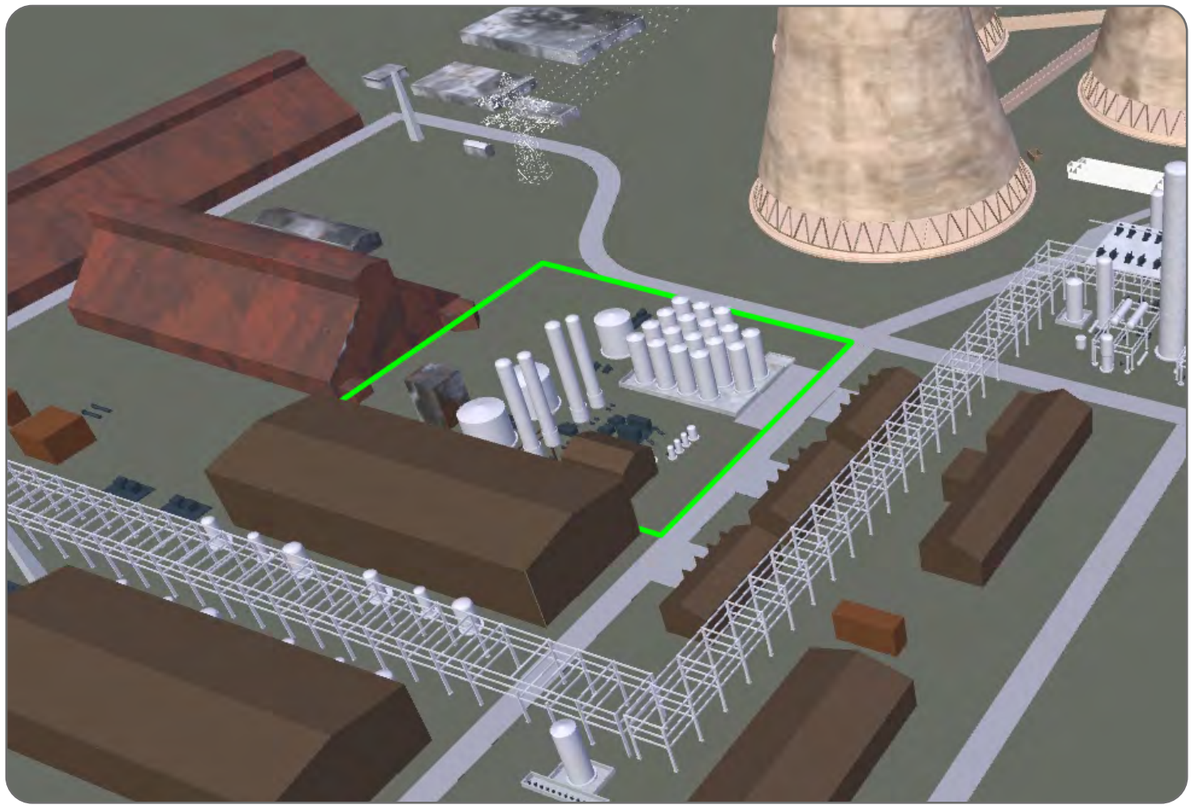


Fig.15. Area 2 - Proposed Scheme

3.3.4. Area 2 will be the location for the treatment of waste water and storage of solvents associated with the BECCS process.

3.3.5. It is bordered to the north by the Limestone Storage buildings and by the Materials Processing buildings to the south. The Northern Cooling Towers lie to the east.

3.3.6. The proposed structures in this area are low level, predominantly comprising storage vessels.

Surrounding Context

3.3 Functions associated with the Proposed Scheme

Area 3 - CO_2 Pipeline Route

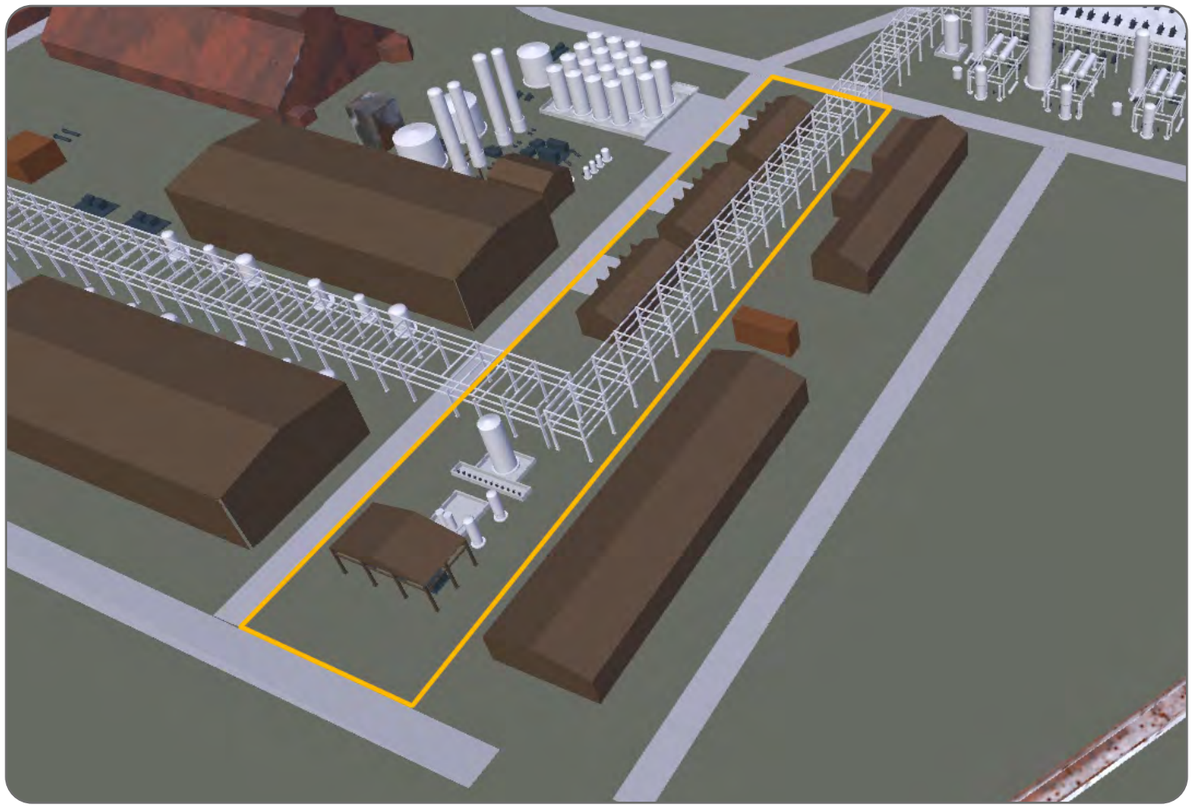


Fig.16. Area 3 - Proposed Scheme

3.3.7. Area 3 will be the location for the pipeline and infrastructure associated with the transit of CO_2 between Area 4 to the east and Area 1 to the north.

3.3.8. It is bordered to the north by CO_2 Compression and Processing Area buildings and by the Materials Processing buildings to the south. The Amine Regeneration Plant Area lies to the east.

3.3.9. The proposed structures in this area are low level, comprising transit infrastructure and storage facilities.

Surrounding Context

3.3 Functions associated with the Proposed Scheme

Area 4 - Amine Regeneration Plant Area

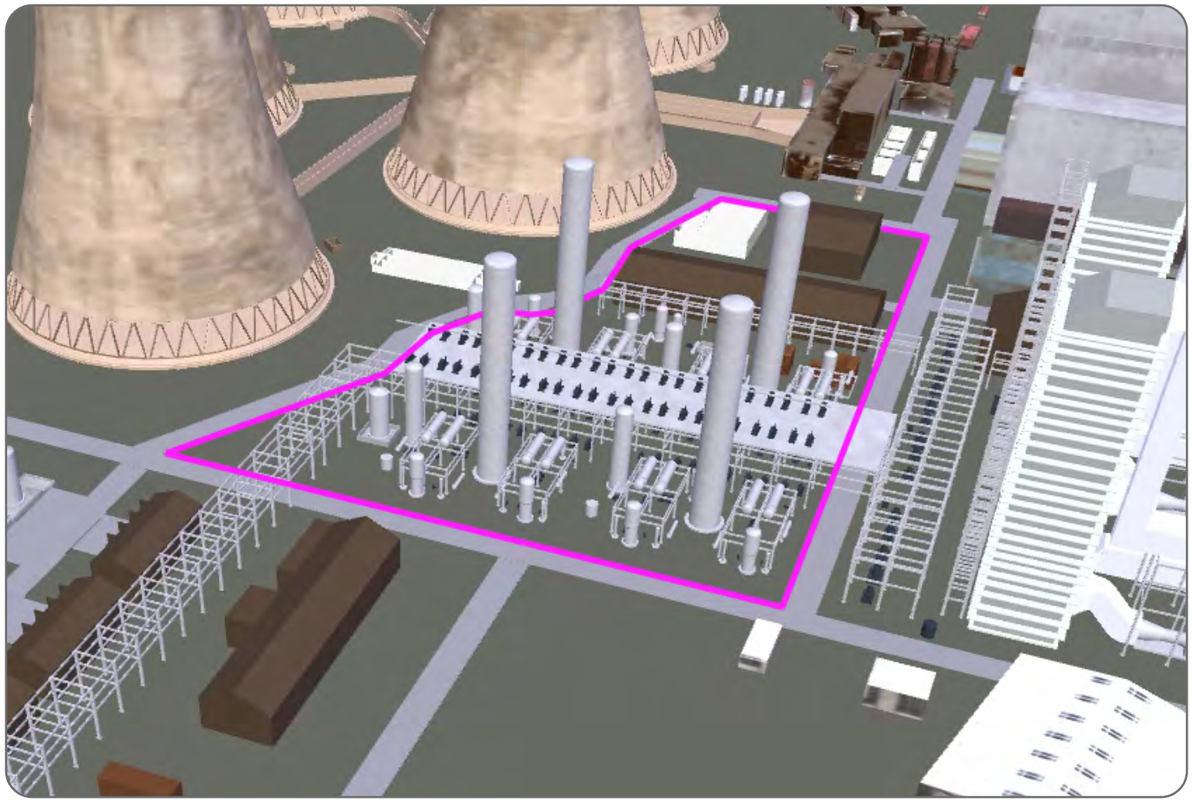


Fig.17. Area 4 - Proposed Scheme

3.3.10. Area 4 will be the location for the processing and regeneration of solvents associated with the BECCS process.

3.3.11. It is bordered to the north by the Northern Cooling Tower field, the Materials Processing buildings lie to the west and the Absorber Column / Quench Tower and Flue Gas Treatment Area lies to the south.

3.3.12. The scale of the proposed structures in this area is varied, ranging from low level transmission infrastructure to 4 Regenerator Columns which stand approximately 60m high.

Surrounding Context

3.3 Functions associated with the Proposed Scheme

Area 5 - Absorber Column / Quench Tower and Flue Gas Treatment Area

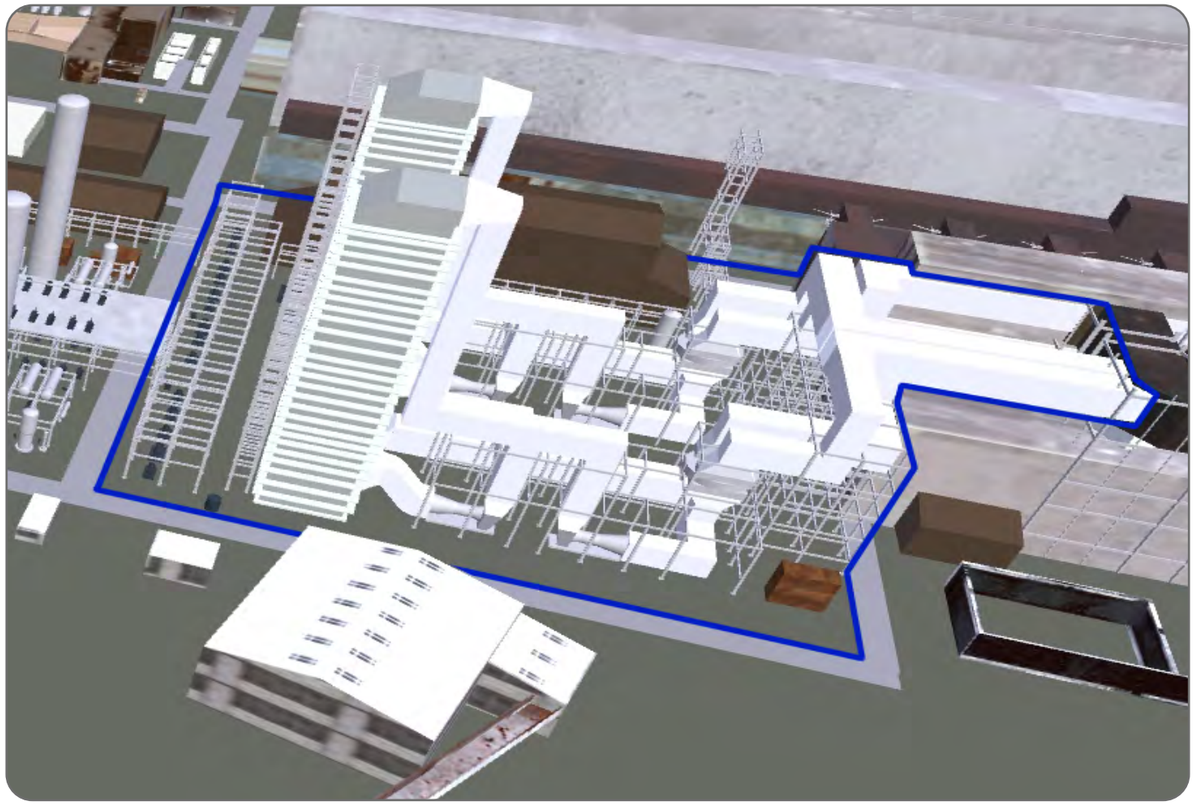


Fig.18. Area 5 - Proposed Scheme

3.3.13. Area 5 is characterised by large-scale buildings and complex industrial infrastructure for dealing with flue gases.

3.3.14. It is bordered to the north by the Amine Regeneration Plant Area. The Boiler House and Turbine Hall buildings lie to the east.

3.3.15. The proposed structures in this area are very large, comprising two Absorber Columns standing at approximately 80m (a similar height to the existing Boiler House building), two Quench Columns, associated ducting and transit infrastructure.

Surrounding Context

3.4 Architectural Form - Precedent Imagery

Precedent imagery - Petra Nova CCS Project, Texas, USA

Fig.19. Site Layout at Petra Nova CCS Project, Texas

Fig.20. CCS Plant at Petra Nova CCS Project, Texas

3.4.1. Petra Nova CCS (a facility attached to a coal-fired power plant in Houston Texas) provides an illustrative example of a comparable carbon capture facility.

3.4.2. Figures 19 and 20 show the layout of the Petra Nova CCS facility, which incorporates a single Absorber Column a Heat Exchanger Column with associated ducting and infrastructure

3.4.3. The structures within the Petra Nova scheme are similar in design and scale to those proposed at Drax Power Station, however the BECCS Scheme is larger, comprising two Absorber Columns and four Heat Exchanger Columns, with additional ducting and infrastructure required to process the larger volumes of flue gas.

4. DESIGN PRINCIPLES

4.1 Siting, Massing and Appearance

4.1.1. The Joint Report of the Executive Architects and The Landscape Consultant (A.E.Weddle, 1966) communicated fundamental design principles, which remain relevant to the overall appearance and perception of the power station as follows:

- The horizontal and vertical massing of major structures;
- The sub-division of site elements (cooling tower clusters, balance of core structures, main chimney);
- The skyline profile in the wider landscape and visual coalescence;
- The materiality and colour of key structures.
- Cooling tower clusters were intentionally sited as two distinct groups and positioned to avoid visual coalescence and regularity.
- The core buildings of the power station were designed as large, simple building forms with distinct horizontal and vertical emphasis.
- The colouration of buildings within the power station was a key component of the design rationale.

Siting

4.1.2. Two solutions were considered for the location of the Proposed Scheme

- The Northern Solution (presented within this report)
- The Southern Solution (shown in Figure 21 below)

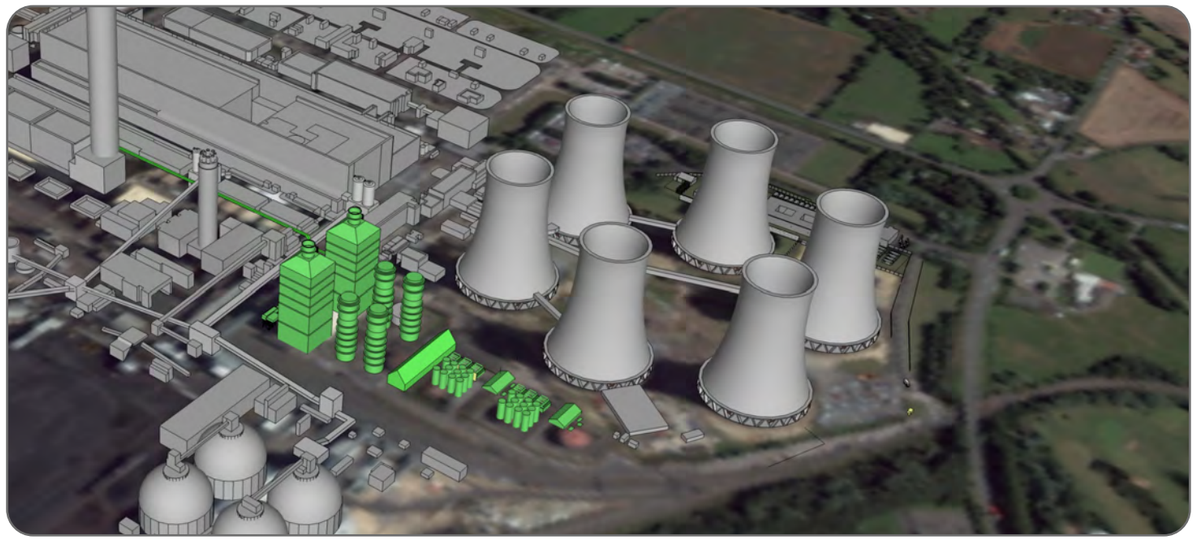


Fig.21. Drax BECCS - The Southern Solution (rejected)

4.1.3. The Northern Solution was selected for the following reasons:

- The northern solution centres around the northern cooling tower field, which enables the use of the existing cooling towers associated with unit 5 and unit 6 (currently coal operating units).
- As the two remaining coal units (units 5 and 6) stopped generating electricity commercially in March 2021 and will cease operations prior to works to construct the Proposed Scheme commencing, those units will no longer affect the operation of other parts of the Power Station utilising the southern set of cooling towers;
- The use of the northern solution locates the BECCS process equipment close to the existing general plant equipment, in particular the high-pressure CO_2 compressors and pipeline, which minimises the length of pipe runs required.
- The close proximity of the main flue gas stack to the northern solution improves the flue gas supply and return tie-in locations
- The northern solution allows the re-use of existing infrastructure such as piles from the by then removed FGD plant;

Massing and Appearance

4.1.4. The material form of much of the Proposed Scheme is largely driven by operational requirements. Maximum design parameters are set out within **Chapter 2 (Site and Project Description)** (document reference 6.1.2) and provide the maximum limits of deviation (vertically and horizontally) for a number of built structures within the Proposed Scheme. The subsequent design and placement of these elements will be developed within these parameters (see Figures 22 – 25). The Works Plans define the full extents of the Proposed Scheme overall.

4.1.5. The design aspiration for the Absorber Columns (Area 5) is that they are in context height-wise with the main Boiler / Turbine House and that they align within this overall central massing. The proportioning of the structures in such a way serves to limit visibility of the Proposed Scheme elements from the east (see Figure 24, Eastern elevation).

4.1.6. It is acknowledged that the Absorber Columns will introduce a new major vertical element to the western elevation of Drax Power Station, displacing the current horizontal emphasis defined by the FGD plant absorber buildings. This will alter the proportionality of the Power Station's western elevation, however the vertical form of the towers will be offset against the existing GT Chimney, located towards the southern extents of the centrally massed buildings (see Figure 23, Western Elevation). The main horizontal emphasis of the skyline will continue to be largely defined by the Boiler / Turbine House.

4.1.7. The colouration of main structures will be selected from the palette set in the following pages wherever practicable, to ensure compliance with the design approach employed for the Power Station as a whole.

Indicative Scale and Massing of Proposed Scheme - Western Elevation

Fig.22. Orthographic elevation of existing vs Proposed Scheme looking east

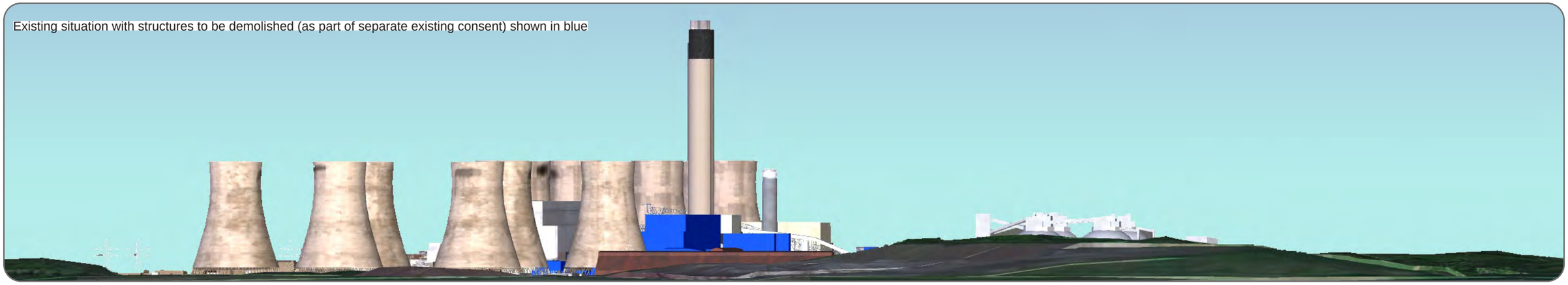
Indicative Scale and Massing of Proposed Scheme - Eastern Elevation

Fig.23. Orthographic elevation of existing vs Proposed Scheme looking west

Indicative Scale and Massing of Proposed Scheme - Southern Elevation

Fig.24. Orthographic elevation of existing vs Proposed Scheme looking north

Indicative Scale and Massing of Proposed Scheme - Northern Elevation



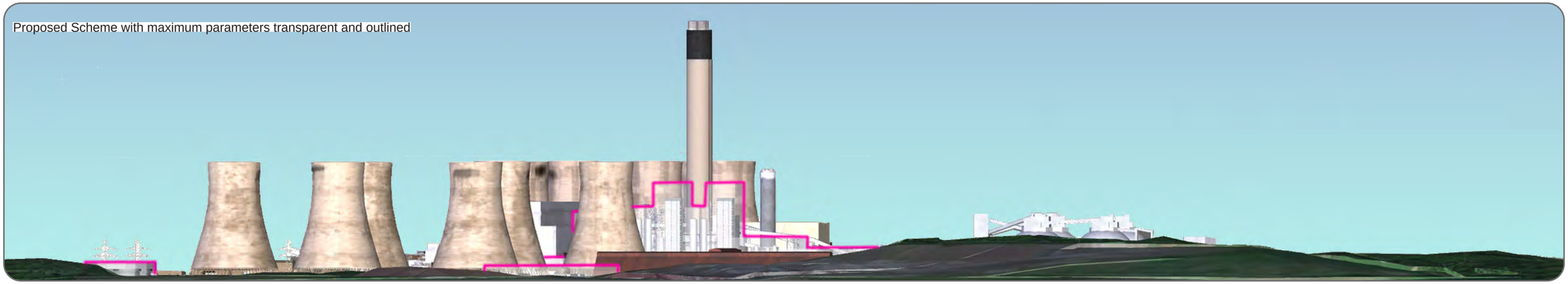


Fig.25. Orthographic elevation of existing vs Proposed Scheme looking south

4.1.8. The power station adopts a restricted colour palette, where practicable, for its major buildings and structures. The purpose of colour selection respects guidelines from the original Joint Design Report, which advocates that:

- Design parameters reference vertical differentiation of colour tone;
- Colour tones consider the relationship of the overall power plant massing against the sky and of lower structural elements.

4.1.9. The design principles employed across the power station observe the following measures:

- To adhere where possible with this original guidance on massing and colour;
- Recognition of horizontal and vertical scales and their importance to the overall massing of the power station;
- Employing lighter colour tones for high buildings/structures in context with associated massing of existing buildings; emphasis on the wider perception of the power station;
- Employing darker colour tones for lower level buildings and distinct lower building sections;
- Relationship to human scale and visibility of buildings against a backdrop of other existing built form and/or vegetation;
- To restrict the use of colour tones to those already agreed/employed within the power station and indicative colour tones which fulfil the design principle objectives;
- It is acknowledged that the form, the functional performance and/or maintenance requirements of particular scheme elements may dictate material selection and thereby restrict the scope for colour selection.

Colour palette progression for the Proposed Scheme

4.1.10. The Proposed Scheme takes account of the design principles described. A colour palette is defined (referenced in **Chapter 2 (Site and Project Description)** (document reference 6.1.2), based on the following analysis of colour palette options:

- Consideration was given to the adoption of either grey tone (Goosewing Grey) or buff tone (Greystone) for the tall structures (absorber columns and regenerator columns), in relation to existing structures and how they will be perceived in combination and association;
- The existing FGD plant absorber buildings (buff tone) currently present a contrast colour tone to the main Boiler House / Turbine Hall building, with a further horizontal emphasis to the core building mass. With their removal (and the likely future removal of redundant absorber buildings) it is considered that the new structures should therefore be grey tone, in context with the main Boiler House / Turbine Hall building and as part of the overall central massing;
- Darker colour tones are preferred for the lower buildings set within Areas 1-3, where existing structures provide a design narrative. These various built forms will be unified by colour restriction, where they are viewed primarily as near-distance elements.

BS381C-436 Dark Camouflage Brown

Selected as similar colour to Limestone and Gypsum buildings

BS 9093 - Ash Grey

Original colour of upper section of the Boiler House and Turbine Hall as specified within Joint Report

BS2660-9098 Blue Grey

Original colour of lower section of the Boiler House and Turbine Hall as specified within Joint Report

BS 10A05 - Goosewing Grey

Colour has been used throughout the Site, predominantly for Tanks, Pipework, Ducting and Storage facilities

Colour Scheme Development

Viewpoint 1 looking east - Goosewing Grey

Viewpoint 2 looking east - Goosewing Grey

Viewpoint 1 looking east - Greystone

Viewpoint 2 looking east - Greystone

Colour Palette by Design Area

4.1.11. Careful consideration of materiality and colour is key to ensuring the visual impact of the Proposed Scheme is minimised wherever possible and to create a sense of cohesion between the existing and proposed structures.

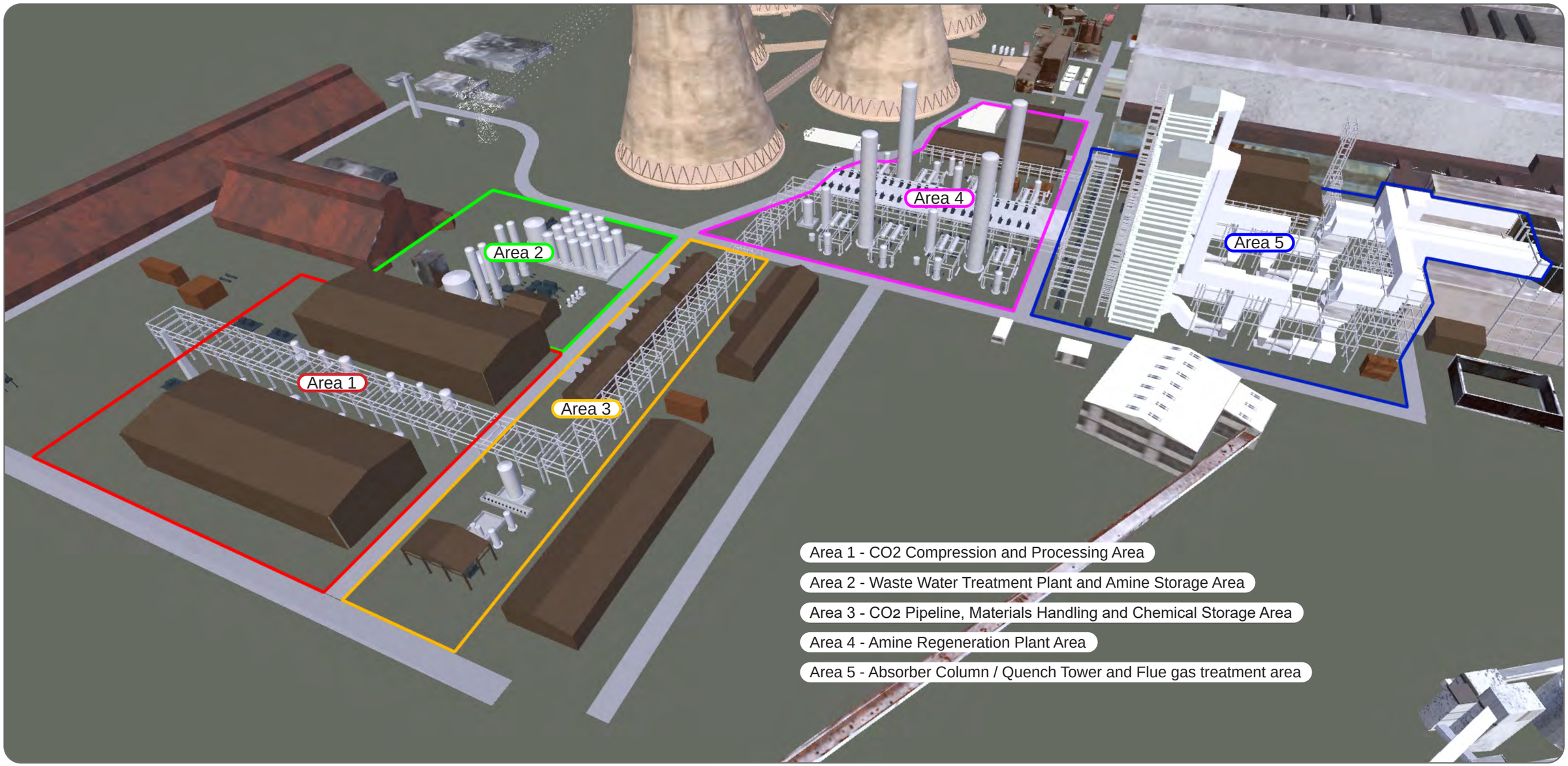


Fig.26. Overview of Proposed Scheme areas

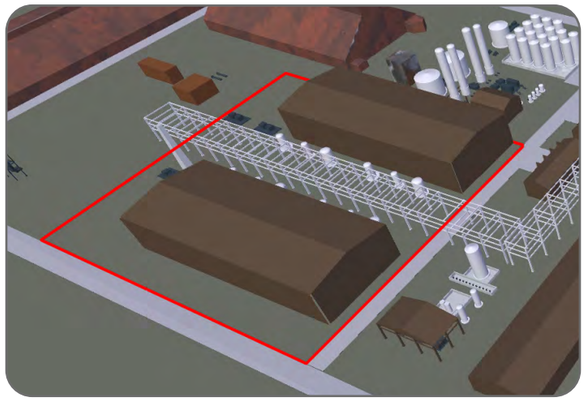


Fig.27. Area 1

Area 1

4.1.12. The proposed structures in this area are generally low level, comprising CO2 processing and storage facilities.

4.1.13. Views are localised, contained by and set against the backdrop of large dark brown coloured buildings and grey storage tanks. Wider views are largely obscured.

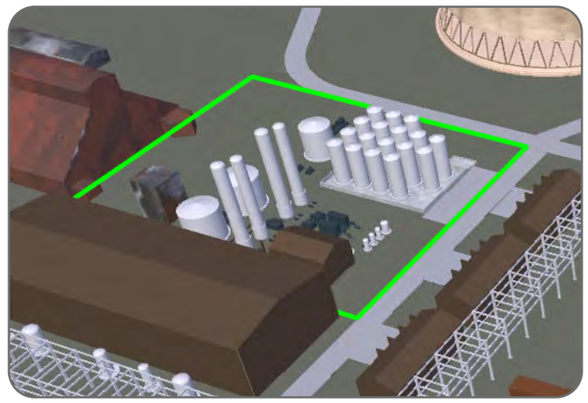


Fig.28. Area 2

Area 2

4.1.14. The proposed structures in this area are generally low level, comprising processing and storage facilities.

4.1.15. Views are localised, contained by and set against the backdrop of large dark brown coloured buildings, grey storage tanks and vegetation, with wider views largely obscured.

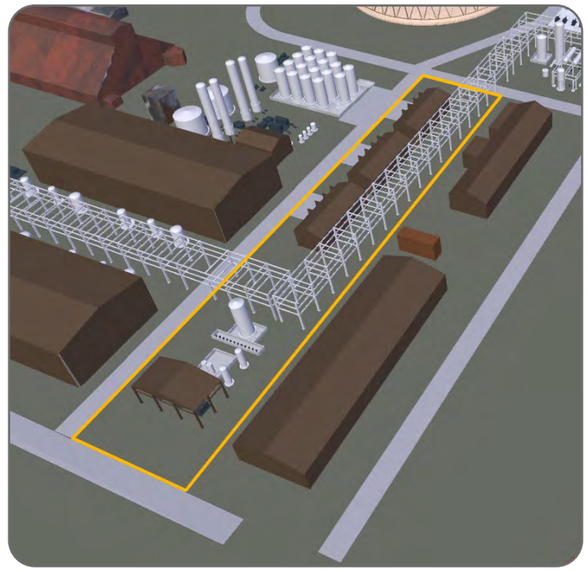
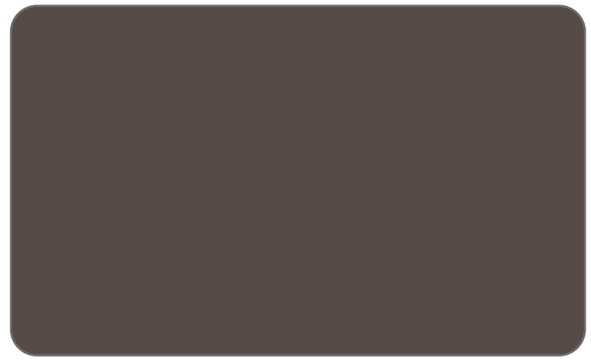


Fig.29. Area 3

Area 3

4.1.16. The proposed structures in this area are generally low level, comprising transit and storage facilities.

4.1.17. Views are localised, contained by and set against the backdrop of large dark brown coloured buildings, grey storage tanks and vegetation, with wider views largely obscured.



Buildings

BS381C-436 Dark Camouflage Brown

Tanks and storage / transit structures

BS 10A05 - Goosewing Grey

Colour Palette - Area 4

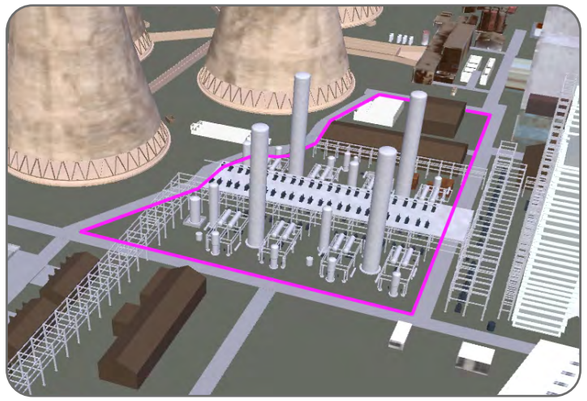


Fig.30. Area 4

4.1.18. The scale of the proposed structures in this area is varied, ranging from low level transmission infrastructure to 4 tall Regenerator Columns.

4.1.19. Views are likely to be possible from a considerable distance, particularly from the west, where they are set against the backdrop of existing grey/beige buildings of the Turbine/ Boiler House and concrete cooling towers.

Buildings up to 15m in height

BS381C-436 Dark Camouflage Brown

Tanks, pipework, ducting and storage structures

BS 10A05 - Goosewing Grey

Buildings and structures over 15m in height

BS 9093 - Ash Grey

Colour Palette - Area 5

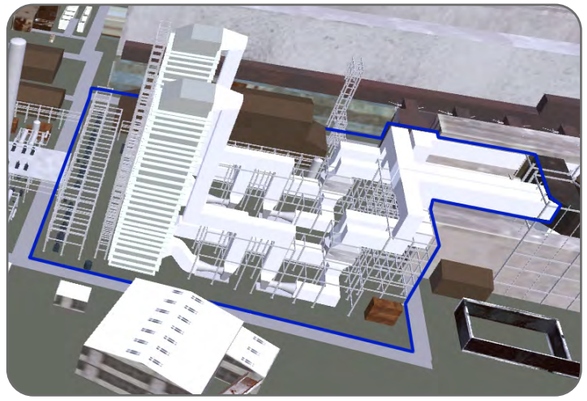


Fig.31. Area 5

4.1.20. The proposed structures in this area are very large, comprising two Absorber Columns, two Quench Towers, associated ducting and transit infrastructure.

4.1.21. Views are likely to be possible from a considerable distance, particularly from the west, where they are set against the backdrop of existing grey buildings of the Turbine/Boiler House and Chimney Stack.

Buildings up to 15m in height

BS381C-436 Dark Camouflage Brown

Tanks, pipework, ducting and storage structures

BS 10A05 - Goosewing Grey

Buildings and structures over 15m in height

BS 9093 - Ash Grey

Overview

4.1.22. Drax Power Station is located within a landscape of predominantly low (or in areas low – medium) district brightness. As a single, large industrial installation with high visible exposure, its night-time illumination contributes to the overall level of external lighting and sky-glow that is experienced within the surrounding landscape.

4.1.23. The **Draft Lighting Strategy** (document reference number 6.7) has been prepared in response to the **EIA Scoping Opinion** (document reference 6.3.1.2) received from the Planning Inspectorate, which stated that:

"The ES should include an assessment of day-time and night-time lighting during construction and operation of the Proposed Development where significant effects are likely to occur". and "the Inspectorate does not agree that heat and light may be scoped out unless it is agreed with relevant consultees and such agreement is evidenced in the ES."

4.1.24. The strategy document is not part of the Environmental Statement (ES) but is a supporting document to the DCO Application. The intention of this supporting document is to provide a framework within which the future exterior lighting design of the Proposed Scheme shall be designed to ensure that International, National and Local standards and guidance documents are embedded within the design process to ensure a compliant and balanced approach to exterior artificial lighting which satisfies the Health and Safety needs of Drax Power Limited operatives and also environmental aspects.

4.1.25. The night-time lighting assessment is presented in **Chapter 9 (Landscape and Visual Amenity)** (document reference 6.1.9) and considers night-time conditions for sensitive visual receptors during construction and operation phases, with reference to the information presented in the Draft Lighting Strategy and set out in **Chapter 2 (Site and Project Description)** (document reference 6.1.2).

Proposed Scheme Design Recommendations

4.1.26. The **Draft Lighting Strategy** (Document Reference Number 6.7) sets out the construction and operational criteria in relation to distinct lighting duties:

- Functional area lighting;
- Road lighting;
- Emergency lighting (not covered in the strategy due to requirements being applicable for interior settings only);
- Escape lighting (not covered in the strategy due to requirements being applicable for interior settings only); and
- Aviation lighting (not covered in this strategy as no new lighting is proposed or required).

4.1.27. The following summary of environmental principles are also referenced within the **Draft Lighting Strategy** as good practice measures which should be applied to both the construction and operational phases:

Designing under the most efficient principles practicable:

- Right Light: Look to the correct application of the lighting standards, defining the required lighting levels dependent on the task being undertaken and the level of activity and risk. Right light refers to the correct selection of light source, with due consideration of the most energy efficient modern sources, such as LED. Balanced against these requirements is the need to consider the impact of lighting on local sensitive flora and fauna, especially bats.
- Right Time: The lighting standards permit levels to be adjusted dependent on the use of an area, such as when working areas are not is use or tasks being undertaken. Lowering levels to the minimum required for safety and security, or even full switch-off regimes, may be considered at certain times. Such an approach may be across the Proposed Scheme or suitably zoned.
- Right Place: Ensure that only the areas required are illuminated. Reductions in spill and obtrusive light to at least the constraints imposed by the applicable Environmental Zone should be achieved, through the careful consideration of luminaires and how they are installed.
- Right System: The most energy efficient lighting installations require a suitable control system. Dependent on the operator and operating regime, a system that allows monitoring and control may be considered.

Equipment Selection:

- The selection of equipment to control light distribution and reduce the installation's impact on the surrounding environment. The use of such equipment will restrict light to the areas required and not contribute to excessive levels of spill, intensity or upward output.
- Selection of appropriate colour temperature for specific functions

Sensitive Lighting Design for Ecological Mitigation:

- Design measures to reduce impact on sensitive habitats, including impacting roosts, commuting routes and established and created dark corridors;
- The use of warmer white LED sources where practicable;
- Specific design measures to avoid light spill onto confirmed roosts, minimise light spill on trees and hedgerows, and to provide buffer zones of low illuminance adjacent to established or proposed key habitats.

Representative Images

4.1.28. The three-dimensional digital model used to generate day-time visualisations (as illustrated in Section 4.4) has also been used to create visualisations of the proposed lighting scheme at night-time.

4.1.29. Night-time drone photography was undertaken to survey lighting levels in particular areas around the site, which have been used as an additional guide when adding baseline lighting levels to the model. From this baseline, a realistic representation of the lighting associated with the Proposed Scheme has been developed.

Existing Power Station - Drone Photography

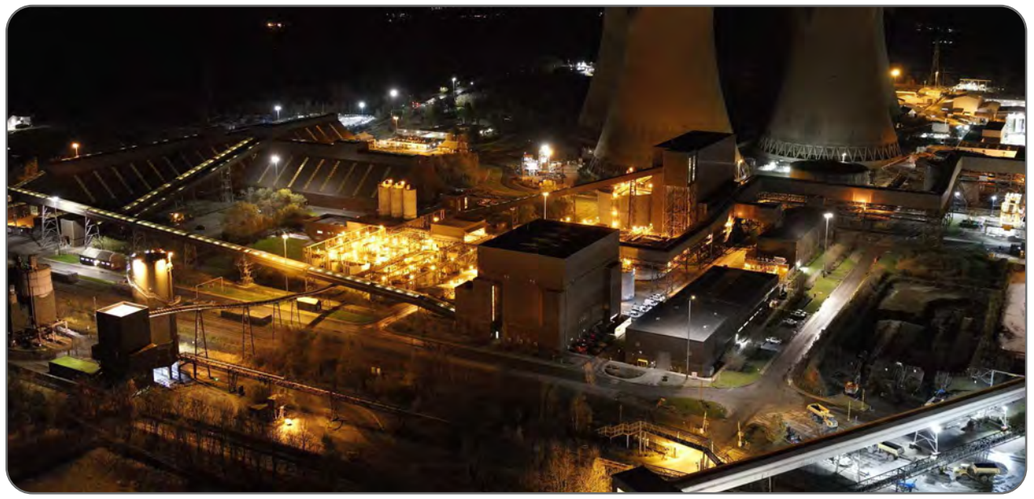


Fig.32. Drone Photography of existing situation at Drax Power Station at night, looking east.

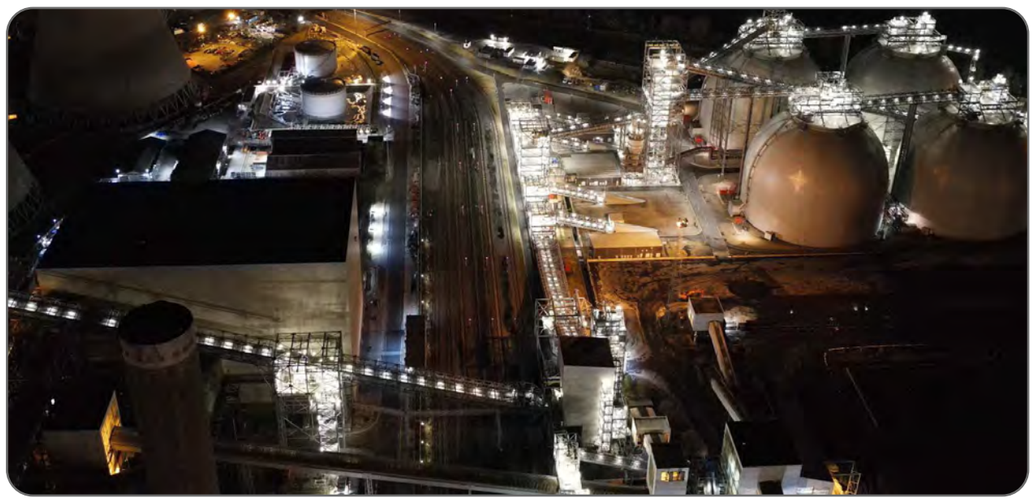


Fig.33. Drone Photography of existing situation at Drax Power Station at night, looking south.

Existing Power Station -Baseline Lighting Model

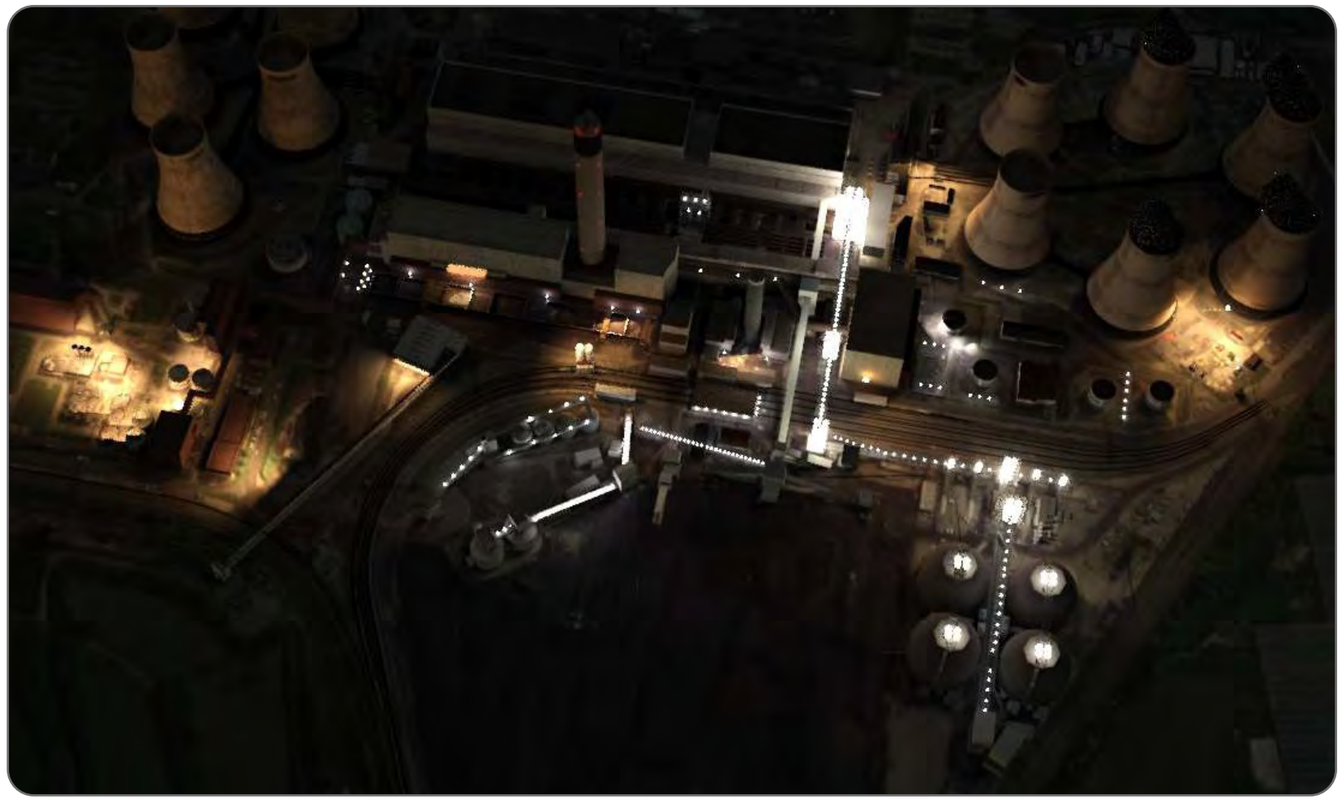


Fig.34. Computer generated model of existing situation at Drax Power Station to illustrate baseline lighting conditions at night, looking east.

Fig.35. Computer generated model of the Proposed BECCS Scheme at Drax Power Station showing indicative lighting conditions at night, looking south.

4.1.30. Figures 35 and 36 show the Proposed BECCS Scheme added to the computer generated baseline model to illustrate indicative night-time lighting conditions during operation.

4.1.31. The lighting levels for the Proposed Scheme are noticeably less intense than for other existing installations.

4.1.32. These images represent a 'worst case scenario' in terms of potential light pollution from the Proposed Scheme, where during operation the extent of functional lighting may vary due to more efficient lighting and lighting control measures as described within the **Draft Lighting Strategy** (Document Reference Number 6.7).

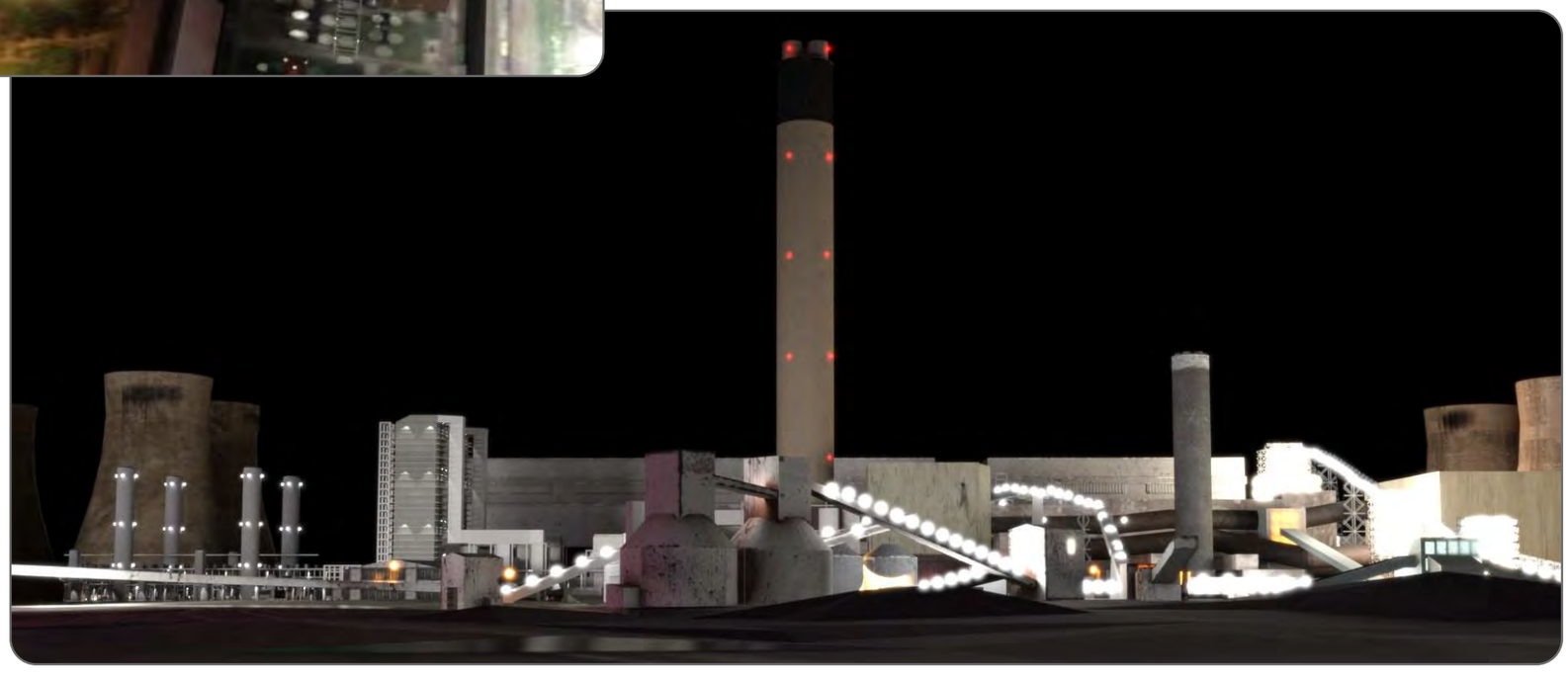


Fig.36. Computer generated model of the Proposed BECCS Scheme at Drax Power Station showing indicative lighting conditions at night, looking east.

4.2 Landscape and Biodiversity

The importance of Green Infrastructure

4.2.1. The NPPF defines Green Infrastructure (GI) as follows:

'Green Infrastructure (GI) is a network of multifunctional green and blue spaces and other natural features, urban and rural, which is capable of delivering a wide range of environmental, economic, health and wellbeing benefits for nature, climate, local and wider communities and prosperity

National Planning Policy Framework, 2021

Natural England Guidance

4.2.2. *The Green Infrastructure Framework - Principles and Standards for England* (2022) sets out a framework for the incorporation of Green Infrastructure throughout the design process. It states:

'A GI network can include street trees, green roofs/walls, parks, private gardens, allotments, sustainable drainage systems, through to wildlife areas, woodlands, wetlands and natural flood management functioning at local and landscape scale. Linear GI includes roadside verges, green bridges, field margins, rights of way, access routes, and canals and rivers.'

The Green Infrastructure Framework - Principles and Standards for England, 2022

4.2.3. High quality GI can deliver multiple benefits as part of the design process. To achieve the best possible outcomes, Natural England recommend the following should be considered:

- Biodiversity / nature recovery
- Health
- Carbon storage / sequestration
- Water - flood regulation, supply and quality
- Soil protection and enhancement
- Air quality, noise and temperature regulation
- Pollination
- Food production - community orchards, allotments, urban food
- Aesthetic value / sense of place
- Education
- Interaction with wildlife / access to nature
- Recreation / active travel

4.2.4. Consideration of the setting of the development and the wider landscape that surrounds it is key. This should extend to:

- Views in and out of the Site;
- Existing 'green corridors';
- Topography;
- Geology;
- Soils;
- Ecology;
- Rivers and waterways /water bodies;
- Open space;
- The character of the area itself - how its natural, cultural/historic and perceptual characteristics make it distictive; and
- The needs of the Community, so that the design reflects these where possible.

Leeds City Region Green and Blue Infrastructure Strategy

4.2.5. The vision for Leeds City Region is for all its residents to have easy access to a high-quality, safe and well-used network of footpaths, cycleways, green spaces, waterways and wildlife habitats. This green and blue infrastructure is viewed as essential in contributing towards a strong economy, a sustainable environment and outstanding quality of life. It is also part of the ultimate goal of making Leeds City Region a zero-carbon economy, which is underpinned by high quality green and blue infrastructure.

4.2.6. Priorities actions include:

- Effective water management and flood risk reduction – developing natural flood management programmes and drainage solutions
- Build green and blue infrastructure into physical development and housing –creating vibrant, healthy and inspiring places where people want to live, work and invest
- Enhance green and blue corridors and networks – integrating green and blue infrastructure within the transport routes that link our towns, cities and rural areas
- Improve community access to and enjoyment of green and blue infrastructure –building healthier, more environmentally sustainable communities
- Plant and manage more trees and woodlands – improving air quality, reducing carbon emissions and creating a greener, even more attractive region

4.2.7. The green and blue infrastructure surrounding Drax Power Station forms an essential aspect of how the power station is perceived. As described in **Section 2.3** , the wide-reaching design measures employed by the formative Weddle strategy for Drax Power Station remain largely intact, with a strong legacy framework of mature, linked woodland belts,

4.2.8. The vegetation helps screen the majority of lower-level site infrastructure and activity, restricting visibility to the taller elements of the power station and its characteristic skyline profile in middle distance and far distance views. The landform and woodland framework of Barlow Mound is particularly effective, where the scale of the landscape intervention (in terms of landform and vegetation pattern) is proportionate with the massing of the Power Station itself. Drax Power Station has arguably an iconic presence in the landscape, which contributes to a local sense of place.

4.2.9. Areas of woodland and scrub vegetation within and surrounding the Power Station boundary create a linked network of wildlife habitats. This immediate green infrastructure affords a more human landscape scale, in contrast with the predominantly industrial setting, although it is acknowledged that the immense scale and exposure of industrial installations within the Power Station are wholly dominant at a local level.

4.2.10. Areas of potential green infrastructure enhancement in relation to Drax Power Station may include the following measures:

Opportunities to strengthen strategic landscape framework surrounding Drax:

- Future design framework objectives which may seek to strengthen the vegetation pattern surrounding the Power Station, aligning with historic landscape strategy aspirations. The creation of new ancillary infrastructure has by its nature introduced visual change, this being more evident in the more open landscape to the south-west of the Power Station and where the lower level of industrial infrastructure is more exposed;

- Targeted measures may include (subject to the future functional requirements of land parcels) the creation of additional buffer planting, potentially in combination with earthworks to the periphery of the coal/materials storage area on the south-western boundaries of the power station. The bolstering of boundary hedges in the wider landscape to the south-west would provide further connectivity and structure.

Landscape/ecology combined benefits of green infrastructure:

- Ensuring that measures linked to habitat reinstatement/creation and biodiversity net gain can also contribute positively to wider green infrastructure enhancement objectives.

- A site scale landscape design approach that embraces biodiversity and amenity values of green infrastructure, encouraging habitat creation/connectivity and in enhancing worker/visitor environments.

Community and well-being

4.2.11. A network of public footpaths link with green infrastructure surrounding Drax Power Station, including the promoted SDC Drax Millennium Walks (the Drax Loop (Energy Trail), Big River Walk and Barlow Common Short Walk). Further strategic enhancement measures for publicly accessible areas in the vicinity of the Power Station may include:

- Provision of additional areas for recreational access;

- Improved wayfinding measures (signage and information available to footpath users) and user facilities such as seating points;

- Provision of interpretation (with potential links to digital media) at key viewpoints of the power station and other local features of interest. These would have educational value, illustrating for example the area's history from the manufacture of airships at the start of WW1 to the development of the Power Station and Barlow Mound, which has defined the landscape here for over 50 years. The wildlife value and importance of the surrounding green infrastructure could also be highlighted and reinforced. The functions and environmental credentials of the power station could be further communicated, demonstrating how Drax are already achieving Net Zero but are seeking to become Net Negative through the development of the BECCS scheme.

- Measures to divert the "Energy Way" away from security boundary fencing (where practicable) may improve the quality of user experience. This has been effective for footpath creation to the immediate north of the power station and could potentially be implemented in areas to the west and south of the power station boundary.

Green infrastructure in relation to the Proposed Scheme

4.2.12. The **Outline Landscape and Biodiversity Strategy (OLBS)** (document reference 6.6) sets out the committed landscape and biodiversity mitigation measures in relation to the Proposed Scheme.

Vegetation Retention:

4.2.13. Where practicable the Proposed Scheme has designed out the removal of existing, natural habitats such as those in the north and north-eastern area of the Power Station Site through changes in Order Limits. This has been provisioned through **Figure 3 (Vegetation Retention)** (document reference 6.6.3) of the **OLBS** (document reference 6.6).

4.2.14. Specific areas of existing vegetation within the Power Station Site and within the Order Limits are identified for retention and protection, these being located and described on **Figure 3 (Vegetation Retention)** (document reference 6.6.3) of the **OLBS** (document reference 6.6).

4.2.15. Areas of existing amenity planting located elsewhere within the Works Plans areas will be retained wherever practicable. There is however likely to be necessary loss of amenity planting in order to facilitate works, the extent and detail of which will require resolution at detailed design. Where the loss of such planting is unavoidable, the detailed design will seek to reinstate those landscape elements that are temporarily lost, or to incorporate new amenity planting measures in-keeping with the original aspirations as set out within the Weddle Strategy for Drax Power Station. These measures would be agreed in consultation with the Planning Authority and included as part of the **Detailed Landscape and Biodiversity Strategy** as it is progressed.

Enhancement Opportunities:

4.2.16. In relation to landscape, **Chapter 9 (Landscape and Visual Amenity)** (document reference 6.1.9) of the ES does not report any likely significant operational effects on landscape or visual receptors due to the Proposed Scheme. As such, there are no specific landscape-focused mitigation measures proposed which would contribute to green infrastructure enhancement outside of the Order Limits.

4.2.17. For ecological purposes, there are several areas of habitat creation (both within the Order Limits and off-site) identified within the **OLBS** (document reference 6.6), which would contribute to green infrastructure enhancement, in line with the principles described. These measures include

- Habitat Provision Area (near Pear Tree Avenue / New Road); Proposed woodland and new / enhanced hedgerows which will provide further definition of agricultural land, creating a stronger sense of enclosure and filtering of views towards Drax Power Station for PRoW users and nearby residential receptors;

- Off-Site Habitat Provision Area (Arthurs Wood and Fallow Field): Woodland enhancement measures which will contribute to the extensive existing woodland structure associated with Barlow Mound.

4.2.18. Landscape mitigation measures identified for the construction phase (to the East Construction Laydown Area boundary) will subsequently serve to strengthen the landscape pattern surrounding Drax Power Station during operation, while the reinstatement of vegetation removed during construction will help restore and potentially enhance those green infrastructure elements within the Order Limits.

4.2.19. Areas of soft and hard landscape areas within the Power Station Site may require reinstatement or re-design, in relation to detailed design phases within the **Works Plan** extents. This may present opportunities for green infrastructure enhancement within the Power Station extents, through the application of good practice design principles described.

Landscape Design within Drax Power Station

4.2.20. The green infrastructure elements of the power station are a legacy of the original Weddle landscape strategy / management plans for Drax and continue to provide environmental functions. Woodland belts and amenity structural planting contribute to a sense of well-being for workers and visitors to Drax Power Station. They further provide habitat potential and serve as an interface between the site and surrounding green infrastructure.

4.2.21. Design principles considered to represent good practice for soft and hard landscaping throughout the Power Station Site are outlined below. Accordingly, they provide a design basis for any subsequent re-design of public realm areas within the Power Station extents in relation to the Proposed Scheme as referenced in **Chapter 9 (Landscape and Visual Amenity)** (Document reference 6.1.9)

The inclusion, wherever practicable, of landscape elements which reinforce the original intents of the Weddle Strategy for the Drax Power Station Site, notably:

- To create an attractive and positive working environment for site users within the confines of the Power Station; and

- To provide a landscape structure capable of incorporating continuing development of ancillary industry.

Planting measures which seek to enhance any new or modified public realm:

- Clear definition of pedestrian/vehicular circulation; sub-division of larger spaces (such as new parking area provision);

- Introducing a “human scale” as a benefit of planting measures; reducing the sense of imposition from adjacent large-scale infrastructure; and

- Landscape measures where practicable to screen and soften the effects of installed artificial light sources.

Improving the biodiversity value of amenity planted areas within the Power Station Site:

- Increasing species-rich grassland areas, with reduced amenity grassed areas (subject to function);

- Incorporating species-rich amenity hedges where introduced; and

- Reducing the use of ornamental shrub species in favour of species selection for biodiversity and habitat creation, while maintaining an amenity function.

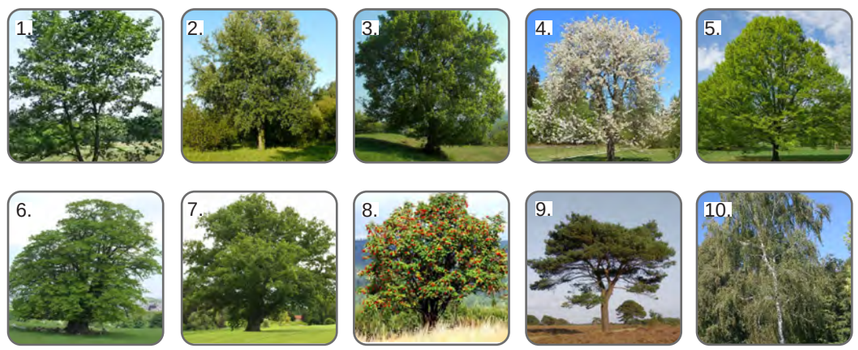
- Enhancement opportunities resulting from any necessary replacement of aged, over-mature amenity planting, where its appearance and function is now heavily compromised.

Indicative Soft Landscape Palette

4.2.22. An indicative soft landscape palette has been selected based on a combination of the original landscape design and management strategy (set out in *Drax Power Station Landscape Management Report - July 1987 (revised July 1990)* (A.E.Weddle, 1987), species identified as beneficial to the landscape and biodiversity objectives for the Proposed Scheme and other suitable species observed during visits to the Site and surrounding area. Further information in relation to soft landscape can be found in the **OLBS**.

Specimen Trees

1. Alder (Alnus glutinosa)
2. Aspen (Populus tremula)
3. Field Maple (Acer campestre)
4. Wild Cherry (Prunus avium)
5. Hornbeam (Carpinus betulus)
6. Lime (Tilia cordata)
7. English Oak (Quercus robur)
8. Rowan (Sorbus aucuparia
9. Scots Pine (Pinus sylvestris)
10. Silver birch (Betula pendula)

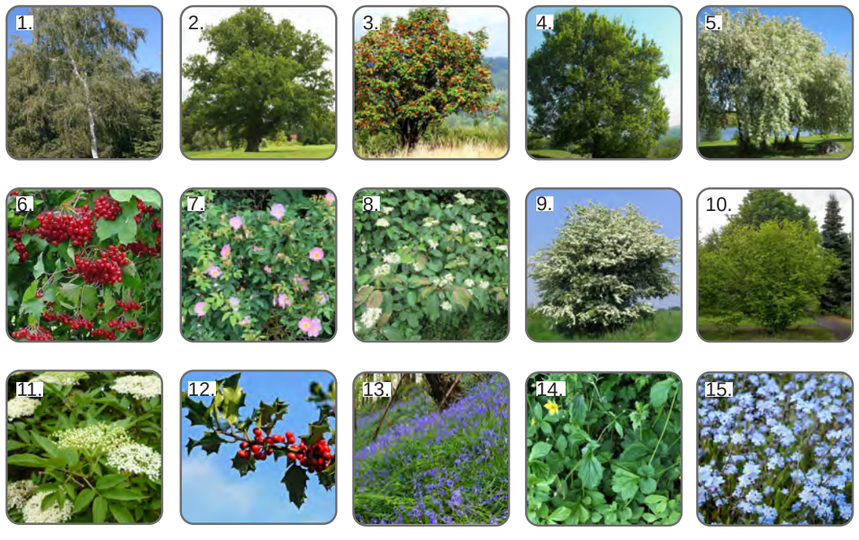


4.2.23. An indicative palette of native specimen trees has been selected for use in areas where they can perform both an amenity function and contribute to ecological objectives for increasing biodiversity and habitat connectivity.

4.2.24. Avenue tree planting and specimen tree groups can provide structure to areas of public circulation, reduce the influence of built development and potentially lower light reflection.

Woodland, Understorey and Ground Flora

1. Silver birch (Betula pendula)
2. English Oak (Quercus robur)
3. Rowan (Sorbus acuparia)
4. Field Maple (Acer campestre)
5. Bird cherry (Prunus padus)
6. Guelder rose (Viburnum opulus)
7. Dog rose (Rosa canina)
8. Dogwood (Cornus sanguinea)
9. Hawthorn (Crataegus monogyna)
10. Hazel (Corylus avellana)
11. Elder (Sambucus nigra)
12. Holly (Ilex aquifolium)
13. Bluebell (Hyacinthoides non-scripta)



4.2.25. An indicative palette of woodland, understorey and ground flora has been selected for use in areas where existing woodland has become fragmented, or for areas of new planting with a purpose to increase biodiversity throughout the site while also adding amenity value.

Hedgerows

1. English Oak (Quercus robur)
2. Blackthorn (Prunus spinosa)
3. Field Maple (Acer campestre)
4. Hawthorn (Crataegus monogyna)
5. Dog rose (Rosa canina)
6. Hazel (Corylus avellana)
7. Wild Cherry (Prunus avium)

4.2.26. An indicative palette of native hedgerow species for either the replacement of existing functional hedgerows which have become over-mature / gapped, or for the creation of new hedge definition in areas of re-designed public realm.

Amenity Planting

1. Cotoneaster var
2. Cornus var
3. Hypericum var
4. Lavender var
5. Rosa var

4.2.27. An indicative palette of amenity planting species has been selected for use in existing formal planting areas and amenity spaces. The species reflect those that can be found in the core administrative areas where there is an emphasis on visual amenity.

4.2.28. This category of planting would be limited to these areas, employed for the replacement of over mature or degraded planting which is no longer performing the function for which it was originally purposed.

Grassland Planting

4.2.29. An indicative species-rich meadow mixture has been selected which includes species observed locally. Mown grass verges would be kept to a functional minimum, in order to increase the proportion of species diverse grassland habitat within the Power Station site.

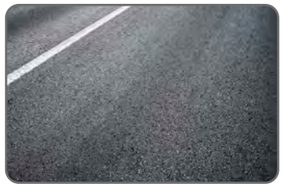
1. Yarrow (Achilea milefolium)
2. Betony (Betonica officinalis)
3. Common knapweed (Centaurea nigra)
4. Devil's bit scabious (Sucissa pratensis)
5. Tufted vetch (Vicia cracca)
6. Bird's-foot trefoil (Lotus corniculatus)
7. Oxeye daisy (Leucanthemum vulgare)
8. Rough hawkbit (Leontodon hispidus)
9. Meadow buttercup (Ranunculus acris)
10. Common bent (Agrostis capilaris)
11. Crested dog's tail (Cynosurus cristatus)
12. Quaking-grass (Briza media)

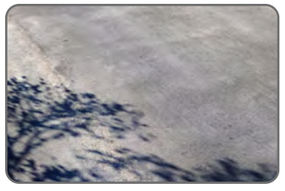
Indicative Hard Landscape Palette

4.2.30. An indicative hard landscape palette is indicated below, based on existing site observation and with reference to good practice historic design guidance.

4.2.31. The detailed design of public realm areas within the Power Station site should promote a logical hierarchy of pavings, boundary treatments and street furniture in order to create a clear character identity for site workers and visitors.

Paving, kerbs, hard surfaces and drainage (Indicative)


Asphalt surface


Concrete surface


Conservation Kerb


Standard Kerb


Grey Concrete slabs


Grey Block Paving


Buff Concrete Slabs


Channel Drain


Slot drain


Yorkshire Limestone


Yorkshire Flint

4.2.32. The detailed design of hard-surfaced areas and drainage structures will seek to rationalise and form a logical design palette / hierarchy of materials.

Walling, fencing and retaining structures (Indicative)


Security Fencing


Post and Rail Fencing


Precast walling


Steel Guardrails

4.2.33. The detailed design will seek to create a design hierarchy for new boundary treatments

4.3 Climate Change and Sustainability

Achieving Carbon Reduction

4.3.1. The **Net Zero Strategy: Build Back Greener (HM Government, October 2021)** strategy sets out pathways for the UK to meet the national carbon budgets and achieve net zero within the UK. The Policy's net zero pathway includes responding to and adoption of new technologies such as:

- Carbon capture and storage from power generation, hydrogen production and industrial processes. The technology also supports negative emissions from engineered greenhouse gas removals – Bioenergy with Carbon Capture and Storage (BECCS) and Direct Air Carbon Capture and Storage (DACCS);

- Biomass, combined with carbon capture and storage can remove carbon from the atmosphere and support low carbon electricity and hydrogen generation. Biomass and other waste can also support low carbon fuels for industry, buildings and transport. The Government is due publish a Biomass Strategy in 2022 that will set out how BECCS could be deployed.

4.3.2. The **Selby District Core Strategy Local Plan**, paragraphs 7.21 to 7.23 note that both *"Drax and Eggborough power stations contribute significantly to the District greenhouse gas emissions and as this power generation accounts for most of the District's emissions." "Implementation of [the Government's energy] policy is demonstrated at Drax by the co-firing of biomass and the proposals to develop a biomass fuelled electricity generating plant." "The Government's aim to reduce carbon emissions through the promotion of 'clean coal technologies', such as carbon capture and storage (CCS) will be a key issue for Selby over the plan period and beyond."*

4.3.3. The Local Plan Policy SP17 (low carbon and renewable energy) makes reference to the development schemes using the full range of available technology including improvements at existing fossil fuel energy generating plants to reduce carbon emissions.

Proposed Scheme Design Measures

4.3.4. Primary design measures have been incorporated into the Proposed Scheme in order to achieve carbon reduction and to achieve greater levels of sustainability. These measures are listed in Chapter 2 (Site and Project Description) (document reference 6.1.2) and include:

- Technology selection for the carbon capture process;
- The retro-fitting of existing plant;
- Efficient water recycling in relation to the Carbon Capture Wastewater Treatment Plant;
- Steam supply innovation, to maximise extraction of energy;
- Use of single compressors for carbon dioxide compression, reducing the spatial requirement for the Carbon Dioxide Processing and Compression Plant and so reducing the risk of habitat loss in more ecologically sensitive areas of the Power Station site;
- The re-use of aggregate imported to site for both construction and as structural fill; and
- Energy supply resilience measures.

4.3.5. The design approaches for flood risk mitigation and surface water drainage strategy both contribute to the wider aims of green and blue infrastructure objectives.

Flood risk mitigation and climate change consideration

4.3.6. Hydraulic modelling of the future baseline scenario has been carried out as part of the Flood Risk Assessment (FRA) supporting the Environmental Statement (ES). In the future baseline scenario, it is considered that the River Ouse in the area of the Order Limits is fluvially dominated, with minor tidal influence. The most significant future change in the baseline conditions is likely to be associated with an increase in peak river flows and sea level, associated with the potential effects of climate change.

4.3.7. The climate change allowances (as well as a design scenario for the Proposed Scheme and used in the hydraulic modelling) were agreed with the Environment Agency. A sensitivity analysis was carried out as part of the hydraulic modelling exercise, to investigate potential impact of other more extreme scenarios on the Proposed Scheme.

4.3.8. The Proposed Scheme is considered as essential infrastructure, which needs to stay operational during flood events. To mitigate against the potential risk of flooding to the sensitive infrastructure, the Proposed Scheme design is proposed to be elevated 800 mm above the envisaged flood levels for the design scenario, which will also provide mitigation for the sensitivity check scenarios.

4.3.9. Further details on the risk of flooding are provided in **Chapter 12 Water Environment** (document reference 6.1.12) of the ES and the FRA in Appendix 12.1 (document reference 6.3.12.1).

Surface water drainage strategy

4.3.10. Currently surface water runoff generated within the Drax Power Station Site is discharged to the River Ouse and Carr Dyke in addition to the discharge of water used in the cooling process.

4.3.11. The proposed **Surface Water Drainage Strategy** (Appendix 12.3) consists of the collection of surface water runoff from across the Drax Power Station Site by a network of surface water sewers. These will be directed to a new sump and pump arrangement, which under normal operating conditions will direct these waters to the "northern cooling water reservoir" where they will be utilised as cooling water (i.e. not immediately discharged to the River Ouse, as in the current scenario)

4.3.12. This presents a more sustainable solution, reducing the volume of water which needs to be abstracted under licence from the River Ouse for the cooling process and a reduction of the total discharge to the River Ouse, due to surface water runoff been reused in the cooling process.

4.3.13. More detailed information on the proposed surface water drainage strategy is provided in the **Surface Water Drainage Strategy** (document reference 6.3.12.3) and in Appendix 12.3

5. PLANNING POLICY, LEGISLATION AND GUIDANCE.

5.1 Legislation

5.1.1. The following legislation has been considered in the preparation of this document:

Legislation	Statements	Evidence of compliance with legislation
European Landscape Convention, 2000.	The UK is a signatory to the European Landscape Convention (ELC) (Council of Europe, 2000) which was ratified in 2006 and became binding in the UK from 1 March 2007. The ELC requires *"landscape to be integrated into regional and town planning policies and in cultural, environmental, agricultural, social and economic policies, as well as any other policies with possible direct or indirect impacts on landscape"*. It also acknowledges that all landscapes can be important, whether or not they are designated. There is no legislation specifically covering landscape character or visual amenity but the spirit of the ELC is carried through in planning policy and government guidance.	The Proposed Scheme design takes into consideration planning policy at National, County and District scales as well as considering a range of policies, legislation and initiatives that have possible *'direct or indirect impacts on landscape'*
The Environment Act, 2021.	The Environmental Act (Department for Environment, Food and Rural Affairs, 2021) is the mandate for Biodiversity Net Gain (BNG) requirements for development in England. This legislation ensures that the delivery of much-needed infrastructure and housing is not at the expense of vital biodiversity.	The requirement for the scheme to achieve BNG has been considered at all stages of the design process
Hedgerow Regulations, 1997	The Hedgerows Regulations (1997) make provision for the protection of important hedgerows in England and Wales. The regulations affect hedgerows which are 20m or more in length, or connected at both ends to another hedgerow of any length. They relate to hedgerows which are on, or adjoining land used for agriculture and/or conservation purposes. They do not include hedges that are attached to, or marking the boundaries of a private dwelling. Details of the hedgerow habitats are set out within Chapter 8 Ecology of this ES.	There are currently no hedgerows subject to these regulations within the Order Limits

5.2 National Planning Policy

5.2.1. Relevant national planning policy that has been considered in relation to good design and landscape and ecological impact is as follows.

National Planning Statements	Relevant excerpts	Evidence of compliance with Policy
Overarching National Planning Policy Statement (EN-1) (Department for Business, Energy and Industrial Strategy, 2021).	Paragraph 5.9.8 importantly recognises that *"Virtually all nationally significant infrastructure projects will have effects on the landscape."* *In light of this fact, the paragraph goes on to provide "Projects need to be designed carefully, taking into account the potential impact on the landscape. Having regard to siting, operational and other relevant constraints the aim should be to minimise harm to the landscape, providing reasonable mitigation where possible and appropriate".* Paragraph 5.9.7 provides *"Within a defined site, adverse landscape and visual effects may be minimised through appropriate siting of infrastructure within that site, design including colours and materials, and landscaping schemes, depending on the size and type of the proposed project. Materials and designs of buildings should always be given careful consideration2*	The design process included an optioneering phase, which explored the comparative benefits/constraints of alternative locations and scheme configurations. Consideration has been given to primary mitigation measures including location, massing, materiality and colour of built form. Historic architectural and landscape strategies for Drax Power Station have additionally informed decision-making processes in relation to planting measures and green infrastructure.
National Policy Statement for Renewable Energy Infrastructure (EN-3) (Department for Business, Energy and Industrial Strategy, 2021).	Paragraph 2.4.2 States: *'Proposals for renewable energy infrastructure should demonstrate good design in respect of landscape and visual amenity, and in the design of the project to mitigate impacts such as noise and effects on ecology.'*	The location, layout, overall massing and colour palette of the Proposed Scheme have been considered from a Landscape and Visual Impact perspective, with primary mitigation aimed at reducing adverse effects where possible. Ecology measures have been incorporated in order to fulfill BNG and enhancement objectives.
National Planning Policy Framework, 2021	Within Section 12 of the NPPF *"Achieving well-designed places"* the Government sets out a number of overriding core planning principles for achieving well designed places. Of relevance to the consideration of impacts on the landscape and how LPA's are engaged with during the design process, paragraph 132 provides, *"Design quality should be considered throughout the evolution and assessment of individual proposals. Early discussion between applicants, the local planning authority and local community about the design and style of emerging schemes is important for clarifying expectations and reconciling local and commercial interests. Applicants should work closely with those affected by their proposals to evolve designs that take account of the views of the community. Applications that can demonstrate early, proactive and effective engagement with the community should be looked on more favourably than those that cannot."*	Engagement with North Yorkshire County Council and Selby District Council to establish agreement in relation to Design Principles and objectives

5.3 Emerging National Planning Policy

5.3.1. Emerging National Planning Policy has also been considered in relation to the Proposed Scheme

Emerging Policy Statements	Relevant excerpts	Evidence of compliance with Policy
Draft Overarching National Policy Statement for Energy (EN-1) (Department for Business, Energy and Industrial Strategy, 2021).	Paragraph 4.6.2 states: *'Given the benefits of "good design" in mitigating the adverse impacts of a project, applicants should consider how "good design" can be applied to a project during the early stages of the project lifecycle. Design principles should be established from the outset of the project to guide the development from conception to operation'* Paragraph 5.10.7 states: *"The assessment should include the visibility and conspicuousness of the project during construction and of the presence and operation of the project and potential impacts on views and visual amenity. This should include light pollution effects, including on local amenity, and nature conservation".*	Design Principles have been set out during the early stages of the project, establishing a framework for the development of the scheme throughout the design process Potential impacts on views and visual amenity have been considered from the outset. Materiality, colour, lighting and planting schemes have been selected to complement exisitng infrastructure, nature conservation constraints and historic design decisions within the site.

5.4 Local Planning Policy

5.4.1. The study area for EIA spans four Local Planning Authority (LPA) areas: North Yorkshire County Council, Selby District Council, East Riding of Yorkshire Council and Doncaster Metropolitan Borough Council. Policies of relevance in terms of Design Principles are as follows:

Local Planning Authority	Planning Policy Document	Planning Policy	Example of compliance with Policy
North Yorkshire County Council	The saved policies of the **North Yorkshire Waste Local Plan** (North Yorkshire County Council, 2006); and	**Policy 5/1** Waste Minimisation states: *Proposals for major development should include a statement identifying the waste implications of the development and measures taken to minimise and manage the waste generated. Permission will not be granted where this has not been adequately addressed.*	**Policy 5/1** Potential Waste implications associated with the Proposed Scheme have been considered from the outset in line with best practice.
Selby District Council	**Selby District Core Strategy Local Plan, October 2013** (Selby District Council, 2013).	**Policy S 15:** seeks to promote sustainable development and encourages developments to consider tree planting, new woodlands and hedgerows in landscaping schemes to create habitats, reduce the urban heat island effect and to offset carbon loss. **Policy SP 18:** requires the safeguarding and, where possible, enhancement of the historic and natural environment including landscape character of the area and settings of areas of acknowledged importance. Specific reference is made to increasing connectivity to the District's green infrastructure promoting opportunities to increase its multi functionality and the need to identify, protect and enhance locally distinctive landscapes, areas of tranquillity, public rights of way and access, and open spaces. **Policy SP 19:** requires high quality design that has regard to local character and incorporates new and/or existing landscaping and access to open space and green infrastructure.	**Policy S 15:** The Proposed Scheme is designed to greatly reduce CO2 emissions from Drax Power Station, so in this respect it can be regarded as 'Sustainable Development'. Landscape and biodiversity planting measures comprise areas of habitat provision, with ecological enhancement measures aimed at BNG. **Policy SP 18:** The habitat creation area and proposed hedgerow planting to the north of the Power Station will respect the setting of the nearby Drax Augustinian Priory Scheduled Monument. **Policies SP18 and SP19:** The Proposed Scheme incorporates landscape proposals that feature native species and which improve ecological connectivity with existing green infrastructure.

5.4 Local Planning Policy continued

Local Planning Authority	Planning Policy Document	Planning Policy	Example of compliance with Policy
East Riding of Yorkshire Council	**East Riding Local Plan Strategy Document, 2016** (East Ridiing of Yorkshire Council, 2016).	**Policy EC5 Supporting the Energy Sector** states: proposals will be supported where any significant adverse impacts can be addressed, and the residual harm outweighs proposals. Due consideration should be given to cumulative effects of other proposals, Important Landscape Areas, local amenity including noise, traffic and visual impacts and biodiversity, geodiversity and nature. **Policy ENV1 Integrating High Quality Design:** seeks to ensure that the diverse character and appearance of the area is safeguarded and respected considering the specific characteristic of the sites wider context and surrounding area. Proposals should be of an appropriate scale, density, massing, height and materials and incorporate hard and/or soft landscaping alongside boundary treatments to enhance the setting of the building, public space and views. **Policy ENV2 Promoting a High-Quality Landscape** states: *'due consideration should be given to how the Proposed Scheme integrates into the landscape respecting intrinsic landscape qualities of the landscape setting and where possible opportunities to restore and enhance landscape characteristics and features. The policy adds that proposals should respect and enhance existing landscape character in the Landscape Character Assessment and in particular Important Landscape Areas including the Lower Derwent Valley and the Thorne, Crowle and Goole Moors which lie within the Study Area.* **Policy ENV4 Conserving and Enhancing Biodiversity and Geodiversity**: seeks to optimise opportunities to enhance biodiversity through promoting and enhancing green infrastructure and protecting, strengthening and reducing fragmentation. **Policy ENV5 Strengthening Green Infrastructure** states: development proposals should seek to integrate existing and/or new green infrastructure features within their design and enhance their functionality and connectivity.	**Policy EC5** The potential for significant adverse effects on landscape and visual amenity, noise and ecology have been mitigated through careful consideration of primary and secondary mitigation measures. **Policies ENV 1 and ENV 2** Proposals are of an appropriate scale, density height and massing, in context with existing development. Materiality and colour palettes for large structures have been considered in order to reduce visual impact. Landscape and biodiversity proposals are intended to tie in with existing green infrastructure.. **Policy ENV4** Proposals achieve BNG through native planting and enhancement of green infrastructure **Policy ENV5** Proposals aim to integrate with existing green infrastructure and increase habitat connectivity where possible.

5.4 Local Planning Policy continued

Local Planning Authority	Planning Policy Document	Planning Policy	Example of compliance with Policy
Doncaster Metropolitan Borough Council	**Doncaster Local Plan 2015-2035, adopted September 2021** (Doncaster Metropolitan Borough Council, 2012).	**Policy 26 Green Infrastructure (GI) (Strategic Policy):** seeks to protect, maintain, enhance and where possible extend / create GI informed by latest Council audits and strategies. **Policy 29 Ecological Networks (Strategic Policy)** states that proposals will only be supported that deliver a net gain for biodiversity and protect, create, maintain and enhance the Borough's ecological networks. **Policy 32 Woodlands, Trees and Hedgerows** states: proposals will be supported where it can be demonstrated that woodlands, trees and hedgerows have been adequately considered during the design process that a significant adverse impact can be avoided. There is a presumption against development that results in the loss or deterioration of ancient woodland and / or veteran trees. **Policy 33 Landscape (Strategic Policy)** seeks to support proposals that consider the quality, local distinctiveness and sensitivity to change of distinctive landscape character areas and individual landscape features. Development will be permitted where it conserves, enhances and possible restores the landscape character, local distinctiveness, setting and relationship, nature conservation value, special qualities of waterways and the topography of the area. Where development will result in a significant impact consideration should be given to alternative site selection, the scale, massing, design, form, layout and orientation as well as the inclusion of satiable mitigation measures of appropriate compensation off site. **Policy 48 Landscaping of New Developments** states: that development will be supported which protects landscape character, protects and enhances existing landscape features, and provides a high quality, comprehensive hard and soft landscape scheme.	**Policy 26** Proposals achieve BNG through native planting and enhancement of green infrastructure **Policy 29** Proposals achieve BNG through native planting and enhancement of green infrastructure. Existing ecological networks are retained and enhanced where possible **Policy 32** No areas of ancient woodland or veteran trees are lost to the Proposed Scheme. Existing trees and hedgerows are retained and enhanced where possible **Policy 33** Consideration has been given to alternative site selection during an optioneering process. Scale, massing, design, form, layout and orientation have also been considered during the design process **Policy 48** Existing landscape features are retained where possible and a strong set of design principles has been used to inform the design of the hard and soft landscape aspects of the Proposed Scheme.

5.5 Regional Strategies

5.5.1. Regional Strategies that have relevance to the Proposed Scheme in terms of Design Principles are listed below:

Organisation	Policy Document	Strategy	Example of compliance with Strategy
Leeds City Region Enterprise Partnership	**Leeds City Region Green Infrastructure Strategy** (Leeds City Region Enterprise Partnership, 2018).	**Leeds City Region Green Infrastructure Strategy** (Leeds City Region Enterprise Partnership, 2018) was prepared by the Leeds City Region Enterprise Partnership and seeks to expand green infrastructure to enable everyone within the region to be "within easy access to an outstanding and well used network of green infrastructure that reduces flood risks and supports health, the economic, the environment and a superb quality of life." The document identifies seven headline Outcomes, including: • "Become a UK trailblazer in catchment planning and natural flood management. • Make quality green infrastructure a defining feature of the way the City Region does development.1,000 miles of green infrastructure rich corridors, including canals, rail, road, and a City Region cycle route network. • Everybody within easy reach (1km) of an outstanding, diverse, well used green infrastructure network. • Create a White Rose Forest and increase tree cover by a third The Strategy covers all of the Leeds City Region and seeks to make connections to areas beyond which impact upon it, for instance river catchments. Linked to this core purpose are five interconnected aims: • Quality place (for people and investment) • Health and well being • Flood risk reduction • Wildlife and habitats • Climate change, air and water quality Seven priority areas have been identified where "tangible and impactful action can be delivered" through a detailed Delivery Plan. The Strategy goes on to state that all priorities are interconnected, and each priority will deliver multiple benefits as well as contributing to the above aims. Priorities include: • Effective water management and flood risk reduction • Build green and blue infrastructure into physical development and housing • Enhance green and blue corridors and networks • Heighten community access to / enjoyment of green and blue infrastructure • Plant and manage more trees and woodlands • Restore the uplands and manage them sustainably • Business growth, jobs, skills, and education	The Proposed Scheme contributes to a number of the Strategy aims, including: • Wildlife and habitats - The Proposed Scheme aims to deliver a net gain in Biodiversity and enhances ecological networks. • The Carbon Capture and Storage technology significantly reduces the CO2 emissions associated with the Power Station, contributing to ambitious governmental net zero targets. • The Proposed Scheme considers green infrastructure in the design, incorporating areas of habitat provision with increased provision of hedgerow and woodland enhancement. • Innovative water management approaches for the re-use of surface water run-off.

5.5 Regional Strategies continued

Organisation	Policy Document	Strategy	Example of compliance with Strategy
Dales to Vales River Network Catchment Partnership	**Dales to Vale River Network Partnership,** (http://dvrn.co.uk).	**The Dales to Vales River Network (DVRN)** is a catchment partnership which brings together local people, communities, organisations and businesses to make decisions on managing the rivers, becks and lakes in the Swale, Ure, Nidd, Ouse and Wharf Catchment. The network has highlighted a number of issues which need addressing including water quality, enhancing biodiversity, heavy metals and flooding, The Proposed Scheme lies within the Ouse Catchment Management Plan (Dales to Vales River Network Catchment Partnership, 2013). Plans which accompany the Catchment Management Plan indicate the extent of existing “green areas” in terms of woodland / forestry and areas of “floodplain woodland potential” and “riparian woodland potential”. The Plans highlight the importance of the area in terms of shading and fluvial flooding. The former, through riparian trees, can provide shading for aquatic species, whilst fluvial flooding can be impeded through the introduction of more wetland woodland habitat to store water.	The Proposed Scheme incorporates soft landscape proposals that are designed to deliver a net gain in Biodiversity. The Proposed Scheme incorporates woodland species that are well suited to floodplain catchment areas and can fulfill the characteristics of ‘floodplain woodland’

5.6 Guidance

5.6.1. Key guidance documents of relevance to the Proposed Scheme in terms of Design Principles are listed below:

Guidance
The Green Infrastructure Framework - Principles and Standards for England (emerging) Natural England, 2022
Guidelines for Landscape and Visual Assessment" ('GLVIA3') published by the Landscape Institute ('LI') and the Institute of Environmental Management and Assessment ('IEMA'), 3rd Edition (2013) Landscape Institute and IEMA, 2013.
An Approach to Landscape Character Assessment", Natural England, 2014
Visual Representation of development proposals, Technical Guidance Note 06/19, Landscape Institute, 2019

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