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Hornsea Project Four: Environmental Statement

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Volume A4, Annex 4.6: Design Vision Statement

Document Control

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Accepted - Thomas Watts, Ørsted, August 2021

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Section 1

Vision Statement

1.1 - Vision Statement

Introduction

1.1.1 The Design Vision Statement for Hornsea Project Four Offshore Wind Farm (hereafter referred to as 'Hornsea Four') presents the 'vision' for Hornsea Four. It sets out how design parameters, primary and secondary mitigation and enhancement and net gain measures from the suite of Hornsea Four documents interact, which is further illustrated in **Section 1.1.6**. The Design Vision Statement, supported by the documents outlined in **Section 1.1.3**, helps to ensure a sense of place is considered and integrated throughout the design process and adverse environmental effects are mitigated where possible whilst respecting landscape character. This will be achieved through the integration of locally inspired design principles and engineering optimisation. Key design considerations include the use of materials, colour, and landscape treatments. Proposals seek to bring not only greater visual mitigation as part of Hornsea Four, but also encourage ecological and amenity enhancements. The core elements of the Design Vision Statement including the relevant project mitigations are secured via respective elements of the draft DCO (outlined in **Section 1.1.3**). The Design Vision Statement is therefore provided as a visual aid only.

1.1.2 It is important to note that visualisation tools, drawings or photographs are utilised to demonstrate illustrative examples of how proposals may materialise during the development phase of Hornsea Four, notably between development consent, the pre-construction design stage, and construction, the earliest of which is anticipated to commence in 2024. Final details will be agreed with relevant stakeholders (set out in the individual documents listed in **Section 1.1.3**) prior to commencement of the relevant stage of connection works through the discharge of DCO requirements set out in **Section 1.1.3**, and informed by design and engineering requirements.

Existing Documents

1.1.3 This Design Vision provides an overview of information presented throughout a wider suite of documents, which comprise of the following:

Biodiversity Net Gain

- **Volume F2, Chapter 15: Outline Net Gain Strategy** – Covering only matters that are measurable, linked to biodiversity net gain. The outline measures will be developed further post-consent of Hornsea Four and approved under Requirement 6 of the draft DCO;

Enhancement Measures

- **Volume F2, Chapter 14: Outline Enhancement Strategy** – Sets out outline enhancement measures (measures identified over and above mitigation measures) associated with both the natural and human environment. The outline measures will be developed further post-consent of Hornsea Four and approved under Requirement 22 of the draft DCO;

Mitigation Measures

- **Volume F2, Chapter 8: Outline Landscape Management Plan** – Sets out the outline approach to landscaping works which will inform the detailed landscaping to be approved under Requirement 8 of the draft DCO. The indicative landscape masterplan also includes some embedded enhancement measures;
- **Volume A3, Chapter 1-10: Onshore Environmental Assessment** – Comprises ten environmental topic areas subject to Environmental Impact Assessment (EIA), setting out primary, tertiary and secondary mitigation measures (secured through various DCO provisions as identified in **Volume A4, Annex 5.2: Commitments Register**) to avoid or reduce environmental effects;
- Further mitigation measures associated with Hornsea Four are secured in the Outline Ecological Management Plan (**Volume F2, Chapter 3**), Outline Onshore Infrastructure Drainage Strategy (**Volume F2, Chapter 6**), Outline Onshore Written Scheme of Investigation (**Volume F2, Chapter 10**), Outline Code of Construction Practice (**Volume F2, Chapter 2**);

Detailed Design

- **Volume F2, Chapter 13: Outline Design Plan** – Provides the outline approach and key embedded design mitigations of the OnSS and EBI which will inform the detailed design to be approved under Requirement 7 of the draft DCO;

DCO Parameters and Maximum Design Scenario

- **Volume C1.1: Hornsea Four Draft Development Consent Order** – Consents the overarching maximum parameters associated with Hornsea Four infrastructure; and
- **Volume A1, Chapter 4: Project Description** – Further refines the maximum design scenario (MDS) for the Hornsea Four infrastructure providing additional parameters not outlined in the draft DCO.

1.1.4 These documents have been created to support the application for Development Consent for Hornsea Four. Each document is secured via requirements in **Volume C1.1: Hornsea Four Draft Development Consent Order**.

1.1 - Vision Statement

How to use the Design Vision Statement

1.1.5 Throughout this report the suite of Hornsea Four application documents listed in **Section 1.1.3**, are cross referenced in numerous ways including:

- **Bold Blue Text** referencing specific paragraphs, sections or other Hornsea Four application documents by name;
- Specific colours reference where additional/detailed information can be located when a section covers information from one of the five main topics covered by the Hornsea Four application documents. For example, any paragraph in the Design Vision that relates to **Biodiversity Net Gain** is represented by **light green**, which is shown as a block colour in the margin behind the section numbers *(see Example 1)*. The visual in **Section 1.1.6** outlines which documents relate to the 5 main submission topics. Information found primarily in the **Design Vision** is represented by **Orsted blue**; and
- Specific logos will also reference where additional/detailed information can be located when a visual, photograph or section covers information from one of the five main topics covered by the Hornsea Four application documents. For example, any diagrams that show elements of **Enhancement Measures** will have the corresponding logo next to it (*see example 2*). Multiple logos may be shown when a visual represents more than one of the five main topics covered. These logos are also represented throughout the document in the footer below with their corresponding title for easy reference (*see example 3*).

Example 1

0.0.0 Information found primarily in the **Design Vision** is represented by **Orsted blue** as shown by the block colour in the margin

0.0.1 **Biodiversity Net Gain** is represented by **light green**

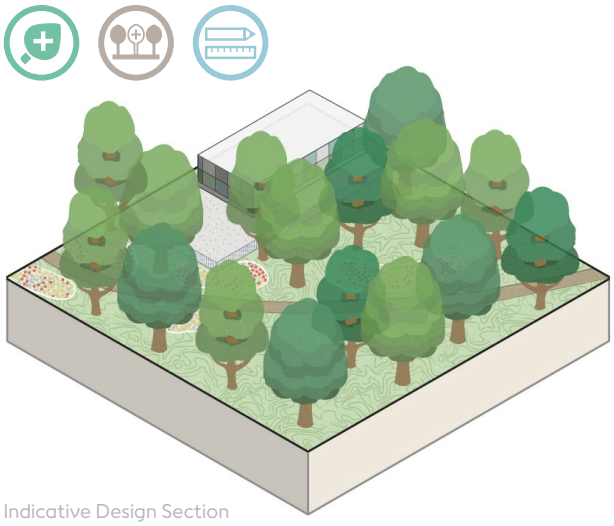
0.0.2 **Enhancement Measures** is represented by **aqua**

0.0.3 **Mitigation Measures** is represented by **brown**

0.0.4 **Detailed Design** is represented by **light blue**

0.0.5 **Maximum Design Scenarios (MDS) and Development Consent Orders (DCO) Parameters** is represented by **dark blue**

Example 2



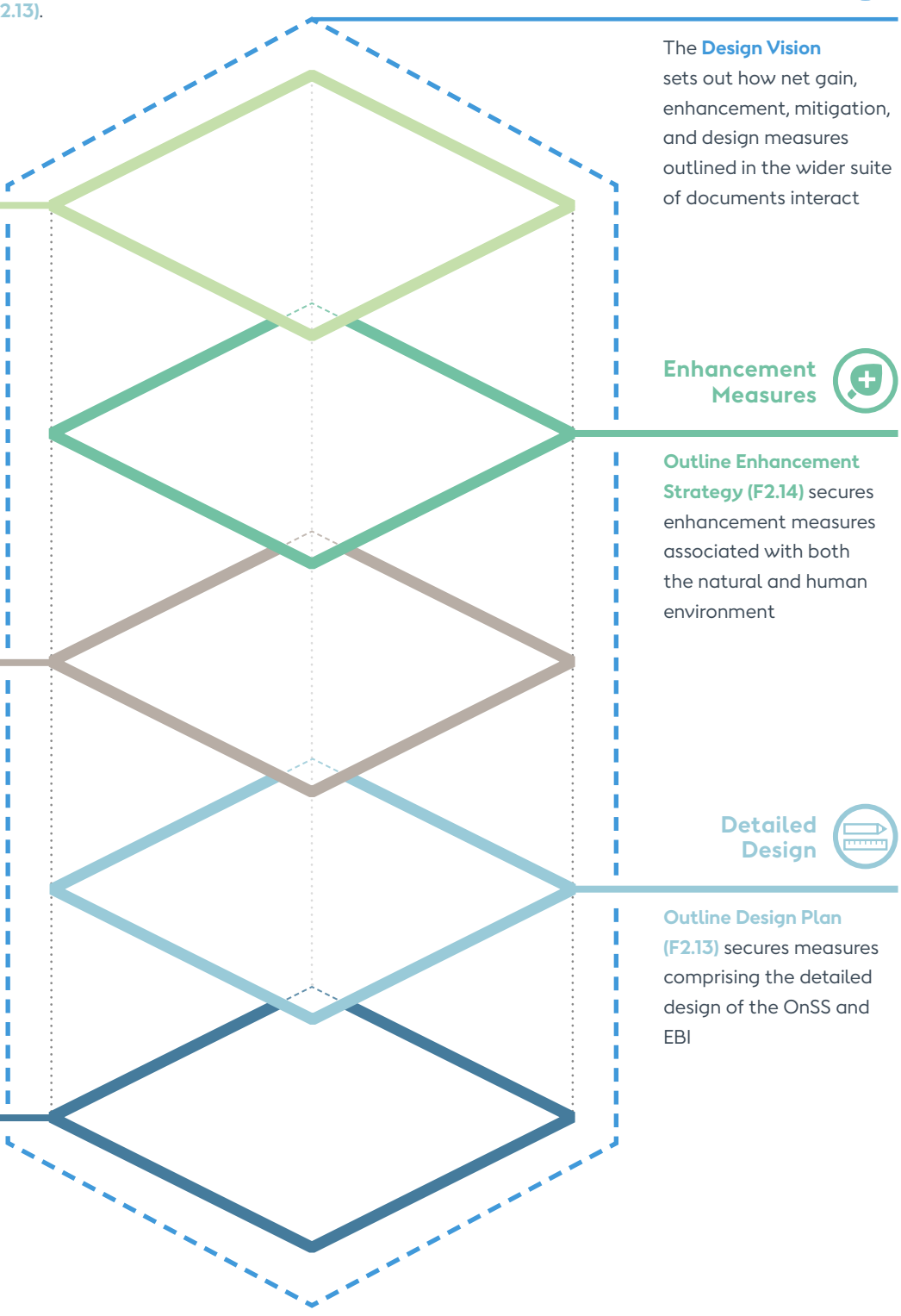
Indicative Design Section

Example 3

1.1 - Vision Statement

Document Hierarchy

1.1.6 The Design Vision provides an overview of information found in the Hornsea Four application documents outlined in **Section 1.1.3**. Each document falls within one of the five main topics listed below. Specific colours and logos are again referenced here, with the specific document where additional information can be found listed below. For example, additional information on **Detailed Design** can be found in **Outline Design Plan (F2.13)**.



Design Vision

The **Design Vision** sets out how net gain, enhancement, mitigation, and design measures outlined in the wider suite of documents interact

Biodiversity Net Gain

Outline Net Gain Strategy (F2.15) secures biodiversity net gain measures

Enhancement Measures

Outline Enhancement Strategy (F2.14) secures enhancement measures associated with both the natural and human environment

Mitigation Measures

Various onshore environment assessments, commitments and management plans and strategies secure primary, tertiary, and secondary mitigation measures to avoid or reduce environmental effects

Detailed Design

Outline Design Plan (F2.13) secures measures comprising the detailed design of the OnSS and EBI

MDS and DCO Parameters

Draft Development Consent Order (C1.1) and **Volume A1, Chapter 4: Project Description** consents the maximum design parameters associated with Hornsea Four

Design Vision proposals seek to bring not only visual mitigation of Hornsea Four, but also encourage ecological and amenity enhancements.

Section 2

Local Context Study

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2.1 - Site Context

Introduction

2.1.1 There are three areas being considered as part of the Design Vision Statement :

1. Onshore Substation (OnSS)
2. Landfall Area
3. Onshore Export Cable Corridor (Onshore ECC)

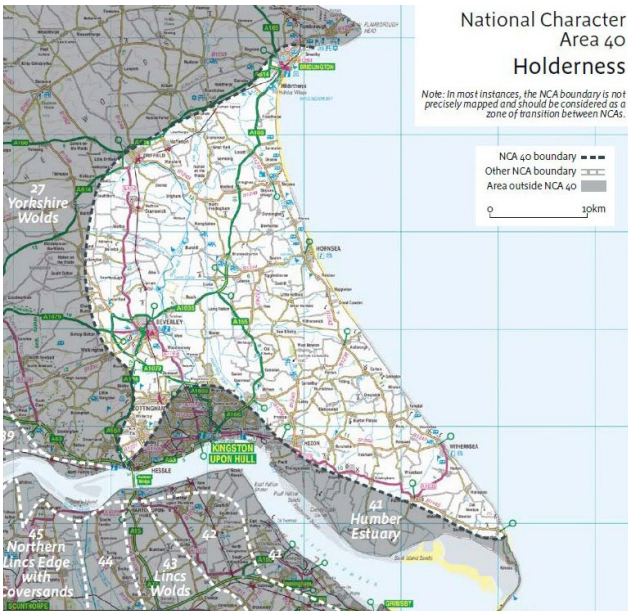
All 3 elements of the project lie within the East Riding of Yorkshire and are part of the following landscape character areas.

National Character Area – Holderness (NCA40)

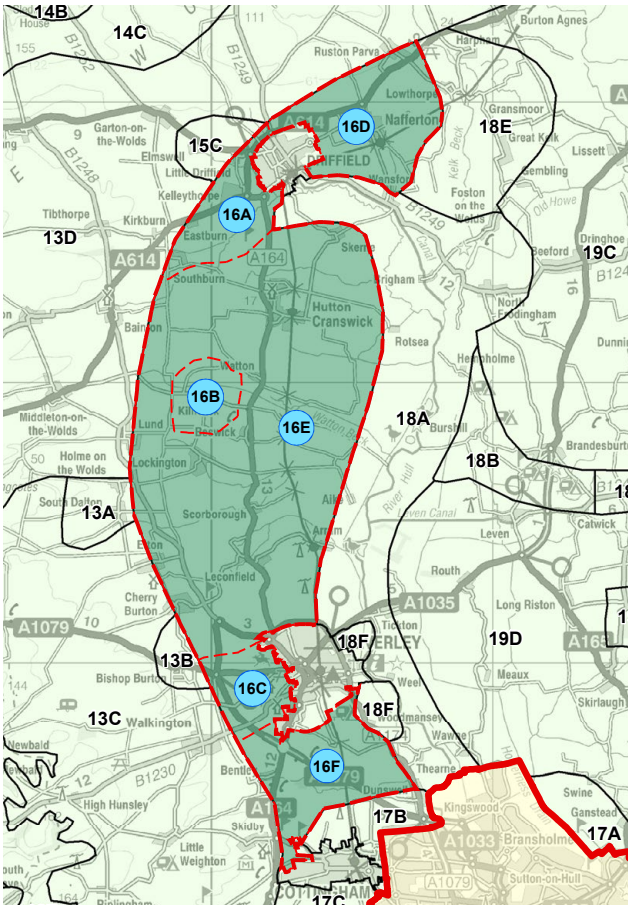
2.1.2 Key characteristics include:

- Broad, low-lying plain with few hills, bounded by the curving chalk escarpment of the Yorkshire Wolds and Flamborough Head to the west and north respectively;
- The fertile floodplain of the River Hull is important for agriculture, exhibiting large scale field patterns and linear drainage channels;
- Both arable and livestock farming occur as dominant industries, with farmland interspersed by occasional tree cover in the form of shelter belts and hedgerows;
- Settlements are generally dispersed, traditional style villages linked by a mesh of minor roads; and
- Panoramic views offered as a result of the gentle topography.

2.1.3 The OnSS site and onshore ECC also sit within the East Riding of Yorkshire Landscape Character Area. The East Riding of Yorkshire Landscape Character Assessment (2018) was prepared to assess the landscape character of the area, to inform its future growth and development. The landscape of the study area is divided into Landscape Character Types (LCTs) reflecting the results of desk study and field survey. These LCTs are then further refined into Landscape Character Areas (LCAs) forming discrete named geographical units.



Img 1 - National Character Area mapping *(Source: National England)*



Img 2 - Local Character Area mapping *(Source: National England)*

Local Landscape Character - Sloping Farmland (LCT 16) and Beverley Parks Farmland (LCA 16F)

2.1.4 Key characteristics include:

- Gently rolling landform sloping gradually down to the east;
- Intermittent scattered woodland blocks throughout and hedgerow in places;
- Intensively farmed rectilinear arable fields of large to medium size interspersed with less regular early enclosure fields particularly around villages;
- A number of turbine developments within the landscape with others visible beyond. Pylons are also a dominant visual feature; and
- The under lying solid geology is chalk from the Cretaceous period.

2.1.5 Key visual receptors include :

- Nearby settlement and residents in isolated hamlets including Burn Park Farm and Poplar Farm;
- Recreational users of the landscape (residents or visitors);
- Workers operating in nearby industry; and
- Travelling receptors who may be passing through the area by road or railway.

Img 3 - Creyke Beck Substation, approximately 180m east of the OnSS site *(Source: Orsted)*

2.2 - Site Context - OnSS

Introduction

2.2.1 The OnSS site is located within a rural arable setting with intermittent scattered woodland and hedgerows. Existing pylons are a dominant feature of the landscape and the National Grid Electricity Transmission (NGET) substation at Creyke Beck and other industrial infrastructure is located to the east and south-east of the OnSS site. An existing public right of way (PRoW) runs through the OnSS site and a cycle route passes to the east. Individual and coupled residential properties are scattered throughout the zone.

2.2.2 ### Site Constraints

- Overhead Power Lines;
- Field Boundaries;
- Existing settlement;
- Local residential receptors;
- Wide open views;
- Visual receptors;
- PRoW; and
- Drainage.

Site Opportunities

- Rural isolated setting;
- Existing woodland/ habitat networks;
- Field drains;
- Underlying geology;
- Hedgerows;
- Industrial influences; and
- Improved accessibility such as improvements to the PRoW network and NCC in accordance with paragraph 98 of the NPPF.

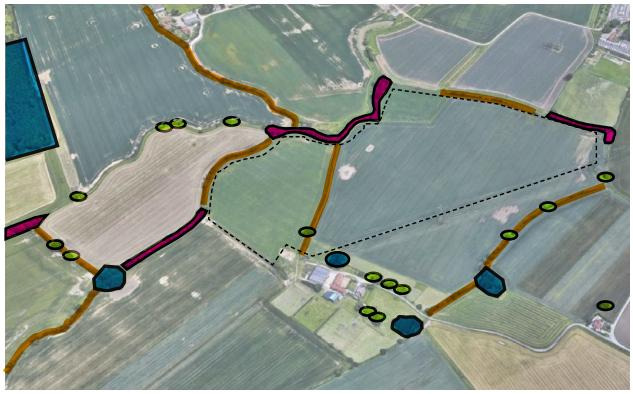


Fig 1 - Existing woodland structure plan

Key

Img 4 - Mixed native woodland belts
(Source: Orsted)

Img 5 - Clustered woodland
(Source: Orsted)

Img 6 - Individual mature trees
(Source: Orsted)

Img 7 - Mature native hedgerows
(Source: Orsted)

2.2 - Site Context - OnSS

OnSS Substation Site

2.2.3

Fig 2 - Hornsea Four OnSS site

Study Area

Ancient Woodland

Existing Public Footpath

Removed Public Footpath

Railway Line

Public Bridleway

Cycle route

Overhead Powerlines

2.3 - Site Context - The Landfall Area

Introduction

2.3.1 The Landfall area is located on the coastline between the settlements of Barmston and Wilsthorpe. This area lies within **Landscape Character - Coastal Farmland (LCA 20) and Bridlington to Hornsea Coast (LCA 20C)**

2.3.2 The **East Riding of Yorkshire Council (ERYC) Landscape Character Assessment (ERYC, 2018)** identifies the following key characteristics:

- Flat to gently undulating topography sloping gently eastwards;
- Boulder clay cliffs eroding into the sea;
- Limited tree cover due to exposed windswept coastal landscape;
- Smaller villages and farmsteads and minor roads threatened by erosion;
- Fragments of historic field pattern around villages and hamlets;
- Tourism development along the coast including static caravan parks are prominent; and
- Large scale turbine development visible within the landscape.

2.3.3 **Site Constraints**

- Close proximity to Flamborough Head (SAC) and Flamborough Headland Heritage Coast;
- Listed buildings and historical war assets;
- Coastal footpaths and PRoW; and
- Residential properties.

Site Opportunities

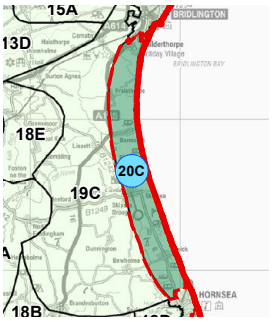
- Tourism opportunities; and
- Existing onshore windfarm and associated infrastructure

2.3.4

Fig 3 - Plan indicating the Landfall Area

Key

- Railway Line
- SAM (Scheduled Ancient Monument)
- PRoW
- Bridleway
- Watercourse
- Listed Building
- Landscape Character Area Boundary



Img 8 - Local Character Area mapping *(Source: East Riding Council)*

Img 9 - River mouth of The Earl's Dyke meeting Fraisthorpe Sands *(Source: Paul Glazzard)*

Img 10 - War defences are prominent along the coastline and a historic feature *(Source: pillboxesinsuffolk.blogspot.com)*

2.4 - Site Context - Onshore ECC

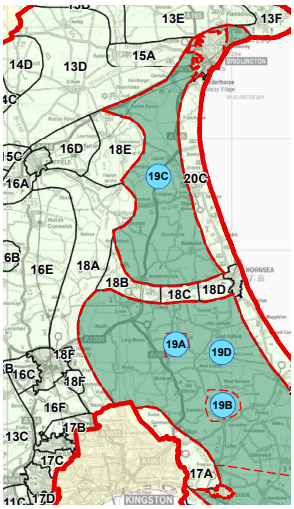
Introduction

2.4.1

Fig 4 - Plan indicating the Onshore ECC area

Key

- ECC Area
- Study Area
- Earl's Dyke



Img 11 - Local Character Area mapping *(Source: East Riding Council)*

2.4.2

Site constraints

- Historic Environment Receptors;
- Field drainage ditches and watercourses;
- Scattered farmsteads; and
- Residential properties.

Site opportunities

- Limited tree cover;
- Flat topography;
- Few landscape designations; and
- Few access routes.

Img 12 - Open farmland, flat low lying topography with limited tree cover *(Source: East Riding Council)*

Img 13 - The Earl's Dyke *(Source: East Riding Council)*

2.5 - Policy EN1 Principles

2.5.1 The Department of Energy and Climate Changes **Overarching National Policy Statement for Energy - Policy EN1, Section 4.5 - the 'criteria for "good design" for energy infrastructure'**, is an essential reference document and covers the following principles :

Section 4.5.1 covers the 'appearance and sustainability of proposed infrastructure' ensuring that 'good design to energy projects should produce sustainable infrastructure sensitive to place, efficient in the use of natural resources and energy used in their construction and operation'. **Section 4.5.2** states how good design can 'help mitigate adverse impacts'. **Section 4.5.3** takes into account 'functionality and aesthetics' and promotes the consideration of 'existing landscape character, landform, vegetation and sensitive materials'. **Section 4.5.4** covers the documentation of design development and as stated in **Section 4.5.5**, 'taking further independent professional advice is encouraged' in reference to detailed design proposals. For the independent design advice, engineers on behalf of the Hornsea Four Project have collaborated with independent design consultant (LUC).

The design principles covered in this Design Vision Statement cover various aspects raised in **Policy EN1, Section 4.5**. These include considering the appearance of OnSS infrastructure to soften it into the surrounding landscape. It also significantly references existing landscape character, landform, vegetation, and materials as a starting point for proposed interventions. These principles ensure energy infrastructure projects promote biodiversity, enhance the quality of the area and mitigate various impacts on the immediate landscape. Further detail of individual EN1 policy and Hornsea Four's response is covered in the individual submission documents outlined in Section 1.1.

Section 3

OnSS Design Code Principles

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3.1 - Introduction to OnSS Design Code

Introduction

3.1.1 The Hornsea Four OnSS will connect to the NGET substation at Creyke Beck which is located to the east of the OnSS site near Cottingham. This Design Vision Statement has been produced to provide an overview of the Hornsea Four vision, bringing input together from multiple documents (as shown in **Section 1.1.6**), with the aim of ensuring that future design evolution is sensitive to the local landscape setting. This statement considers the existing landscape context and explores a series of interventions and best practice solutions to best integrate the development into the surrounding landscape, minimising visual impact where possible. Design principles also seek to strengthen the amenity and ecological potential of the development. It is envisaged that the design principles highlighted can be applied to the Hornsea Four OnSS site during the detailed design and construction phases of the project, subject to feasibility.

3.1.2 Options that are not feasible due to technical requirements, safety concerns or other considerations are removed from consideration based on set criteria and presented throughout the document as design development stages to adhere to **Policy EN1, Section 4.5.4**.

3.1.3 This Design Vision Statement explores design proposals for the following:

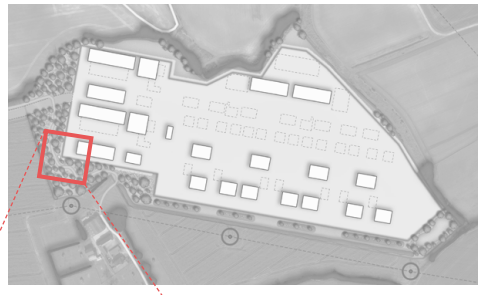
- Built Form, Materials and Colours;
- Landscape Treatments;
- Boundary Treatments, Fencing and Hedgerows;
- Earthworks;
- Sustainable Drainage System (SuDS) and Drainage;
- Access, Circulation and Wayfinding; and
- Lighting.

3.1 - Introduction to OnSS Design Code

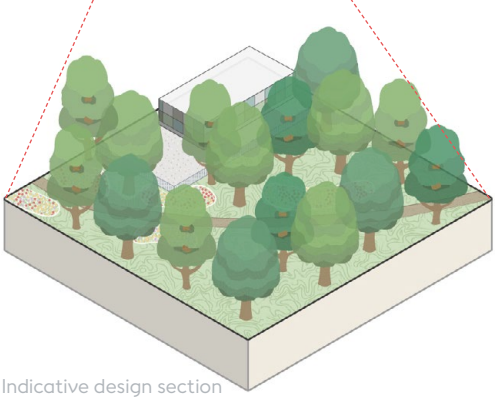
Design Development

3.1.4 At the end of each chapter there is a visual that summarises how design proposals work together, accompanied by associated site plans to show where on the site it references (*see example 1*). These individual summary diagrams are combined in **Section 3.10**, to represent the overall design proposals for the OnSS site (*see example 2*). The site design is further expanded in **Section 3.10**, to show which design elements reference one of the five main topics covered by the Hornsea Four application documents (*see example 3*).

Example 1

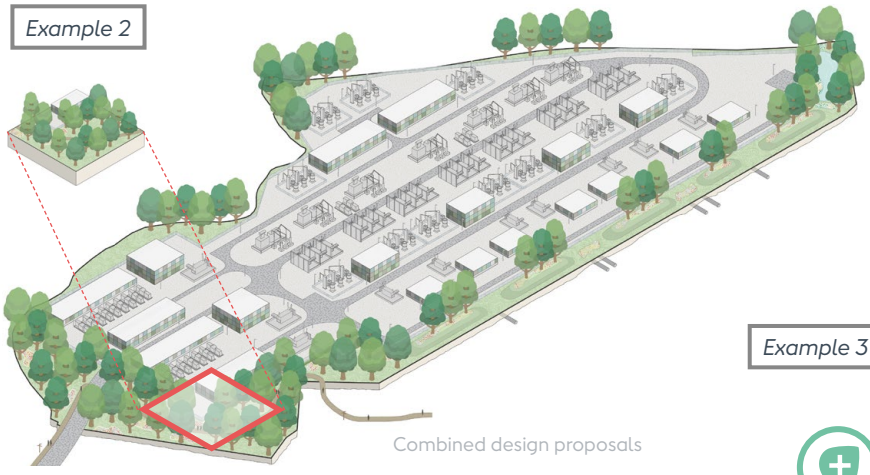


Site location



Indicative design section

Example 2



Combined design proposals

Example 3

Design layers

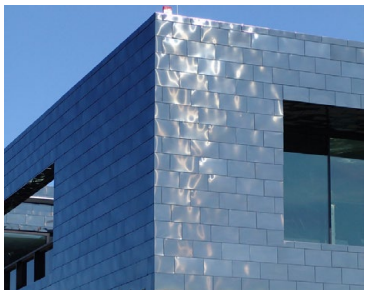
3.2 - Built Form, Materials and Colours

Built Form

3.2.1 The following sections outline the maximum design scenario (MDS) of the OnSS and EBI (as outlined in **Volume A1, Chapter 4: Project Description**), along with the design approach to the built form elements, led by engineering requirements and where feasible, inspired by local vernacular and examples of best practice substation design. The key aims of the building form, composition and layout options include:

- Producing a buildable and operational scheme that satisfies engineering requirements,
- Allowing for emergency and maintenance access,
- Reducing the visual impact where feasible through mitigation, and
- Creating a consistent design standard throughout the OnSS and EBI, where feasible, to avoid or reduce visual clutter.

3.2.2 Building form for both the OnSS and EBI is anticipated to be 'cube' shaped, with a two-sided sloping roof. This type of building form is a functional form that doesn't jar with the surrounding vernacular. This simple building form is also prominent throughout the NGET substation at Creyke Beck site. The roofline could be designed to strengthen the linkages to surrounding agricultural structures. Deviation from the cube design would result in increased building footprints and would likely increase visual impact.



Img 14 - Cube building form
(Source: Detlef Schobert)

3.2.3 The OnSS and EBI layout and equipment organisation must be set out in sequential order as do all electrical transmission systems. Reorganisation of these components would require a significant increase in OnSS Footprint, in addition to a large increase in connections, cables and complexity. For this reason, only the standard transmission system layout will be considered. Every effort will be made to use space as efficiently as possible.

3.2.4 *Figure 5* presents an indicative layouts for HVDC OnSS site, with further detail on MDS and DCO parameters provided in Table 1 (further information on the MDS is provided in **Volume A1, Chapter 4: Project Description**).

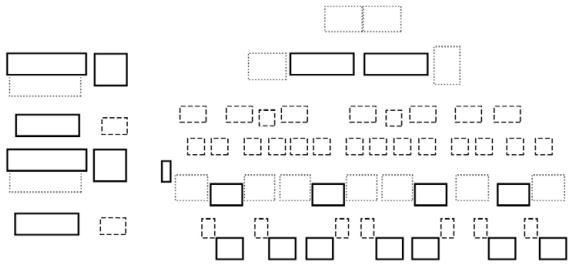


Fig 5 - HVDC current indicative layout

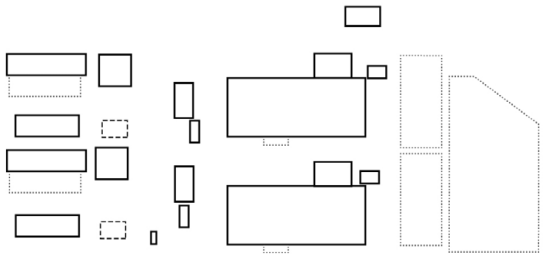


Fig 6 - HVAC current indicative layout

Parameter	No	Length (m)	Width (m)	Height (m)
OnSS				
Main Buildings	2	240	80	25
Secondary Buildings	15	Area max = 7000m2		15
HV Equipment Clusters and Components	45	N/A	N/A	15
EBI				
Main Buildings	4	100	25	15
Secondary Building Type 1	4	40	40	20
Secondary Building Type 2	6	14	10	10

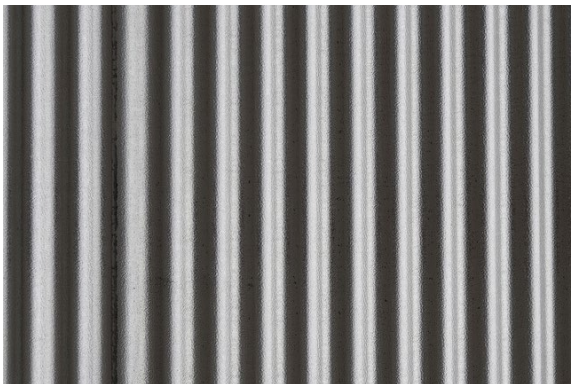
Table 1 - Maximum design scenarios and development consent order parameters

3.2 - Built Form, Materials and Colours

Materials

3.2.5 The choice of material for the proposed buildings serves a functional and structural requirement. As such, the choice of materials to be used would be dictated by the functional requirements of the OnSS and EBI. It is anticipated that building materials are likely to comprise corrugated metal sheeting, which has the following benefits:

- Robust, cost effective and generally low maintenance;
- Corrugated form prominent in rural setting;
- Flexible in terms of colour choice;
- Not flammable; and
- Readily available.



Img 15 - Corrugated sheeting *(Source: maxpixel.net)*

3.2.6 Other material options may potentially be considered during detail design, subject to satisfying functional and structural requirements.

3.2 - Built Form, Materials and Colours

Colour and Finishes

3.2.7 Whilst the technical and functional requirements of the OnSS and EBI limit several design considerations, there is an opportunity to consider the application of colour on the façades of buildings.

3.2.8 A colour sampling exercise was undertaken to determine the most prominent colours within the local landscape. This has been used to inform the possible colour palette options for the OnSS and could also influence signage and hard landscape materials. Using colours with a strong local context would help integrate the development into the landscape. Colours have been influenced by dominant local features including infrastructure/cloudcover, skylines, agriculture and geomorphology.

3.2.9 Given the rural context of the OnSS site, bright, bold colours are not suited for this development and muted shades would create a 'quieter' appearance and soften the visual impact of the development. Subject to the direction and topography of the viewpoint, lighter shades would typically be used towards the roofline as it would make the top of buildings comparatively less visible against the skyline, whilst dark brown / green tones at the lower section would blend in with the wooded horizon line throughout the seasons.

3.2.10 The colours cool grey, light steel blue, dark olive green and rosy brown were considered to be the most appropriate for the Hornsea Four OnSS. It is considered that the cool grey colour is the most prominent and would:

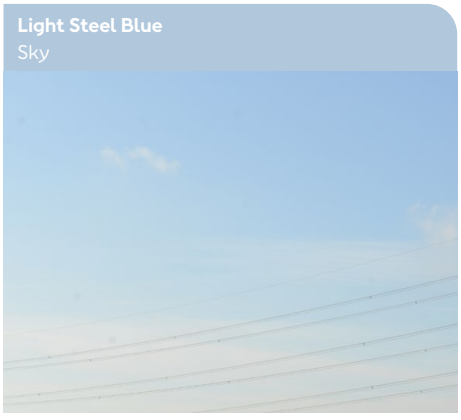
- Compliment existing infrastructure (pylons, wind turbines and existing substation);
- Compliment rather than competes with the surrounding palette of landscape colours; and
- Be appropriate throughout the seasons.

The exact colours used will be reliant on manufacturer limitations and approval from East Riding of Yorkshire Council. As such, the colours to be used for the OnSS and EBI will be similar to those referenced in **Section 3.2.10** and **Section 3.2.11** and outlined in further detail in Section 7.3 of **Volume F2, Chapter 13: Outline Design Plan**.

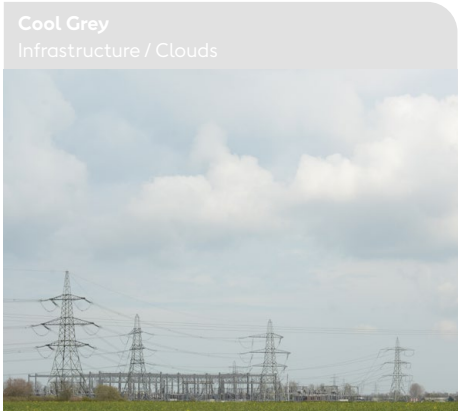
3.2.11

Img 16 - Geomorphology colour mapping *(Source: Orsted)*

Img 17 - Agriculture colour mapping *(Source: Orsted)*



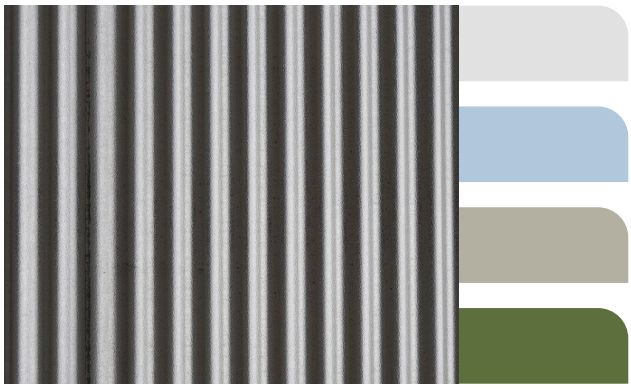
Img 18 - Sky colour mapping *(Source: Orsted)*



Img 19 - Infrastructure and clouds colour mapping *(Source: Orsted)*

3.2 - Built Form, Materials and Colours

Colour Application



Img 15 - Corrugated sheeting *(Source: maxpixel.net)*

3.2.12 The use of corrugated or flat panelling allows a wide variety of colour and composition options, which if used correctly will help to mitigate the visual impact of the OnSS structures. The OnSS and EBI site will be reviewed from the north, east, south and west to determine the most appropriate colour application for each building façade. For example, an area of higher topography would potentially require greener or earthier tones to extend higher on building facades than a viewpoint from a lower topography. This could result in the dark olive green band at the base of buildings extending higher on one building façade (for example the north) than another (for example the south). Different colour application options (such as simple banding and adaptive panelling) will not be mixed across different facades – one option will be used throughout. The feasibility of this exercise is to be determined as part of the final Design Plan; there is potential for all facades to utilise identical colour application.

3.2.13 Three colour layout options have been prepared in **Section 3.2.15**, to show how panelling colour and composition can be used on the OnSS to reflect the landscape setting. The finish of the colour used on building facades will be considered to ensure that the reflectiveness of surfaces is reduced as much as is feasible. The application of the colour palette on the OnSS buildings will take the form of one of the three following finishes:

Option 1 - Basic 3 tone banding across the building façades;

Option 2 - Multi-layer banding that reflects the surrounding landscape using a variations of staggered colour panels; and

Option 3 - Adaptive panelling that is unique across each building façade providing effective visual mitigation since it accurately responds to the unique landscape setting of each building.

3.2.14 The Applicant is committed to using a variation of one of the colour application designs outlined in Figure 7 to Figure 9. The development of the final option selected during detailed design will be agreed through consultation with ERYC.

3.2 - Built Form, Materials and Colours

Coloured Cladding

3.2.15

Fig 7 - Basic 3 Tone Banding

Fig 8 - Multi-Layer Banding

Fig 9 - Adaptive Panelling

3.2 - Built Form, Materials and Colours

Summary

3.2.16 The built form of the OnSS site will produce a buildable and operational scheme that satisfies engineering requirements, reduces visual clutter where feasible and creates a consistent design standard throughout the OnSS and EBI. The simple 'cube' form is a functional form that doesn't jar with the surrounding vernacular, whilst also reflecting existing built form at the adjacent NGET substation at Creyke Beck. The OnSS layout must be in sequential order as do all electrical transmission systems, for this reason, only the standard transmission system layout will be considered, and every effort will be made to use space as efficiently as possible.

It is anticipated that building materials will likely comprise corrugated metal sheeting, which is robust, generally low maintenance and prominent in the rural setting. Other material options may potentially be considered during detail design, subject to satisfying functional and structural requirements.

Given the rural context, bright or bold colours would not be suited for this development, muted shades would soften the visual appearance of the development. These colours complement existing infrastructure and the local landscape palette and would be appropriate throughout the seasons.

Details and options covering the built form, colour and materials used at the OnSS site will be confirmed during the detailed design stage.

Site location

1 Built Form

The built form reflects the local vernacular and meets functional requirements set out by the MDS and DCO parameters

2 Layout

The site layout meets functional requirements, with every effort being taken to ensure it is spatially efficient

3 Materials and Colour

Materials and colour reflect local vernacular and will help mitigate the visual impact of the OnSS

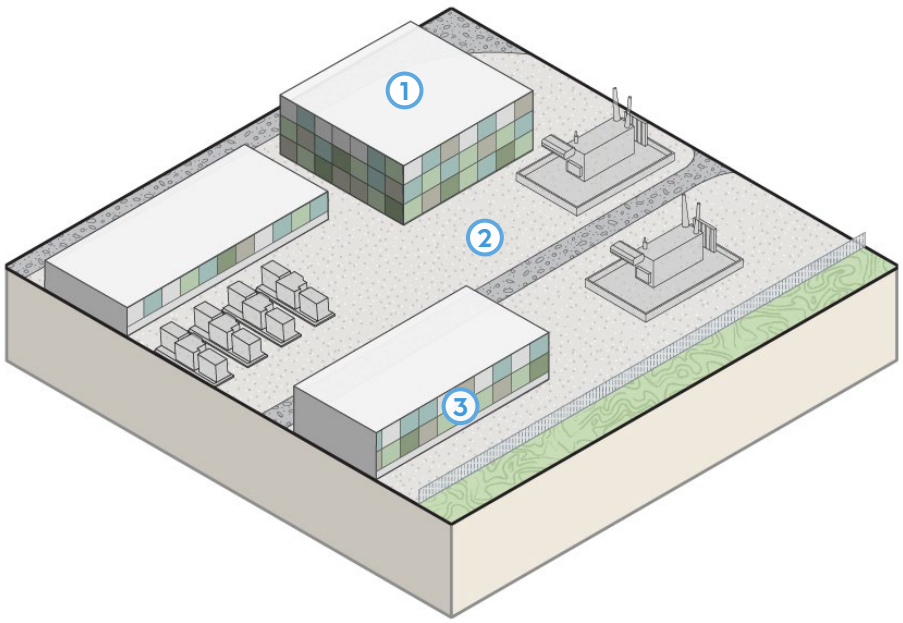


Fig 10 - Built form, materials and colour design section

3.3 - Landscape Treatments

Hard Landscape Treatments

3.3.1 The hard surfacing within the OnSS and EBI plants shall be of a nature that is suitable of the operation and maintenance of the OnSS.

3.3.2 All permanent roads, hard standings and footpaths shall be of impervious construction, laid to falls. All other areas shall generally be capable of carrying maintenance traffic and otherwise be maintenance free. All surfacing will comply with the Specification for Highways works.

3.3.3 OnSS surfacing shall be capable of trafficking by plant having individual wheel loads up to 5 tonnes. The materials to be used will be determined during detailed design.

3.3.4 Objectives and aspiration of the proposed hard landscape materials include:

- Easily maintained;
- Robust and durable;
- Free draining surfaces;
- Sustainable;
- Reflect local setting; and
- Neutral colours that reduce visual impact.

Grey Hard Landscape Treatments

Img 20 - Non-porous and Porous Asphalt *(Source: greenblue.com)*

Img 21 - Reinforced gravel *(Source: geosyn.co.uk)*

Buff Hard Landscape Treatments

Img 22 - Self binding gravel *(Source: LUC)*

Green Hard Landscape Treatments

Img 23 - Chamomile lawn/moss *(Source: LUC)*

3.3 - Landscape Treatments

Soft Landscape Treatments

3.3.5 Soft landscape treatments should be informed by local environmental features including vegetation, boundaries, landform and built form mitigation. Landscape treatments in this section are shown for illustrative purposes and are not informed by any assessment of existing conditions.

3.3.6 Landscape treatments should provide visual mitigation around the periphery of the OnSS site whilst considering the site constraints including any overhead powerlines. A minimum clearance of 7.3m is stated in the National Grids technical guidance for clearance between trees and 400kV overhead powerlines. As a result, planting adjacent to powerlines will be restricted to groundcover and low level plant species. Taller woodland species should be avoided since they pose a major threat to overhead lines. Visual mitigation can be achieved through a combination of small tree species, tall hedgerows, fencing and earthworks. This mitigation would help integrate the OnSS into the surrounding landscape.

3.3.7 Woodland planting to the perimeter of the OnSS site where possible, should involve an organic layout mimicking canopy layers found in the wider countryside. This would help integrate the planting into the wider landscape. The field layer would include native grasslands species and herbs. The shrub layer would introduce native shrub species whilst the upper layer would include native tree species such as beech, alder and oak. The introduction of new planting would provide an overall enhancement to the OnSS site.
The specific interaction between enhancement measures and biodiversity net gain measures (**Volume F2, Chapter 16**) (those that are measurable for net gain) at the OnSS will be defined and established during the detailed design stage. Measures relevant to biodiversity net gain will be included within the final Net Gain Strategy and used for net gain calculations.

Fig 11 - Typical boundary soft landscape treatment

Img 24 - Typical mixed vegetation *(Source: LUC)*

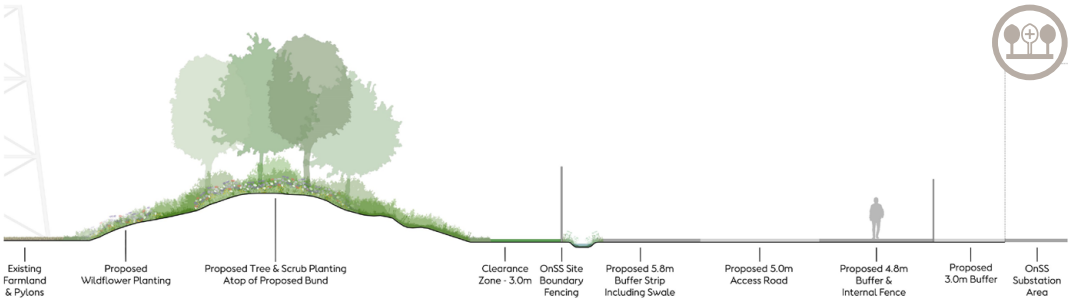


Fig 12 - Typicalbund soft landscape treatment adjacent to overhead power lines

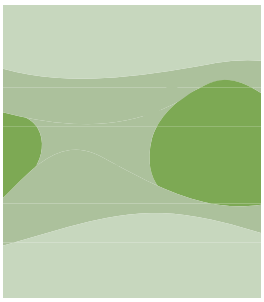


Fig 13 - Organic layout

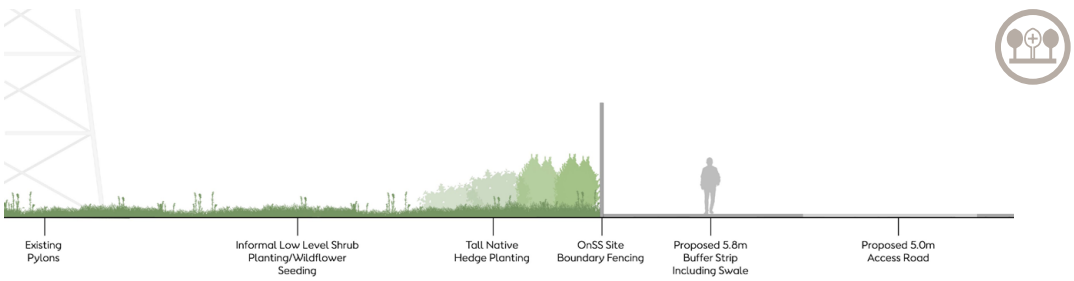


Fig 14 - Typical boundary soft landscape treatment adjacent to overhead power lines

3.3 - Landscape Treatments

Summary

3.3.8 The selection of hard landscape materials for the OnSS site shall be of a nature that is suitable of the operation and maintenance of the OnSS. Materials functional and structural capabilities, as well as environmental performance will also be taken into consideration.

Soft landscape treatments should provide visual mitigation and enhancements for the OnSS site, be informed by local environmental features and utilise locally native species where possible. Soft landscape treatments will also need to provide environmental performance measures such as sustainable drainage.

Site constraints will need to be considered, such as overhead powerlines where planting will be restricted to groundcover and low level planting. Assessment of existing conditions will be undertaken to inform specific planting details.

Details and options covering the landscape treatments used at the OnSS site will be confirmed during the detailed design stage.

Site location

1 Hard Landscape

Selected for functional, structural and environmental capabilities

2 Soft Landscape

Provide visual mitigation, increased biodiversity and environmental enhancements utilising locally native species where feasible

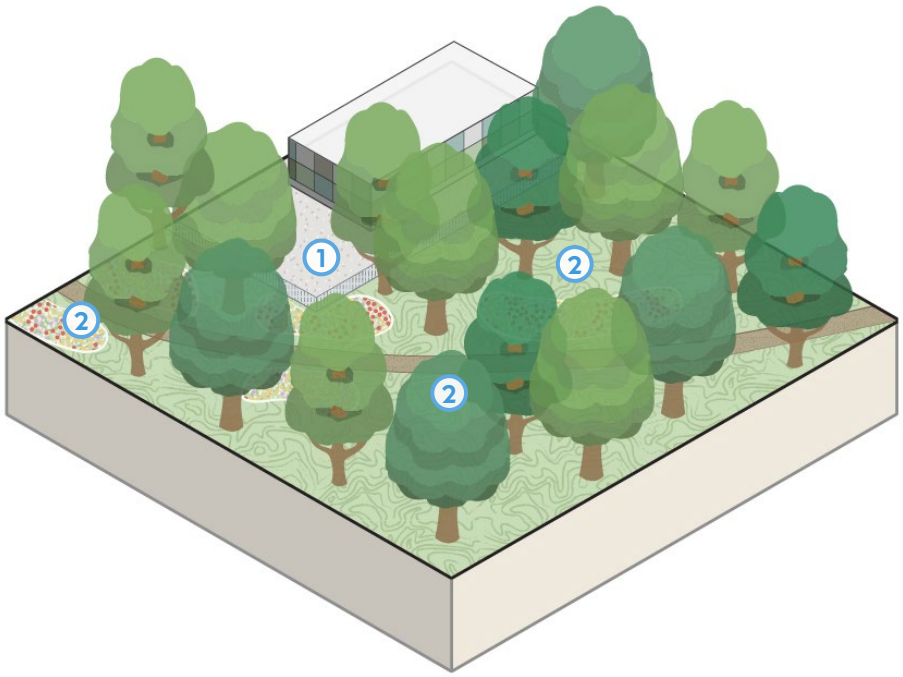


Fig 15 - Landscape treatment design section

3.4 - Boundary Treatments, Fencing and Hedgerows

Security Fencing Options

3.4.1 The perimeter of the OnSS site needs to be robust, fit for purpose and provide adequate site security. The security fence around the perimeter of the OnSS shall comply with National Grid Technical Standard 2.22. The external OnSS perimeter security fencing and gates shall, as a minimum, be a Category 2 'Standard' fence system. This is defined as a 2.4m high fence that can be either physical mesh or palisade barrier with electric pulse fence.

3.4.2 Whilst palisade fence has traditionally been the preferred choice for OnSS fence construction further investigation will be carried out during detail design in order to consider the use of steel mesh panel fencing.

Img 25 - Steel mesh panel fencing *(Source: Charles Elliot)*

Img 26 - Galvanised steel security palisade fencing *(Source: Albert Bridge)*

Screen Options

3.4.3 The use of screens will be explored during detailed design for areas on the perimeter of the OnSS and EBI site where footfall of pedestrians is anticipated, such as the diverted PRoW. The benefits of screens to mitigate views of the OnSS and EBI will be considered during detailed design. This will be weighed up against the use of natural screening such as hedgerows, which will be prioritised.

3.4.4 If used, an industrial, utilitarian aesthetic where possible, should be avoided as this does not reflect the rural setting of the OnSS and EBI site. Screens could instead seek to use materials that reflect the local landscape such as timber. Colour could be applied to reduce the visual impact particularly along vegetated boundaries. Any screens would need to be located outside of the security fencing.

Img 27 - Painted horizontal timber slat screen *(Source: rtlnieuws.nl)*

Img 28 - Timber acoustic fencing *(Source: thewildegroup.co.uk)*

3.4 - Boundary Treatments, Fencing and Hedgerows

Planted Boundary Options

3.4.5 Planted boundaries where possible, should avoid the use of single, non-native species that present a uniform aesthetic. Planted boundaries could instead take reference from the local native hedgerows that provide varying form, structure and colour. This would aid visual mitigation of the OnSS and also mitigate ecological impacts. Whilst living walls can provide effective screening and a unique aesthetic that could be appropriate in certain areas these are however costly and are unlikely to sit well within the rural setting.

Img 29 - Native mixed hedgerow
(Source: LUC)

Img 30 - Uniform single species hedgerow. Non-native species
(Source: LUC)

3.4.6 Boundary hedgerows consisting of mixed native species such as :-

Acer campestre	Alnus glutinosa
Corylus avellana	Crataegus monogyna

Table 2 - Native hedgerow species

Placement and selection of each species would depend on existing site specific species, conditions and also livestock around the hedgerow. For instance, horses can have a poisonous reaction to Ilex aquifolium in some cases. The introduction of hedgerow would provide enhancements to the OnSS site through increased habitat creation and reduce use of manmade features in a rural setting.

3.4 - Boundary Treatments, Fencing and Hedgerows

Summary

3.4.7 The perimeter of the OnSS site needs to be robust, fit for purpose and provide adequate site security.

The use of screens could be explored during detailed design for areas on the perimeter of the OnSS and EBI site where footfall of pedestrians are anticipated such as the diverted PRoW. This will be weighed up against the use of natural screening such as hedgerows, which will be prioritised.

Planted boundaries should take reference from the local native hedgerow species that provide varying form, structure and colour. This aids visual integration of the OnSS, although placement and selection of each species will depend on existing species, conditions, and presence of livestock in adjacent fields.

Details and options covering the landscape treatments used at the OnSS site will be confirmed during the detailed design stage.

Site location

1 Fences and Screens

Provide appropriate aesthetic and adequate security within technical standards and requirements

2 Planted Boundaries

Integrate OnSS into landscape providing visual mitigation, whilst enhancing the sites appearance and biodiversity

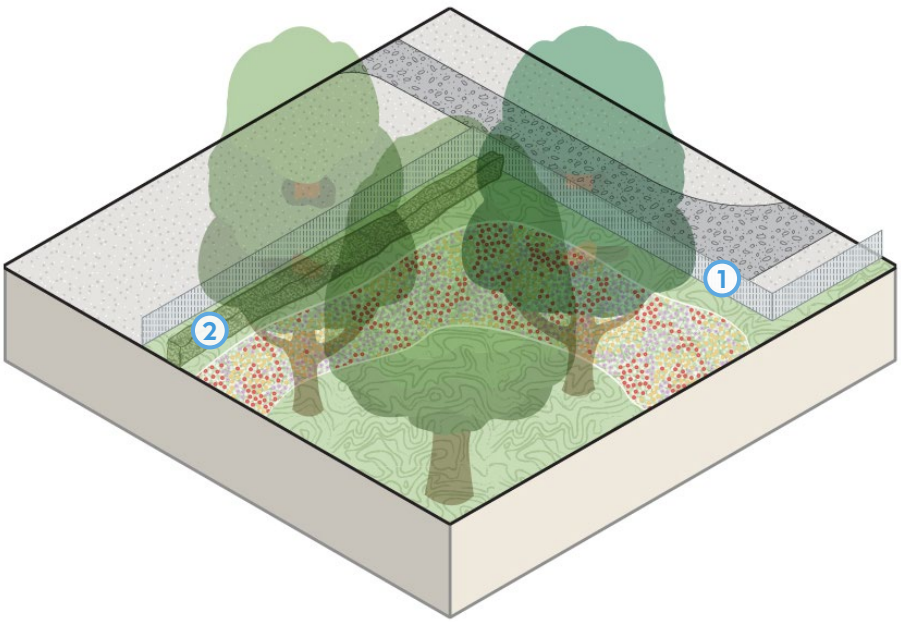


Fig 16 - Boundary treatment, fencing and hedgerow design section

3.5 - Earthworks

Earthwork Bunds

3.5.1 Earthwork bunds could provide visual mitigation primarily for the properties in close proximity to the OnSS and pedestrians using the footpath networks. The existing landform also consists of a flat, low lying plain with little topographical variation.

3.5.2 Any proposed earthwork bunds should therefore take an organic, sinuous form with soft edges that create a subtle feature within the landscape, as opposed to a hard-edged engineered form. The topography and newly introduced planting would provide enhancement to the existing landscape and will be confirmed during detailed design.

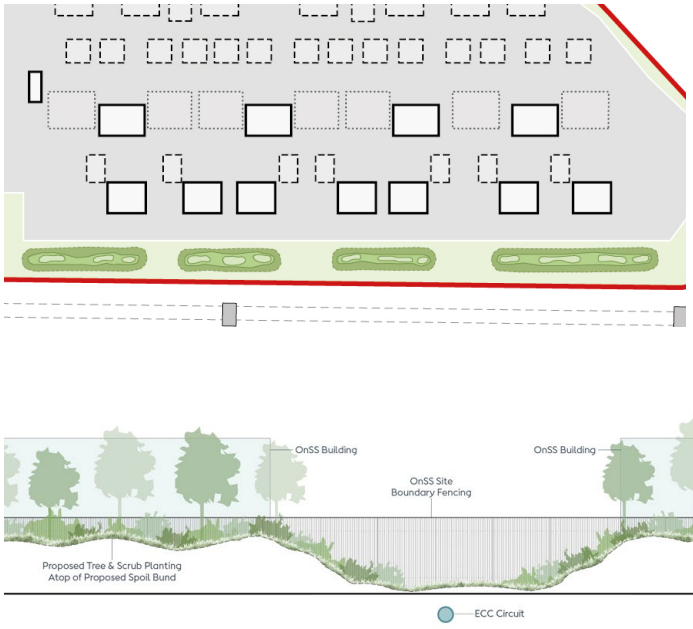
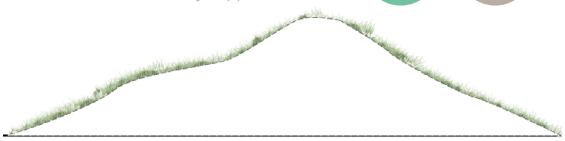


Fig 17 - Organic soft bund

Organic Soft Bund

Note : The location of the bund shown is not based on assessment work, and is only indicative of various design approaches.



Img 31 - Organic bund *(Source: Paul Farmer)*

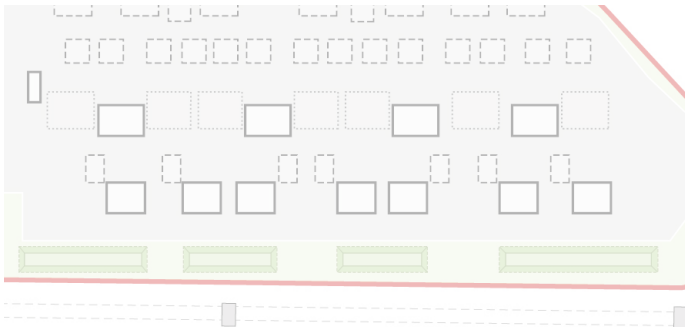


Fig 18 - Angular engineered bund

Angular Engineered Bund

3.5 - Earthworks

Earthwork Bunds

3.5.3 An earthwork bund is preferred to a timber screen since it can be easily integrated into the existing landscape. The OnSS is located within an area of generally level topography ensuring an earthwork bund would provide significant visual mitigation of the site.

3.5.4 The form, scale and use of planting will be key to integrating proposed earthwork bunds into the landscape. An earthwork bund would also serve as a platform for wildflower, grasses and other vegetation to enhance the sites appearance and increase biodiversity.

3.5.5 Another advantage of introducing an earthwork bund is to utilise excess spoil from the site's construction phase. Spoil will be created as part of the cut and fill exercise to level the site. Normally excess spoil from levelling and excavation is transported off site, retaining and utilising as much spoil as possible on site mitigates additional costs and potential environmental impacts whilst providing a new resource on site.

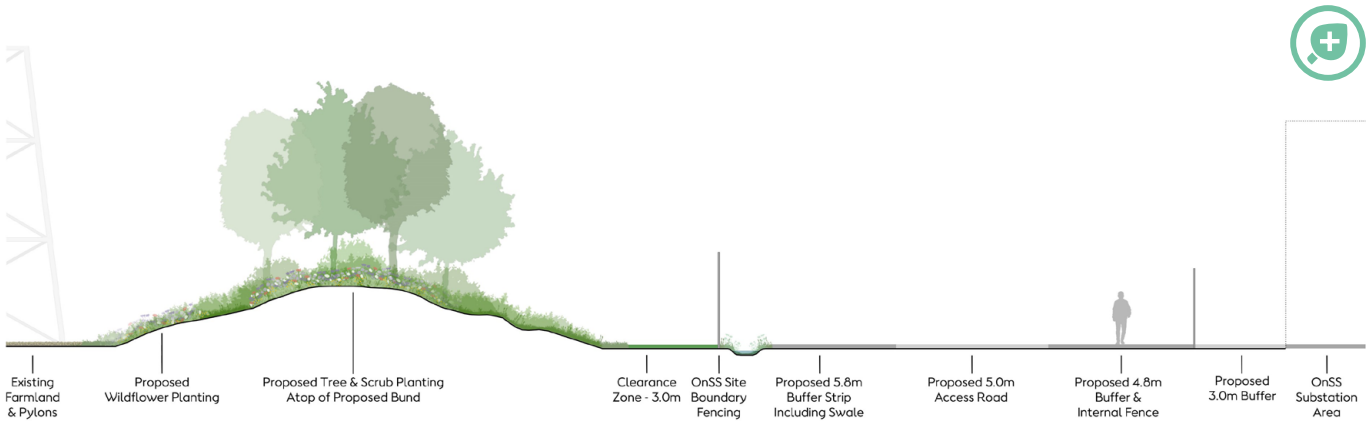


Fig 19 - Informal organic bund utilising existing spoil, with low level tree, shrub and wildflower planting enhancements

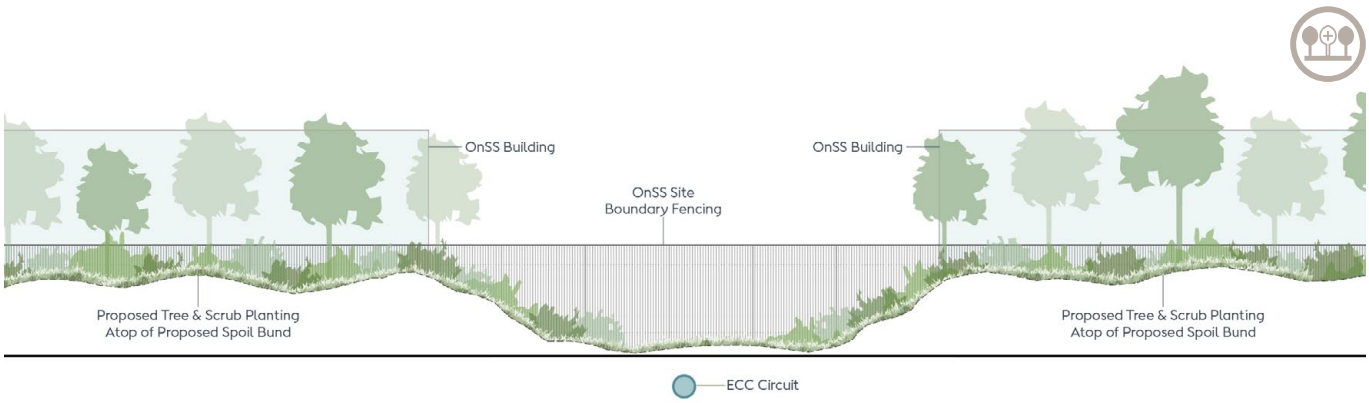


Fig 20 - Informal organic bund with opening over ECC cable route ensuring no interference

3.5 - Earthworks

Summary

3.5.6 Earthwork bunds would provide visual mitigation for the properties in close proximity to the OnSS and people using the local PRoW network. The existing landform consists of flat, low lying plains with little topographical variation. Any proposed earthwork bunds should therefore take an organic, sinuous form with soft edges that create a subtle feature within the landscape, as opposed to a hard-edged engineered form. The bunds can be created utilising spoil from the site clearance works, which provides a new resource from otherwise 'waste' material.

Earthwork bunds would also create a platform for wildflower, grasses and other vegetation to enhance the sites appearance and increase biodiversity. The form, scale and use of planting will be key to integrating proposed earthwork bunds into the landscape.

Details and options covering the earthworks used at the OnSS site will be confirmed during the detailed design stage.

Site location

1 Earthwork Bunds

Provide visual mitigation utilising an organic form and create a platform for wildflower, grasses and other vegetation

2 Bund Planting

Provide visual mitigation, enhance the sites appearance, increased biodiversity and integrate bund into landscape

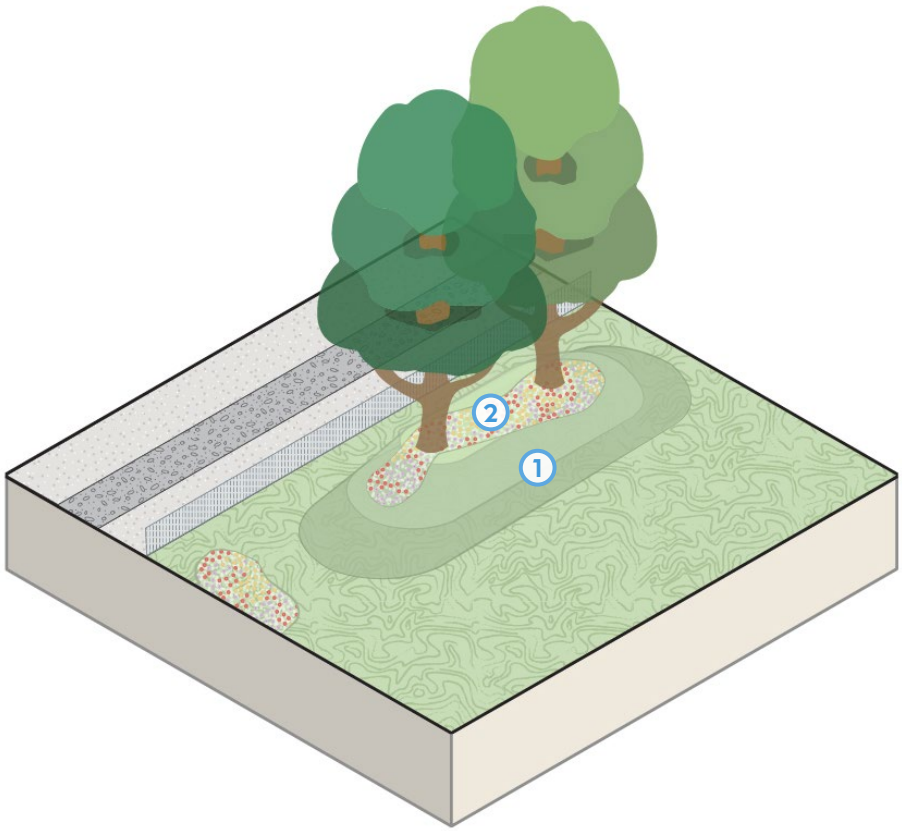


Fig 21 - Earthwork design section

3.6 - SuDS and Drainage

Drainage Systems

3.6.1 This section identifies the opportunities to integrate natural drainage systems within the OnSS site (outside of security fencing), however further groundworks investigation is required to define the feasibility of each option. The drainage design outside of the OnSS operational site is anticipated to include SuDS such as filter drains soaking into the ground, green swales and green attenuation features. Drainage design within the operational OnSS site will consist of traditional drainage methods such as underground drainage pipes and gullies, hardstanding attenuation features, hardstanding swales and controlled outflow via pumps. These varied approaches aim to control drainage, protect adjacent agricultural land and habitats from flooding and protect the OnSS site from flooding.

3.6.2 Surface water will be discharged from the site at a controlled rate which will be determined during the detailed design stage. Appropriate consideration will be given to maintaining the existing floodplain capacity and / or flow conveyance during extreme rainfall events. These principles are provided in the Outline Onshore Infrastructure Drainage Strategy (**Volume F2, Chapter 6**) with which the Onshore Infrastructure Drainage Strategy will be developed. This drainage method provides environmental and biodiversity benefits, whilst minimising future flooding risks.

Attenuation

3.6.3 This integrated SuDS could hold water, allowing it to slowly drain back into the ground and surrounding water courses. Water run-off from the OnSS site could be treated in the attenuation features using vegetation. Native aquatic planting and a varied wetland edge for bankside marginal planting, could develop a mosaic of habitats that will enhance structural diversity.

3.6.4 Attenuation features will be required to restrict the surface water run-off to the existing 1 in 1-year rainfall event and the 1 in 100 year rainfall event for the peak greenfield run-off rate, for the same event. Sufficient storage will be provided to attenuate surface water and discharge at a controlled rate during surface water events. The full specification for the volume and location of the attenuation storage will be set out within the detailed **Onshore Infrastructure Drainage Strategy**, which will be based on the outline Drainage Strategy and produced during detailed design

Img 32 - Attenuation feature *(Source: Aaron Volkening)*

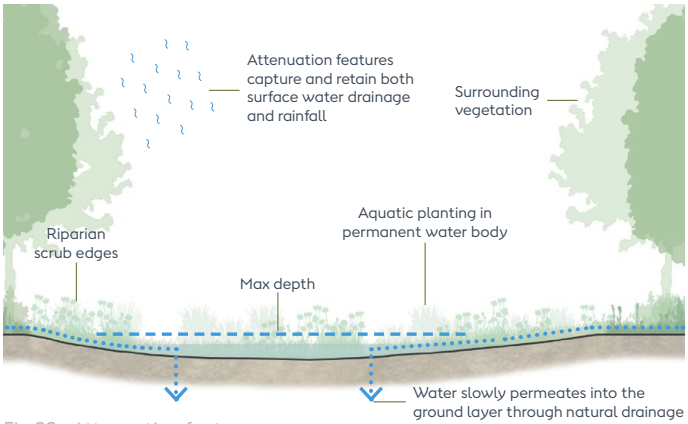


Fig 22 - Attenuation feature

3.6.5 Varying water depths could provide over-wintering refuges for wildlife. Ecological value can be enhanced further through the creation of small pools around the margins of any attenuation basin, to allow a wider range of animals and plants to use the site. An attenuation feature will help prevent flooding on-site and in the surrounding landscape, treat surface water run-off and create a landscape feature that enhances biodiversity, natural habitats and provides visual mitigation of the OnSS.

3.6 - SuDS and Drainage

Linear Dry Swales

3.6.6 Linear dry swales could be integrated into linear spaces outside the operational OnSS site and utilise vegetation to attenuate surface water run-off. This would be a beneficial drainage solution along the OnSS sites southern boundary as excess water run-off could be channelled into attenuation features. The use of vegetation will enhance the sites appearance, whilst the swales further mitigate the risk of flooding on-site and in the surrounding landscape and ensure run-off is treated before entering local watercourses.

Img 33 - Linear dry swales
(Source: wiki.sustainabletechnologies.ca)

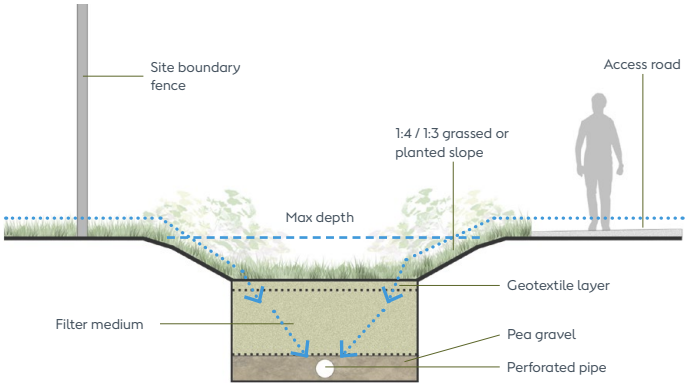
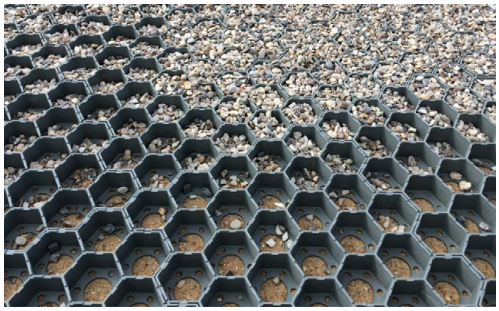


Fig 23 - Linear dry swale

Filter Drains / Permeable Paving

3.6.7 Filter drains placed across the site would allow water run-off to soak into the surrounding ground through drainage aggregate. The drainage aggregate could mitigate pollutants entering the groundwater. The construction and form of filter drains will be determined during the detailed design stage.

3.6.8 Permeable paving could be incorporated within access routes, hardstanding and parking areas with light traffic levels (outside of security fencing). This will increase permeation of water into ground, limiting water run-off from hardstanding and mitigating the need for traditional hardstanding drainage measures. Further investigation will be carried out during detailed design to consider the potential use of permeable paving in adherence with relevant standards.



Img 34 - Porous pavements *(Source: geosyn.co.uk)*

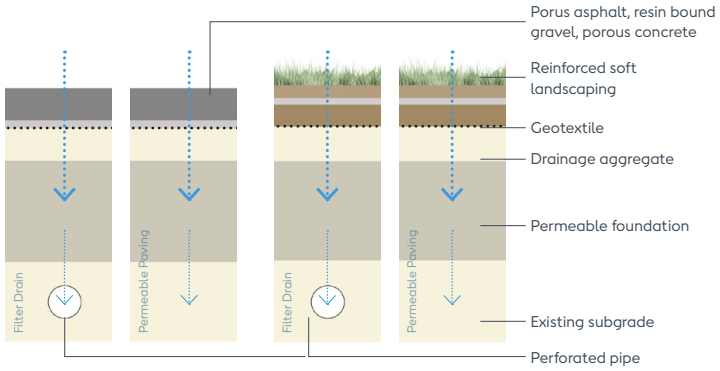


Fig 24 - Filter drain and permeable paving example

3.6 - SuDS and Drainage

Summary

3.6.9 The drainage design outside of the OnSS security fencing could include SuDS such as filter drains, green swales and green attenuation features. Drainage design within the operational OnSS site will consist of traditional drainage methods such as underground drainage pipes and gullies, hardstanding attenuation features, hardstanding swales and controlled outflow via pumps. These varied approaches aim to control drainage, protect adjacent agricultural land and habitats from flooding and protect the OnSS site from flooding.

Filter drains placed across the site would allow water run-off to soak into the surrounding soil through drainage aggregate. Permeable paving could be incorporated within access routes, hardstanding and parking areas with light traffic levels to increase permeation of water into ground, limiting water run-off from hardstanding.

Swales could be integrated into linear spaces, utilising vegetation to treat surface water run-off from across the OnSS site and perimeter access roads. Attenuation features provides an enhancement to the OnSS site integrates sustainable drainage into the landscape. This would help prevent flooding on-site and in the surrounding landscape, clean surface water run-off using vegetation and create a landscape feature that increases biodiversity, natural habitats and provides visual mitigation of the OnSS.

Details and options covering the SuDS and Drainage used at the OnSS site will be confirmed during the detailed design stage.

Site location

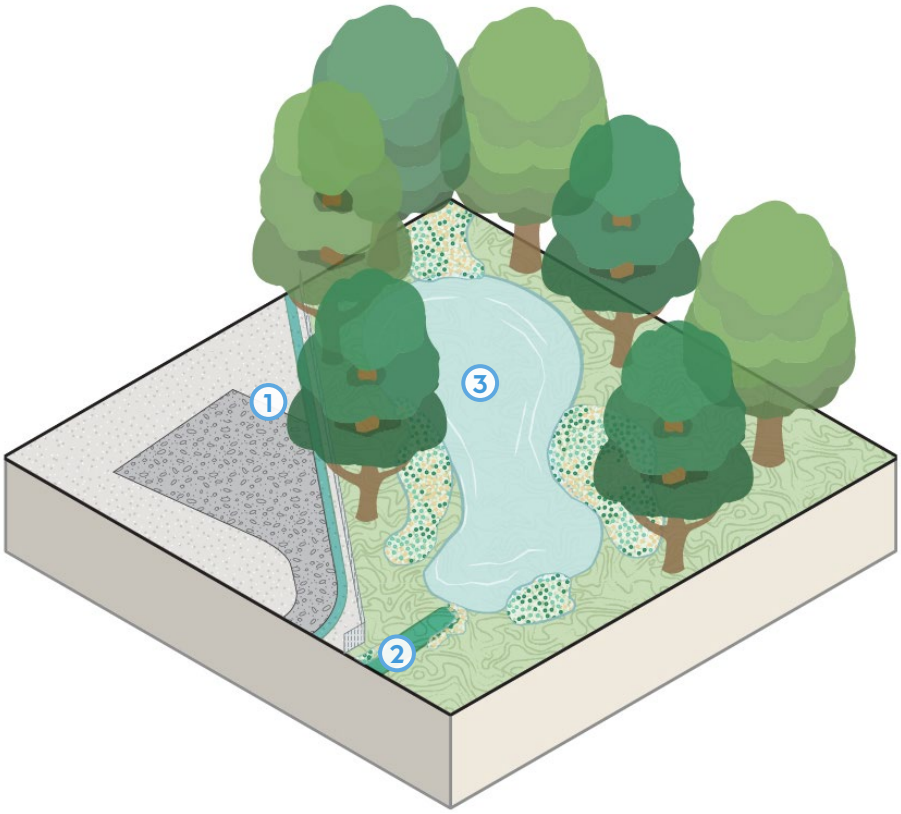


Fig 25 - SuDS and drainage design section

1 Filter Drains/Permeable Hardstanding

Filter drains and permeable hardstanding will soak surface water run-off into surrounding soil and limit the amount of standing water or potential flooding

2 Swales

Linear swales treat surface water run-off using vegetation such as reed beds

3 Attenuation Pond

Attenuation ponds will prevent flooding from excess surface water run-off. Vegetation increases biodiversity and visual mitigation

3.7 - Access, Circulation and Wayfinding

Access and Circulation

3.7.1 Any PRoW that currently runs through the OnSS site need to be diverted to ensure access to the countryside is maintained. PRoW would be diverted through the outside section of the OnSS operational site, with details of any proposed diversion to be arranged and agreed through consultation. The new route would need to be designed as an attractive access corridor, utilising existing hedgerow boundaries where possible. The PRoW and Planning Guidance, states '*for routes that run through open space / green corridor the surfaced path should be 2m wide, with a minimum of 2m on either side of green space*'.

3.7.2 Within the Hornsea Four Order Limits there is opportunity to implement a hedgerow corridor as part of a PRoW diversion. This could provide an ecological corridor and an attractive route to enhance the sites appearance, whilst also providing additional visual screening once the hedgerow has reached maturity. If a PRoW is adjacent to an existing hedgerow this could be utilised as part of the PRoW, as it would provide immediate visual screening and a buffer between walkers and the OnSS.

PRoW Treatments

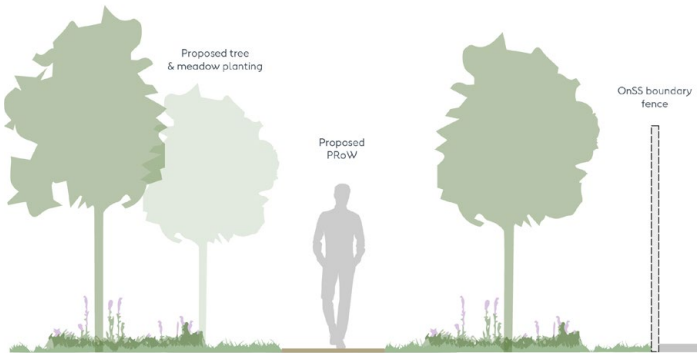


Fig 26 - PRoW through OnSS site

Note : Exact details of any PRoW diversions will be agreed through consultation with key stakeholders

Fig 27 - PRoW exiting/entering the site

Fig 28 - PRoW through surrounding agricultural land

3.7 - Access, Circulation and Wayfinding

PRoW Diversion

3.7.3 Aims of the diverted public right of way:

- Utilised existing habitat networks (hedgerows);
- Ensure a direct route is still achieved;
- Create a green corridor;
- Maintain views out towards the open countryside;
- Provide signage and information boards explaining the Hornsea Four project; and
- Screen views into the OnSS.

3.7.4 The permanent diversion of SKID16 PRoW will be incorporated into the additional landscaping provided to the west of the OnSS. The PRoW would follow the existing route when heading north, through the section of privately owned land. The route will then continue northeast into the OnSS site thorough the area of additional landscaping to the west of the OnSS. This landscaped area will be ecologically diverse and include wayfinding and interpretation about the Hornsea Four project. The route crosses the site access road and then heads west following the proposed site access road, until re-joining the existing PRoW network giving access to the wider landscape. Whilst the principles of the diversion is consented under the DCO, the exact route within the landscape planting will be agreed during the detailed design stages with East Riding of Yorkshire Council.

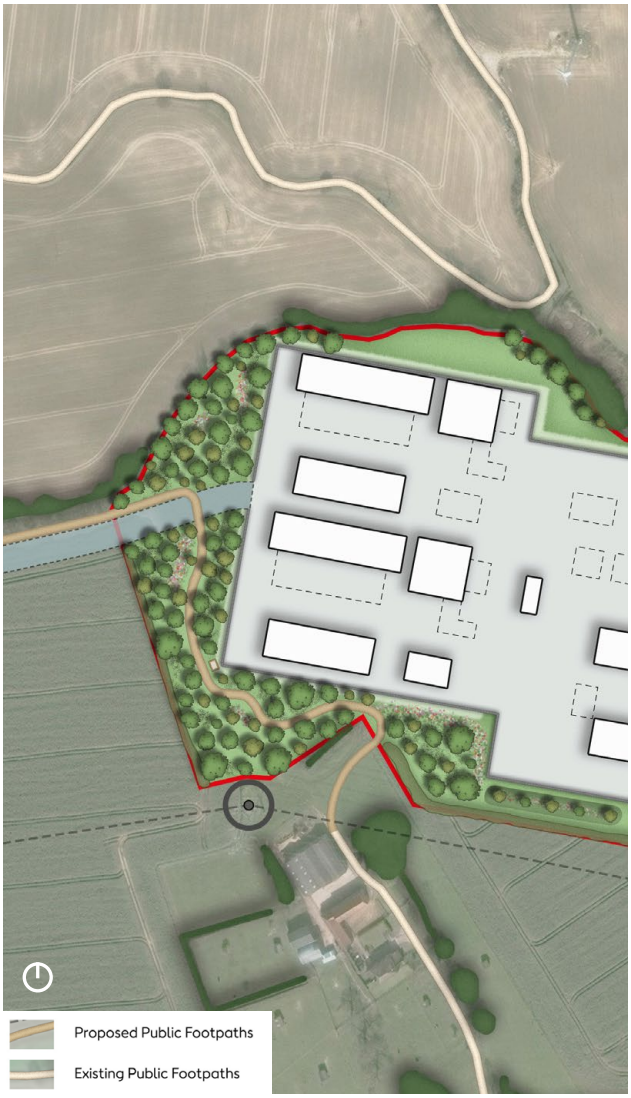


Fig 29 - Potential PRoW through on-site vegetated corridor.
Exact route to be agreed during detailed design with East Riding of Yorkshire Council.

Img 35 - New native hedgerow planting along PRoW creating wildlife corridors *(Source: Orsted)*

Img 36 - PRoW access integrated with existing hedgerow *(Source: southeastfarmer.net)*

3.7 - Access, Circulation and Wayfinding

Signage and Wayfinding

3.7.5 The key aims of the signage and wayfinding outside of the OnSS security fencing are to:

- Consider location, orientation and height to avoid visual clutter;
- Provide a consistent brand and identification for the site;
- Be clear, concise and fit for purpose (long lasting / legible);
- Identify key buildings and be consistent with the overall materiality of the OnSS;
- Define key access points around the site;
- Avoid the use of multiple signs and consolidate information where possible; and
- Provide information and interpretation about the Hornsea Four Project for pedestrians using the PRoW.

3.7.6 Signage and wayfinding inside the OnSS operational site will typically comprise internal safety signage. The design characteristics of this signage is to be determined based on technical requirements. Signage and wayfinding around the outside of the OnSS operational site (such as PRoW signage, information boards) will use colour and materials informed by the local landscape where feasible and provide a consistent design theme throughout all signage where feasible.

Img 37 - Low key signage in-keeping with agricultural setting along PRoWs
(Source: Albert Bridge)

Img 38 - Timber monolith signage showing information about the Hornsea Four Project
(Source: Sally Painter)

Img 39 - Signage integrated into the floorscape to reduce visual clutter
(Source: pnlphotographies.com)

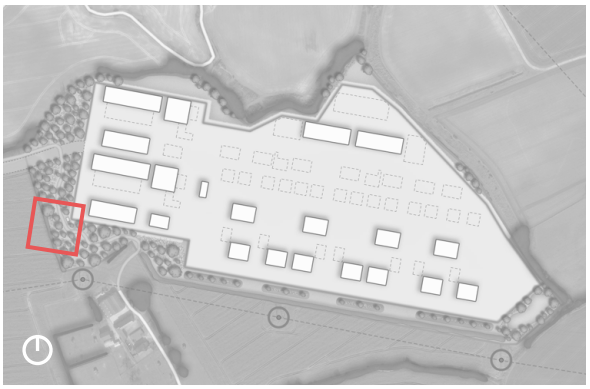
3.7 - Access, Circulation and Wayfinding

Summary

3.7.7 The permanent diversion of SKID16 PRoW will be incorporated into the additional landscaping provided to the west of the OnSS. Exact PRoW route diversions will be agreed during the detailed design stages of the project with East Riding of Yorkshire Council ensuring access to the countryside is maintained.

The proposals seek to divert any PRoW from the OnSS and any nearby properties creating an attractive access corridor with conditions, utilising existing hedgerow boundaries where possible. Signage and wayfinding along the route would provide a consistent brand and identity for the site whilst defining key routes, points of interest and information and interpretation about Hornsea Four.

Details and options covering the Access, Circulation and Wayfinding used at the OnSS site will be confirmed during the detailed design stage.



Site location

1 PRoW

The proposed PRoW incorporated into additional landscaping and connected to existing routes

2 PRoW Treatments

New or existing tree, hedgerow and shrub planting will provide an attractive and biodiverse PRoW

3 Wayfinding and Interpretation

Will involve consistent branding that defines use of key routes, points of interest and key facts about Hornsea Four

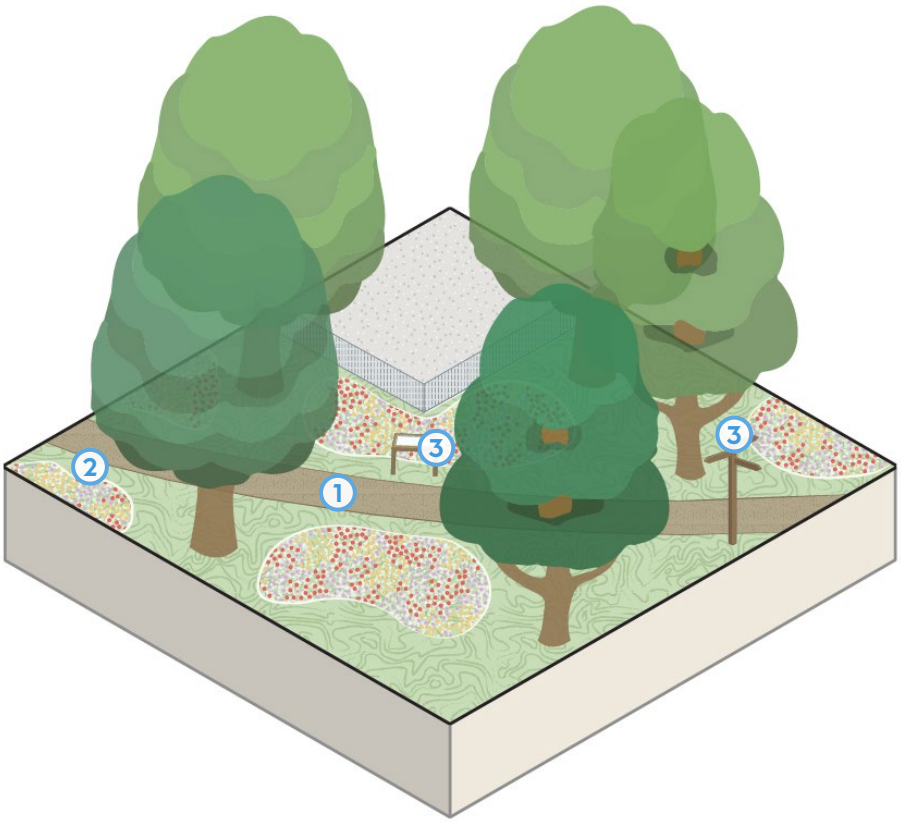


Fig 30 - Access, circulation and wayfinding design section

3.8 - Lighting

Lighting Approach

3.8.1 Lighting at the OnSS site should:

- Only operate when required and will be directed inwards in order to provide a minimum 10m 'dark corridor' within existing vegetation for wildlife, in line with the latest industry guidance;
- Maintain unlit areas where there is existing vegetation for ecological reasons;
- Fulfil the operational requirements of minimal light levels that permits and guidelines allow at nightime;
- Light only essential areas such as key routes and building entrances;
- Produce minimal levels of overspill into the surrounding countryside;
- Incorporate 'dark periods', through the use of either motion sensitive or time limited lighting;
- Ensure that permanent lighting is reserved for essential areas only;
- Avoid the use of reflective surfaces under lighting;
- Incorporate the use of narrow spectrum bulbs, avoiding white and blue wavelengths of the light spectrum;
- Avoid the use of cool light and instead use warm white LED to minimise visual impacts;
- Provide a safe environment for users;
- Be integrated with the existing infrastructure and avoid the use of additional columns and visual clutter; and
- Light wayfinding and signage to aid orientation at night.

3.8.2 In order to provide consideration for bats currently utilising the vegetation to the north of the OnSS and temporary construction compound, up to a 10m wide 'dark corridor' buffer will be implemented within these areas, as well as to the east of the OnSS. Lighting will be directed away from this dark corridor and in line with **F2.3: Outline Ecological Management Plan**. An indicative representation of the dark corridor buffer is shown below.

Fig 31 - Indicative plan showing dark corridor around site for wildlife movement with proposed bat roosts and existing veteran trees

3.8 - Lighting

Summary

3.8.3 Lighting on the OnSS site will only operate when required and will be primarily directed inwards. There would be a need to maintain dark corridors along the northern boundary for ecological and habitat reasons.

Light will be provided to only essential areas of the site such as key routes and building entrances. This would produce minimal levels of overspill into the surrounding countryside. Lighting features should be integrated as part of the existing infrastructure and avoid the use of additional lighting columns that visual clutter.

Details and options covering the lighting used at the OnSS site will be confirmed during the detailed design stage.

Site location

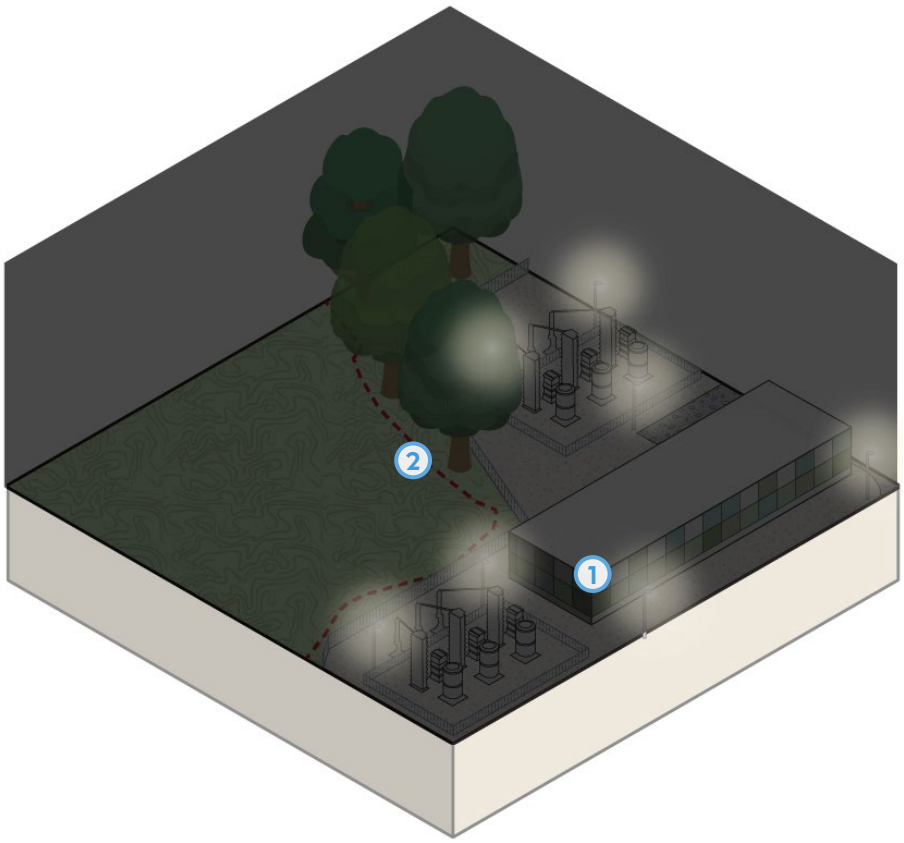


Fig 32 - Lighting design section

1 Key Lighting

Lighting will be restricted only to essential areas limiting overspill and will only be only activated when needed

2 Dark Corridor

Lighting will be prevented from spilling over into designated dark corridors to limit wildlife disruption

3.9 - Indicative Landscape Mitigation Plan

Indicative Masterplan

3.9.1 The indicative masterplan represents the culmination of design proposals for the OnSS outlined throughout the report. It ensures that visual and environmental mitigation of the OnSS, enhancements to ecological assets sites appearance and provides biodiversity net gain. Exact details of the landscape masterplan proposals will be agreed during the detailed design stages of the project with East Riding of Yorkshire Council.

Fig 33 - Indicative landscape masterplan

- Proposed Trees
- Proposed Scrub
- Proposed Riparian Scrub
- Proposed Attenuation Feature
- Proposed Wildflower Planting
- Proposed Landscape Bund
- Proposed Hedgerow
- Existing Woodland & Hedgerow
- Indicative Building Footprint
- Existing Pylons and OHL
- Proposed Public Footpaths
- Existing Public Footpaths
- Potential Vehicular Entrance Into Site
- Proposed Barrier Fence

3.10 - OnSS Landscape Mitigation

3.10.1 Design Vision

The combination of Biodiversity Net Gain, Enhancement Measures, Mitigation Measures, Detailed Design and the MDS/ DCO Parameters all create the Design Vision for the Hornsea Four OnSS site.

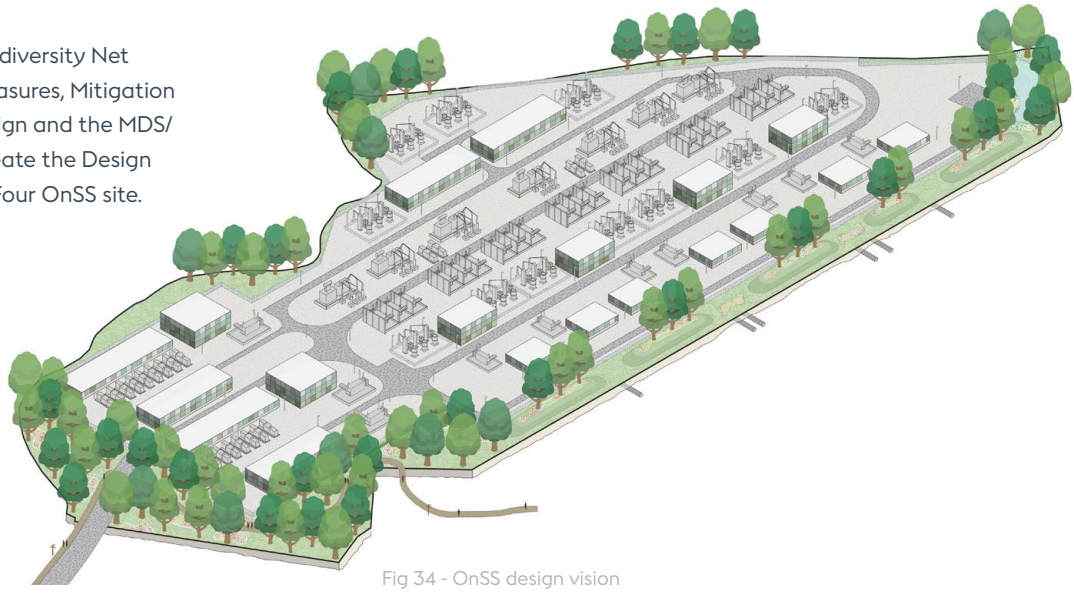


Fig 34 - OnSS design vision

3.10.2 Biodiversity Net Gain

Biodiversity Net Gain would be targeted at the OnSS site through the introduction of new locally native planting where relevant and the expansion of potential habitat sites.

Fig 35 - Biodiversity net gain

3.10.3 Enhancement Measures

Enhancement Measures include the introduction, retention and enhancement of landscape planting within and around the OnSS site. It also includes the creation of an attenuation feature, a PRoW route through the site subject to landowner permission.

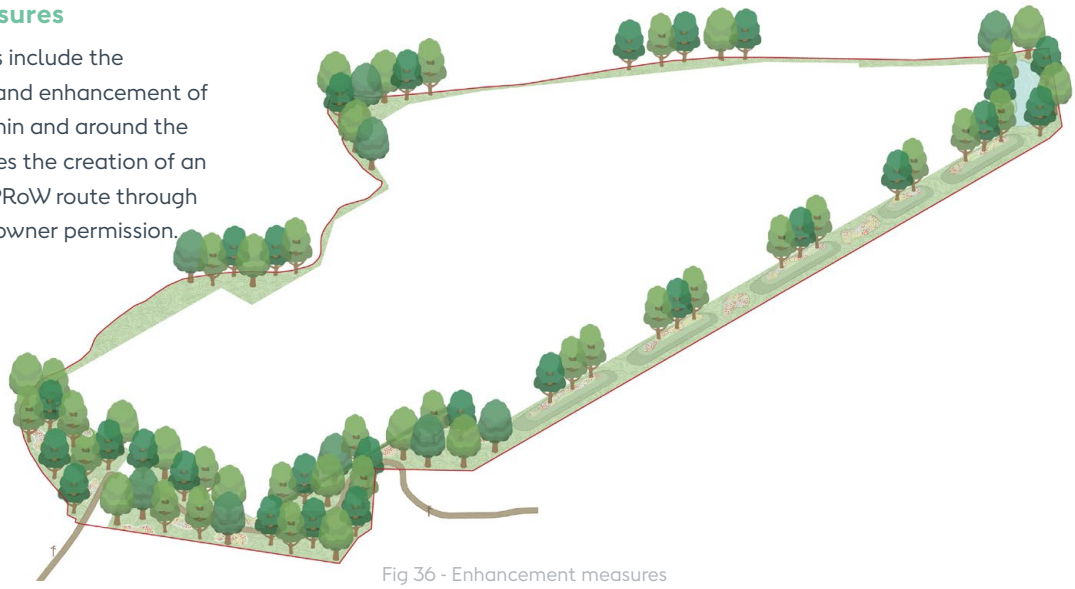


Fig 36 - Enhancement measures

3.10 - OnSS Landscape Mitigation

3.10.4 Mitigation Measures

Mitigation Measures also include the introduction and retention of native planting and the creation of dark corridors to provide habitat networks for species such as bats. Bunds along the southern boundary would also provide visual mitigation of the OnSS.

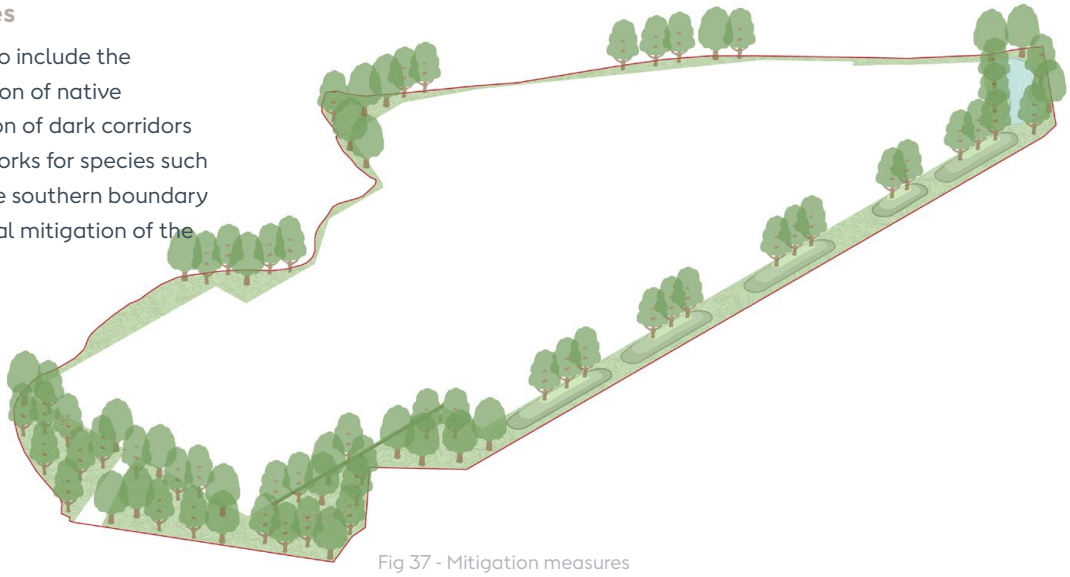


Fig 37 - Mitigation measures

3.10.5 Detailed Design

Detailed Design includes but is not limited to the site layout, scale, materials, colour, surfacing and access into and around the site for workers. Detailed design aspects will determine the final parameter of many of the previous proposals.

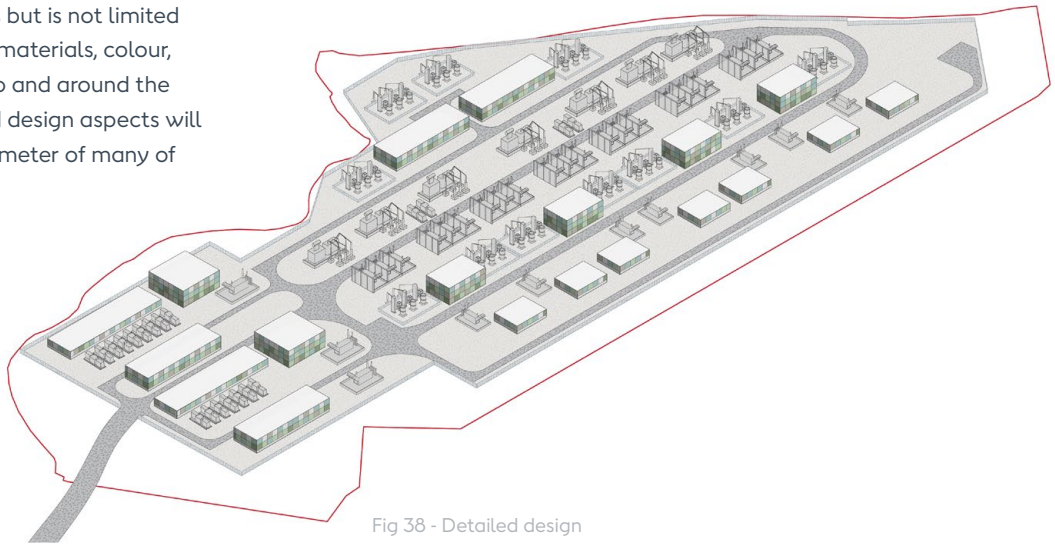


Fig 38 - Detailed design

3.10.6 MDS and DCO Parameters

DCO and MDS parameters define the buildings and electrical infrastructure that create the site, as well as where the onshore ECC enters the site.

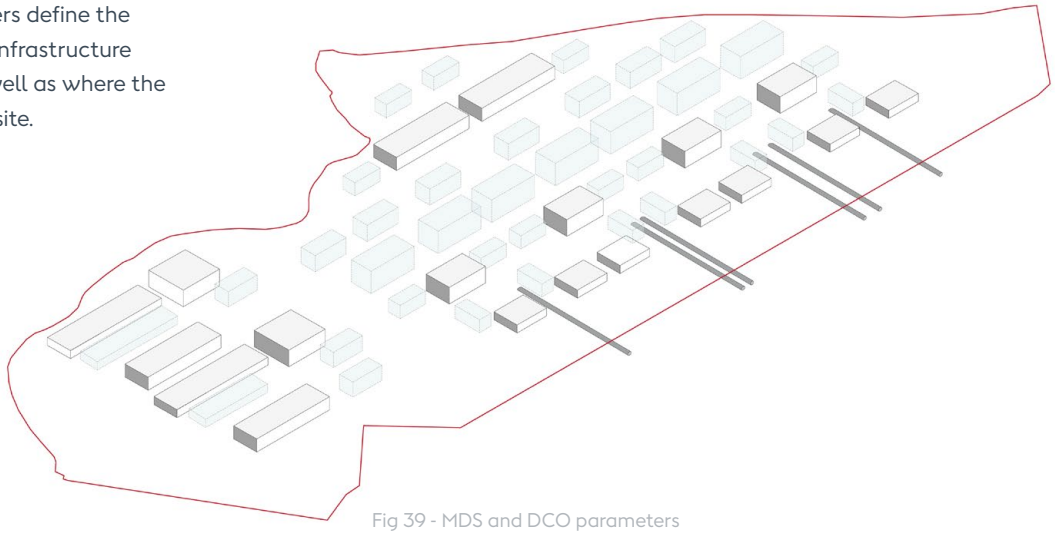


Fig 39 - MDS and DCO parameters

Section 4

Landfall Design Code Principles

Hornsea 4
Ørsted

4.1 - Landfall

Introduction

4.1.1 The landfall area is located within a coastal landscape to the south of the seaside town of Bridlington. The characteristics of the landscape character type, Coastal Farmland, in which the site is located includes undulating landscape, limited tree cover, fragments of historic field pattern, boulder clay cliffs and tourism development along the coast. The proposals where relevant therefore seek to complement and enhance the existing landscape character and mitigate any impact of the landfall development.
There are opportunities to enhance the tourism offer in this location by enhancing the setting of the war defences which are a prominent feature along this part of the coastline.

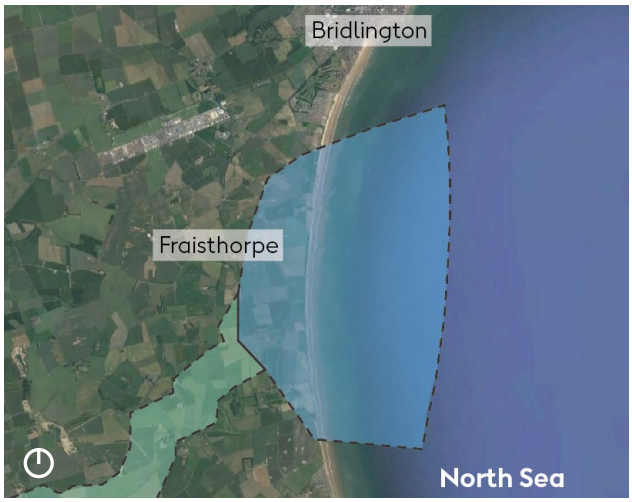


Fig 40 - Landfall mapping

Landfall Area

Onshore ECC Area

(These areas do not represent the accurate boundaries of the landfall or onshore ECC sites)

Existing Attributes / Elements

4.1.2

Img 40 - River mouth of The Earl's Dyke emptying across Fraisthorpe Sands
(Source: Paul Glazzard)

Img 41 - There are PRoWs, paths and bridleways in the area
(Source: Phil Catterall)

Img 42 - There is a large parking area at Barmston, giving access to Fraisthorpe Beach
(Source: John C)

Img 43 - There are multiple listed buildings including religious, agricultural and war defence structures
(Source: Mat Fascione)

Img 44 - War defences are a prominent and historic feature along the coast, including Fraisthorpe Beach *(Source: pillboxesinsuffolk.blogspot.com)*

4.2 - Mitigation, Reinstatement and Treatments

Interventions

4.2.1 The mitigation proposals associated with the landfall location will seek to maintain access to the area. A new coastal path developed separately to Hornsea Four will help connect existing routes and will create opportunities for Hornsea Four to introduce new seating, interpretation, and wayfinding. The design of new features where possible, should be in-keeping with this rural environment, and distinct local character. Materials used for signage and seating where possible, should be natural high-quality materials such as timber and local gravels and stone.

4.2.2 The route could enhance the existing local historic assets to create new heritage destinations, such as the existing wartime beach front defences, which highlight notable local wartime events. All proposed interventions should be sensitively designed to reflect the coastal environment and heritage significance.

Img 45 - PRoW's and New Coastal Path *(Source: Pauline E)*

Img 46 - Wayfinding and Interpretation *(Source: heinejones.com.au)*

Img 47 - Vegetation *(Source: LUC)*

4.2.3 A new coastal path will be created (not associated with Hornsea Four) improving access to the area, this will be provided prior to the Hornsea Four as a separate project. Existing PRoWs will largely be left open during the construction phase, with affected routes being reinstated after construction is complete and access to the beach maintained. Wayfinding will be improved in this area to highlight existing historic assets and wider footpath network.

4.2.4 Additional signage may be introduced within the landfall site to highlight the new coastal path, existing PRoWs and the variety of historic assets in the local area. The material choice and construction technique where possible, should be sensitive to the surrounding natural environment.

4.2.5 Biodiversity enhancements are not currently identified or secured at the landfall site; however, biodiversity enhancements will be provided by the Hornsea Four project where relevant. For example vegetation removed from the landfall area could be reinstated or replaced with the same or similar types of vegetation, utilising locally native species to maintain or increase biodiversity.

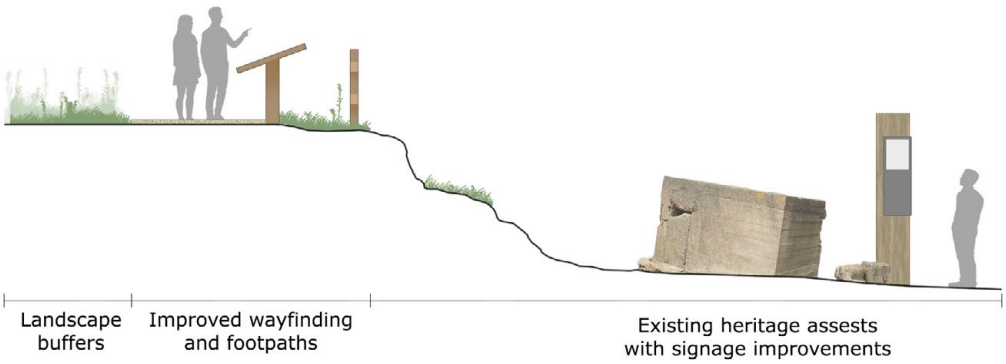


Fig 41 - Example landfall area improvements

(Only actioned were feasible, with proposals to be agreed during detailed design stages with East Riding of Yorkshire Council)

4.3 - Landfall Landscape Mitigation

4.3.1 Design Vision

The combination of Enhancement Measures, Mitigation Measures, Detailed Design and the MDS/DCO Parameters create the Design Vision for the Landfall Site.

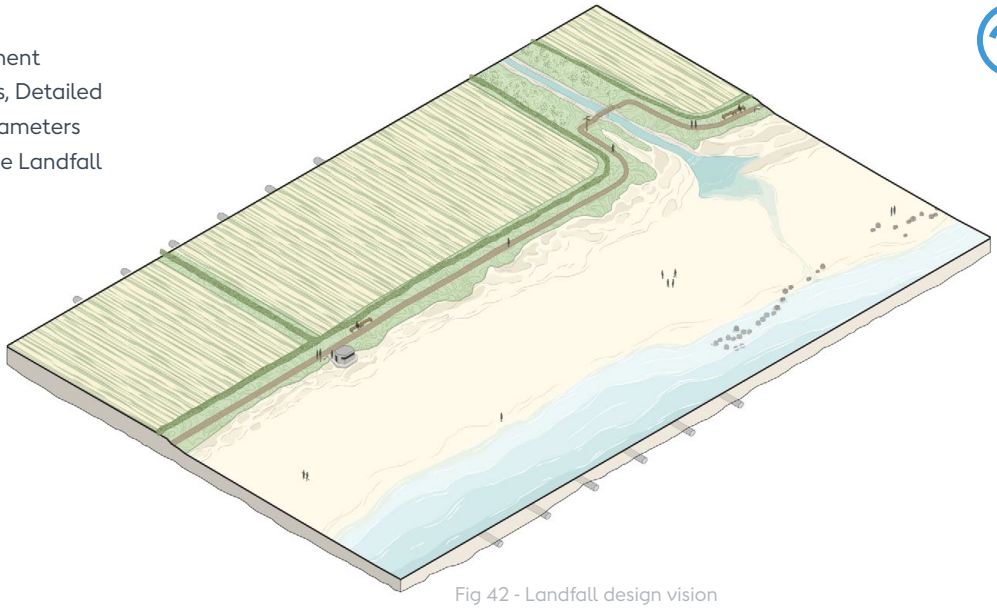


Fig 42 - Landfall design vision

4.3.2 Enhancement Measures

Enhancement Measures include new seating opportunities, as well as interpretation and wayfinding highlighting the coastal path network and the variety of historic assets including the World War 2 'Pill Boxes' and anti-tank barricades positioned along the coast. Hedgerow planting, reseeding and the enhancement of vegetation will be undertaken where relevant.

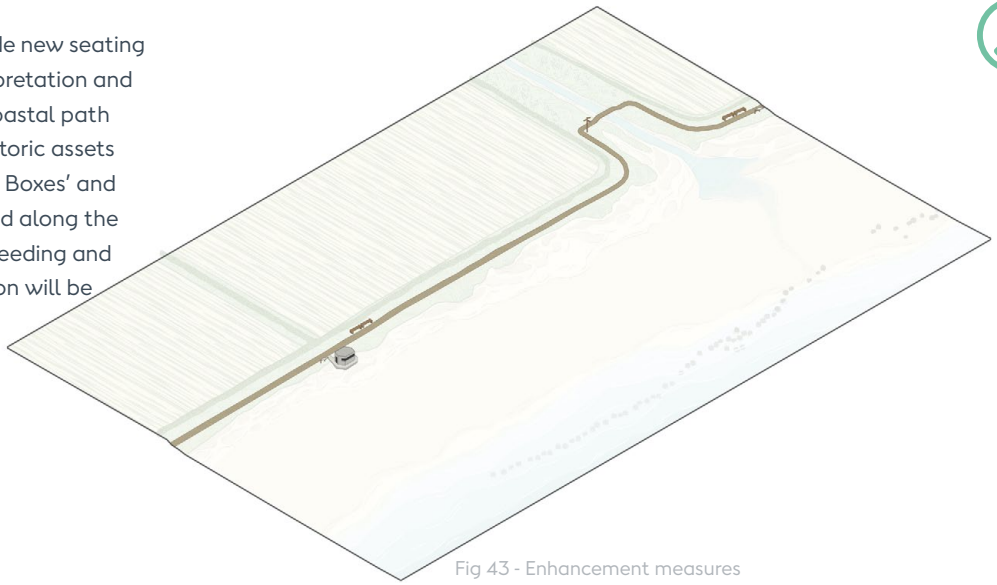


Fig 43 - Enhancement measures

4.3 - Landfall Landscpae Mitigation

4.3.3 Mitigation Measures

Mitigation Measures include routing the cable circuits under the beach to avoid disruption and minimal impacts to existing habitats present in the area during construction phases, as well as the retention of existing native vegetation.

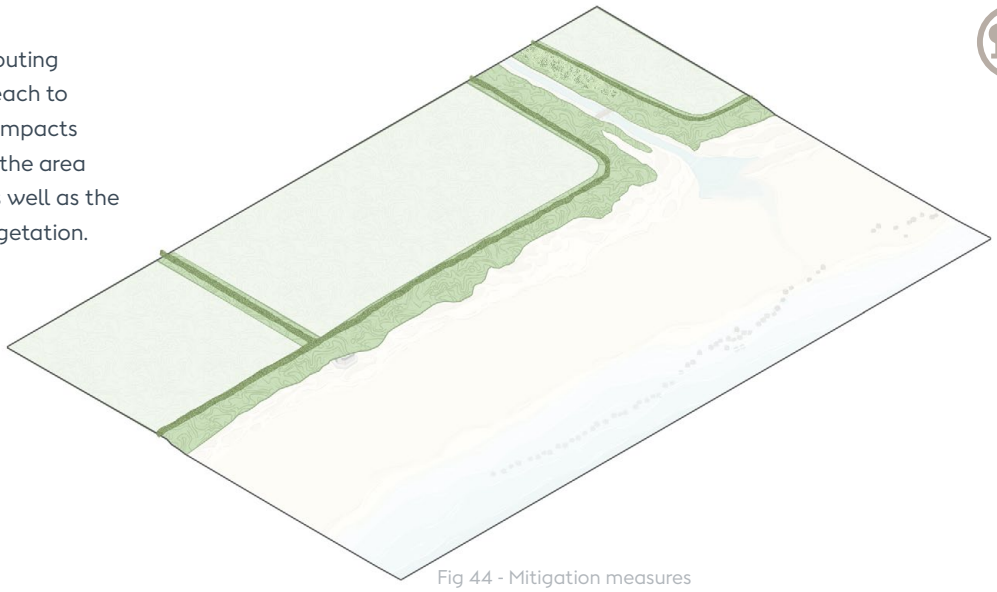


Fig 44 - Mitigation measures

4.3.4 MDS and DCO Parameters

DCO and MDS parameters define the routing of the cable circuits and the technical requirements.

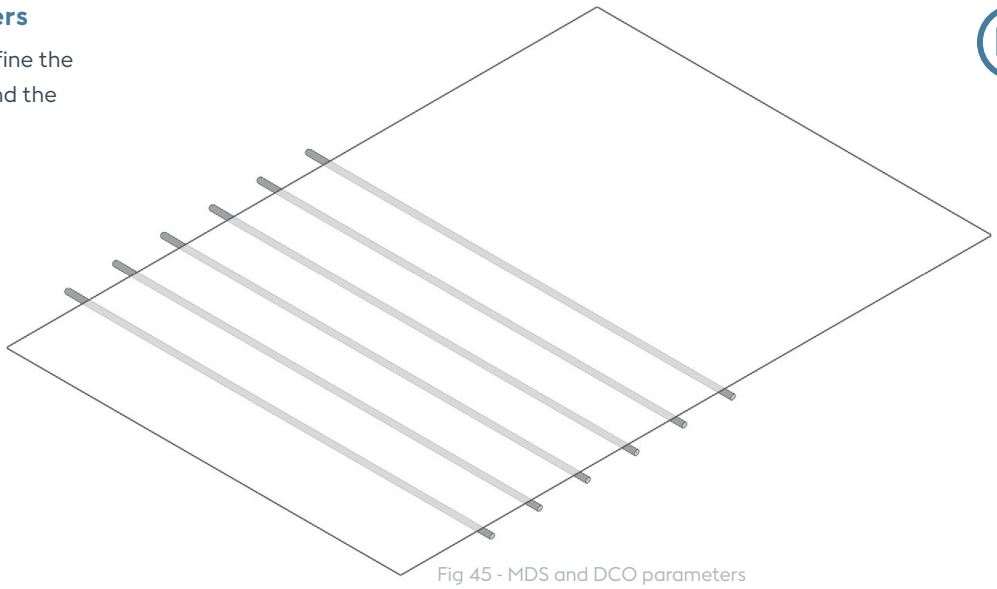


Fig 45 - MDS and DCO parameters

Section 5

ECC Design Code Principles

Hornsea 4
Ørsted

5.1 - ECC

Introduction

5.1.1 The onshore ECC extends from Fraisthorpe to Cottingham crossing the local landscape character areas of Open Farmland (LCA 19) and North Holderness Open Farmland (LCA 19C). The key characteristics of these landscape types include a gently undulating topography containing clusters of woodland, various waterbodies, drainage ditches and native hedgerows. Where the onshore ECC results in the loss of such habitat and landscape features within the confines of the route, these should be reinstated to preserve and protect the landscape character. In some instances when pedestrian routes come into contact with the onshore ECC there is enhancement opportunity to improve seating, interpretation and wayfinding .

Fig 46 - ECC Route mapping

Landfall Area

Onshore ECC Area

Substation Site

(These areas do not represent the accurate boundaries of the landfall, onshore ECC or substation sites)

Existing Attributes / Elements

5.1.2

Img 48 - Clusters of mixed native woodland and individual mature trees in proximity to the onshore ECC area *(Source: Orsted)*

Img 49 - Native hedgerows create ecologically rich field boundaries in proximity to the onshore ECC *(Source: Orsted)*

Img 50 - PRoW, paths and bridleways in proximity to the onshore ECC *(Source: Steve Daniels)*

Img 51 - Various waterbodies in and around the onshore ECC including Bealey's Beck, and Skerne Wetlands *(Source: Paul Harrop)*

Img 52 - Multiple listed structures, heritage assets and places of interest in proximity to the onshore ECC *(Source: Michael W Beales BEM)*

5.2 - Mitigation, Reinstatement and Treatments

Interventions

5.2.1 Appropriate landscape interventions are proposed to mitigate the impact of the ECC route on existing features. This could include the reinstatement of any lost vegetation. Other interventions could include the introduction of seating and wayfinding and interpretation boards, whilst focusing attention towards heritage assets and local destinations along the route. This would create an opportunity to improve pedestrian connectivity where the onshore ECC passes between Fraisthorpe and Cottingham.

5.2.2 These are all approaches that are set out indicatively in the Outline Enhancement Strategy, which would be outlined through consultation during the post-consent stages. These would only be actioned if they are feasible, applicable, have landowner consent and proven to provide an overall benefit to the project and specific area.

Vegetation

5.2.3 Where agreed with landowners, hedgerows and trees removed along the onshore ECC route will be replaced with hedgerows or trees of a more diverse and locally native species composition than that which was removed.

5.2.4 In some instances, dependant on existing condition/species and/or landowner feedback, hedgerows or trees removed along the onshore ECC route will be replaced with the same species as that which was removed. Not all vegetation removed will be replaced.

Fig 47 - Planting mitigation

Access

5.2.5 Improving public footpath accessibility along the onshore ECC route through the provision of signage to local destinations, gates, clearance of vegetation and improved surfacing may be implemented. Existing public footpaths directly affected by works along the onshore ECC route could be replaced with similar or improved materials (dependant on the type of PRoW and the surroundings).

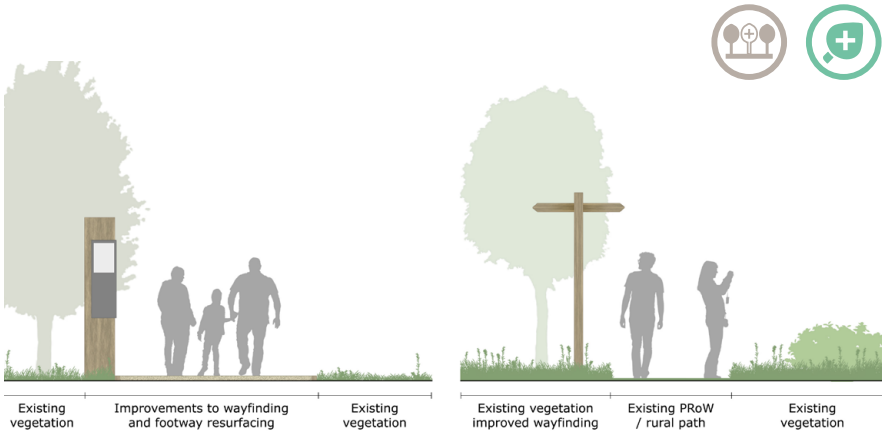


Fig 48 - Improved access, interpretation and wayfinding

Places of Interest

5.2.6 Places of interest, listed structures and heritage assets along the onshore ECC have been circumvented where possible. There is potential to enhance these locations with new signage or other infrastructure.

Fig 49 - Enhancements to places of interest

5.2 - Mitigation, Reinstatement and Treatments

Buffer Zones

5.2.7 Buffer zones could be created along the onshore ECC route to encompass sites containing important species or existing habitats. They would be maintained and enhanced to maximise the quality of habitat. As stated in **F2.3: Outline Ecological Management Plan** (**Section 3.2**) buffer zones could be applied to all areas where habitat is retained, created and/or reinstated. Buffer zones would be species dependent e.g. badgers - 30m; watervoles 10m; otters up to 50-100m from the edge of the working area (**Section 3.3**). Within the buffer zones enhancement may 'look' different depending on the species e.g. for bats - erection of suitable bat boxes for range of species on retained trees; Water voles - seeding of banks to create a diverse grass sward for feeding opportunities and/or shelter; Reptiles - creation of hibernacula (log piles) sites and/or areas of planting for foraging, basking and/or shelter.

Bat Habitats

5.2.8 Wherever possible hedgerows should be allowed to become overgrown to improve their habitat value. These hedgerows have been selected for enhancement in this way due to their value as providing habitat for barbastelle bat. The following enhancements are proposed:
Subject to landowner permissions prior to construction, hedgerows identified as important for foraging and commuting bats would be left to become overgrown. Hedgerows would be allowed to become overgrown within the onshore Order Limits and therefore a total of up to 80m could be left to become overgrown in this manner. This would be undertaken to improve the quality of the surrounding hedgerow as a resource for commuting and foraging bats (Bat Conversation Trust, 2015).

Re-Seeding

5.2.9 Re-seeding disturbed ground created by or identified during construction with native species rich seed mixes, pollen and nectar strips, and clover leys.

Hedgerow Replacement

5.2.10 Planting hedgerow gaps created by or identified during export cable installation. Selecting native woody species such as spindle, hawthorn, rowan and hazel with an emphasis on species bearing nectar, berries, fruit and nuts which will enhance the foraging opportunities of local fauna and provide benefits for nesting birds, invertebrates and bats. Planting of a quantity and ecological quality beyond screening for visual impact mitigation purposes.
It is proposed that hedgerows located within the onshore project area which are removed for construction are replanted to an improved ecological standard, one that aligns with the guidance of hedgerow planting. It has been proposed that this enhancement applies to all hedgerows directly affected by the project, as a UK Habitat of Principal Importance (UKHPI). Specifically, the following enhancements are proposed:
Replanting will follow guidance within the East Riding of Yorkshire hedgerow Biodiversity Action Plan (BAP) strategy, i.e. species composition for East Riding of Yorkshire. Ground flora planting designed to encourage insect biomass will be included. Where possible hedges will be double planted with 2 m grassland strips on both sides so there is always a leeward side to forage.

Img 53 - Dark corridors would ensure any existing bat roosts aren't disturbed *(Sourc: commons.wikipedia.org)*

Img 54 - Opportunities to re-seed disturbed ground with native species rich seed mixes *(Source: LUC)*

5.3 - Hedgerow treatment along the ECC route

Implementing Hedgerow

5.3.1 Whilst laying the cabling along the ECC route, sections of hedgerow and other vegetation may need to be removed either temporarily or permanently to make way for laying the cable. The removal and mitigation of any stretches of hedgerow or vegetation will be subject to feasibility, impact analysis and consultation with stakeholders.

5.3.2 If stretches of hedgerow need to be removed, it could be replaced with transplant sized species. This will involve introducing the new hedgerow into pre-prepared trenches once the ECC cable has been laid. Adequate depth would need to be left between the hedgerow roots and ECC cabling to ensure roots don't dry out the soil causing potential cable failures.

5.3.3

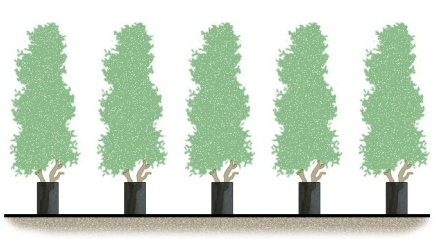


Fig 50 - Introducing new transplant sized hedge species

High Quality Hedgerow

5.3.4 In a scenario where high-quality hedgerow is in the path of the ECC route, any removed hedgerow may be replanted with an improved ecological standard that mitigates loss and enhances the ecological quality beyond that required for mitigation purposes. As stated in **Volume F2, Chapter 14: Outline Enhancement Strategy**:

'Planting hedgerow gaps along the onshore export cable corridor with native woody species such as spindle, hawthorn, rowan and hazel and an emphasis on species bearing nectar, berries, fruit and nuts will enhance foraging opportunities of local fauna and provide benefits for nesting birds, invertebrates and bats. ... Hedgerows removed for onshore export cable installation may be replanted to an improved ecological standard, one that aligns with local guidance of hedgerow planting i.e. the East Riding of Yorkshire hedgerow Biodiversity Action Plan (BAP) strategy. Where possible hedges will be double planted with 2 m grassland strips on both sides so there is always a leeward side to forage.'

This approach will be subject to feasibility, impact analysis and consultation with stakeholders and landowner agreement.

5.3.5

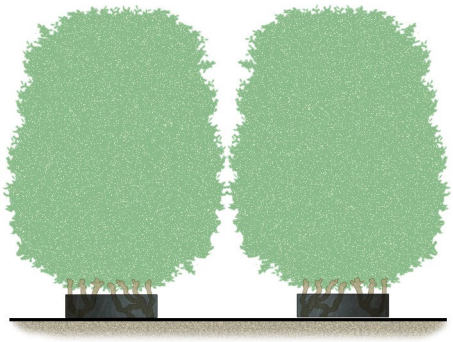


Fig 51 - Introducing of new native hedgerow to enhance ecological quality

5.4 - ECC Landscape Mitigation

5.4.1 Design Vision

The combination of Enhancement Measures, Mitigation Measures, Detailed Design and the MDS/DCO Parameters all create the Design Vision for the onshore ECC.

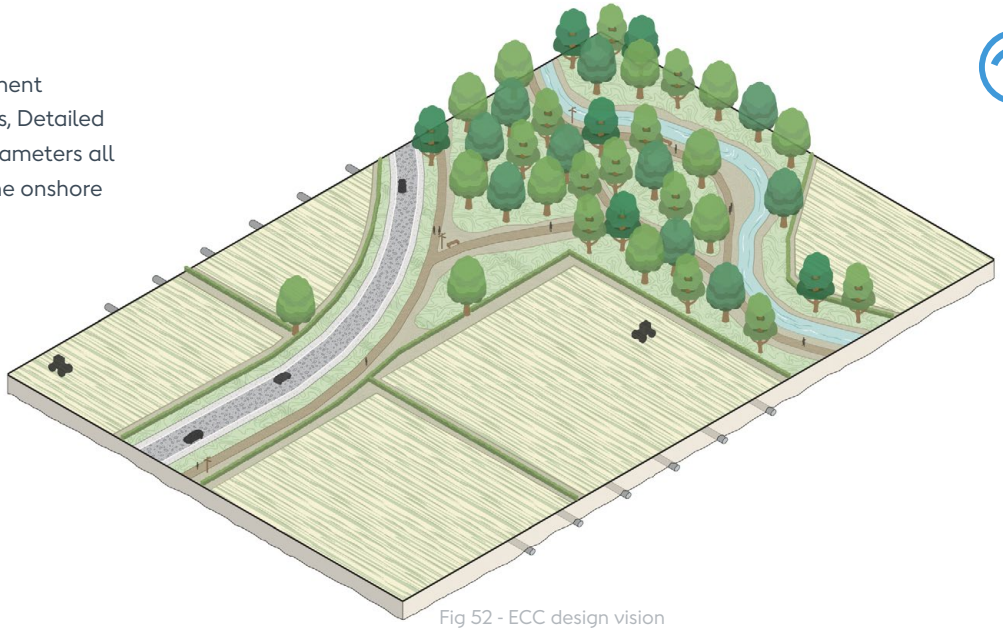


Fig 52 - ECC design vision

5.42. Enhancement Measures

Enhancement Measures will also be site specific along the route, including the introduction of locally native vegetation, expanded habitat conditions, enhanced PRoW routes, interpretation and wayfinding and improved settings for historic assets.

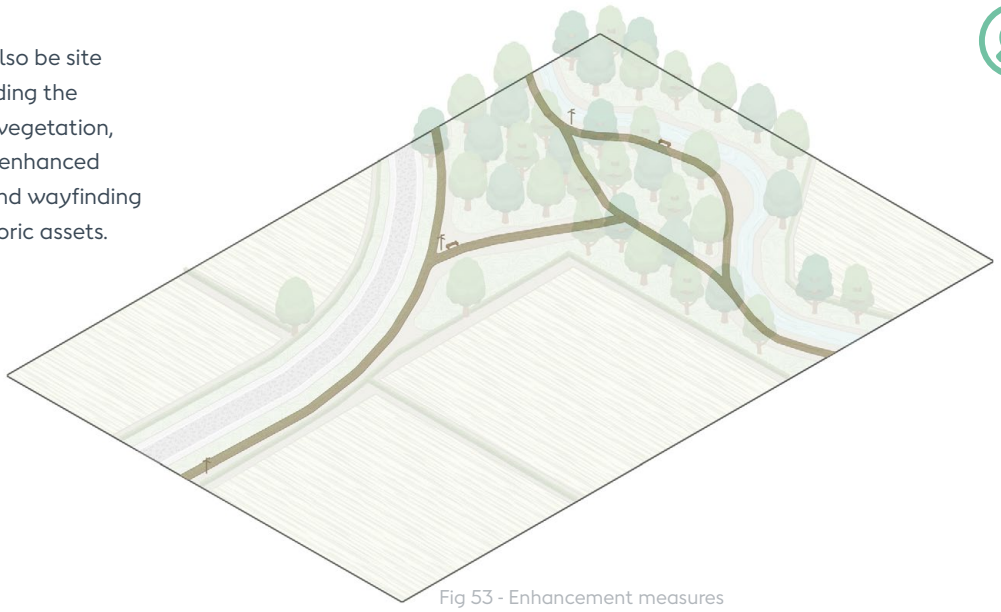


Fig 53 - Enhancement measures

5.4 - ECC Landscape Mitigation

5.4.3 Mitigation Measures

Mitigation Measures include the retention/ replacement of existing landscaping along the route and the use of HDD to tunnel under a number of crossings and sensitive locations routing the cable circuits underground.

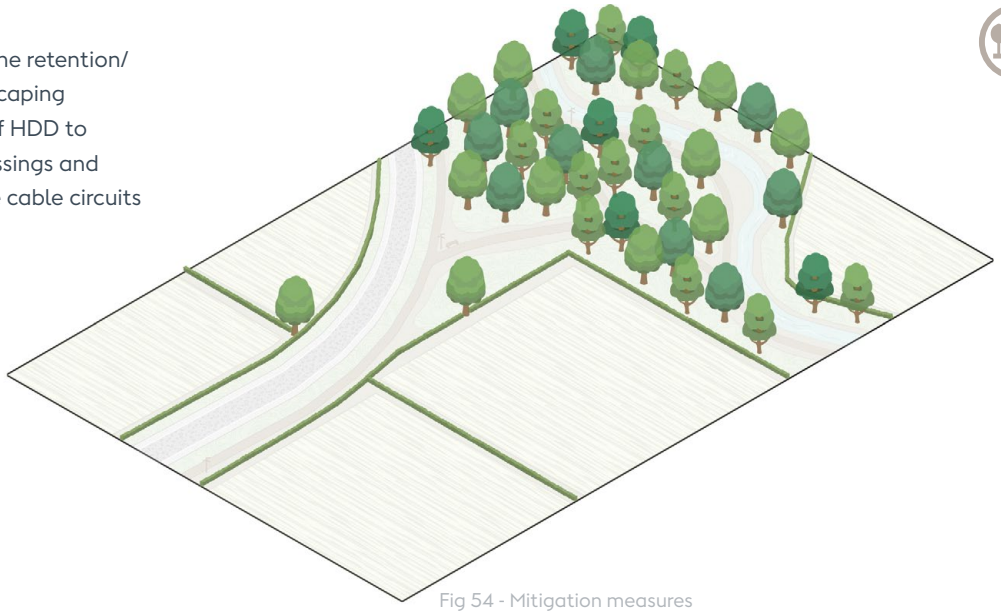


Fig 54 - Mitigation measures

5.4.4 MDS and DCO Parameters

DCO and MDS parameters define the routing and technical requirements of the onshore ECC.

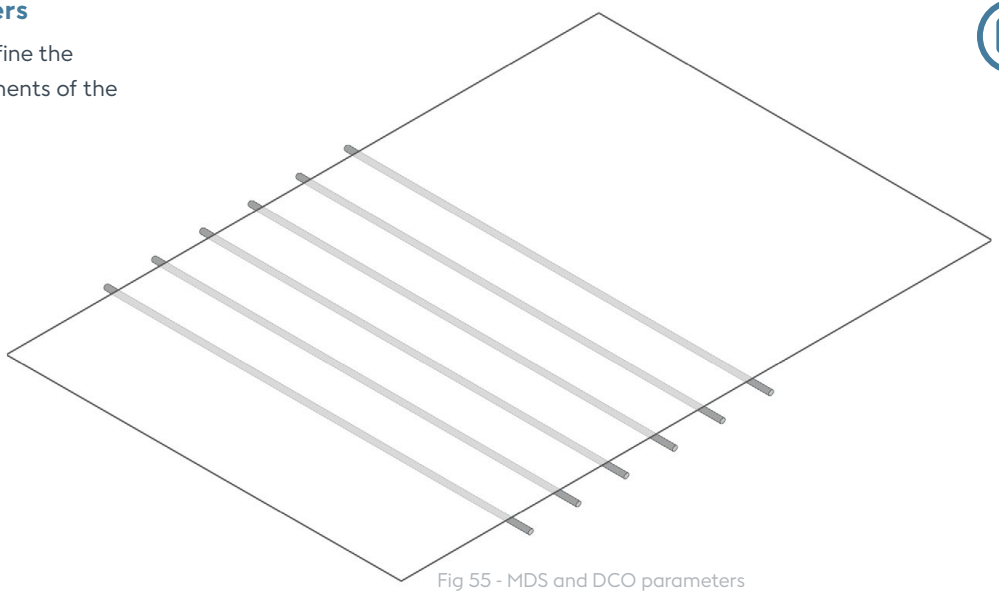


Fig 55 - MDS and DCO parameters

5.5 - Public Engagement

Example of public consultation for all design areas

5.5.1

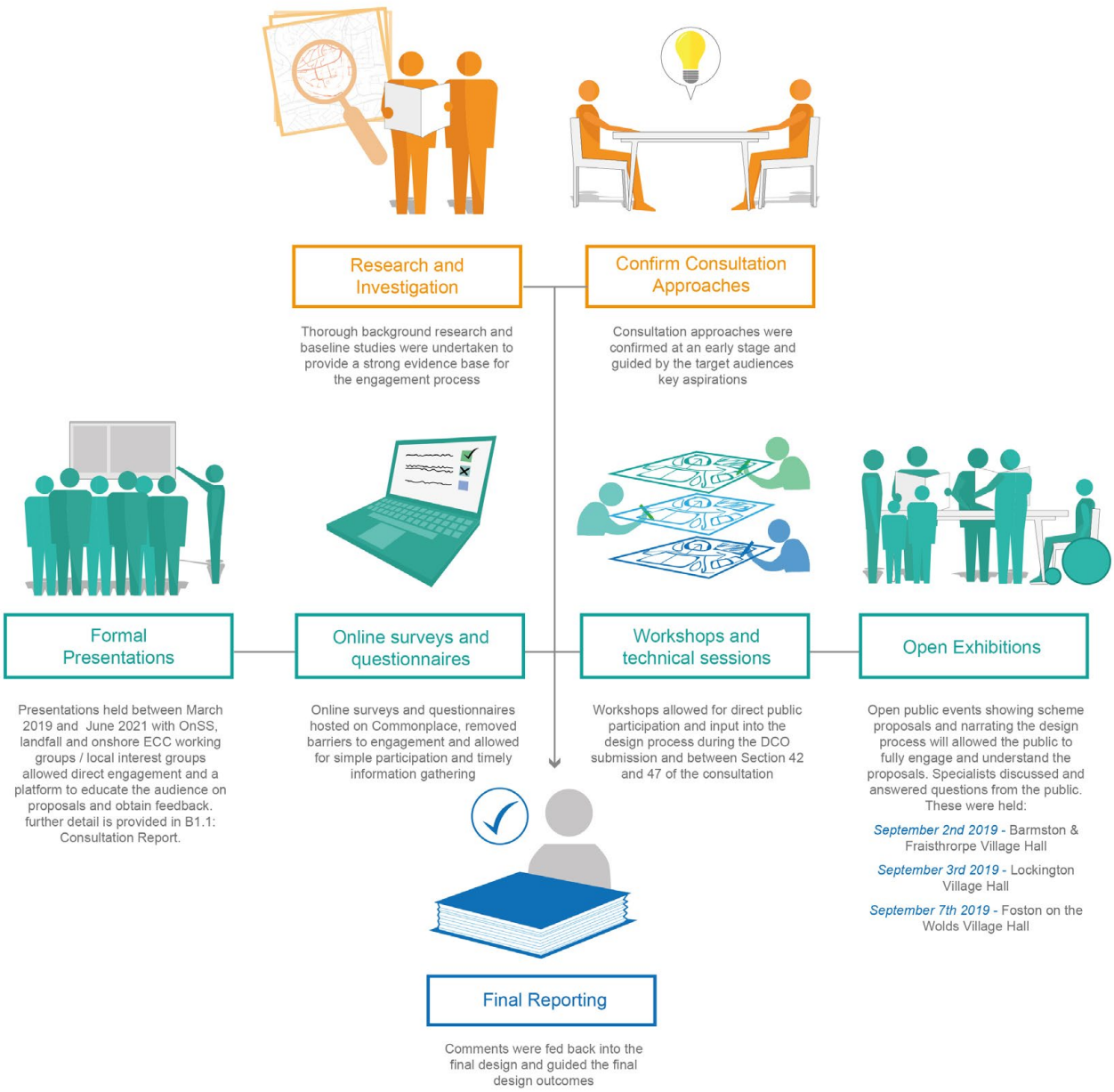


Fig 56 - Public consultation throughout the project

Section 6

Summary

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6.1 - Summary

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6.1.1

OnSS and EBI Design Vision

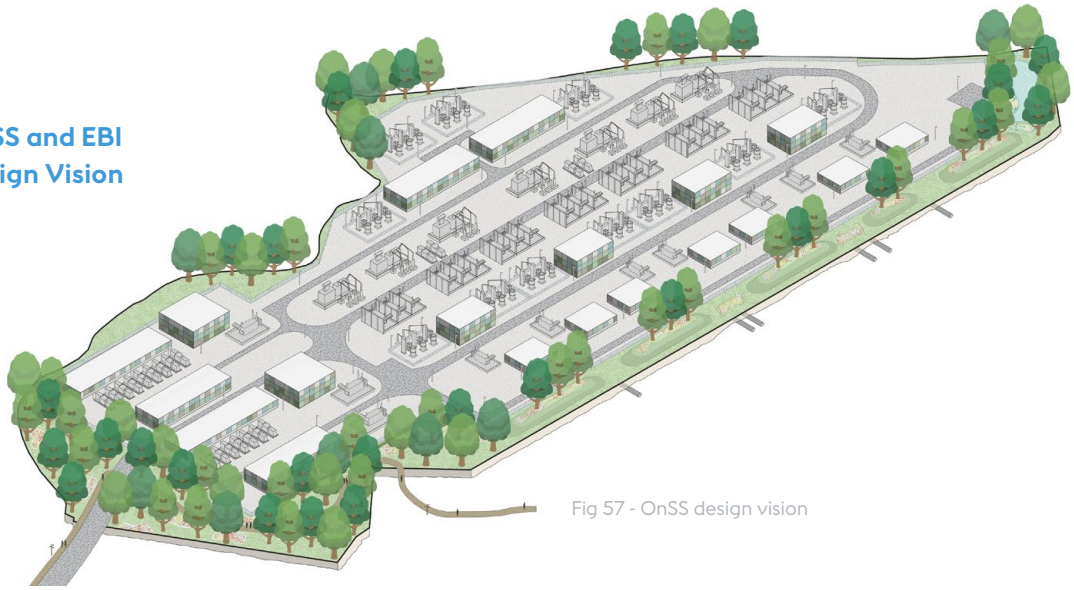

Fig 57 - OnSS design vision

Landfall Design Vision

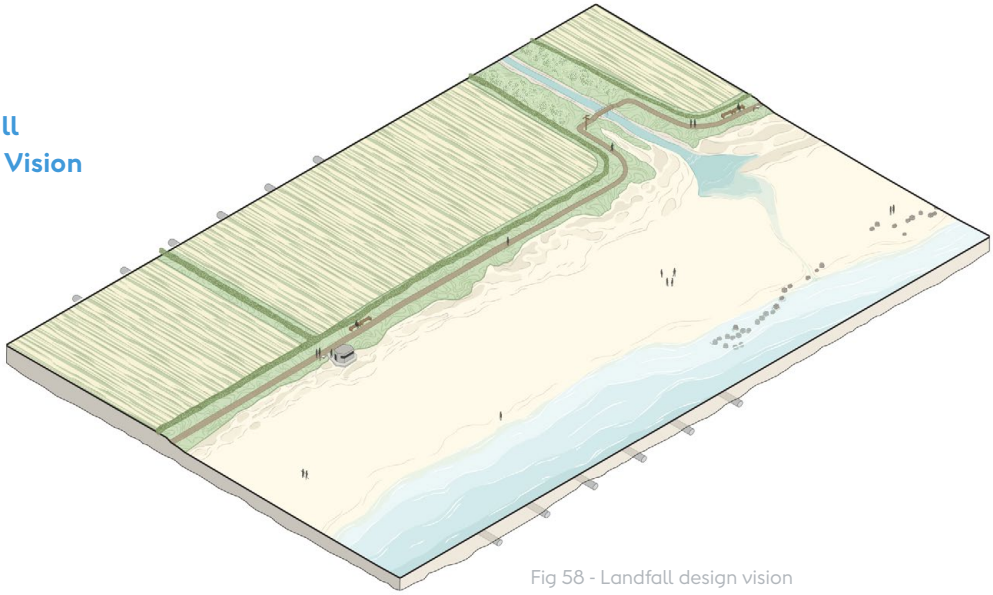

Fig 58 - Landfall design vision

ECC Route Design Vision

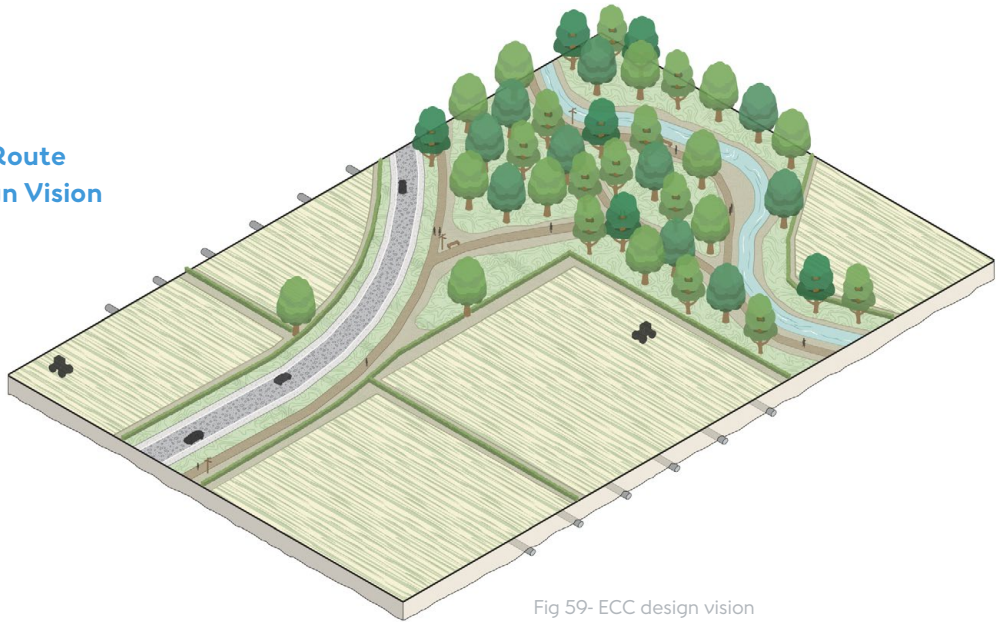

Fig 59- ECC design vision

Section 7

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Hornsea Project Four: Environmental Statement

PINS Document Reference A4.4.6

APFP Regulation: 5(2)(a)

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