



# East Anglia ONE North Offshore Windfarm

## Substations Design Principles Statement

Applicant: East Anglia ONE North Limited  
Document Reference: ExA.AS-28.D4.V1  
SPR Reference: EA1N-DWF-ENV-REP-IBR-000390

Author: ScottishPower Renewables  
Date: 13<sup>th</sup> January 2021  
Revision: Version 01

**Applicable to East Anglia ONE North**



Revision Summary				
Rev	Date	Prepared by	Checked by	Approved by
01	13/01/21	Brian McGrellis	Lesley Jamieson	Rich Morris

Description of Revisions			
Rev	Page	Section	Description
01	n/a	n/a	Final for Deadline 4 Submission



# Table of Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
1.1	Background	1
1.2	DCO Requirement 12	2
<b>2</b>	<b>Design Principles Guidance</b>	<b>3</b>
2.1	National Policy Statements	3
2.2	National Infrastructure Strategy and Design Principles for National Infrastructure	4
<b>3</b>	<b>East Anglia ONE Offshore Windfarm Design and Delivery Process</b>	<b>6</b>
3.1	The East Anglia ONE Project	6
3.2	Design Principles Adopted	6
3.3	Design Council Feedback	7
3.4	Design Iteration	7
<b>4</b>	<b>Design Evolution to Date</b>	<b>8</b>
<b>5</b>	<b>Substations Design Principles</b>	<b>10</b>
5.1	Design Principles to be Adopted	10
5.2	Design Champion	14
<b>6</b>	<b>Estimated Finished Ground Levels and Maximum Visual Envelope</b>	<b>15</b>
6.1	Finished Ground Levels	15
6.2	Onshore Substation Height Reductions	16
6.3	Maximum Visual Envelope	16
<b>7</b>	<b>References</b>	<b>18</b>
<b>Appendix A: Engagement Strategy</b>		<b>19</b>
<b>Appendix B: Figures</b>		<b>27</b>



## Glossary of Acronyms

AIS	Air Insulated Switchgear
DCO	Development Consent Order
GIS	Gas Insulated Switchgear
NPS	National Policy Statement
OLEMS	Outline Landscape and Ecological Management Strategy
PRoW	Public Right of Way



## Glossary of Terminology

Applicant	East Anglia ONE North Limited
Cable sealing end compound	A compound which allows the safe transition of cables between the overhead lines and underground cables which connect to the National Grid substation.
Cable sealing end (with circuit breaker) compound	A compound (which includes a circuit breaker) which allows the safe transition of cables between the overhead lines and underground cables which connect to the National Grid substation.
Development area	The area comprising the onshore development area and the offshore development area (described as the 'order limits' within the Development Consent Order).
East Anglia ONE North project	The proposed project consisting of up to 67 wind turbines, up to four offshore electrical platforms, up to one construction, operation and maintenance platform, inter-array cables, platform link cables, up to one operational meteorological mast, up to two offshore export cables, fibre optic cables, landfall infrastructure, onshore cables and ducts, onshore substation, and National Grid infrastructure.
East Anglia ONE North windfarm site	The offshore area within which wind turbines and offshore platforms will be located.
National electricity grid	The high voltage electricity transmission network in England and Wales owned and maintained by National Grid Electricity Transmission
National Grid infrastructure	A National Grid substation, cable sealing end compounds, cable sealing end (with circuit breaker) compound, underground cabling and National Grid overhead line realignment works to facilitate connection to the national electricity grid, all of which will be consented as part of the proposed East Anglia ONE North project Development Consent Order but will be National Grid owned assets.
National Grid overhead line realignment works	Works required to upgrade the existing electricity pylons and overhead lines (including cable sealing end compounds and cable sealing end (with circuit breaker) compound) to transport electricity from the National Grid substation to the national electricity grid.
National Grid overhead line realignment works area	The proposed area for National Grid overhead line realignment works.
National Grid substation	The substation (including all of the electrical equipment within it) necessary to connect the electricity generated by the proposed East Anglia ONE North project to the national electricity grid which will be owned by National Grid but is being consented as part of the proposed East Anglia ONE North project Development Consent Order.
National Grid substation location	The proposed location of the National Grid substation.
Onshore development area	The area in which the landfall, onshore cable corridor, onshore substation, landscaping and ecological mitigation areas, temporary construction facilities (such as access roads and construction consolidation sites), and the National Grid Infrastructure will be located.
Onshore infrastructure	The combined name for all of the onshore infrastructure associated with the proposed East Anglia ONE North project from landfall to the connection to the national electricity grid.
Onshore substation	The East Anglia ONE North substation and all of the electrical equipment within the onshore substation and connecting to the National Grid infrastructure.
Onshore substation location	The proposed location of the onshore substation for the proposed East Anglia ONE North project.



# 1 Introduction

## 1.1 Background

1. This substations design principles statement presents the design principles to be adopted during the detailed design of the onshore substation, National Grid substation and cable sealing end compounds associated with the East Anglia ONE North Offshore Windfarm project, (the Project) for which East Anglia ONE North Limited (the Applicant) is seeking a Development Consent Order (DCO) (the Application).
2. In maintaining the Applicant's co-ordinated design approach to the development of the Project, a version of this substations design principles statement has also been prepared for the East Anglia TWO Offshore Windfarm project.
3. This substations design principles statement should be read in conjunction with the ***Outline Landscape and Ecological Mitigation Strategy*** (OLEMS) (REP3-030).
4. This substations design principles statement has been informed by:
  - The National Infrastructure Strategy (HM Treasury, November 2020);
  - Response to the National Infrastructure Assessment (HM Treasury, November 2020);
  - The National Infrastructure Commission's publication 'Design Principles for National Infrastructure' (National Infrastructure Commission, February 2020);
  - The Applicant's ***Outline Onshore Substation Design Principles Statement*** (APP-585) and ***Outline National Grid Substation Design Principles Statement*** (REP1-046);
  - The successful design and delivery process adopted for the East Anglia ONE Offshore Windfarm Project (which included the submission of an outline design principles statement as part of its DCO application; Design Council design review; submission of the substation detailed design details; and subsequent approval by the relevant planning authority), which formed the framework for successfully delivering design improvements and reductions in the environmental impact of the onshore substation (see ***Section 3*** below); and
  - The Applicant's design and consultation process undertaken to date, which has gathered stakeholder views and opinion on the design of the onshore substation and its associated landscaping.



5. This substations design principles statement updates and supersedes the Applicant's **Outline Onshore Substation Design Principles Statement** (APP-585) which was submitted with the Project's DCO application and the **Outline National Grid Substation Design Principles Statement** (REP1-046) which was submitted to Examination at Deadline 1.

### 1.2 DCO Requirement 12

6. This substations design principles statement will inform the Applicant's submission to the relevant planning authority under Requirement 12 of the **draft DCO** (REP3-011). The Applicant proposes to amend the references to the "outline onshore substation design principles statement" and the "outline National Grid substation design principles statement" in the next iteration of the **draft DCO** to instead refer to the design principles referred to within this document at Section 5. This substations design principles statement would also be certified under the DCO.



## 2 Design Principles Guidance

### 2.1 National Policy Statements

7. Existing policy set out within the Overarching National Policy Statement for Energy (NPS-EN-1) makes clear the requirements of good design in energy projects, with key considerations including:
  - Paragraph 4.5.1: *“The visual appearance of a building is sometimes considered to be the most important factor in good design. But high quality and inclusive design goes far beyond aesthetic considerations. The functionality of an object — be it a building or other type of infrastructure — including fitness for purpose and sustainability, is equally important. Applying “good design” to energy projects should produce sustainable infrastructure sensitive to place, efficient in the use of natural resources and energy used in their construction and operation, matched by an appearance that demonstrates good aesthetic as far as possible. It is acknowledged, however that the nature of much energy infrastructure development will often limit the extent to which it can contribute to the enhancement of the quality of the area.”*
  - Paragraph 4.5.3: *“In the light of the above, and given the importance which the Planning Act 2008 places on good design and sustainability, the IPC needs to be satisfied that energy infrastructure developments are sustainable and, having regard to regulatory and other constraints, are as attractive, durable and adaptable (including taking account of natural hazards such as flooding) as they can be.”*
8. EN-1 NPS also states that “Virtually all nationally significant energy infrastructure projects will have effects on the landscape. Projects need to be designed carefully, taking account of 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.”
9. EN-3 NPS for Renewable Energy Infrastructure states that *“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.”*





## 2.2 National Infrastructure Strategy and Design Principles for National Infrastructure

10. In its National Infrastructure Strategy (HM Treasury, November 2020), the Government states its ambition to deliver an infrastructure revolution – *“a radical improvement in the quality of the UK’s infrastructure to help level up the country, strengthen the Union, and put the UK on the path to net zero emissions by 2050”*. Woven through that strategy, as part of its ambition to accelerate and improve the delivery of infrastructure projects, is an emphasis on design quality.
11. Published alongside the National Infrastructure Strategy was the Government’s Response to the National Infrastructure Assessment (HM Treasury, November 2020). This response mostly endorsed the National Infrastructure Commission’s recommendations within the Assessment, including: welcoming the National Infrastructure Commission’s design principles; confirming the Government’s commitment to *“embedding good design in all major infrastructure projects”*; and noting the critical role that good design plays in *“delivering user satisfaction; social, environmental and economic benefits; and value for money in infrastructure projects...”*.
12. The National Infrastructure Commission’s publication ‘Design Principles for National Infrastructure’ (National Infrastructure Commission, February 2020) sets out four design principles to guide the planning and delivery of major infrastructure projects:
  - **Climate** (i.e. mitigate greenhouse gas emissions and adapt to climate change);
  - **People** (i.e. reflect what society wants and share benefits widely);
  - **Places** (i.e. provide a sense of identity and improve our environment); and
  - **Value** (i.e. achieve multiple benefits and solve problems well).
13. The guidance, published four months after submission of the Project’s DCO application, proposes a useful shared design vision for national infrastructure projects, whilst also recognising that organisations should build upon the approach outlined by developing their own design vision, ambition and plan that embraces the abovementioned design principles and accounts for the circumstances of individual projects.
14. Both the National Infrastructure Commission’s Design Principles publication (National Infrastructure Commission, February 2020) and the Government’s Response to the National Infrastructure Assessment (HM Treasury, November 2020) recognise the valuable role a senior design champion can play in the



evolution of a national infrastructure project. The National Infrastructure Commission's Design Principles publication states:

*“The Commission identified a need for championing of good design at board level on projects. The first National Infrastructure Assessment recommended that a board level design champion be appointed for every nationally significant infrastructure project. Their role will be to make sure good design is prioritised from the early stages of a project, provide a continual emphasis on that design vision throughout and hold board members and project management to account for delivering those design objectives.*

15. To achieve the design principles and objectives set out above and recognising the functional requirements of the onshore substation and National Grid substation, the Applicant has set out in **Section 5** below the proposed structure and principles guiding further design maturation post consent.
16. The proposed process for the Project set out in **Section 5** (and secured by Requirement 12 of the draft DCO) updates and builds on the process successfully deployed for East Anglia ONE Offshore Windfarm (as described in Section 3 below).



## 3 East Anglia ONE Offshore Windfarm Design and Delivery Process

### 3.1 The East Anglia ONE Project

17. East Anglia ONE is a 714 megawatt (MW) offshore windfarm located in the North Sea, 43km from the East Anglian coast. The project connects into an onshore substation at Bramford in Mid-Suffolk. The windfarm is a joint venture between ScottishPower Renewables and Green Investment Group. ScottishPower Renewables is the parent company of East Anglia TWO Limited and East Anglia ONE North Limited, and these projects benefit from the significant experience and expertise gained on the East Anglia ONE project.

### 3.2 Design Principles Adopted

18. The design and delivery process adopted for the East Anglia ONE onshore substation comprised:
- Engagement with local communities and stakeholders during the pre-application stage of its DCO application regarding the onshore substation design and landscape mitigation;
  - Submission of an outline design principles Statement<sup>1</sup> with the DCO application, which set out the considerations and process for finalising the detailed design and which achieved design improvements and reductions in the environmental impact of the onshore substation;
  - Engagement with local communities and stakeholders post consent, as part of the detailed design process; and
  - Commissioning of the Design Council to undertake an independent design review of the onshore substation.
19. The East Anglia ONE outline design principles statement allowed the East Anglia ONE design teams to further develop and refine the design of the onshore substation based on stakeholder's feedback; the Design Council independent design review; and the design team's challenge and refinement of the design envelope through the procurement and detailed design stage to reduce the environmental impact of the project.

---

<sup>1</sup> At the time of the East Anglia ONE DCO application, an Outline Converter Station Design Principles Statement was submitted. Project design evolution resulted in the converter station being replaced with an onshore substation.



### 3.3 Design Council Feedback

20. The Design Council's response to the project's initial design brief submission recognised: *"the project team's commitment to good design, the extensive research and analysis undertaken of the existing environment and careful consideration given to the site's natural assets are an excellent starting point for this project"*.
21. The Design Council's feedback comprised of three core themes:
- **Principles:** for instance, a key recommendation was to develop a strategic masterplan to guide the evolution of the landscape in a holistic way and inform the development of an appropriate architectural response. The Applicant has adopted this approach for the Project, through the Outline Landscape Management Plan presented in the ***Outline Landscape and Ecological Management Strategy*** (REP3-030), which considers the landscape mitigation necessary for the East Anglia TWO onshore substation, East Anglia ONE North onshore substation, National Grid substation, and National Grid cable sealing end compounds.
  - **Landscape:** for instance, use of a varied woodland mix; use of mesh fencing; reuse of excavated material to form berms; establish early planting.
  - **Substation building and surrounding equipment:** for instance, development of functional, simple, crisply detailed substation building but which responds successfully to the surrounding context.

### 3.4 Design Iteration

22. The engagement process and Design Council independent review resulted in improvements to the onshore substation design, which were incorporated into the procurement and detailed design stages of the project which delivered:
- A maximum 'as built' building height of 68m AOD (12m), reduced from 75m AOD (19m) as specified in the DCO; and
  - A maximum 'as built' external equipment height of 68m AOD (12m), reduced from 69m AOD (13m) as specified in the DCO.
23. The East Anglia ONE project's successful approach to delivering a co-ordinated design which reflects local stakeholder's views where possible, and reduces the environmental impact of the project, has been adopted for the East Anglia TWO and East Anglia ONE North projects. Furthermore, the approach has been refined for the East Anglia TWO and East Anglia ONE North projects to reflect updated policy and guidance including the National Infrastructure Commission's 'Design Principles for National Infrastructure'.



## 4 Design Evolution to Date

24. The Applicant considers that 'good design' has and continues to be promoted as part of the ongoing design iteration process. This has been applied at various levels, from the strategic siting choices; local siting and co-location of the substations; the landscape design around the onshore substation and National Grid infrastructure; and within the substation layout itself, all of which with regard to reducing the harm to the landscape and local environment through careful siting and design.
25. **Site Selection:** With regard to the onshore substation, National Grid's Guidelines on Substation Siting and Design (The Horlock Rules) have been taken into consideration during the site selection process. The selected onshore substation location demonstrates good aesthetic as far as possible. Specifically, the selected location avoids all International, National, county and local landscape designations. It does not affect any ancient woodland and mitigation measures ensure hedgerow loss which would occur is compensated for in new planting around the onshore substation as set out in the ***Outline Landscape and Ecological Management Strategy (OLEMS)*** (REP3-030). The site benefits from existing natural screening provided by Grove Wood and Laurel Covert, as well as other smaller tree blocks and hedgerows surrounding the site. These landscape features provide screening principally from the east and create a wooded backdrop in views from other directions, below which the height of the onshore substation and National Grid substation will be contained and in so doing, make a design based contribution to the mitigation of landscape and visual effects.
26. **Outline Landscape and Ecological Management Strategy:** The OLEMS (REP3-030) demonstrates good landscape design in terms of the sympathetic design of proposed new landscape features, enhancement of woodland areas and restoration of historic field boundaries. New planting has been designed to integrate the development into the landscape, consisting of both backdrop and screening planting, as described in the OLEMS to mitigate landscape and visual impacts.
27. The OLEMS also addresses local design guidance through:
- The use of locally appropriate native woodland and hedging species;
  - Design of field layouts to be in keeping with the local field pattern or the historic pattern of boundaries where possible;
  - There are also opportunities to design locally appropriate planting schemes to reduce the visual impact further;



- The option to modify the management of existing hedgerows to retain these boundary features at a specific height;
- The location of the development in relation to existing trees that act either as screening or as a backdrop should be carefully considered;
- New planting designed to integrate the development into the character of the landscape and consists of both backdrop and screening planting;
- Increasing the stock of hedgerow trees; and
- Increasing the extent of woodland cover, with effective management.

28. **Onshore Substation Design Envelope:** With regards to the onshore substation layout design, more space efficient solutions have been identified by the Applicant within the preferred arrangement, with a reduced onshore substation footprint of 170x190m being confirmed by the Applicant at Deadline 2 (**Project Update Note** (REP2-007)) which has allowed for the retention of an existing area of established woodland which would have previously been removed. Furthermore, the Applicant confirmed the lowering of maximum building and external equipment heights, and refinement of the estimated finished ground levels Deadline 3 (REP3-052), which has resulted in the lowering of the maximum datum height of the onshore substations and National Grid substation buildings and external equipment.
29. The Applicant considers that these ongoing, iterative design changes to the substation design will reduce landscape and visual effects of the Project and will continue to promote the delivery of good design principles.



## 5 Substations Design Principles

### 5.1 Design Principles to be Adopted

31. The following design principles will be used to develop (and thereafter submit for approval) details of the onshore substation, National Grid substation and National Grid cable sealing end compounds, in accordance with Requirement 12 of the draft DCO (REP3-011).
32. The design principles are shown in bold in **Table 5.1**, categorised in line with the four design principles to guide the planning and delivery of major infrastructure as set out in 'Design Principles for National Infrastructure' (National Infrastructure Commission, February 2020).





**Table 5.1: Design Principles to be Adopted**

NIC Design Principle	Applicant's Design Principle	Activity
<b>People and Value</b>	<b>Include engagement with Parish Councils, local residents and relevant planning authorities</b>	<p>Continued engagement with Parish Councils, local residents and relevant authorities (Suffolk County Council and East Suffolk Council) on design and landscape proposals. Opportunity will be provided through the development of the design and landscape proposals to seek feedback from local communities who will be directly affected by the development and where appropriate, the feedback received will form part of the onshore substation, National Grid substation and National Grid cable sealing end compounds procurement and/or detailed design process.</p> <p>Appendix A presents further information on the engagement which will be undertaken to inform and influence the design development of the substations and the associated timing for those consultation stages.</p>
<b>People and Value</b>	<b>Ensure feedback from appropriate professional expertise in landscape, cultural heritage, planning, engineering and design and from members of the public, will continue to influence the design</b>	<p>This feedback will ensure opportunities are identified, tested and pursued to achieve an appropriate, fit for purpose design outcome.</p> <p>Through the Applicant's pre-application consultations with stakeholders, including Expert Topic Groups and Public Information Days, feedback has been received which has already influenced the Project's design, including the footprint and height of the onshore substation and the surrounding landscape.</p>
<b>People and Value</b>	<b>Be informed by a design review with the Design Council (or similar body), in consultation with the relevant local planning authorities</b>	<p>The output of this design review will inform the onshore substation, National Grid substation and National Grid cable sealing end compounds procurement and/or detailed design process.</p> <p>Appendix A presents further information on engagement with the Design Council (or similar body).</p>
<b>People and Value</b>	<b>Designate a senior business representative as the design champion</b>	<p>Designation of a senior business representative (such as a project director or business director) as the design champion for the project, in order to maintain the necessary focal point and co-ordination in the progression of good design.</p>



## Substations Design Principles Statement

13<sup>th</sup> January 2021



NIC Design Principle	Applicant's Design Principle	Activity
Climate, People, Places and Value	Consider 'Good Design' in line with the requirements of Overarching National Policy Statement for Energy (NPS EN-1) and the National Infrastructure Commission's 'Design Principles for National Infrastructure' (National Infrastructure Commission, February 2020)	Use of NPS EN-1 and National Infrastructure Commission's 'Design Principles for National Infrastructure' to inform the Project's design process.
Places	The visual impacts of the substation buildings will be minimised as far as possible by their sensitive placing, the use of appropriate design, building materials, shape, layout, coloration and finishes	Appropriate building design and materials will be actively sought as part of the procurement process.
Climate, People, and Places	Use of planting to minimise visual effect and maximise screening opportunities	On-site mitigation planting proposals will be undertaken within the onshore development area immediately around the onshore substation, National Grid substation and National Grid cable sealing end compounds, in order to minimise its visual effect and maximise screening opportunities from key viewpoints/receptors, while also responding to local landscape character, pattern and growing conditions.
Climate, People, and Places	Use of bunds to support visual screening	<p>The overall site design will maximise the opportunity for site won topsoil and subsoil materials to be reused on site within landscape earthworks 'bunds'. These bunds should support the visual screening of the onshore substation and National Grid substation while having a gradual external slope gradient that appears natural and complements the existing terrain (when looking towards the onshore substation). Further details are presented within the <b>OLEMS</b> (REP3-030).</p> <p>The Applicant is committed to utilising suitable material excavated on site for the creation of bunds (or berms) although note that until detailed ground investigation information is obtained as part of the detailed design process, the quantity of suitable excavated material to form engineered bunds will not be known.</p>

## Substations Design Principles Statement

13<sup>th</sup> January 2021



NIC Design Principle	Applicant's Design Principle	Activity
Climate, People, Places and Value	Enhancement of Public Rights of Way	<p>The overall site design will seek to deliver gains for public amenity, including enhanced access through Public Rights of Way (PRoW) proposals and areas for landscape planting.</p> <p>Further details are presented within the <b>Outline PRoW Strategy</b> (REP3-024) which describes the ca. 1km of new PRoW to be provided in the area of the onshore substation/National Grid substation.</p>
Climate, People, and Places	Include use of low maintenance ground cover species, establishment of native woodland/trees native woodland and the return of unrequired land to agricultural use where feasible.	<p>Landscaping planting of species rich grassland areas will be established to provide a low maintenance ground cover which also enhances the local biodiversity in areas that are not to be returned to agricultural use or planted as woodland.</p> <p>The overall site design will also identify land around the onshore substation and National Grid substation that will be returned to agricultural use during the operational period where feasible. Further details are presented within the <b>OLEMS</b> (REP3-030).</p>
Climate, and Places	Incorporation of ecological enhancement considerations within the adopted landscaping scheme to deliver habitat creation on the site	<p>On site mitigation planting will promote ecological enhancement and planting proposals will be considered along with building design and layout of ancillary structures.</p> <p>Further details are presented within the <b>OLEMS</b> (REP3-030). The overall site design should have regard to the potential for embedded ecological mitigation and enhancement.</p> <p>The Sustainable Drainage System (SuDS) solution for the onshore substation, National Grid substation and National Grid cable sealing end compounds, as a minimum, will include a ponded area, which will deliver habitat creation on the site. Further details are presented within the <b>OLEMS</b> (REP3-030) and <b>Outline Operational Drainage Management Plan</b> (REP3-046).</p>
Climate	The design will optimise generation of renewable energy to displace carbon emissions and meet national and international carbon reduction and renewable energy targets, in line with the project objectives	<p>The fundamental purpose of the Project is to combat climate change through the deployment of a renewable energy source. The functional nature of the onshore substation and National Grid infrastructure and the need to operate a safe and efficient electricity transmission asset is a fundamental design constraint that must be recognised at all times, whilst achieving the above-mentioned design principles.</p>



### 5.2 Design Champion

33. As demonstrated by the successful delivery of the East Anglia ONE Offshore Windfarm, the organisational structure and process adopted during the detailed design of the East Anglia ONE onshore substation is effective and secured environmental improvements in the delivery of the project.
34. To reaffirm this process for the Project, the Applicant will designate a senior business representative (such as a project director or business director) as the design champion for the Project in order to maintain the necessary focal point and co-ordination in the progression of good design for the Project's onshore substation the National Grid substation and cable sealing end compounds. The design champion will ensure effective design co-ordination between the Project's onshore substation, the National Grid substation and cable sealing end compounds, and the adjacent East Anglia ONE North project. The design champion will also ensure that good design continues to be prioritised and will provide a continual emphasis on that design vision throughout, holding the Project's delivery team to account for delivering those design objectives.



## 6 Estimated Finished Ground Levels and Maximum Visual Envelope

### 6.1 Finished Ground Levels

35. The Applicant has further considered the finished ground levels of the onshore substation and National Grid substation adopted for the Application. Whilst acknowledging the need for future geotechnical and detailed design studies to be undertaken (in order to establish the soil properties, bearing capacity, groundwater levels etc.), further refinement to the estimated finished ground levels has however been possible at this early stage which allows more certainty on the visual envelope of the Project.
36. In considering revisions to the estimated finished ground levels, the following key principles have been followed which are considered reasonable for the current pre-consent/pre-detailed design phase of the Project:
- Maintain the height differential in finished ground levels between each onshore substation and the National Grid substation at no more than 0.5m for constructability and maintenance reasons;
  - Ensure excess material from ground levelling is not unreasonably excessive so as to have a consequential impact on assessed vehicle movements;
  - Seek reductions in the finished ground levels compared to that presented within the visualisations which accompany **Chapter 29 – Landscape and Visual Impact** (APP-077) and therefore seek to reduce the environmental effects of the Projects.
37. Other factors that could influence the final finished ground level, includes surface water drainage design requirements and groundwater constraints, to ensure appropriate management and control of groundwater interactions in the design of the onshore substation.
38. In undertaking this review, the Applicant has revised the estimated finished ground levels (expressed in Above Ordnance Datum (AOD)) from that which the Applicant's photomontages were based (**Chapter 29** (APP-077)) as presented below:
- Onshore substation (eastern location): Estimated finished ground level reduced from 20.7 to **18.7m AOD**;



- Onshore substation (western location): Estimated finished ground level remains at **18.2m AOD**; and
- National Grid substation: Estimated finished ground level reduced from 18.9m to **18.2m AOD**.

## 6.2 Onshore Substation Height Reductions

39. Further review of the project design envelope and early supply chain engagement has allowed the Applicant to reduce the height of the buildings and external equipment within the onshore substation from that originally applied for.
40. In undertaking this review, the Applicant has committed to the revised maximum building and external equipment heights presented in **Table 6.1** below (heights presented are above finished ground level):

**Table 6.1 Revised Onshore Substation Building and External Equipment Heights**

Onshore Substation Building / External Equipment	Building or External Equipment Height Presented within the Application	Revised Maximum Building or External Equipment Height Committed to at Deadline 3	Notes
Harmonic filters	18m	<b>14m</b>	4m reduction in maximum height achieved
Statcom building	15m	<b>12m</b>	3m reduction in maximum height achieved
GIS building	15m	<b>14m</b>	1m reduction in maximum height achieved
Lightning protection masts	25m	<b>20m</b>	5m reduction in maximum height achieved

41. The maximum height of buildings within the onshore substation is now 14m above finished ground level. The maximum height of external electrical equipment within the onshore substations is now 14m above finished ground level. The maximum height of lightning protection masts within the onshore substations is now 20m above finished ground level.

## 6.3 Maximum Visual Envelope

42. As noted above, given that the Applicant has yet to undertake ground investigations it is not yet possible to establish the final finished ground levels at this stage of design.



43. The Applicant notes however, that stakeholders would prefer a level of certainty in establishing the maximum visual envelope of the Project. To balance the uncertainty and necessary flexibility in the design of the onshore substation and National Grid substation with certainty with regards to their maximum visual envelope, the Applicant has adopted a maximum vertical datum height (expressed in m AOD) for buildings, external equipment and lightning protection masts (as detailed below).
44. This ensures the Applicant retain the necessary flexibility at the detail design stage of the Project to balance the finished ground levels and (within the limitations of the draft DCO) the heights of buildings and external equipment, to achieve (and where possible, improve on) the maximum vertical datum height (expressed in m AOD).
45. The maximum building height, maximum external equipment height and maximum lightning protection mast height expressed in AOD, are presented in **Table 6.2** below. The onshore substation eastern and western locations are illustrated in **Figure 1, Appendix B**.

**Table 6.2 Maximum Heights**

Substation Parameter	Maximum Height (AOD)
Onshore Substation (Eastern Location) - Maximum Building Height	32.7m AOD
Onshore Substation (Western Location) - Maximum Building Height	32.2m AOD
Onshore Substation (Eastern Location) - Maximum External Equipment Height	32.7m AOD
Onshore Substation (Western Location) - Maximum External Equipment Height	32.2m AOD
Onshore Substation (Eastern Location) – Maximum Lightning Protection Height	38.7m AOD
Onshore Substation (Western Location) – Maximum Lightning Protection Height	38.2m AOD
National Grid Substation (AIS Technology) – Maximum Building Height	24.2m AOD
National Grid Substation (GIS Technology) – Maximum Building Height	34.2m AOD
National Grid Substation – Maximum External Equipment Height	34.2m AOD



## 7 References

Department of Energy and Climate Change (DECC) (2011). Overarching National Policy Statement for Energy (EN-1). July 2011

HM Treasury (November 2020). Response to the National Infrastructure Assessment. November 2020

HM Treasury (November 2020). The National Infrastructure Strategy. November 2020

National Infrastructure Commission (February 2020). Design Principles for National Infrastructure. February 2020



## Appendix A: Engagement Strategy





# Engagement Strategy

## Introduction

1. This document sets out how consultation will be undertaken as the design of the onshore substation, National Grid substation and cable sealing end compounds (together the 'substations') associated with the East Anglia ONE North Offshore Windfarm (the Project) evolves, prior to the discharge of the relevant Development Consent Order (DCO) Requirements.
2. It explains how the substations design principles statement will be implemented as the Project progress and highlights the key elements of these principles for ease of reference.
3. The design of the substations and their environs will be co-ordinated through the development of a **Landscape Masterplan** which will include the land which is required for landscaping and drainage features including SuDS (Sustainable Drainage System) ponds. The Landscape Masterplan will build on the Outline Landscape Management Plan presented in the **OLEMS** (REP3-030) and will continue to be developed through the design period. There will also be an **Architectural Framework** document which will consider the various options for the finishes and styles of certain elements of the substation development. The location of the substations and the parameters which will be set out in the DCO will not be the subject of consultation. Further information on these documents is presented below.
4. This document describes the approach to the Landscape Masterplan and Architectural Framework documents and explains how engagement will take place in the development of these documents.

## DCO Requirements

5. There are a number of Requirements in the draft DCO which necessitate the relevant planning authority (East Suffolk Council (ESC)) to discharge Requirements which will confirm the final details of a number of matters including the design of each substation, the associated landscape and the surface water management. These Requirements will be discharged using a suite of documents known as Requirement Discharge Documents (RDDs).
6. The RDD in respect of Requirement 12, relating to the final details of each onshore substation, the National Grid substation and cable sealing end



compounds, will be developed separately but in accordance with the Landscape Masterplan which will include phasing of the works, if required.

7. In advance of the preparation of the RDDs relating to the substation area, the Architectural Framework will be prepared, and the Landscape Masterplan will be further developed in consultation with local stakeholders.
8. The Applicant will engage with ESC during the DCO recommendation/determination phase of the Application in order to progress the Landscape Masterplan and Architectural Framework. Once consents for the Project have been granted, the Applicant will formally engage with local stakeholders on the Landscape Masterplan and Architectural Framework.

### Landscape Masterplan

9. The primary aim of the Landscape Masterplan is to develop a landscape framework around the proposed substations that provides sufficient screening to mitigate as far as practicable, the visual impact of these developments and integrate them sensitively within the landscape.
10. It will develop the principles and detail set out in the **OLEMS** (REP3-030) and will be discussed with stakeholders at workshop meetings. The landscaping solutions within the final Landscape Masterplan will be set out in the final Landscape Management Plan for approval by ESC.
11. In line with the OLEMS, the landscape design approach selected for the substations combines the approaches of concealing and integrating the substations into the landscape to meet the mitigation requirements and also as a response to the local landscape character and the historic landscape context.
12. The further development of the Landscape Masterplan will reflect the design of the substations; and the opportunity for both bunding and refinement of woodland planting to address the main aim of providing visual screening of the substations. It will also detail where new hedgerows may be planted to supplement the woodland framework around the substation complex.
13. The final Landscape Masterplan will identify areas of species rich grassland and SuDS ponds, providing enhanced habitat benefits in their own right, while also providing further visual contrast with the 'technological' appearance of the grid connection developments. Arable farming fields that are retained for agricultural use will contribute to retaining the rural character in the area around the developments.



14. It will also present details of any early establishment of tree and hedgerow planting, in order to deliver mitigation as early as possible for the Projects, to the extent that the relevant order limits allow.

### Architectural Framework

15. There are a number of important and fundamental technical constraints which are inherent to the design of the substations, particularly in respect to the location, form and appearance of the external electrical equipment and the functionality of buildings. The layout of the substations will be determined by their functional demands, safety requirements, and various practical restrictions and considerations which will result in a safe and efficient electrical layout. The design criteria for the substation layout are relatively rigid, in order to comply with safety, maintainability and quality of supply obligations. However, within these constraints, other elements will be used to ensure the substations respond as well as possible to a sense of place and to minimise their visual impact. These elements will be set out in the Architectural Framework document.
16. The Architectural Framework will be prepared to provide further information to guide and inform the detailed design for the individual substations. The design approach outlined therein will provide principles in terms of the form, colour and materials of the following key architectural components:
- Buildings;
  - Fencing; and
  - Hard landscaping.
17. The Architectural Framework will be prepared with advice from specialists including, landscape architects and design engineers in order to develop an architectural vocabulary that can be applied to the substations throughout all phases of the Projects. It will provide design proposals for the appropriate solutions for external architectural treatment.
18. The Architectural Framework will consider the existing landscape context and will develop an external treatment to the substation complex that will respond successfully to the surrounding environment and context. Where the Project is developed after construction of the East Anglia ONE North project, the Architectural Framework will also consider the design and finishes of the East Anglia ONE North project's onshore substation and National Grid substation to ensure appropriate design co-ordination is maintained. The document will also respond, as far as is practical, to feedback received during community engagement. The Architectural Framework will ensure that the treatment



proposed for the substations is sensitive to place, with visual impacts minimised as far as practical by the use of appropriate design, building materials, shape, layout, coloration and finishes, whilst considering the functional constraints of the substations themselves.

19. The final Architectural Framework will include:

- An overview of the approach taken, based on the established design parameters, principles set out in existing documentation and the advice and comments provided by ESC, the local community and the Design Council;
- Consideration of the form of the substation complex;
- Colour analysis and review of potential façade colours for the external treatment of the substation buildings;
- Review of material options for the primary forms of buildings and fencing; and
- Conclusions relating to the proposed solution for the external appearance of the substation complex in terms of form, colour and materials.

20. Once complete the Architectural Framework will form the base from which the Detailed Design Document (required to satisfy DCO Requirement 12), for each substation will be developed.

### Engagement: Stage 1

21. In order to generate the above-mentioned Landscape Masterplan and Architectural Framework, the following stage 1 engagement will be undertaken which will include an independent design review and engagement with the local community as set out in the following text.

#### *Independent Design Review*

22. The draft Landscape Masterplan and Architectural Framework will be submitted for an independent and objective review by a nationally recognised impartial body (such as the Design Council, in consultation with ESC) to inform and guide the final design solutions. It is recognised that for technical and operational reasons, the outcome of the design review process must produce a response that is practicable and capable of implementation in line with the regulatory and safety requirements of the substations.

#### *Parish Council and Local Resident Engagement*

23. Parish Council and local resident engagement will be undertaken during the development of the Landscape Masterplan and the Architectural Framework. This engagement will be in respect of the matters which are set out above,



describing the Landscape Masterplan and Architectural Framework. Whilst the height of building and external equipment will not be subject of consultation as the maximum heights will be set out in the DCO, the Applicant will outline the rationale for the heights of key buildings and external equipment heights.

24. The purpose of this engagement will be to obtain stakeholders' views on the options that are being considered in respect of matters such as planting, hard landscaping, colours and finishes.
25. A one-day workshop will be held once the draft Landscape Masterplan and draft Architectural Framework have been developed to a point where it is appropriate to present to stakeholders the various options that require their consideration and input. This will be at a venue close to the substation complex, subject to Covid-19 restrictions.
26. There will be a session at the start of the workshop to provide an introduction and explanation of what is to be discussed. Those attending will then be split into a number of workshop groups. Each group will include stakeholders, developer representatives and technical specialists. A suitably experienced chair/facilitator will make notes and ensure that the discussions run to time. The groups will be facilitated and will spend time discussing a number of pre-defined topics. Each group is envisaged to comprise of no more than 10 people (including the Applicant and National Grid representatives) to ensure constructive discussion and debate.
27. During the workshop it is anticipated that there may be an animated model of the substation complex so that discussion can be undertaken looking at the model and considering different approaches. Photomontages will be used where appropriate and sample materials will be made available. A briefing pack will be sent to all attendees in advance of the workshop.
28. In parallel with the workshops, engagement with the Design Council and local authorities will be progressed to obtain their views on the matters which are being considered and a site visit will be undertaken.
29. Following the workshop, there will be a three week period for attendees to provide further thoughts and feedback to the Applicant. Material such as photomontages and material samples will be provided to the Parish Councils in the briefing pack in order to assist in facilitating this.
30. It is anticipated that the workshops will be attended by representatives of ESC (as the relevant planning authority), Friston Parish Council and Knodishall Parish Council (representing the wider community) and residents in the immediate



vicinity of the substations. The final number of attendees from the local community (Parish Councils and local residents) will be in the region of 20.

31. In the event that it is not possible to hold the workshops in person (due to Covid-19 restrictions) then they will be held virtually.

### Engagement: Stage 2

32. Feedback from the workshop and the Design Council will then be fed into the Landscape Masterplan and Architectural Framework as appropriate. Once a finalised draft is available, the documents will be circulated to the attendees of the workshop and a further one day workshop will be arranged to present the detail and explain the rationale behind the final decisions, and provide an opportunity for final comment.
33. The documents will then be finalised and details of proposed layout, scale and external appearance of the substations will be submitted to ESC for their approval.

### Time Scales

34. The following indicative timescales are proposed to accommodate stakeholder engagement:

- **Prior to Granting of Development Consent Order**

- Early consultation with ESC during the DCO recommendation and determination period;
- Further development of the Landscape Masterplan;
- Development of the Architectural Framework;
- Design Council early engagement;
- Supply chain engagement; and
- Further development and refinement of substations design concept.

- **Following receipt of Development Consent: Month 1**

- Set up stakeholder engagement workshop and circulate draft documents; and
- Provide information to Design Council.

- **Month 2**

- Hold workshop with stakeholders to discuss Landscape Masterplan and Architectural Framework; and
- Design Council liaison.

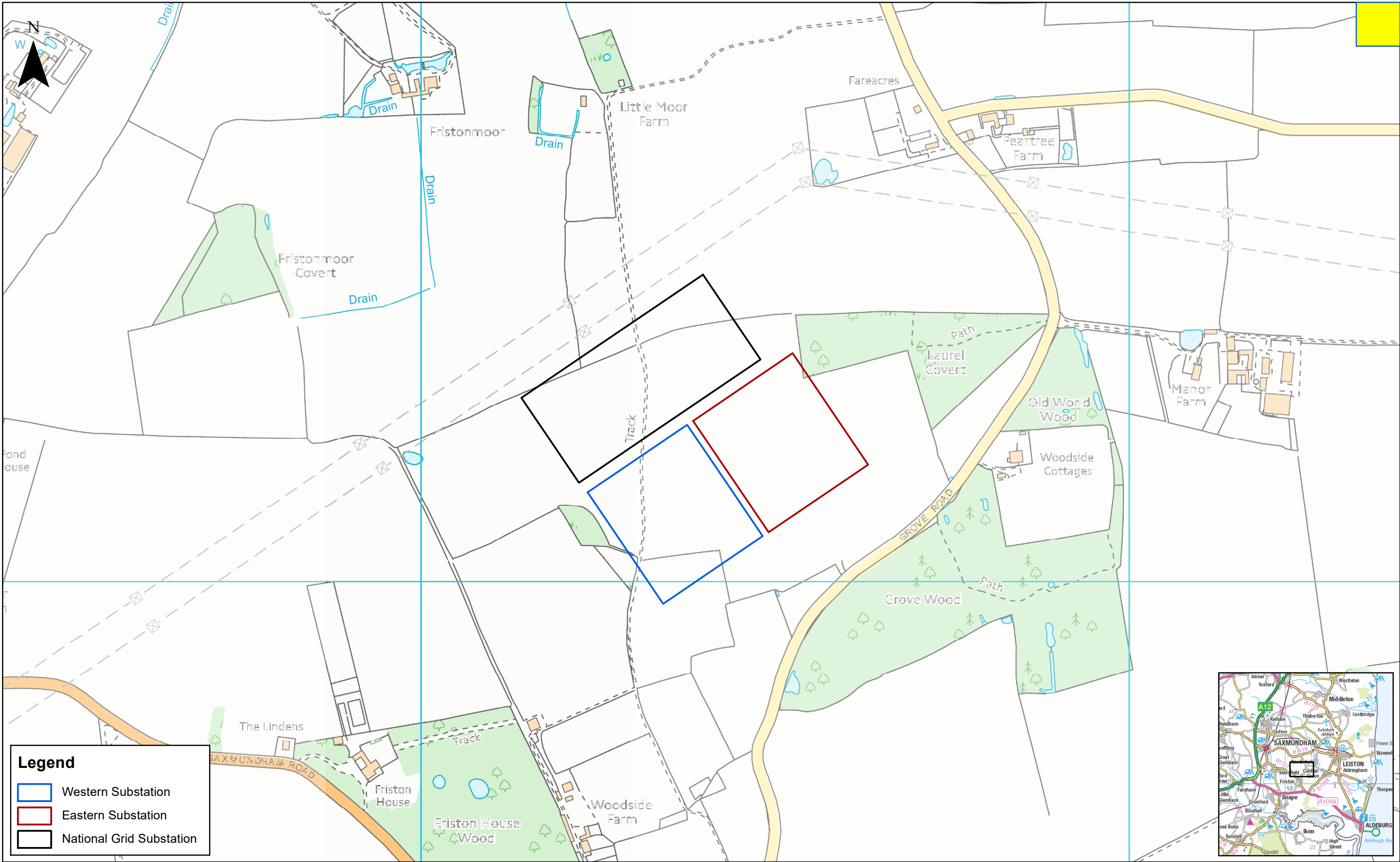



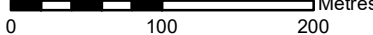
- **Month 3**
  - Further develop the Landscape Masterplan following outcomes of workshop;
  - Further develop the Architectural Framework following outcomes of the workshop;
  - Receive final comments from stakeholders; and
  - Receive comments from the Design Council.
- **Month 4**
  - Refine Landscape Masterplan; and
  - Refine Architectural Framework.
- **Month 5**
  - Attend workshop with stakeholders to provide update on the Landscape Masterplan and the Architectural Framework; and
  - Submit final Landscape Masterplan and Architectural Framework for ESC comment.
- **Month 6**
  - ESC comments on the Landscape Masterplan and Architectural Framework.
- **Month 7 onwards**
  - Applicant commences process of submitting Requirement Discharge Documents addressing Requirement 12 (Detail Design); Requirement 14 (Landscape Management Plan) and Requirement 17 (Fencing) for the substation complex within the framework of the Landscape Masterplan and Architectural Framework.



## Appendix B: Figures





 <b>SCOTTISHPOWER RENEWABLES</b>						1:5,000		<b>East Anglia ONE North</b>	<b>Drg No</b>	EA1N-DEV-DRG-IBR-001270	
				Prepared:	AB	<b>Scale @ A3</b>			<b>Rev</b>	1	Coordinate System: BNG Datum: OSGB36
	1	13/01/2021	AB	First Issue.	Checked:	KC	<small>Source: © Crown copyright and database rights 2021. Ordnance Survey 0100031673. This map has been produced to the latest known information at the time of issue, and has been produced for your information only. Please consult with the SPR Onshore GIS team to ensure the content is still current before using the information contained on this map. To the fullest extent permitted by law, we accept no responsibility or liability (whether in contract, tort (including negligence) or otherwise in respect of any errors or omissions in the information contained in the map and shall not be liable for any loss, damage or expense caused by such errors or omissions.</small>		<b>Date</b>	13/01/21	
	<b>Rev</b>	<b>Date</b>	<b>By</b>	<b>Comment</b>	<b>Approved:</b>	FM			<b>Figure</b>	1	