NORTH FALLS

Offshore Wind Farm

DESIGN VISION

North Falls Offshore Wind Farm

Document Reference No: 004577036-04
Date: 06 February 2023
Revision: 04

DESIGN VISION

06 February 2023

Project	North Falls Offshore Wind Farm
Sub-Project or Package	Project Design
Document Title	Design Vision
Document Reference	004577036-04
Revision	04 (Draft B)
Supplier Reference No	PB9244-RHD-ZZ-ON-RP-YE-0153

Revision	Date	Status/Reason for Issue	Originator	Checked	Approved
01 (Draft B)	26/08/22	Draft for NFOW review	LUC	GC	-
02 (Draft B)	02/11/22	Draft for NFOW review	LUC	AH	-
03 (Draft A)	29/11/22	Draft for NFOW review	LUC	GC	-
04 (Draft B)	06/02/23	Final for issue	LUC	GC/AH	JP/DH

Contents

Tables

Plates

Figures

Glossary of Acronyms

AIS	Air-Insulated Switchgear
AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
BNG	Biodiversity Net Gain
DCO	Development Consent Order
DNPS	Draft National Policy Statement
EACN	East Anglia Coastal Node substation
EDG	Essex Design Guide
EGIS	Essex Green Infrastructure Strategy
EN-1	Overarching National Policy Statement for Energy
EN-3	National Policy Statement for Renewable Energy Infrastructure
EN-5	National Policy Statement for Electricity Networks Infrastructure
ESuDS	Essex Sustainable Drainage Systems Design Guide
ETP	Essex Tree Palette
GBI	Green and Blue Infrastructure
GI	Green Infrastructure
GIS	Gas Insulated Switchgear
IEMA	Institute of Environmental Management and Assessment
IPC	Infrastructure Planning Commission
LCA	Local Character Area
NCA	National Character Area
NFOW	North Falls Offshore Wind Farm Limited
NIC	National Infrastructure Commissions
NIS	National Infrastructure Strategy
NPS	National Policy Statements
NSIP	Nationally Significant Infrastructure Project
PEIR	Preliminary Environmental Information Report
PRoW	Public Rights of Way
SEO	Statements of Environmental Opportunity
SuDS	Sustainable Drainage Systems
TLCA	Tendring District Landscape Character Assessment

Glossary of Terminology

Onshore project area	The boundary in which all onshore infrastructure required for the Project will be located (i.e. landfall; onshore cable route, accesses, construction compounds; onshore substation and National Grid substation extension), as considered within the PEIR.
The Applicant	North Falls Offshore Wind Farm Limited (NFOW).
The Project Or 'North Falls'	North Falls Offshore Wind Farm, including all onshore and offshore infrastructure.
Onshore cable corridor(s)	Onshore corridor(s) within which the onshore export cables and associated infrastructure will be located. A final onshore cable route for which consent will be sought will be selected from within these corridor(s).
Onshore substation	A compound containing electrical equipment required to transform and stabilise electricity generated by the Project so that it can be connected to the National Grid.
Onshore substation zone	Area within which the onshore substation will be located.

1 Design Vision Overview

1.1 Introduction

1. The Design Vision for the North Falls Offshore Wind Farm (NFOW) (hereafter referred to as 'North Falls' or 'the Project') outlines a series of design principles that will be used to guide the emerging development proposals. The principles respond positively to the range of constraints and opportunities arising from the site and its surrounding context, whilst responding to the necessary technical requirements of the Project and statutory guidance. The principles set out in the Design Vision seek to enhance and strengthen the landscape character of the North Falls setting, ensuring that a sensitive and high quality development is successfully integrated within the local community.
2. Large infrastructure developments are required to mitigate adverse effects as a result of their development, during construction, operation and decommissioning. The Design Vision therefore anticipates the likely mitigation measures that may be needed to reduce these effects and includes them within the overarching design principles. In this way they will feed into the iterative design process with the wider project team involved in design and delivery.
3. Key considerations include:
    - Site Layout;
    - Built Form;
    - Materials and Colour;
    - Access;
    - Public Rights of Way (PRoW);
    - Earthworks;
    - Boundary Treatments;
    - Hard Landscape;
    - Lighting;
    - Ecological Enhancements; and
    - Drainage and Water.
4. The Design Vision principles are informed through research as well as National and Local policy and guidance documents. The Design Vision will help guide design and engineering teams through the development of the Project, working as a reference document that provides technical and enhancement proposals to mitigate the impacts of the development. The Design Vision also allows all people working on the Project to engage with and implement design principles at every step of the Project's development and delivery. The design principles will evolve through the early stages of the Project's development, later providing a fixed reference point through the later stages to ensure a successful scheme is delivered responding to all relevant design opportunities.

5. The visualisations, plans and precedent imagery shown throughout the Design Vision are intended to provide visual representations for illustrative purposes only. The final design of the North Falls onshore substation and associated infrastructure will be confirmed through detailed design and engineering that will be undertaken post-consent and agreed with relevant stakeholders and local authorities.

1.2 Existing Documents

1.2.1 North Falls Preliminary Environmental Information Report (PEIR)

6. The Design Vision will accompany the North Falls PEIR. Relevant chapters have provided detailed information around topics discussed in the Design Vision, such as visual receptors highlighted in Chapter 30 Landscape and Visual Impact Assessment (LVIA) (Volume I), or Biodiversity Net Gain (BNG) opportunity areas highlighted in Chapter 23 Onshore Ecology (Volume I). Chapters relevant to Design Vision principles will be referenced throughout the document and include:

- Chapter 21 Water Resources and Flood Risk (Volume I);
- Chapter 22 Land Use and Agriculture (Volume I);
- Chapter 23 Onshore Ecology (Volume I);
- Chapter 24 Onshore Ornithology (Volume I);
- Chapter 25 Onshore Archaeology and Cultural Heritage (Volume I);
- Chapter 26 Noise and Vibration (Volume I);
- Chapter 27 Traffic and Transport (Volume I);
- Chapter 30 Landscape and Visual Impact Assessment (Volume I); and
- Chapter 33 Climate Change (Volume I).

1.2.2 Collaboration with Other Projects

7. North Falls are aware that part of good design includes ensuring that opportunities to collaborate with other nearby developments during the design and construction phases will minimise impacts as far as possible and ensure an overall harmonious design. The Project has therefore sought, within the context of the onshore substation zone, to find opportunities for design collaboration between North Falls, East Anglia Coastal Node substation (EACN) and the Five Estuaries Offshore Wind Farm project (‘Five Estuaries’) which are at a similar early stage in the design and engineering process. An awareness of these schemes has influenced the Design Vision principles, which will inform the detailed substation design and engineering that will be undertaken post-consent.

2 Guidance and Policies

2.1 National Planning Policy

2.1.1 National Policy Statement for Energy Infrastructure, 2011 (NPS, 2011)

8. There are six National Planning Policy Statements, which set out current government policy on different types of national energy infrastructure development. The Overarching NPS for Energy (EN-1) sets out the Government's policy for delivery of major energy infrastructure. The remaining five technology-specific NPSs should be read in conjunction with EN-1.

9. Section 4.5, identifies the 'criteria for "good design" for energy infrastructure'. These include:

   - Paragraph 4.5.1, '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';
   - Paragraph 4.5.2, 'good design, in terms of siting and use of appropriate technologies can help mitigate adverse impacts';
   - Paragraph 4.5.3, 'the applicant has taken into account the functionality (including fitness for purpose and sustainability) and aesthetics (including its contribution to the quality of the area in which it would be located) as far as possible and 'demonstrate good design […] relative to existing landscape character, landform and vegetation';
   - Paragraph 4.5.4, demonstrate *'how the proposed design evolved'* and the reasons for these changes; and
   - Paragraph 4.5.5, consider 'taking independent professional advice on the design aspects of the proposal'.

10. Section 5.3, '*Biodiversity and geological conservation*' states that the applicant should include appropriate mitigation measures;

    Paragraph 5.3.18, outlines these measures as 'confined to the minimum areas required for the works. During construction and operation best practice will be followed to ensure that risk of disturbance or damage to species or habitats is minimised. Habitats will, where practicable, be restored after construction works have finished. Opportunities will be taken to enhance existing habitats and, where practicable, to create new habitats of value'.

11. Section 5.8, '*Historic Environment*' states that the construction, operation and decommissioning of energy infrastructure has the potential to result in adverse impacts on the historic environment. Considerations relevant to the Design Vision for the onshore substation include;

    - Paragraph 5.8.6, 'the impacts on other non-designated heritage assets'.
    - Paragraph 5.8.13, 'consideration of design should include scale, height, massing, alignment, materials and use'.

12. Section 5.9, '*Landscape and Visual*' stipulates that a landscape and visual assessment should be carried out by the applicant. Considerations relevant to the Design Vision for the onshore substation include;

- Paragraph 5.9.22, ‘adverse landscape and visual effects may be minimised through appropriate siting of infrastructure within that site, design including colours and materials, and landscaping schemes’. ‘Materials and designs of buildings should always be given careful consideration’.
- Paragraph 5.9.23, ‘Depending on topography of the surrounding terrain and areas of population it may be appropriate to undertake landscaping off site. For example, filling in gaps in existing tree and hedge lines’.

13. Section 5.10, ‘Land use including open space, green infrastructure and Green Belt’ acknowledges that provision of energy infrastructure may have ‘particular effects on open space including green infrastructure’. The Mitigation section provides considerations relevant to the Design Vision for the onshore substation. These include;
    - Paragraph 5.10.20, ‘Where green infrastructure is affected, the [Secretary of State] should consider imposing requirements to ensure the connectivity of the green infrastructure network is maintained’. and ‘that any necessary work are undertaken, where possible, to mitigate any adverse impact and, where appropriate, to improve that network’.
    - Paragraph 5.10.24, ‘Rights of way, National Trails and other rights of access to land are important recreational facilities’. ‘The [Secretary of State] should expect applicants to take appropriate mitigation measures to address adverse effects’.
14. The NPS for Renewable Energy Infrastructure (EN-3) provides the primary basis for decisions by the Planning Inspectorate on applications for nationally significant renewable energy infrastructure.
15. Section 2.4 provides summary ‘criteria for “good design” for energy infrastructure’. It states that proposals 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’.
16. Section 2.6, ‘*Offshore Wind*’ provides specific guidance in relation to offshore wind farms and their infrastructure. Considerations relevant to the Design Vision for the onshore substation include;
    - Paragraph 2.6.70 (Impacts on Biodiversity), ‘Mitigation may be possible in the form of careful design of the development itself’.
    - Paragraph 2.6.144 (Impacts on Historic Environment), ‘The [Secretary of State] should be satisfied that offshore wind farms and associated infrastructure have been designed sensitively, taking account known heritage assets and their status’.
17. The NPS for Electricity Networks Infrastructure (EN-5) provides the primary basis for decisions by the Secretary of State (successor to the Infrastructure Planning Commission (IPC)) on applications for electricity networks infrastructure. It sets out technology-specific considerations on Biodiversity and Landscape and Visual impacts. Considerations relevant to the Design Vision for the onshore substation include;
    - Paragraph 2.2.5, ‘how they [the substation] are placed in the local landscape taking account of such things as local topography and the possibility of screening’.

2.1.2 Draft Revised National Policy (DNPS, 2021)

18. In December 2020 the Government published its Energy White Paper; '*Powering our net zero future*'. This outlined its long-term strategy to deliver its statutory commitment to achieve net zero emissions by 2020.

19. In order to achieve the change in policy, the Government reviewed its existing National Policy Statements (NPS) for energy, with subsequent updates for EN-1 to EN-5 undertaken. These were published in draft form in September 2021 and are likely to be adopted prior to the determination of the application, therefore these have been given precedence when considering their application to the Design Vision.

2.1.3 Draft overarching NPS for Energy, EN-1 (DNPS, 2021)

20. Section 4.6 identifies the criteria for '*Good Design*' for energy infrastructure. In summary key policy requirements include:

- Design principles (taking account of national guidance on infrastructure design, such as the Design Principles for National Infrastructure, published by the National Infrastructure Commission in Feb 2020) should be established from the outset of the Project to guide the development from conception to operation;
- Energy infrastructure developments should be 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;
- Applicants should take into account both functionality (including fitness for purpose and sustainability) and aesthetics (including its contribution to the quality of the area in which it would be located, any potential amenity benefits, and visual impacts on the landscape or seascape) as far as possible;
- Applicants should be able to demonstrate how the design has evolved and why the favoured choice has been selected (this includes considerations of siting relative to existing landscape character, landform and vegetation);
- The Secretary of State should take into account the ultimate purpose of the infrastructure and bear in mind the operational, safety and security requirements which the design has to satisfy. Many of the wider impacts of a development, such as landscape and environmental impacts, will be important factors in the design process; and
- Applicants and the Secretary of State should consider taking independent professional advice on the design aspects of a proposal (e.g. from the Design Council).

2.1.4 Draft NPS for Renewable Energy Infrastructure, EN-3 (DNPS, 2021)

21. Paragraph 2.4.2 requires renewable energy infrastructure proposals to 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.

2.1.5 Draft NPS for Electricity Networks Infrastructure, EN-5 (DNPS, 2021)

22. In the context of delivering good design, Paragraph 2.7.2 acknowledges that electricity networks infrastructure must in the first instance be safe and secure. As such it states that while good design opportunities for such infrastructure should be maximised (including through avoiding/mitigating potential adverse impacts) these should not threaten the functional performance of the infrastructure in respect of security of supply and public and occupational safety.

23. There is a wide body of national and design guidance documents which cover best practice and design standards, which will be used in the development of the onshore substation where relevant. An overview of some of the key documents has been provided below which includes:

- National Infrastructure Commission Design Principles for National Infrastructure, (NIC, 2020);
- IEMA Environmental Impact Assessment Guide to Delivering Quality Development, (IEMA, 2016);
- National Infrastructure Strategy, (NIS, 2020);
- Tendring Landscape Character Assessment – LCA 7A, (TLCA, 2001);
- Essex Design Guide, (EDG, 2018);
- Essex Sustainable Drainage Systems Design Guide, (ESuDS, 2020);
- Essex Green Infrastructure Strategy, (EGIS, 2020); and
- Essex Tree Palette, (ETP, 2018).

2.2 National Design Guidance

2.2.1 National Infrastructure Commissions Design Principles for National Infrastructure (NIC, 2020):

24. The most prominent guidance document is the National Infrastructure Commissions (NIC) Design Principles for National Infrastructure, 2020. The NIC outlines four key design principles, that should be key considerations throughout the design process to shape a positive future for infrastructure design in the UK. These are:

- Climate: Mitigate greenhouse gas emissions and adapt to climate change;
- People: Reflect what society wants and share benefits widely;
- Places: Provide a sense of identity and improve our environment; and
- Value: Achieve multiple benefits and solve problems well.

Plate 2.1 NIC Key Design Principles (NIC, 2020)

25. The four key principles have been referenced throughout the Design Vision (Section 5 of this document) highlighting how these principles have influenced the design approach to achieve a successful scheme that provides benefits throughout the Project's lifespan.

2.2.2 IEMA Environmental Impact Assessment Guide to Delivering Quality Development (IEMA, 2016):

26. The focus of the guide is on the delivery of mitigation associated with new development; improving practice so that efforts at the design and pre-application stage to develop mitigation are carried forward with full understanding at the implementation and management stages.

27. Three key principles to delivering quality development are set out within the report. Principle 1 is the most relevant to the development of a Design Vision. This states that '*there should be pro-active collaboration with stakeholders, both internally within the project team (developer / designer / contractor / construction delivery teams) and externally (consenting authority and key stakeholders)'.* Consideration of likely mitigation should be undertaken by competent environmental experts from the earliest possible design stage following the completion of baseline data collection and appraisal, interacting with the Project team, consenting authority, key stakeholders and ideally the construction teams/contractors responsible for the delivery of the Project. This approach maximises the likelihood of success and cost effectiveness of mitigation and ensures the technical and financial viability of mitigation can be rigorously evaluated.

28. The assessment states that the design and incorporation of mitigation measures should be an iterative process, continuing beyond the pre-application process.

2.2.3 National Infrastructure Strategy (NIS, 2020):

29. The National Infrastructure Strategy sets out plans to transform how UK infrastructure is delivered, designed and funded. As stated, *'This Strategy sets out the government's plans to transform its approach to infrastructure policy and delivery, to meet both the short- and long-term challenges facing the UK'*.

30. Embedding good design in all infrastructure projects is an essential element in securing high performance of infrastructure from the start. The National Infrastructure Strategy outlines three methods for embedding good design in line with the design principles set out by the NIC. These include:

- 'Local plans which set clear rules rather than general policies for development, so that quality cannot be negotiated away, nor can the lived experience of the consumer be ignored too readily';
- 'A reformed planning system which brings forward a new focus on design and sustainability in national policy and practice, building on the National Design Guide'; and
- 'Requiring all infrastructure projects to have a board level design champion in place by the end of 2021 at either the project, programme or organisational level, supported where appropriate by design panels'.

2.3 Local Design Guidance

31. Other key guidance documents include:

2.3.1 Tendring Landscape Character Assessment – LCA 7A (TLCA, 2001):

32. The Tendring Landscape Character Assessment provides an overview of the existing landscape character covering the onshore substation zone and the surrounding vicinity. The onshore substation zone is located entirely within Landscape Character Area 7 - Heathland Plateaux, and locally situated within Landscape Character 7A - Bromley Heaths. General design guidance within character area 7A is outlined in the assessment to inform new development. The most relevant criteria to the onshore substation zone are:

- '*The large-scale open landscape means that particular care must be taken in siting and design. Any new development, even single farm buildings have the potential to be highly visible over long distances'*;
- '*Plateau edges form highly visible skylines and are particularly sensitive to built development';*
- *'The church towers frequently form prominent landmark features within this open landscape and views to these should be conserved';*
- *'Care should be taken in the siting of communication masts or other vertical elements – isolated elements may act as landmark features, but several can lead to a cluttered skyline';*
- *'New buildings should be constructed in such a way that they blend with the landscape in scale, colour and design. In this very large scale, open landscape it would be inappropriate to try and hide a new building behind earth bunds or vegetation';*
- *'Opportunities exist for innovative architecture providing it fits with the scale of the landscape, responds to local landform and utilises local materials';*
- *'Sympathetic roof design and materials are critical to the character of local buildings';* and
- *'Local features of interest, such as louvred panels, can add detail to farm buildings'.*

2.3.2 Essex Design Guide (EDG, 2018):

33. The Essex Design Guide originated in 1973, with a focus on the design of new housing areas. Whilst it continues to primarily offer guidance on residential areas, it also provides other guidance on schools, solar farms and mixed-use development. There is also a section providing Commercial, Industrial and Larger Footprint Building Guidance, identifying five key design principles, four of which are identified as relevant to the development site;

34. **Principle 1** - Layout: the guidance recognises that large footprint commercial and industrial buildings are one of the more challenging developments to design sympathetically and effectively, with much of the success coming from an appropriate and well thought out approach to the layout. The guidance reinforces the need for each site to respond to its specific context, allowing larger footprint

buildings to assimilate and integrate well with the prevailing landscape and existing built form. Use of landform, either by sinking elements into the landscape, using gradients to build into the landscape, retaining pre-existing landform and natural site boundaries (hedgerows, lines of trees) to screen are all identified. Though should also be given to using appropriate boundary treatments and planting to provide shading to buildings and parked vehicles, improving local air quality, enhancing local biodiversity and ensuring sustainable drainage on site.

35. **Principle 2** - Access and Parking: the guidance recognises that larger footprint buildings are often located in remote/edge of settlement locations and have a high reliance on car use. Whilst guidance on the provision of public transport and car reduction are not wholly appropriate to the delivery of Nationally Significant Infrastructure Projects (NSIPs), useful guidance is provided on the design and layout of parking areas, with the aim to achieve a safe, attractive and flexible environment, which future-proofs provision in preparation for changes in technology, car ownership and driving behaviour. Measures to reduce the dominance of parking areas within the public realm are recommended, including use of permeable hard surfaces and regular landscape breaks to 'soften' the environment, offering additional benefits to biodiversity, microclimate and SUDS.

36. **Principle 3** - Materials, Character and Architecture: the guidance advises that a contextual appraisal, landscape character assessments and local vernacular guides should inform the design process of any new development, informing the choice of materials, boundary treatments and architectural style. Appropriate proportion and scale are highlighted as being challenging to large scale industrial or commercial buildings and options to visually 'break up' elevations should be considered. The buildings should be considered features in themselves and there should not be an overt reliance on screening them as the default approach to managing their impact and that of associated infrastructure. The guidance notes the importance of considering which are the primary and secondary frontages of buildings to inform choice in quality and materiality of elevational materials. Effective and innovative methods of interpreting the traditional, vernacular palette should be explored, with landscaping considered an integral part in the contribution to the character, aesthetics and sense of place.

37. **Principle 5** - Sustainability and Heath: This guidance states that principles for sustainable design and construction will apply to larger footprint buildings, including use of locally sourced materials, renewable energy sources and creation of comprehensive water and waste management schemes. They should also seek to provide a biodiversity 'net gain' by considering the inclusion of living walls, green roofs and considering other sustainable measure such as rainwater harvesting and permeable paving.

2.3.3 Essex Sustainable Drainage Systems Design Guide (ESuDS, 2020):

38. The Essex Sustainable Drainage Systems Design Guide promotes a more sustainable form of drainage and the highlights the overall benefits of Sustainable Drainage Systems (SuDS), which include:

    - Water quality – SuDS can help prevent and treat pollution in surface water runoff, protecting and enhancing the environment;
    - Amenity – SuDS can have visual and community benefits for the community; and

- Biodiversity – SuDS can provide the opportunity to create and improve habitats for wildlife, enhancing biodiversity, and enable multi-functional green infrastructure.

39. The document outlines the best practice and technical guidance for the implementation of appropriately designed and constructed SuDS. This will be used to inform the development of appropriate, site-specific SuDS designs for the North Falls site.

40. The guidance note identifies that SuDS can be introduced throughout a development as soakaways, filter strips, swales, bioretention areas, detention basins, ponds and permeable paving. The SuDS Design Guide also advises how SuDS mitigate the adverse effects of water run-off, some of the effects relevant to the onshore substation include:

    - Reducing run-off rates, thereby lessening the risk of flooding downstream;
    - Reducing pollution risks associated with development; and
    - Providing habitats for wildlife and opportunities for biodiversity enrichment.

2.3.4 Essex Green Infrastructure Strategy (EGIS, 2020):

41. Essex Green Infrastructure Strategy was created in 2020 to promote high quality green spaces and green infrastructure in Essex. As stated in the document introduction '*The aim is to guide and shape planning and other services through setting principles that can inform plans and strategies, that will enable a coherent approach and partner collaboration in the delivery and long-term management of multi-functional natural assets, which will provide environmental, social and economic benefits'.*

42. Some of the relevant environmental, social and economic benefits of green infrastructure, which will be relevant to the design of the onshore substation include:

    - Space and habitat for wildlife, with access to nature for people;
    - Adapting to and mitigating climate change, such as managing floods and air pollution; and
    - Enhancing and protecting biodiversity.

2.3.5 Essex Tree Palette (ETP, 2018):

43. Essex Tree Palette provides a reliable guide for selecting the most appropriate species of locally native tree that are suitable to plant in non-urban parts of Essex according to the predominant landscape character and soil geology. The palette includes trees suitable for hedgerows and woodlands. As stated, '*The palette is deliberately a small list with the intention that the planting will be enriched by natural regeneration from the surrounding countryside which will better reflect the local variation in tree species. We advocate considering using natural regeneration on its own where viable'*. As well as suggesting species that are relevant to plant it also suggests species, which should be avoided.

44. This guidance, baseline ecological surveys and landscape character information, will be used to inform the list of species suggested within the Design Vision principles.

3 North Falls Onshore Substation

3.1 Project Description

45. North Falls is a proposed extension located west of the existing Greater Gabbard offshore wind farm, which is located off the east coast of England in the Southern North Sea and was opened in 2013. The Project is being developed by North Falls Offshore Wind Farm Limited (NFOW), a joint venture between SSE Renewables and RWE.

46. The Project will comprise offshore wind turbine array areas, and up to two offshore electrical substation platforms which will be connected to the shore by offshore export cables installed within the offshore cable corridor. The Project also requires onshore infrastructure in order to connect the offshore wind farm to the National Grid, the footprint for which is collectively referred to as the 'onshore project area'. The onshore project area will comprise:

    - Landfall;
    - Buried onshore export cables located within the onshore cable route located within the onshore cable corridors, from landfall (between Clacton-on-Sea and Frinton-on-Sea) to the onshore substation and National Grid substation; and
    - Onshore substation.

47. The onshore substation will comprise a compound containing electrical equipment required to transform and stabilise electricity generated by the Project so that it can be connected to the National Grid. The detail and location of the various equipment will be determined as the Project design develops. At this stage in the Project's design, alternative technologies are being considered for transforming and stabilising the electricity, including air-insulated switchgear (AIS) or gas insulated switchgear (GIS). Depending on the technology selected different equipment will be required, including a GIS building (approximately 50 x 15 x 15m high) for GIS technology, or external busbar equipment over a larger footprint for AIS technology.

48. The buildings required for each technology will be included within the Project's design as presented as part of the Project's DCO application. The operational and functional requirements of the onshore substation will inform the detailed design and layout. The principles outlined in the Design Vision identify the design response that responds to the range of design and mitigation opportunities that will arise during the construction, operation and decommission of the onshore substation.

49. In April 2021, National Grid provided North Falls with a draft offer for connection at a new 'East Anglia Coastal' substation. No confirmed location for the new substation was provided within the offer. In December 2021 National Grid informally provided North Falls with confirmation that the new substation would be located in land east of the village of Ardleigh in Tendring district, Essex. To date, no formal location for the new substation which forms the basis of the grid connection offer has been made to North Falls.

50. North Falls has used this information as the basis of the site selection process for the Project, which has resulted in the identification of an onshore substation

zone. It is an approximately 60ha area located either side of Ardleigh Road to the east of the village of Ardleigh in Tendring district, Essex.

3.1.1 Consultation

51. As a Nationally Significant Infrastructure Project (NSIP), North Falls will carry out consultation with statutory consultees in accordance with the Planning Act 2008 and also consultation with non-statutory consultees. Local stakeholder and community consultation will be undertaken in the pre-application phase, providing the opportunity for stakeholders to review plans, provide comments, submit feedback on elements of the process and the development, which North Falls will consider.

4 Context Study

4.1 National and Local Context

4.1.1 Introduction

52. Reviewing the local context of the onshore substation helps provide a better understanding of the intrinsic landscape character, condition, visual amenity and underlying sensitivity of the area surrounding the onshore substation zone. Gaining an understanding of the inherent opportunities and constraints within the site context and identifying particularly sensitive receptors to potential impacts will allow us to develop more robust and locally appropriate solutions as part of the design response. Design guidance provided within baseline information sources, identified separately in Section 2.1, will also be used to inform the Design Vision.

4.1.2 Landscape Character

53. The onshore project area falls entirely within the County of Essex and is covered by the National Character Area (NCA) Northern Thames Basin 111 (NCA, 2013) The onshore substation zone is located entirely within Landscape Character Area 7 - Heathland Plateaux, and locally situated within Landscape Character 7A - Bromley as noted in the Tendring District Landscape Character Assessment (TLCA, 2001).

54. The character, constraints and condition outlined through the NCA and LCA assessments inform areas that may need to be addressed through Design Vision principles. These include managing water, habitat creation and retention and retaining the existing landscape typology to better integrate the onshore substation zone.

4.1.3 Landscape Character - National Scale

55. The predominant character area covering the onshore project area is National Character Area Profile 111 Northern Thames Basin. A section of the onshore cable corridor also briefly passes through National Character Area 81 Greater Thames Estuary. NCA 81 consists predominantly of a flat coastal landscape intersected by watercourses running adjacent to the coast. The onshore cable corridor passes through areas of marsh with a remnant 20th-century military pill box and a golf course before entering NCA 111. NCA 111 covers the majority of the onshore project area and the Northern Thames Basin's key characteristics as:

    - ‘‘There is a diverse range of semi-natural habitats (throughout the Basin). These include ancient woodland, lowland heath and floodplain grazing marsh. These provide important habitats for a wide range of species including great crested newt, water vole, dormouse and otter’;
    - ‘Parts of Essex are heavily wooded. Other areas within Essex are more open in character. There are also significant areas of wood pasture and pollarded veteran trees’;

- ‘Rich archaeology includes sites related to Roman occupation, including the Roman capital at Colchester and Roman city at St Albans (Verulamium)’;
- ‘Extensive tracts of flat land’;
- ‘The field pattern is very varied, reflecting historical activity’; and
- ‘The landscape has mixed farming uses.’ (NCA, 2013)

56. NCA 111 also sets out four Statements of Environmental Opportunities (SEO) for the Northern Thames Basin. These opportunities provide an overview of the environmental considerations that need to be addressed in the NCA. These include:

- ‘SEO 1 – Manage rivers and river valleys to protect and improve water quality and help to reduce flooding in the downstream urban areas’;
- ‘SEO 2 – Manage the agricultural landscape and diverse range of soils which allow the Northern Thames Basin to be a major food provider’;
- ‘SEO 3 – Protect and appropriately manage the historic environment, which contributes to local character and sense of identity’; and
- ‘SEO 4 - Manage and expand the significant areas of broadleaf woodland and wood pasture.’ (NCA, 2013).

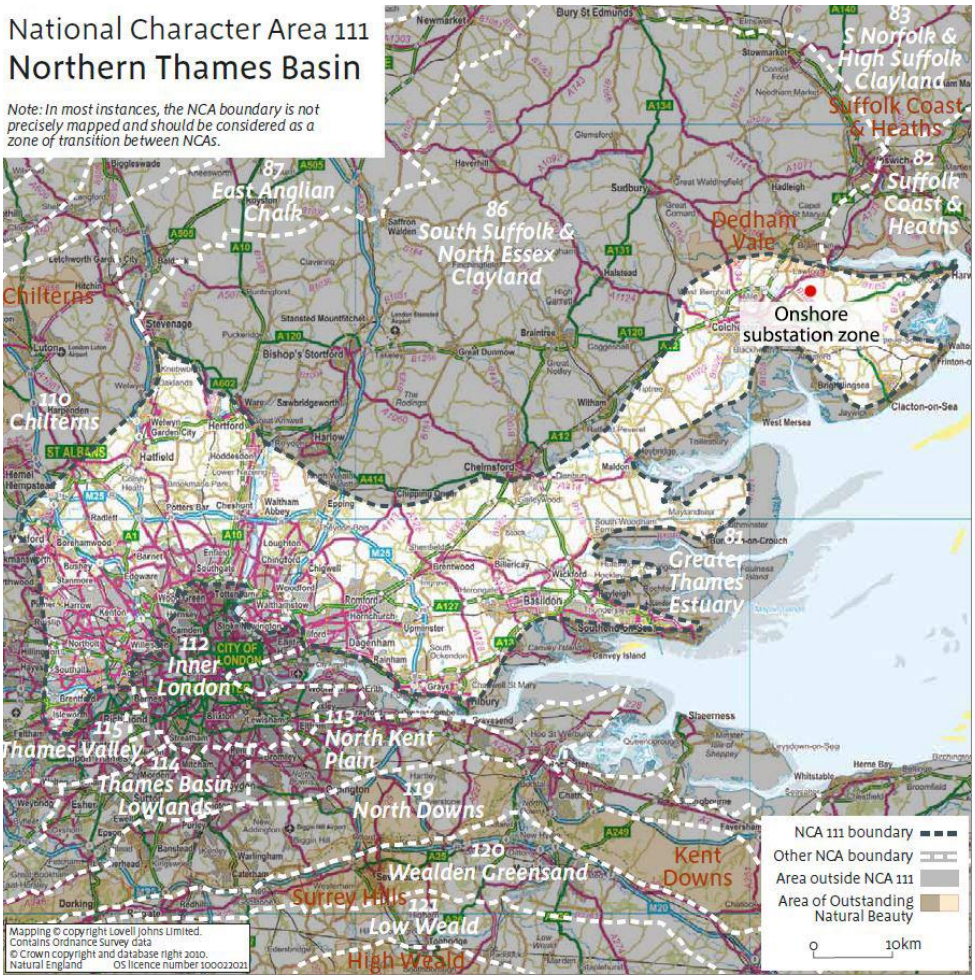


Figure 4.1 National Character Area 111 (NCA, 2013) – Northern Thames Basin NE466

4.1.4 Landscape Character - Local Scale

57. The onshore substation is covered by character area 7A Heathland Plateaux – Bromley Heaths, in the Tendring District Landscape Character Assessment. The key characteristics of this landscape, are noted as follows:

- ‘Exposed and windswept plateau corresponding to highest part of the district’;
- ‘Deep, coarse, loamy and often stoneless brown soils which support a high-grade agricultural land’;
- ‘Large scale productive arable fields divided by low, gappy hedgerows where hedgerow oaks stand out as silhouettes against the skyline’;
- ‘Apple orchards around Ardleigh, Elmstead and Frating are sheltered by belts of poplar or fast growing Leylandii’;
- ‘Former heaths largely converted to smallholdings or regenerating woodland. Small areas of remnant heath survive’;
- ‘Neglected oak/ sweet chestnut coppice with ground flora typical of acidic woodland soils’;
- ‘Low density, rural settlement pattern of scattered farms and halls, hamlets villages and small market towns’;
- ‘Network of narrow lanes connect scattered farms and villages, and roadside verges often contain gorse and bracken’; and
- ‘Dramatic, dominating skyline.’ (TLCA, 2001).

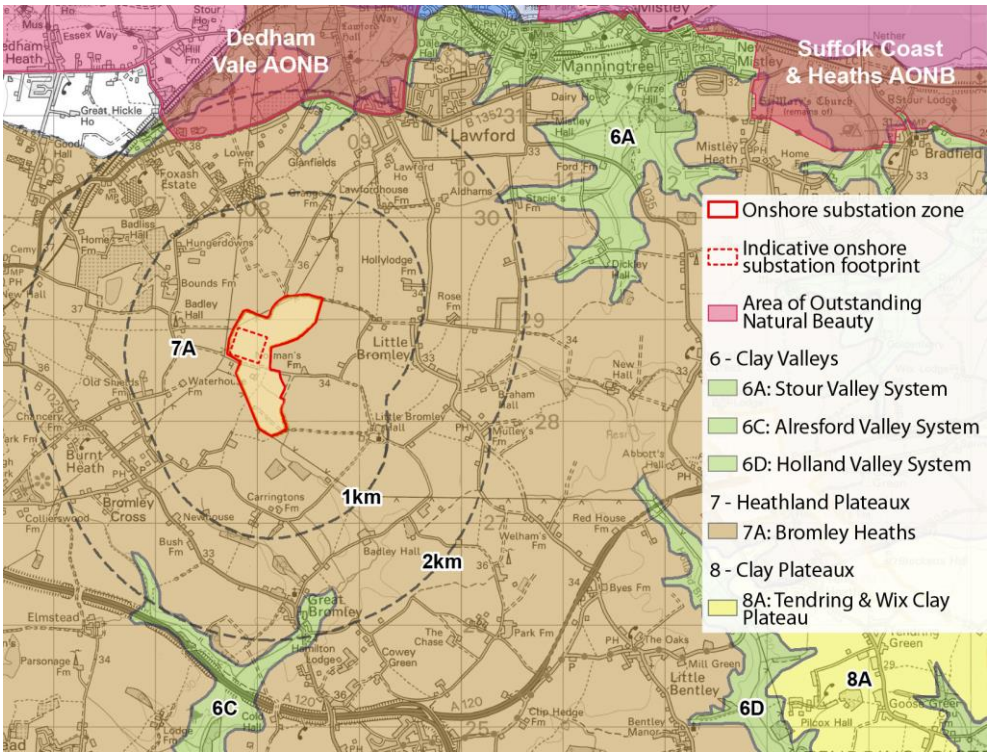


Figure 4.2 Plan showing landscape character areas encompassing the onshore substation zone

4.1.5 Landscape Designations

58. Additional context considerations include any landscape designations within the site itself or the wider study area. As stated in Chapter 30 LVIA (Volume I) the site is not located in any nationally designated landscapes (National Parks, Areas of Outstanding Natural Beauty) or locally designated landscapes (Areas of Special Character, as identified in the emerging Tendring District Local Plan 2013-2033 and beyond, publication draft).

59. The Suffolk Coast and Heaths Area of Outstanding Natural Beauty (AONB) is located outside of the study area being situated around 2km to the north, refer to Figure 4.2. Viewpoint assessment in Chapter 30 LVIA (Volume I) confirms that visibility from the AONB, towards the onshore substation zone, is limited. Due to distance and the limited nature of actual visibility, landscape effects on the special qualities of the AONB are unlikely to be significant.

60. The Dedham Vale AONB is located to the north-west of the study area. Chapter 30 LVIA (Volume I) notes that the potential for notable views from this designated landscape is considered unlikely, given the more inland location, narrower nature of the river corridor and intervening vegetation.

4.2 Onshore Substation Context

4.2.1 Landscape Context

61. The proposed North Falls onshore substation zone is located to the north-east of the existing National Grid substation, on Ardleigh Road. The site is located approximately 2km to the south-west of the settlement of Lawford, in Tendring.

62. The site is approximately 35m Above Ordnance Datum (AOD), with a generally flat landform across the site. The landcover is characterised by arable farmland with large-scale field patterns. Field boundaries across the onshore substation zone are generally open in character, with some hedgerow boundaries with occasional hedgerow trees. There is a greater level of tree cover along the boundary with Barn Lane and Grange Road, to the north and west, and around the existing substation on Ardleigh Road, to the south-west of the onshore substation zone. There are views across open to farmland to the east and south, with a steel-tower overhead electricity line that crosses the north-western edge of the site.

63. There are existing Public Rights of Way (PRoW) to the north of the site (170-25, 170-21, 170-22), east of the site (170-23, 170-57, 170-19, 172-12, 172-14) and south of the site (172-15). Barn Lane, a local byway (170-57) runs along the north-eastern boundary of the site. Refer to Figure 4.3 for existing PRoW, byways and bridleways.

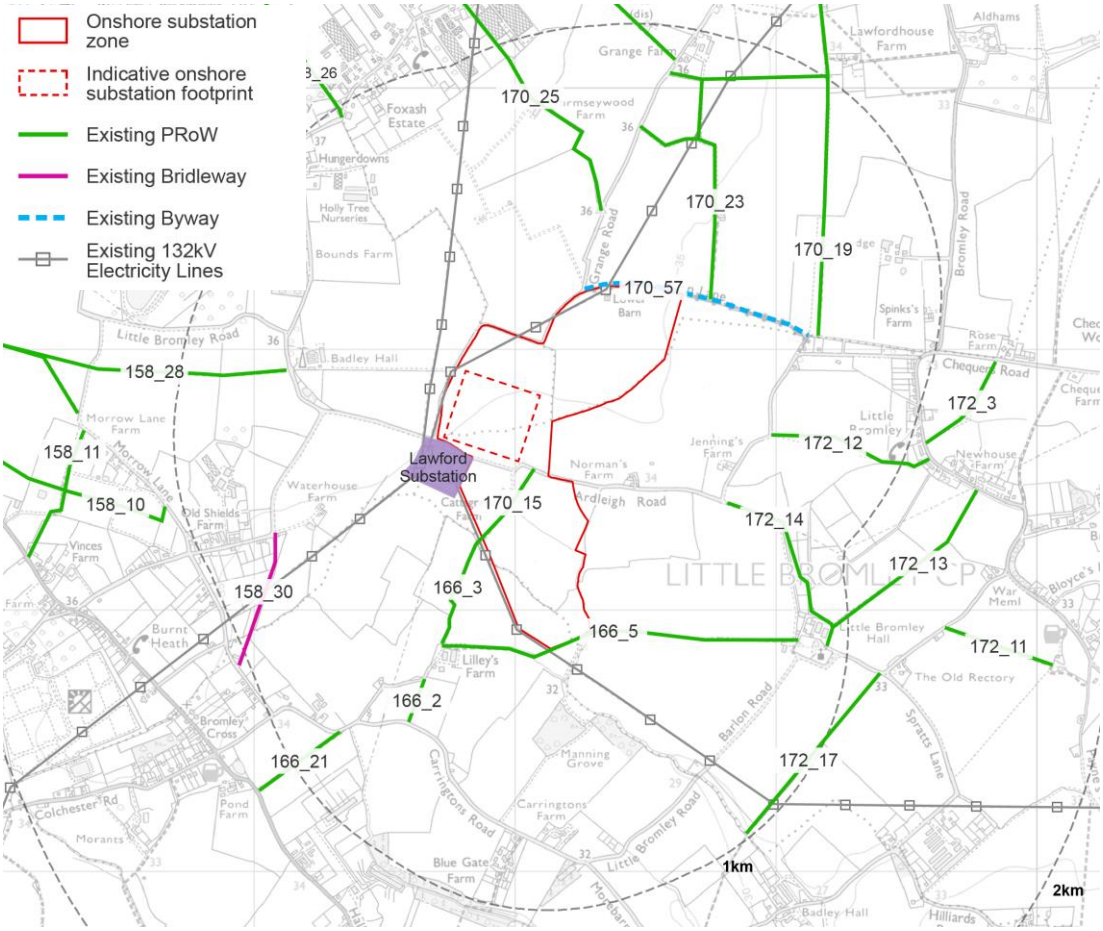


Figure 4.3 Existing PRoW, byways and bridleways

64. The exact location of the onshore substation footprint within the onshore substation zone is subject to further site selection work. In particular, this will be informed by an iterative EIA process that will consider a range of issues and constraints affecting the potential location of the substation footprint. This work will be undertaken and presented as part of the DCO application. The development of the onshore substation will have the potential to effect existing landscape elements. The following general design principles should therefore be considered when developing the site layout;

- Seek to retain hedgerow boundaries and occasional hedgerow trees along the north-western boundary, where possible;
- Seek to retain scattered mature trees along the south-eastern site boundary, where possible;
- Where not possible, tree and hedgerow losses should be replaced as part of a comprehensive soft landscape scheme;
- Consider how to address potential cumulative effects on the local landscape character resulting from the development in combination with the existing sub-station e.g. design of compound boundary and structures, earthworks and drainage.

4.2.2 Visual Context

65. The onshore substation zone is located between a number of small settlements including Little Bromley approximately 1km to the east, Bromley Cross approximately 1.5km to the southwest and Lawford approximately 2km to the northeast. The surrounding landscape slopes gradually from northwest to southeast towards the coast but is generally flat with some long-range views. As stated in Chapter 30 LVIA (Volume I), potential visual receptors surrounding the onshore substation zone include:

    - Residents, including views from isolated properties and small hamlets and settlements such as Norman's Farm to the east;
    - Road users along Little Bromley Road, Grange Road and Ardleigh Road (including tourists);
    - Those engaged in recreational activities (e.g. walkers using PRoW and bridleways, and cyclists and users of the coastal edge near the proposed landfall) primarily along PRoW 170_57, 172_15, 172_14 and 172_12; and
    - People at their place of work, including agricultural workers to the northwest of the site.

66. Chapter 30 LVIA (Volume I) highlights that 'there are a small number of properties and farmsteads generally focused to east and south-east of site (beyond 250m). Norman's Farm, to south-east, is the closest residential property and likely to experience more open secondary views to site. Views from properties on the western edge of Little Bromley, to the east, are secondary and typically filtered/ screened by intervening vegetation… There is a hedge lined footpath along Barn Lane (and associated bridleway) to the north-east of site… In terms of wider views, the substation study area is generally flat and hedgerows and areas of woodland will generally help to filter and screen middle to longer distance views.' Refer to Figure 4.4 for plan showing siting zone visibility.

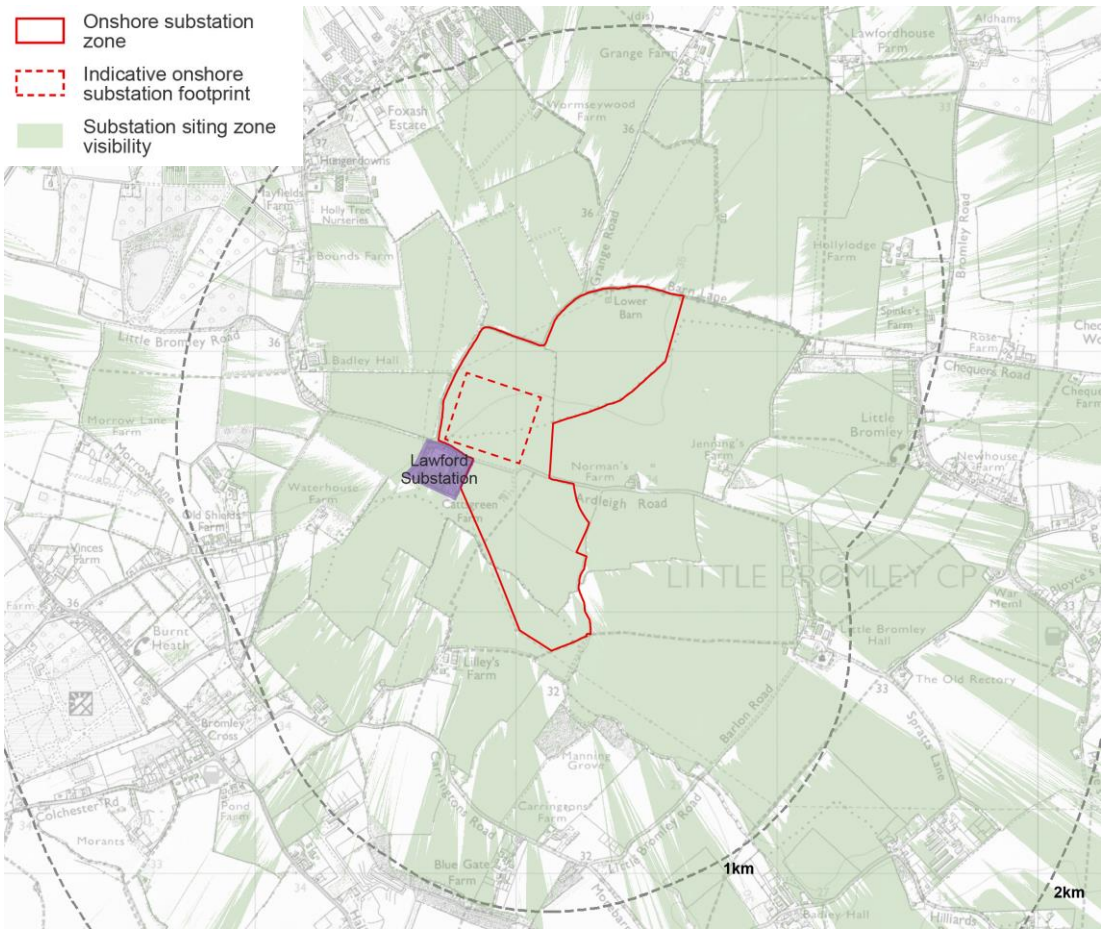


Figure 4.4 Substation siting zone visibility

67. The onshore substation zone is adjacent to the existing Lawford substation situated to the southwest of Ardleigh Road. Pylons connecting to the existing substation are visible in the landscape, but views of other electrical infrastructure equipment are screened from local receptors by mature clusters of trees. Ardleigh Road passes through the onshore substation zone running northwest to southeast. An existing PRoW runs through the southern section of the onshore substation zone connecting Ardleigh Road to Lilley's Lane.

68. The onshore substation zone is located within arable farmland with large scale field patterns. Field boundaries consist of a mixture of mature and gappy hedgerows with occasional hedgerow trees that provide seasonal screening. The individual and clusters of mature trees surrounding the onshore substation zone are easily visible in the landscape providing focal points. These natural elements enhance the rural character of the area. The only watercourse present in the onshore substation zone and the surrounding area runs through the fields to the south of the zone heading southwest. Refer to Figure 4.5 for plan showing indicative existing vegetation and watercourses.

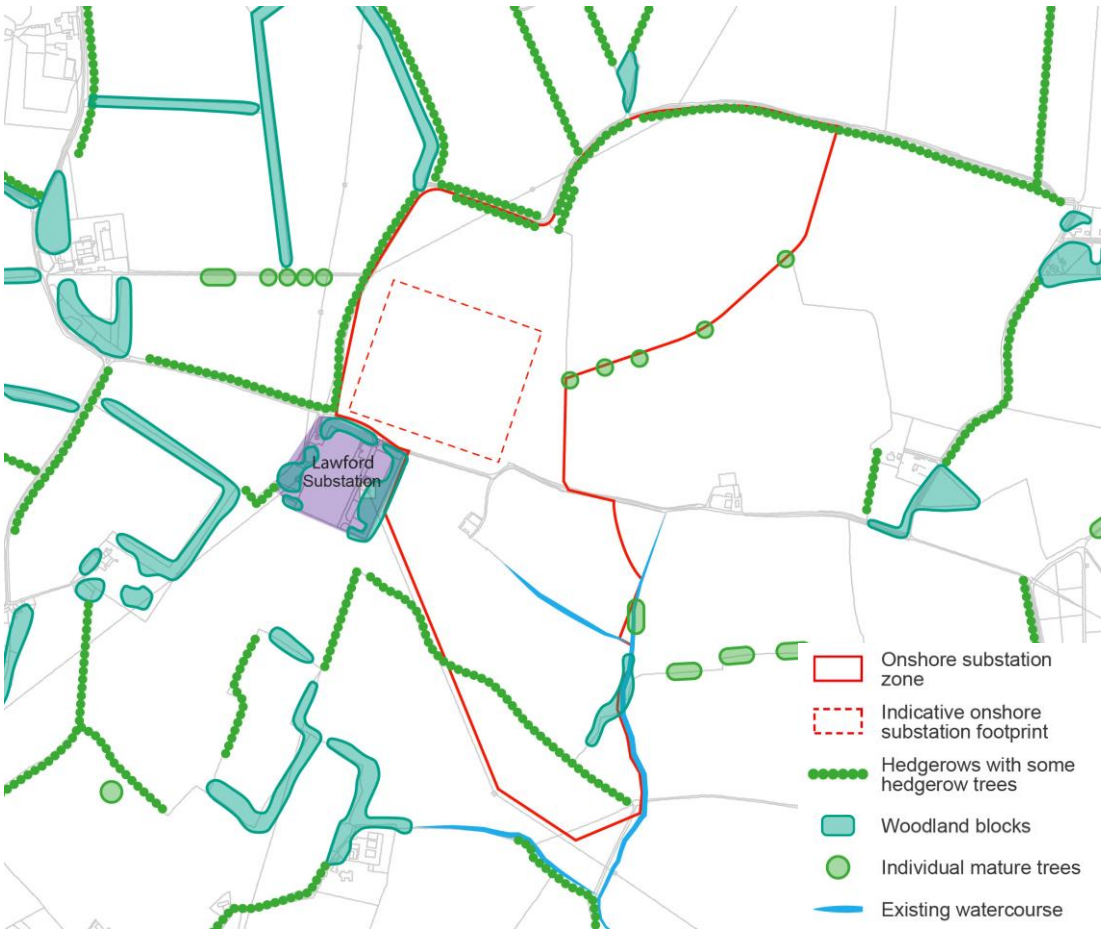


Figure 4.5 Existing vegetation and watercourses around the site

69. Whilst the exact location of onshore substation footprint within the onshore substation zone is currently unknown, development of the site clearly has the potential to affect existing visual amenity and the views experienced by a number of receptor groups. The following general design principles should therefore be considered when developing the substation site layout to reduce views of the operational footprint within the substation zone for these receptors;

- Consider how to address potential visual effects on sensitive PRoW users on routes to the north of the site (170-25, 170-22, 170-21), east of the site (170-57, 172-12, 172-14) and the south of the site (172-15);
- Consider how to address potential visual effects on sensitive residential receptors in isolated properties and farmsteads to the east and south-east of the site;
- Consider how to address potential cumulative impacts on the local landscape character resulting from the proposed development in combination with the existing sub-station and other planned substations in the surrounding area. These include placement of buildings and structures, design of compound boundary and retention of vegetation; and
- Consider how to address potential sequential visual effects experienced by road users within the zone of theoretical visibility.

4.2.3 Site Constraints and Opportunities

70. Reviewing the NCA, LCA and the onshore substation context, has identified a number of opportunities and constraints present around the onshore substation zone that the proposed design principles will need to address. These include:

Site Opportunities

- Generally flat topography within the onshore substation zone - this provides flexibility for initial siting and for construction of the substation and associated infrastructure. The exact location of the onshore substation footprint within the onshore substation zone is subject to further site selection work. In particular, this will be informed by an iterative EIA process that will consider a range of issues and constraints affecting the potential location of the substation footprint. This work will be undertaken and presented as part of the DCO application.
- Scope to enhance existing landscape - the existing site is used for intensive arable cultivation with minimal boundary vegetation, therefore provides significant scope for landscape, habitat and biodiversity enhancement through the introduction of native planting, SuDS etc.
- Local vernacular - the existing agricultural and horticultural structures around the onshore substation zone form a local vernacular reference that can be explored to better integrate the onshore substation into the setting.

Site Constraints

- Generally flat topography within surrounding landscape - this creates opportunities for long range views across the onshore substation zone and defines the type of vegetation or mitigation that can be used in certain areas due to landscape character;
- Sensitive visual receptors in the vicinity of the site – views of the site can be gained from visual receptors such as local residents and PRoW, consideration will need to be given siting of buildings and infrastructure, materials and colours used and the potential use of landform or vegetation to enhance screening of the site;
- Existing PRoW running along the north-east site boundary - this will require screening and potentially additional wayfinding to connect the PRoW network; and
- Additional substations and infrastructure - there will be additional substations built in the area for the EACN and Five Estuaries projects. This may increase the visual impact and mitigation needs of the onshore substation due to the quantity of electrical infrastructure in the surrounding areas.

5 Onshore Substation Zone Design Vision Statement

5.1 Introduction

71. As stated previously, the Design Vision outlines various principles that respond positively to the range of design and mitigation opportunities that may arise through the Project. These design principles will aim to ensure the site is

integrated into the surrounding landscape and mitigates any impacts from the construction, operation and decommissioning of the onshore substation.

5.1.1 Design Principles

72. The Design Vision outlines principles for the following areas:

- Site Layout;
- Built Form;
- Materials and Colour;
- Access;
- Public Rights of Way;
- Earthworks;
- Boundary Treatments;
- Hard Landscape;
- Lighting;
- Ecological Enhancements; and
- Drainage and Water.

73. Each of the North Falls design principles achieve a different combination of the principles outlined in the NIC document. The following table shows how each section relates individually to the NIC design principles. Summary text is provided after each section to highlight how good design is achieved in relation to climate, people and place. The integration of at least two or more NIC design principles in each section identifies the principle incorporates multiple 'Values' which are not separately identified.

Table 5.1 Relevance of NIC Design Principles

North Falls Design Principles	NIC Design Principles			
	Climate	People	Places	Value
Site Layout	✓		✓	✓
Built Form	✓	✓	✓	✓
Materials and Colour	✓	✓	✓	✓
Access	✓	✓	✓	✓
Public Rights of Way	✓	✓	✓	✓
Earthworks	✓		✓	✓
Boundary Treatments	✓	✓	✓	✓

North Falls Design Principles	NIC Design Principles			
	Climate	People	Places	Value
Hard Landscape	✓		✓	✓
Lighting	✓	✓	✓	✓
Ecological Enhancements	✓	✓	✓	✓
Drainage and Water	✓		✓	✓

NIC Key Design Principles (NIC, 2020)




Site Layout

74. The configuration/layout of the electrical infrastructure outlined in paragraph 45 of this document will be firstly constrained by operational, constructional and technical requirements. Relevant building regulations, RWE Renewables requirements, SSE internal requirements and National Grid technical specifications for electrical substations will have to be followed. The Design Vision considerations therefore include:

- Producing a buildable and functional substation that satisfies engineering and operational requirements;
- Reducing visual impact of the onshore substation in the local landscape and for visual receptors; and
- Creating a uniform arrangement that limits visual clutter and makes screening or visual mitigation possible.

75. The outlined design principles positively respond to the NIC Design Principles climate and places, whilst bringing value to the Project. This is achieved through:

Climate

- Considering orientation of buildings on site to benefit from solar gain and solar shading;
- Design an efficient site layout that makes effective use of space and reduces hard landscape requirements (surfacing, boundaries) in order to conserve materials, reduce heat island effect and minimise surface water runoff;
- Create a site layout that responds sensitively to site topography, reducing the need for extensive cut and fill or retaining structures; and
- Design a site layout that accommodate future flood risk or storm effect.

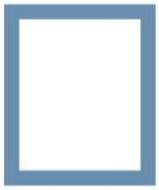
Places

- Organise the site layout to retain key valued landscape, heritage, green and blue infrastructure (GBI) or ecological features, considering the role that existing vegetation can play in allowing the new development to be successfully integrated within its surrounds; and
- Create a site layout that limits sprawl and visual clutter within the landscape and respects key views.



5.2 Built Form

76. The following section proposes design principles in relation to the built form of the onshore substation. As part of the design process, a variety of forms will be explored before a final solution is progressed. All built forms must adhere to the relevant building regulations, National Grid technical specifications, internal requirements of both RWE and SSE and best practice guidelines and will require technical review to assess their feasibility.
77. The built form of the onshore substation should follow best practice in substation design, whilst considering a Design Vision approach that:
    - Produces a buildable and functional substation that satisfies engineering and operational requirements;
    - Reflects local building vernacular where possible, including barns and other large agricultural and horticultural structures;
    - Reduces visual impact of the onshore substation zone in the local landscape and for visual receptors; and
    - Creates a cohesive environment that contains all electrical infrastructure limiting sprawl and visual clutter.
78. The guidance for Tendring Landscape Character Area 7A - Bromley Heaths states ‘that new buildings should be constructed in such a way that they blend with the landscape in scale, colour and design’ (TLCA, 2001).
79. The Essex Design Guide defines the traditional built form in Essex as ‘*typically made up of rectangular rather than square plan forms, with pitched roofs*’ (EDG, 2018). The built form considerations (subject to engineering review and operational requirements), include:



- Flat roof - Typical substation-built form that ensures there is sufficient room to house the electrical components required limiting structural footprints. This is a somewhat common vernacular in the local area due to the agricultural function.

- Curved Roofline - A curved roofline will soften a structure's visual impact against the landscape and skyline. The use of this building form would require a more considered layout with larger components placed centrally but could allow an overall lower roofline. This is a very common vernacular in the local area due to the high density of agricultural barns and produce tunnels to the southwest.

- Pitched Roofline - A pitched roofline will also somewhat soften a structures visual impact against the landscape and skyline depending on its orientation. This would also require larger components to be placed more centrally but may still provide a larger footprint for component placement depending on the pitch's angle. This is a very common vernacular in the local area due to the high density of agricultural barns to the southwest.

- Single Pitch Roofline - A single pitch roofline would allow structures to be softened that are orientated towards visuals receptors but would retain a larger internal area to house electrical components. This would have a very similar look to the pitched roof for visual receptors and is a common vernacular in the local area.

80. The outlined design principles positively respond to the NIC Design Principles climate, people and places, whilst bringing value to the Project. This is achieved through:

Climate

- Considering whether multiple building uses could be combined into one, to minimise material use, energy requirement etc.;
- Considering forms that are suitable for e.g. rainwater harvesting, green/brown roofs, amenity roof, green walls etc.;
- Considering built forms that will benefit from solar gain and solar shading;
- Considering forms that may benefit local flora and fauna e.g. incorporating nest boxes.

People

- Utilising human-scale built forms that will not be overly dominant when experienced from adjacent properties, PRoW or roads.

Places

- Considering whether multiple building uses could be combined into one, to minimise visual clutter or whether several smaller buildings are more appropriate within the surrounding landscape context;
- Considering reducing the height of rooflines to minimise visual impact within the landscape; and
- Considering use of vernacular forms which could be integrated more successfully within the surrounding landscape context.




5.3 Materials & Colour

5.3.1 Materials

81. The choice of material for the onshore substation will provide both functional and aesthetic uses. Therefore, final material selection will be dictated by the technical and operational requirements of the onshore substation. The proposed materials presented are intended to give a broad overview of the potential applications as well as each material's positive and negative aspects. The primary materials will be selected to provide the following benefits:
    - Hardwearing and long-lasting;
    - Provide some visual mitigation through colour, scale or similarity to existing local materials;
    - Provide a variety and colour options where appropriate; and
    - Ideally be from a sustainable source and locally available where possible, with potential to be used reused or recycled at the end of its operational life.
82. Metal cladding is considered as a building material. The benefits of this material include:
    - Hardwearing;
    - Available in a variety of textures, shapes and colours;
    - Readily available and generally low maintenance; and
    - Blend into the existing agricultural infrastructure surrounding the onshore substation.
83. The negative considerations for metal cladding include:
    - Some treatments and finishes may become reflective, increasing visual impact; and

- Use of metal cladding on very large-scale structures may create a predominantly industrial aesthetic, increasing visual impact.

Plate 5.1 Corrugated metal panelling / Source: Brian H / CC BY-SA 2.0

Plate 5.2 Flat metal panelling / Source: Rob Deutscher / CC BY 2.0

84. Polycarbonate is another material that can be considered. The benefits of this material include:

- Lightweight and easy to install;
- Can be easily formed around curved or complex structures;
- Available in a variety of shapes and colours; and
- Can provide higher acoustic insulation if necessary.

85. The negative considerations for polycarbonate include:

- More expensive and less readily available; and
- Requires additional cleaning and maintenance.

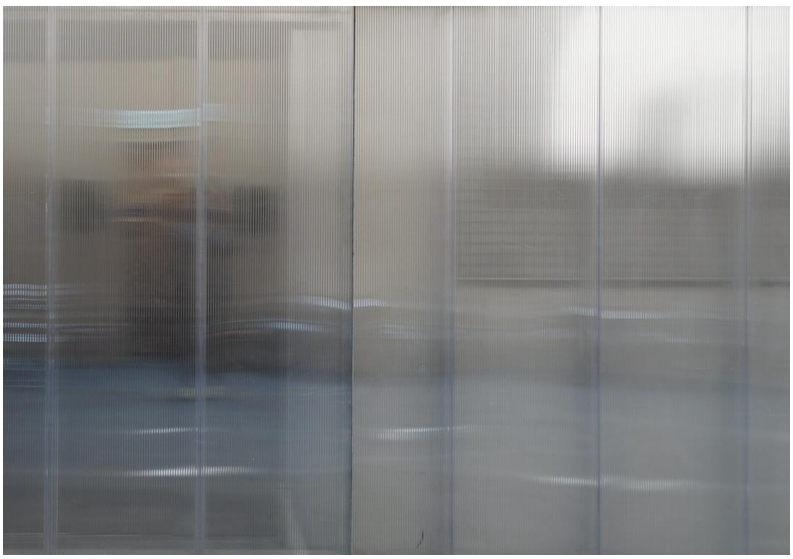


Plate 5.3 Polycarbonate panelling / Source: ACME / CC BY-NC 2.0

86. There is the opportunity to utilise a variety of materials depending on the visibility of the onshore substation structures. This could be achieved by using lower cost metal cladding where the structures are not visible by external receptors, with materials which provide a higher visual mitigation used only on areas of the structures visible by external receptors.

87. The Essex Design Guide defines some of the traditional material in Essex as 'Red Brick, Traditional Coloured Render, Black Weather Boarding, Buff Brick, Slate/ Tiles, Coloured Weather Boarding, Brick Patterning, Zinc and Panelling' (EDG, 2018). Material options will be considered and finalised during the detailed design stage of the Project, subject to functional and technical requirements.

5.3.2 Colour

88. The colour and finish of the final material application can provide increased visual mitigation, integrating the onshore substation into the landscape. The application of colour may not be limited by the functional requirements of the onshore substation.

89. The guidance for Tendring Landscape Character Area 7A -Bromley Heaths states 'that new buildings should be constructed in such a way that they blend with the landscape in scale, colour and design' (TLCA, 2001).

90. The selection of colours and finishes should be informed by the surrounding landscape and the site context. The colour sampling exercise shown in Plates 5.4 reveals the most prominent colours within the local landscape through the blurring of an image that represents the typical landscape typology around the onshore substation zone. This provides a sample palette of colours that can be considered for use around the onshore substation zone for elements such as cladding and fencing.

Plates 5.4 Colour sampling exercise referencing viewpoint looking northeast along PRoW 166_3 / Source: LUC

91. Given the rural and agricultural context of the onshore substation zone, colours have primarily been influenced by the skyline, surrounding vegetation and geomorphology. Some consideration has also been given to the surrounding built form, which includes agricultural structures and residential dwellings. The seasonality of the site forms another key consideration for the colour sampling

exercise. For example, during winter when trees drop their leaves the primary colour would shift from green to brown/grey.

92. The exact colours will be reliant on chosen materials, manufacturer limitations, availability and other co-located substations within the cluster. This would be finalised during detailed design with consideration of feedback from stakeholders. The application of colour can be achieved through single block colours, banding or mixed colour panelling. The colour application will be considered at a later stage.

93. The outlined design principles positively respond to the NIC Design Principles climate, people and places, whilst bringing value to the Project. This is achieved through:

Climate

- Choosing materials with low embodied carbon; and
- Selecting robust materials and fixings that are not maintenance intensive and which allow re-use / recycling.

People

- Considering use of locally appropriate colour palettes within facade treatments to assist with visual mitigation of built form from adjacent properties, PRoW or roads.

Places

- Considering use of locally appropriate materials, in keeping with the surrounding landscape character; and
- Considering use of locally appropriate colour palettes within facade treatments to assist with visual mitigation of built form.




5.4 Access

94. There are a number of existing vehicular routes that interact with the onshore substation zone. At this stage, both construction and operational accesses to the substation are at an early stage of development. Therefore, only general principles can be applied to the site entrance as set out below.

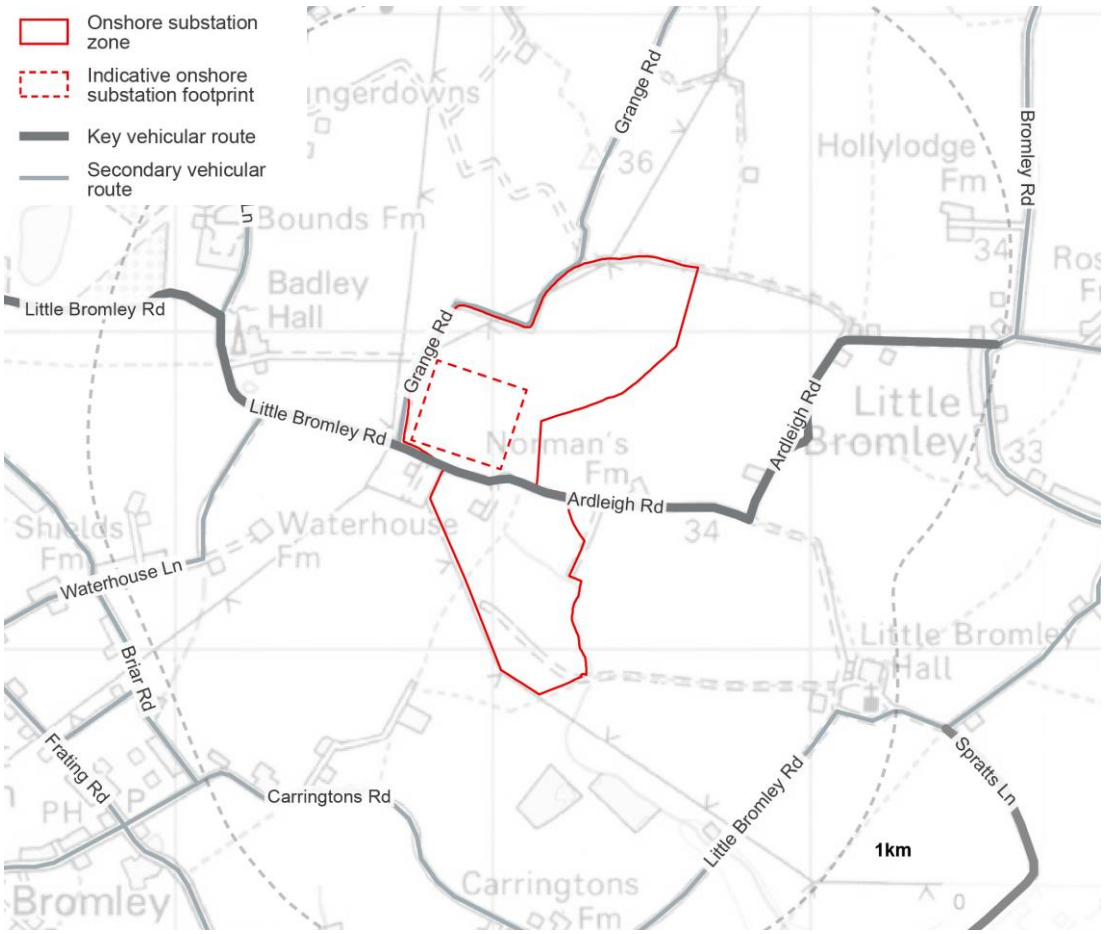


Figure 5.1 Existing vehicular routes around the site

95. The Design Vision consideration for site access includes:

- Screening the site entrance where appropriate to limit visual impact for local receptors, depending on health and safety considerations and highways design standards - DMRB; and
- Appropriate security infrastructure to promote a safe and secure site.

96. The outlined design principles positively respond to the NIC Design Principles climate, people and places, whilst bringing value to the Project. This is achieved through:

Climate

- Considering materials with low embodied carbon;
- Considering use of permeable materials for access routes, layover and parking areas;
- Directing surface water runoff to SuDS measures e.g. filter strips, swales; and
- Considering use of recycled / site-won aggregates for sub-base or surface dressings.

People

- Locating access routes to minimise conflicts with users of the local highway network.

Places

- Considering use of locally appropriate materials, in keeping with the surrounding landscape character; and
- Minimising requirements for excessive signage, barriers and/or lighting that could detract from the surrounding amenity, subject to the Traffic Signs Regulations.




5.5 Public Rights of Way

97. Existing PRoW will be retained and in the unlikely event that any PRoW requires permanent diversions, appropriate signage and furniture will be installed. Consideration will also be given to providing information on site entrance boards.

98. Existing PRoW around the onshore substation zone include: (See Figure 5.2)

- PRoW 166_3 and 170_15 run through the southern section of the site connecting Ardleigh Road to Lilley's Lane;
- PRoW 166_5 runs along the southern extent of the site boundary connecting Lilley's Lane to St Mary's Church;
- PRoW 170_57 is a byway that runs the northern section of the site boundary along Barn Lane; and
- PRoW 170_23 connects to the byway and provide north-south connections for pedestrians.

99. PRoW situated around the onshore substation zone may have either long range, short range or direct views of the onshore substation, depending upon where it is sited within the zone. Existing vegetation such as hedgerows and clusters of trees may provide visual screening, but additional layered vegetation should be considered to prevent views and provide enhanced ecological value.

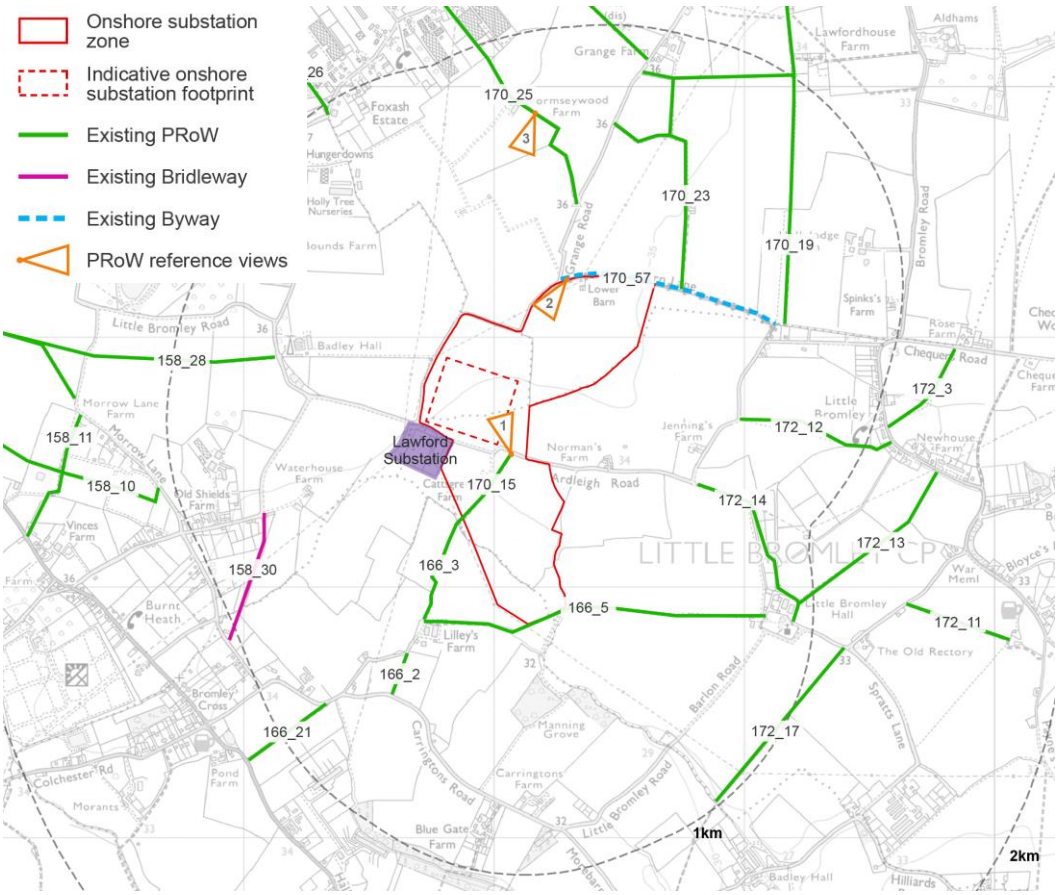


Figure 5.2 Existing PRoW and referenced viewpoints

100. The location of affected PRoW will determine what approach to screening may be needed. (See Figure 5.2) For example:

- Direct views / Viewpoint 1 - PRoW 170_15 exits onto Ardleigh Road within the onshore substation zone as shown in Figure 5.3. There is currently no boundary vegetation present with open views of the onshore substation zone. Vegetated boundaries are present in the area and can be introduced along the site boundary to provide screening. Consideration may need to be given to footway improvements as the route currently follows a single-track road to connect to PRoW 172_14 east of the site;

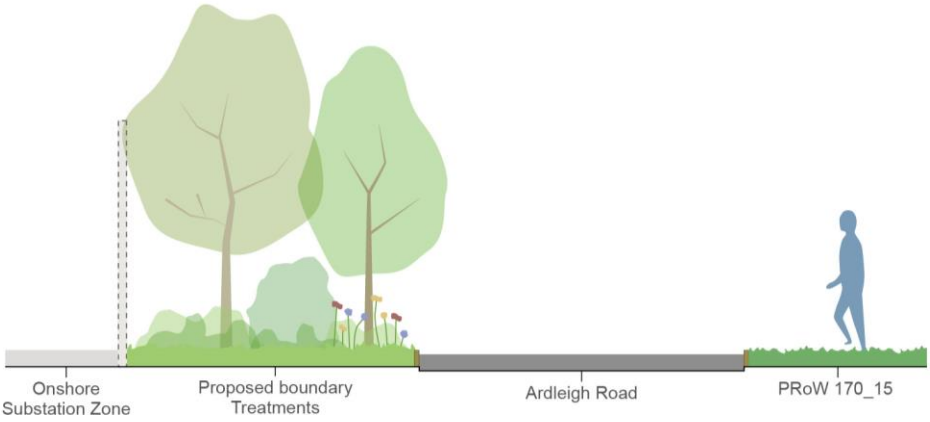


Figure 5.3 Example of potential treatment to PRoW 170_15 adjacent to the site boundary, exiting onto Ardleigh Road

- Short range / Viewpoint 2 - PRoW 170_57 is a byway that exits onto Barn Lane. The vegetation in this area is gappy and may provide seasonal and year-round long-range views of the onshore substation zone. Additional layered vegetation should be considered to provide screening of the onshore substation zone; and
- Long range / Viewpoint 3 - PRoW 170_25 is situated north of the onshore substation zone. The vegetation in this area is gappy and may provide seasonal and year-round long-range views of the onshore substation zone. Additional layered vegetation should be considered to provide screening of the onshore substation zone.

101. Additional improvements, as shown in **Error! Reference source not found.**, that could be considered along PRoW may include wayfinding and interpretation highlighting connections to the wider PRoW network. These will only be considered in areas where additional infrastructure requirements will influence the existing routes, such as finger posts highlighting the PRoW network at the site entrance to ensure pedestrians do not mistakenly enter the site. Other improvements could include additional vegetation to provide screening where routes have intermittent views of the substation infrastructure. These improvements will only be considered where relevant and feasible.

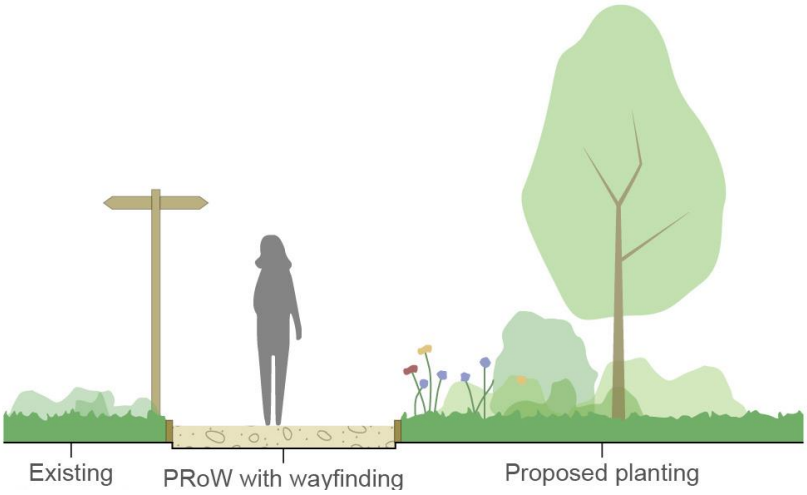


Figure 5.4 Example of potential additional improvements to the PRoW with views of substation infrastructure

102. The outlined design principles positively respond to the NIC Design Principles climate, people, and places, whilst bringing value to the Project. This is achieved through:

Climate

- Considering how any changes to PRoW can enhance routes and increase usage for active travel.

People

- Locating access routes to minimise conflicts with pedestrians, cyclists, horse riders or other users of the PRoW;
- Introducing sympathetic signage, where necessary, to enhance legibility of PRoW network for users; and
- Considering the impact of tall or dominant built form or boundary treatments on users of PRoW. Look to provide suitable buffer distances from routes and/or provide a gradation in landscape treatment to the boundary, in keeping with the local landscape character.

Places

- Considering use of locally appropriate materials and boundary treatments, in keeping with the surrounding landscape character;
- Considering the impact of tall or dominant built form or boundary treatments on users of PRoW. Looking to provide suitable buffer distances from routes and/or providing a gradation in landscape treatment to the boundary, in keeping with the local landscape character; and
- Considering the inclusion of new landscape treatments e.g. hedgerows, scattered trees to enhance the existing landscape character, strengthen localised green infrastructure and provide additional filtering to views from visual receptors.




5.6 Earthworks

103. Due to the flat topography around the onshore substation zone, earthwork bunds could be introduced to help screen the substation from surrounding properties and users of the PRoW network. The guidance for Tendring Landscape Character Area 7A - Bromley Heaths, stated that '*in this very large scale, open landscape it would be inappropriate to try and hide a new building behind earth bunds or vegetation'* (TLCA, 2001). Proposed bunds are not intended to completely obstruct views of the substation, rather screen and reorientate views in sensitive locations. The use of earthwork bunds would need to be reviewed on a location-by-location basis to ensure they do not look unnatural in the landscape. In this scenario, the design of the bunds could be subtle, organic and integrated well into the surrounding landscape. A sensitive design approach to scale, form

and vegetation cover will further mitigate the highlighted risk of them becoming prominent features in the generally flat landscape.

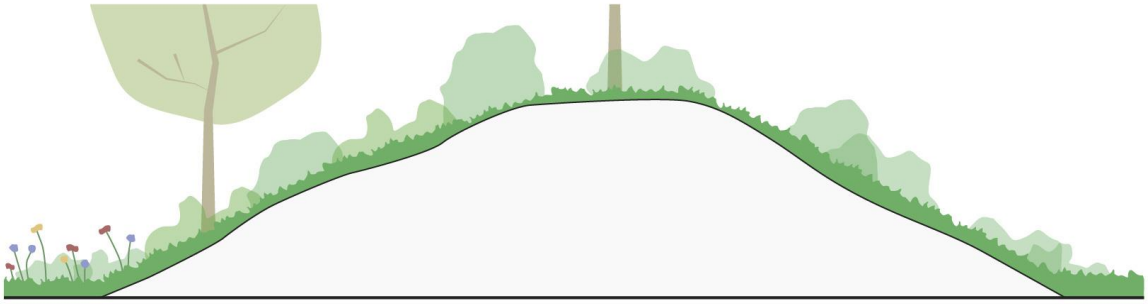


Figure 5.5 Example of organic bund form

104. Bunds would also create a raised platform for planting, with the form and scale of planting helping to integrate any proposed bunds into the landscape. The mix of vegetation will promote biodiversity and enhance the sites aesthetic value.

Plate 5.5 Naturalised bunding / Source: Peter O'Connor / CC BY-SA 2.0

105. The bunds can utilise existing subsoil and topsoil from the onshore substation's construction. This is generally created through cut and fill across the site and is usually stored on site until the end of construction, where as much as possible is then used in landscaping. Retaining as much of the subsoil and topsoil on site as possible reduces costs and the environmental impacts of transporting and waste disposal.

106. The outlined design principles positively respond to the NIC Design Principles climate and places, whilst bringing value to the Project. This is achieved through:

Climate

- Considering whether site-won materials from excavations can be retained on site through incorporation within landform or bunds, thus avoiding off-site transportation.

- Considering whether new landform can be used to assist with visual mitigation.

5.7 Boundary Treatments

107. Boundary treatments around the onshore substation will need to be fit for purpose and provide robust site security. There will be a variety of boundary treatments required across the onshore substation zone, these include:
    - Onshore substation boundaries;
    - Visual screening around the Onshore substation; and
    - Acoustic fencing if required in specific locations.
108. Onshore substation boundary treatments will need to respond to technical requirements. Onshore substation boundary treatments will also need to comply with technical requirements and regulations, and where feasible, reflect their setting in the landscape. For example, boundary treatments visible from local receptors, such as Norman's Farm, in areas outside of the initial onshore substation perimeter should utilise hedgerows and bunds to provide visual mitigation of the onshore substation and ensure it reflects the local rural character.
109. Palisade fencing is generally used for infrastructure boundary treatments as it provides security and durability. Consideration should be given to the colour of the fencing to help better integrate it into the surrounding landscape. Palisade fencing will likely surround the extent of the onshore substation.

Plate 5.6 Palisade fencing / Source: Oakdale

110. Natural screening can be used to integrate the onshore substation boundary into the local landscape. Planted boundary treatments should reflect local species composition and avoid the use of single species and non-native planting. Broad

hedgerows with a variety of species provide the best habitat opportunities. The Essex Tree Palette highlights such species as '*Field Maple, Hazel, Hawthorn and Blackthorn*' (ETP, 2018). Planted boundaries would provide additional biodiversity, habitat creation and ecological mitigation, whilst also providing visual mitigation through the scale, structure and colour of vegetation set within the landscape. Species selection would need to consider local provenance, existing site conditions and technical constraints such as existing overhead powerlines or underground cables.

Plate 5.7 Natural screening hedgerows

111. A variety of boundary treatments can be utilised outside of the immediate onshore substation perimeter to provide screening and additional security. These may include planted boundaries, timber screens, bunds and acoustic screens where relevant.

- Mixture of palisade fencing and planted boundaries in high pedestrian areas;
- Planted boundaries to provide screening of the substation; and
- Bunding and planting to integrate site into the surrounding landscape.

112. Acoustic fencing will be considered if it is highlighted through the Noise Assessment that certain equipment needs acoustic mitigation and if acoustic fencing is operationally feasible. Likely Design Vision principles for acoustic fencing will be limited as any acoustic fencing will be within the substation boundary and will have to meet specific technical specifications.

113. The height requirements of boundary treatments to screen views and provide a secure site are defined by various factors as shown in Figure 5.6, including:

1. Height of built form needing to be screened;
2. Distance of built form to boundary fence;
3. Width of verge and type of vegetation; and
4. Width and type of footpath.

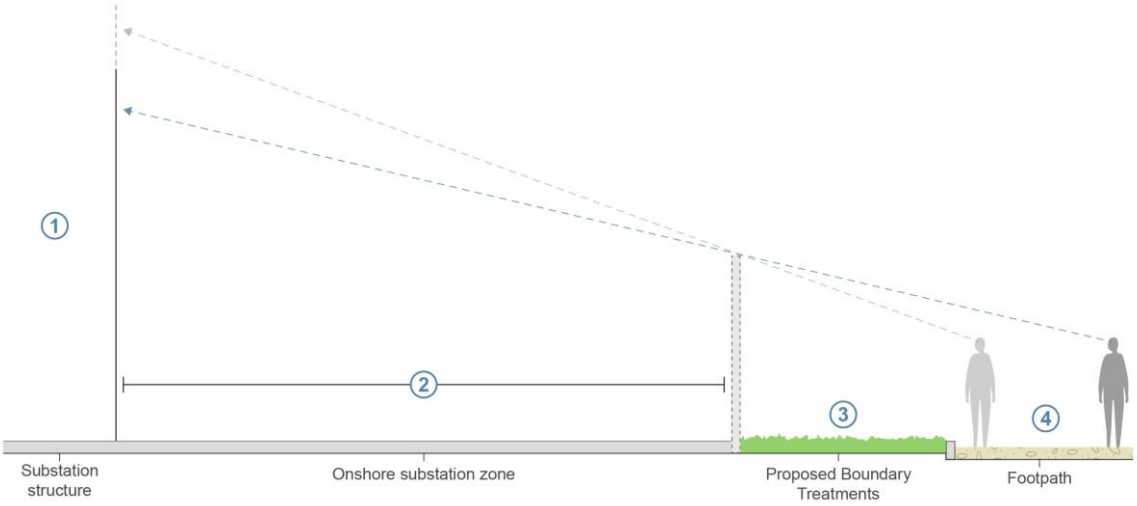


Figure 5.6 Determining boundary treatment scale

114. Once these 4 key factors are determined the scale of boundary treatments can be defined. Some areas may require larger screening treatments such as tree and hedgerows. Other areas may only require low level screening such as hedgerows or shrub planting.

115. The outlined design principles positively respond to the NIC Design Principles climate, people and places, whilst bringing value to the Project. This is achieved through:

Climate

- Considering choosing boundary treatments with low embodied carbon, including use of hedges for natural screening and habitat creation;
- Where hedges are proposed, using native species that are appropriate to the local landscape character; and
- Selecting robust materials and fixings that are not maintenance intensive and which allow re-use / recycling.

People

- Considering use of locally-appropriate colour palettes within boundary treatments to assist with visual mitigation of built form from adjacent properties, PRoW or roads; and
- Considering the scale of fencing, ensuring that will not be overly dominant when experienced from adjacent properties, PRoW or roads.

Places

- Considering use of locally appropriate materials, in keeping with the surrounding landscape character; and
- Considering use of locally-appropriate colour palettes within boundary treatments to assist with visual mitigation of built form.

5.8 Hard Landscape

5.8.1 Onshore Substation

116. The hard surfacing within the onshore substation will be dictated by the site's technical requirements and maintenance needs. The Design Vision aspirations and considerations for the proposed hard landscape materials include:

- Permeability/drainage impacts;
- Sustainability of chosen material; and
- Reduction of visual impact through choice of colour and material type.

117. All surfacing will comply with industry guidance, such as British Standards, Specification for Highways Works and National Grid technical specifications for operational substations.

5.8.2 Onshore Substation Zone

118. The hard surfacing within the onshore substation zone covers aspects such as PRoW diversions or footpath improvements. These materials should also follow the Design Vision aspirations and considerations which include:

- Permeability/drainage; and
- Sustainability of chosen material.

119. These materials will also be subject to local design guidance and stakeholder input.

120. The outlined design principles positively respond to the NIC Design Principles climate and places, whilst bringing value to the Project. This is achieved through:

Climate

- Reducing the extent of hard landscape within the site;
- Consideration of materials with low embodied carbon; and
- Considering use of recycled aggregates for sub-base or surface dressings.

Places

- Considering use of locally appropriate materials, in keeping with the surrounding landscape character.



5.9 Lighting

121. Detailed specifications of operational lighting will be set out in separate construction and operational lighting plans which will form part of a DCO requirement. Within the onshore substation lighting should be directional and limited to areas that require lighting for functional purposes such as key routes, wayfinding and buildings and building entrances. Lighting columns should be situated to provide the most efficient spread of light, with lighting integrated into

the built form where possible to reduce visual clutter within the site. Lighting should only operate when required where possible, through the use of motion sensors or timed controls to reduce the site being lit unnecessarily.

122. The use of artificial light will be minimised to levels that are sufficient to ensure that safety and security requirements are met but light scatter outside of the substation compound is minimised. Dark corridors around the site boundary and unlit areas should be maintained as to not disturb any local wildlife such as bats.

123. The outlined design principles positively respond to the NIC Design Principles climate, people and places, whilst bringing value to the Project. This is achieved through:

Climate

- Minimising the extent of lighting within the site;
- Considering the scale and quantity of light fittings;
- Considering use of motion sensors or timers to restrict the hours of illumination;
- Ensuring luminaires are used which suit the needs of wildlife (while meeting health and safety requirements); and
- Using energy efficient luminaires.

People

- Minimising the extent of lighting within the site;
- Considering the scale and quantity of light fittings;
- Considering use of motion sensors or timers to restrict the hours of illumination; and
- Considering use of specific luminaires to reduce light spill.

Places

- Considering the impact of lighting on localised tranquility and aiming to reduce light pollution wherever possible; and
- Considering use of specific luminaires to reduce light spill.




5.10 Ecological Enhancements

124. Throughout the design of the North Falls onshore substation, efforts will be made to ensure that opportunities for ecological enhancement are sought. As stated in the Essex Design Guide '*new developments in Essex will be expected to enhance existing biodiversity and to create new habitats, together with providing resources for the management of those habitats into the future'. 'Good design can provide many opportunities for biodiversity, and these should be maximised.*

Furthermore, all developments should ensure that networks of habitats are maintained to prevent fragmentation and isolation' (EDG, 2018).

Plate 5.8 View looking southwest from Grange Road and PRoW 170_19 / Source: LUC

Plate 5.9 View looking northwest adjacent to Norman's farm / Source: LUC

125. Ecological enhancements should aim to provide both visual mitigation and enhancements to the existing site where possible. Ecological enhancement covers aspects such as proposed vegetation, structure and landform. A landscape management and mitigation plan will be a DCO requirement and principles in the Design Vision may inform this plan as it is developed.

Consideration needs to be given to the location and structure of any planting in response to the site conditions such as existing topography and vegetation cover.

Plate 5.10 Ecological enhancements through vegetation / Source: LUC

126. Visual mitigation of the onshore substation can be achieved through the introduction of vegetated boundaries consisting of layered trees, hedgerow and shrubs as well as earthwork bunds if appropriate, as shown in Figure 5.7. The guidance for Tendring Landscape Character Area 7A - Bromley Heaths states that '*in this very large scale, open landscape it would be inappropriate to try and hide a new building behind earth bunds or vegetation, therefore opportunities would need to be reviewed on a location-by-location basis' (TLCA, 2001)*. Consideration will therefore be given to the appropriate locations for bunds and/or their use in combination with other forms of screening to ensure the development fits within the surrounding landscape and visual context.

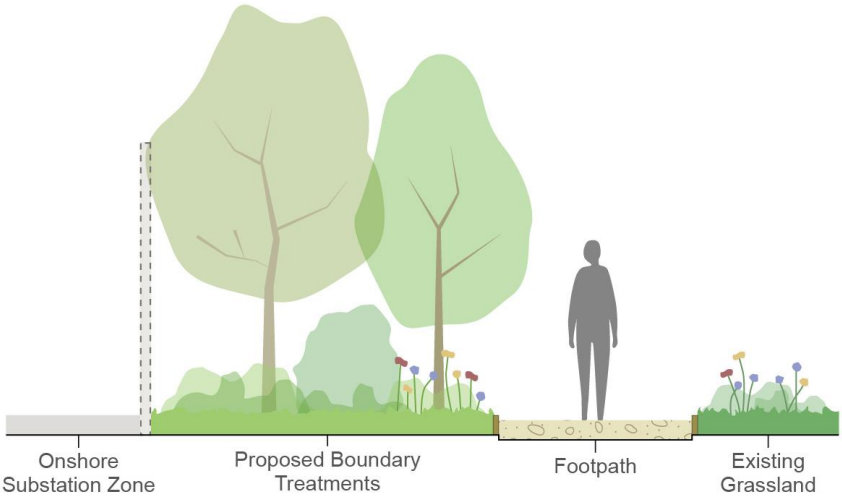


Figure 5.7 Vegetated boundaries providing visual screening

127. Planting around the onshore substation boundary will integrate the site into the surrounding landscape, with elements such as field boundary hedgerows and clusters of trees being common in the area. Species selection for trees and hedgerows has been informed by initial assessments and species referenced in

the Essex Design Guide and Essex Tree Palette. Table 5.2 highlights these species and references which are suitable to be planted as hedgerows. Meadow and shrub planting will be identified on a site-by-site basis to best site the proposed species in relation to the existing landscape.

Table 5.2 Typical tree and hedgerow species

Typical species selection		
Latin name	**Common name**	**Hedgerow species**
Acer campestre	Field Maple	✓
Alnus glutinosa	Alder	
Carpinus betulus	Hornbeam	
Corylus avellana	Hazel	✓
Crataegus monogyna	Hawthorn	✓
Ilex aquifolium	Holly	✓
Prunus spinosa	Blackthorn	✓
Quercus robur	Common Oak	
Salix alba	White Willow	

128. Any additional green infrastructure may also provide natural drainage solutions around the site.

129. In addition to any visual or ecological mitigation, the Project is also exploring opportunities to achieve a minimum 10% biodiversity net gain (BNG) in relation to the Project's onshore works. The Project is engaging with Natural England and other ecological stakeholders and members of the Onshore Ecology Expert Topic Groups to identify suitable projects and plans for delivering this BNG.

130. The route to achieving biodiversity net gain will be determined following further design work plus the conclusion of the biodiversity net gain assessment for the Project, however it is anticipated that landscaping at the substation will provide an excellent opportunity for achieving biodiversity net gain. The approach to achieving biodiversity net gain will be set out in a biodiversity net gain statement submitted with the DCO application, and the design of the biodiversity net gain will be secured through a DCO requirement for a detailed habitat plan

131. The outlined design principles positively respond to the NIC Design Principles climate, people and places, whilst bringing value to the Project. This is achieved through:

Climate

- Retaining existing features and habitats;
- Where existing features are fragmented or damaged, seeking to strengthen their connectivity or repair;

- Considering the introduction of features that will enhance wider GBI or links to habitats beyond the site;
- Seeking to improve existing biodiversity levels to achieve a 10% BNG;
- Using locally native species and source material from within the local area, where possible; and
- Considering use of planting which provides seasonal sources of food for invertebrates, birds and mammals.

People

- Considering habitat creation or other measures that will enhance opportunities for wildlife viewing; and
- Considering use of locally appropriate planting types e.g. hedges, scattered trees, woodland to enhance both ecology and provide filtering to views experienced by visual receptors.

Places

- Considering use of locally appropriate planting types e.g. hedges, scattered trees, woodland to enhance both ecology and strengthen the underlying landscape character; and
- Using locally native species and source material from within the local area, where possible.




5.11 Drainage and Water

132. Water management requirements across the onshore substation zone provides the opportunity to introduce natural drainages features. As stated in the Essex SuDS Design Guidance '*When managing rainfall, the SuDS network should be designed to match natural drainage routes, infiltration rates and discharge rates as far as possible […] The provision of storage helps to reduce flooding whilst helping to control the peak allowable runoff rate. In addition, well-designed SuDS schemes can significantly improve and promote biodiversity and amenity in an area through the use of above ground storage*.' (ESuDS, 2018). The location, scale and feasibility of any of these features would be subject to detailed design and groundworks investigations. Possible sustainable drainage options include:

133. Attenuation Ponds: Attenuation ponds situated within vegetated boundaries create both a drainage solution and additional habitats for local fauna providing biodiversity and climate resilience. Water run-off from the onshore substation and surrounding infrastructure collects in the attenuation ponds and soaks back into the ground, whilst being treated by native aquatic and marginal planting to reduce pollutants. The surrounding planting and scale of the attenuation features provide additional visual mitigation for the onshore substation. Sufficient storage capacity should be provided to store yearly rainfall as well as storm flood frequencies, as stated in the relevant Standards, such as NGET TS2.10.13 Flood Defences for Electricity Substations. The form and structure of attenuation ponds can create additional ecological value through varying water depths for wintering bird and smaller pools around the ponds margins to allow local fauna to use the site.

Plate 5.11 Example of attenuation pond / Source: Essex SuDS design guide

134. Swales: Swales provide a sustainable drainage solution in areas with restricted space or where water needs to be directed away from the onshore substation site. Swales consist of linear grass depressions that channel water run-off to attenuation features. Swales need to be located closer to source of the run-off so could be well situated adjacent to entrance roads, or where the site boundary is constrained. These areas will be dry prior to run-off or rain events, with planting around the upper edges. The introduction of vegetation will provide biodiversity and climate resilience.

Plate 5.12 Example of dry swales / Source: Daniel Filippi / CC

135. Filter Drains or Permeable Surfaces: Filter drains and permeable surfaces allow water run-off to soak into the ground through drainage aggregate. Drainage aggregates can reduce pollutants in the run-off from soaking into the ground. Permeable surfaces could be introduced within the onshore substation at parking areas or lightly trafficked portions of the site. Increasing permeability across the onshore substation will reduce the level of run-off ensuring that natural drainage solutions can provide ample capacity.

Plate 5.13 Example of permeable paving

136. Traditional drainage methods such as underground pipes, gullies and controlled outflow may be required within the onshore substation to meet design guidance and technical requirements for the substation operation. These traditional drainage methods could connect with any proposed natural drainage systems to create an ecologically sustainable drainage solution, whilst introducing additional biodiversity, habitat opportunities and protect adjacent agricultural land.

137. The outlined design principles positively respond to the NIC Design Principles climate and places, whilst bringing value to the Project. This is achieved through:

Climate

- Considering use of rainwater harvesting technology for site buildings;
- Reducing areas of impermeable hardstanding within the site; and
- Considering use of SUDs techniques (permeable paving, filter strips, swales, rain gardens, ponds) to manage surface water runoff on site rather than traditional underground drainage systems or large attenuation tanks.

Places

- Considering how SUDs features can be used to reflect and strengthen local landscape character or provide attractive features for people and wildlife.



5.12 Design Principles Summary

138. The outlined design principles provide a variety of mitigation and enhancement proposals that will respond to the variety of constraints and opportunities presented through the delivery of the onshore substation. The use and combination of these principles will form a landscape plan and outline design that will reflect the iterative finding of the ongoing assessments and integrate consultation responses from key stakeholders, where possible to achieve a successful and beneficial project. Detailed layouts and design proposals for North Falls will be finalised post DCO consent, however, the design principles will be taken into consideration at every stage of the development design.

6 References

Delivering Quality Development Environmental Impact Assessment Guide to. (2016). Available at: https://www.iema.net/download-document/7014 - (IEMA, 2016)
Essex County Council. (2018). Essex Design Guide. [online] Available at: https://www.essexdesignguide.co.uk/ - (EDG, 2018)
Essex County Council. (2018). Guide to planting appropriate tree species for Essex | Place Services. [online] Available at: https://www.placeservices.co.uk/resources/natural-environment/essex-tree-palette/ - (ETP, 2018)
Essex County Council. (2020) Design Guide Sustainable Drainage Systems. Available at: https://www.essexdesignguide.co.uk/pdf/SuDS_Design_Guide_2020.pdf - (ESuDS, 2020)
Essex County Council. (2020). Essex Green Infrastructure Strategy | Place Services. [online] Available at: https://www.placeservices.co.uk/resources/built-environment/essex-gi-strategy/ - (EGIS, 2020)
GOV.UK. (2011). National Policy Statements for energy infrastructure EN1, EN3 and EN5. [online] Available at: https://www.gov.uk/government/publications/national-policy-statements-for-energy-infrastructure. - (NPS, 2011)
GOV.UK. (2021). Planning for new energy infrastructure: review of energy National Policy Statements. [online] Available at: https://www.gov.uk/government/consultations/planning-for-new-energy-infrastructure-review-of-energy-national-policy-statements - (DNPS, 2021)
GOV.UK. (2020). National Infrastructure Strategy. [online] Available at: https://www.gov.uk/government/publications/national-infrastructure-strategy - (NIS, 2020)
LUC (2001). Tendring District Landscape Character Assessment. [online] Available at: https://www.tendringdc.gov.uk/sites/default/files/documents/planning/Planning_Policy/TDC_040%20Landscape%20Character%20Assessment%20Vol%201.pdf - (TLCA, 2001)
Natural England. (2013). NCA Profile:111 Northern Thames Basin - NE466. [online] Natural England - Access to Evidence. Available at: http://publications.naturalengland.org.uk/publication/4721112340496384 - (NCA, 2013)
National Infrastructure Commission (2020). Design Principles for National Infrastructure. [online] NIC. Available at: https://nic.org.uk/studies-reports/design-principles-for-national-infrastructure/ - (NIC, 2020)