Landscape Susceptibility in relation to Energy Generation, Storage and Transmission

for

South Norfolk Council

9th December 2025

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Executive summary

The district of South Norfolk is increasingly finding itself the host of many energy-related nationally significant infrastructure projects (NSIPs) and being asked to determine energy-related planning applications. This increased pressure is due to a number of factors including: changes in the way energy is generated, changes in national policy, the availability of large areas of agricultural land, the high number of sunshine hours in the district, and the availability of existing transmission infrastructure.

The district encompasses a number of different types of landscape, including river valleys, farmland plateau, settled plateau parkland, and urban fringe, as well as transitional areas, for example between the plateau and the river valleys. These landscapes are described in the South Norfolk Landscape Character Assessment (2012).

Since different landscapes are defined by different physical and perceived qualities and attributes, it is likely that they will have differing resiliencies to a particular form of development. For example, a rural landscape could more readily accommodate a traditional barn, without changing the character of the area, whereas other types of development such as a distribution warehouse could potentially result in important changes to the character of the landscape.

In 2024, South Norfolk Council commissioned The Landscape Partnership to undertake a study to assess the sensitivities of the various landscapes of South Norfolk district in relation to energy-related NSIP and non-NSIP projects.

The aim of the study is to provide guidance for those seeking to identify suitable sites for the location of energy generation, storage and transmission projects. It will also be used to inform the council's responses to such proposals in the context of national and local planning policies and the need to reasonably minimise any adverse effects on the landscape and communities of South Norfolk.

The SPD plans positively for energy-related infrastructure but there is also high regard for the intrinsic beauty of the district and to safeguard it for generations to come. The study is written as an evidence document for protecting South Norfolk landscapes from inappropriate development that would harm that intrinsic beauty and character.

Applicants for energy-related projects should not underestimate the importance of landscape-related considerations when making a planning application. Development proposals in landscapes with a high susceptibility and vulnerability to change will be considered less favourably, unless they provide significant and appropriate mitigations that reduce the harm.

The study has two main objectives:

i) To assess the landscape susceptibility of the landscape types and landscape character areas identified in the South Norfolk Landscape Character Assessment in relation to different types and scales of energy development/infrastructure.

ii) To provide guidance to assist the site-specific design of the various energy-related development and infrastructure projects, including the appropriate approach to layout, siting and landscape proposals within the district and its different landscape types.

The energy-related development scenarios considered in this study are:

- solar photovoltaic developments (small-scale up to 5MW, medium-scale up to 15MW, large-scale 15 to 50MW, and very large scale over 50MW)
- anaerobic digestion (AD) plants (farm scale up to 1ha in size and larger installations up to 5ha)
- battery storage facilities (small scale up to 1ha, and larger scale over 1ha)
- overhead powerlines (132kV lines that utilise smaller pylons and 400kV lines that utilise the largest pylons)
- underground cable routes
- substations

South Norfolk Council has previously published a similar study regarding wind turbine developments: South Norfolk District, Wind Turbine Landscape Sensitivity Study, dated April 2006.

The study also includes:

- a more detailed local landscape character assessment to identify the special qualities and characteristics of the landscape surrounding the Norwich Main Substation, and how they might be affected by energy-related projects,
- consideration of South Norfolk Local Plan 2015 Policy DM4.6, which seeks to protect the landscape setting of the A47 Norwich Southern Bypass as it passes to the south of Norwich, and how that might inform energy-related projects.

The findings of the study are summarised in this report, which should be read in conjunction with the accompanying appendices.

1 Introduction

1.1 Introduction to the Supplementary Planning Document

1.1.1 The South Norfolk Landscape Susceptibility Study Supplementary Planning Document (SPD) provides additional guidance on matters covered by the South Norfolk Local Plan, and is a material consideration for decision makers.

1.1.2 The SPD expands on district-wide policies in the Local Plan and provides additional details on how they will be implemented.

1.1.3 The purpose of this susceptibility study is to assess the susceptibility of different landscapes to various types of energy-related development.

1.1.4 The document also provides design guidance for the different types of development which might come forwards. The Supplementary Planning Document provides additional advice and guidance on protecting and enhancing local character and achieving sustainable development, and expands on policies set out in the adopted Local Plan, in particular *Policy 3 – Environmental Protection and Enhancement* in the Greater Norwich Local Plan.

1.1.5 Specific objectives of the SPD are to:

- Enable applicants to understand the relative susceptibility of the landscape to different types of energy-related development,
- Assist applicant's understanding of the local context including locally distinctive characteristics and their susceptibility to change,
- Help ensure that proposals are appropriately designed to be compatible with their surroundings.

1.2 How to use this document

1.2.1 Users are recommended to refer to the South Norfolk Landscape Character Assessment to understand which Landscape Character Area a particular site falls within. Users can then refer to the overall findings in Section 5 or to the more detailed Landscape Susceptibility Analysis in Appendix 3 to understand how susceptible the landscape is to different scales of development. Applicants should also refer to the design guidance in Section 4 to help ensure that development proposals make a positive contribution to local character and distinctiveness, and achieve good design.

1.2.2 The purpose of the SPD is to provide additional evidence about South Norfolk's landscape and this evidence will be a material consideration for a wide variety of energy-related development proposals. These range from Nationally Significant Infrastructure Projects (NSIPs) that affect South Norfolk, to all other schemes under the Town and Country Planning Act 1990, which are

determined by the Council.[1] Due regard should also be given to other adopted landscape guidance relevant to the local context.

1.2.3 All proposals for energy generation, storage, and transmission must seek to achieve sustainable development, and it should be recognised that landscape effects are often an important consideration. On which basis South Norfolk Council will use this SPD as evidence to resist inappropriate proposals for development in landscapes with a high susceptibility and vulnerability to change, unless appropriate and effective mitigation is being provided that addresses the harm.

1.3 Background to the study

1.3.1 The district of South Norfolk is increasingly finding itself the host of many energy-related NSIPs (nationally significant infrastructure projects) and the Council is also being asked to determine energy-related planning applications under the Town and Country Planning Act. Many of these projects are attracted to the district due to the proximity of the electricity transmission hub known as Norwich Main, which is located within the district, to the south of Norwich.

1.3.2 South Norfolk Council has previously published a study on the sensitivity of the landscape of the district to further wind turbine developments (South Norfolk District, Wind Turbine Landscape Sensitivity Study),[2] but as assessment of other types of energy-related development has yet to be undertaken.

1.3.3 The council has been successful in bidding for funding under the Department for Levelling Up, Housing and Communities' Innovation and Capacity Fund, which aims to help speed-up infrastructure delivery. Part of the funding has enabled the council to commission a study to assess the sensitivities and capacities of the various landscapes of South Norfolk district to accommodate energy-related NSIP and non-NSIP projects.

1.3.4 The aim of the study is to provide guidance for those seeking to identify suitable sites for the location of energy generation, storage and transmission projects. It will also be used to inform the council's responses to such proposals in the context of national and local planning policies and the need to reasonably minimise any adverse effects on the landscape and communities of South Norfolk.

1.4 Commission

1.4.1 The Landscape Partnership was commissioned by South Norfolk Council in April 2024 to undertake the study of the susceptibility of the landscape of the district of South Norfolk in relation to energy generation, storage and transmission.

1.4.2 The results of the study are presented in this report, with further assessment and analysis contained in the accompanying appendices.

[1] NSIP are projects of such size that permission for them needs to be given at a national level by the Secretary of State. South Norfolk Council are not responsible for determining NSIPs.
[2] South Norfolk District, Wind Turbine Landscape Sensitivity Study, Land Use Consultants, April 2006, final amendments January 2008

1.5 Objectives

1.5.1 The study has two main objectives:

i) To identify the landscape susceptibility of different types and scales of energy development/infrastructure in relation to the seven generic landscape types (LTs) in the district (A: Rural River Valley, B: Tributary Farmland, C: Tributary Farmland with Parkland, D: Settled Plateau Farmland, E: Plateau Farmland, F: Valley Urban Fringe and G: Fringe Farmland) as defined in the South Norfolk Landscape Character Assessment[3], along with the 20 geographically discrete landscape character areas (LCAs) identified in the assessment.

ii) To provide guidance to assist with the site-specific design of different energy development/infrastructure projects, including the appropriate approach to layout, siting and landscape proposals within the district and its different landscape types.

1.5.2 The study area comprises the whole of the district of South Norfolk except for the areas which fall within the Broads Authority Executive Area.

1.5.3 The study includes a more detailed local landscape character assessment to identify the special qualities and characteristics of the landscape surrounding the Norwich Main Substation (which, as noted above, is a particular focus for energy-related projects) and how they might be affected by energy-related projects. The study area for this assessment encompasses the landscape within a 5km radius of Norwich Main, but excludes areas within the Norwich City administrative boundary.

1.5.4 The study also includes specific consideration of South Norfolk Local Plan 2015 Policy DM4.6, which seeks to protect the landscape setting of the A47 Norwich Southern Bypass as it passes to the south of Norwich, and how that might inform energy-related projects.

1.6 Structure of the report

1.6.1 The Landscape Susceptibility Study is structured as follows:

- Section 1 provides an introduction to the Landscape Susceptibility Study and establishes its purpose.
- Section 2 sets out the methodology which has been used to undertake the Landscape Susceptibility Study.
- Section 3 provides a high-level summary of planning policy as it relates to the design and the landscape siting of energy-related development.
- Section 4 identifies the different types and scales of energy projects and infrastructure that have been considered in the study, i.e. the energy-related development scenarios. It includes an overview of their potential effects on the landscape, and design guidance to minimise such effects.

[3] South Norfolk Landscape Assessment, Landscape Character Areas of the Rural Policy Area, Land Use Consultants, April 2006

- Section 5 provides an overview of the LTs and LCAs within the district and presents a summary of the findings of the Landscape Susceptibility Study for each of the development scenarios as they relate to each LT and LCA.
- Section 6 is a local landscape character assessment of a 5km radius of the Norwich Main.
- Section 7 considers how the Norwich Southern Bypass Protection Zone policies might influence the form and siting of energy-related development.

1.6.2 The report is supported by a number of accompanying appendices:

- Appendix 1: Figures
- Appendix 2: Criteria for assessing Susceptibility to Change
- Appendix 3: Landscape Susceptibility Analysis
- Appendix 4: Local Landscape Character Analysis

2 Planning policy context

2.1 Overview

2.1.1 The following paragraphs provide a high-level summary of planning policy as it relates to the design and location of energy-related developments.

2.2 National Planning Policy Framework (NPPF)

2.2.1 The National Planning Policy Framework[4] [NPPF] sets out the Government's planning polices for England and how these should be applied. It promotes a plan-led planning system and requires that development plans include strategic policies to address each Local Planning Authority's priorities for development and use of land, including [§20] a strategy for:

> *… infrastructure for transport, telecommunications, security, waste management, water supply, wastewater, flood risk and coastal change management, and the provision of minerals and energy (including heat) …*

2.2.2 Chapter 14: *Meeting the challenge of climate change, flooding and coastal change*, notes:

> *The planning system should support the transition to net zero by 2050 and take full account of all climate impacts including overheating, water scarcity, storm and flood risks and coastal change. The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.* [§161]

2.2.3 To help increase the use and supply of renewable and low carbon energy and heat, §165 requires that plans should (amongst other things): *"provide a positive strategy for energy from these sources, that maximises the potential for suitable development, … while ensuring that adverse impacts are addressed appropriately (including cumulative landscape and visual impacts)"*, and *"consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development"*.

2.2.4 With regard to landscape as a consideration in the location of energy-related projects, planning policies and decisions should *"contribute to and enhance the natural and local environment by… protecting and enhancing valued landscapes..."* and *"recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland"* [§187].

2.2.5 In terms of protected landscapes "*Great weight should be given to conserving and enhancing landscape and scenic beauty in National Parks, the Broads and National Landscapes which have*

[4] National Planning Policy Framework, Ministry of Housing, Communities & Local Government (December 2024)

the highest status of protection in relation to these issues. The conservation and enhancement of wildlife and cultural heritage are also important considerations in these areas and should be given great weight in National Parks and the Broad. The scale and extent of development within all these designated areas should be limited, while development within their setting should be sensitively located and designed to avoid or minimise adverse impacts on the designated areas" [§189].

2.3 South Norfolk Local Plan

2.3.1 The adopted South Norfolk Local Plan is made up of various documents. These include the Greater Norwich Local Plan (GNLP), which was jointly prepared by South Norfolk and Broadland District Councils, Norwich City Council and Norfolk County Council, which was adopted on the 25th March 2024. The plan covers the period up to 2038 and includes strategic policies to guide future development and plans to protect the environment, seeking to ensure that delivery of development is achieved in a way which promotes sustainability.

2.3.2 Section 2 describes the Greater Norwich spatial profile. Regarding renewable energy, §109 notes:

> *Renewable Energy 109. Recent years have seen an increase in renewable energy generation locally, chiefly from solar power (both small and large-scale), with some wind and biomass developments. Our plan should support further development of decentralised, renewable and low carbon sources of energy in appropriate locations*

2.3.3 Regarding landscape, §§122 to 124 note:

> *The varied landscape character areas identified by Natural England in and adjacent to Greater Norwich area consist of: the fens and marshes of the Broads to the east of Greater Norwich* [NCA 80]*; a more intimate landscape of small fields and hedgerows adjacent to the Broads, also in the east* NCA 79*; rolling landscapes of varied geology including woodland, heath and former parkland estates in the west and north* [NCA 84 and 78] *and an extensive open clay plateau in the south* [NCA 83].
>
> *These nationally identified landscape character areas inform local landscape character studies. Locally significant landscapes include strategic gaps between settlements, river valleys (including the Wensum, Waveney, Bure, Tiffey, Tas and Chet), undeveloped approaches to Norwich and the setting of the Broads.*
>
> *Greater Norwich does not have a nationally designated Green Belt. National policy is clear that new Green Belts should very rarely be established. Therefore this plan will need to carry forward policies for protecting our valued landscapes.*

2.3.4 Energy and the environment are at core of *The Vision for Greater Norwich in 2038*:

> *By promoting this Greater Norwich Local Plan our aim is that it will support growth of a diverse low carbon economy which will compete globally through its world class knowledge-intensive jobs in the Cambridge Norwich Tech Corridor.*
>
> *As a result, by 2038 Greater Norwich will have vibrant, healthy, inclusive and growing communities supported by the delivery of new homes, infrastructure and an enhanced*

environment. Growth will make the best of Greater Norwich's distinct built, natural and historic environments, whilst protecting and enhancing them.

To achieve this, growth will be clean and resource efficient, with significantly reduced emissions to ensure that Greater Norwich plays a full part in meeting national commitments on tackling climate change and is moving towards a post-carbon economy. The focus on three high growth sectors: clean energy, agri-food and ICT/digital, along with the high environmental standards and significant further improvements to our extensive green infrastructure network promoted through this plan, will support Norfolk and Suffolk as the United Kingdom's clean growth region.

2.3.5 It continues: *"Greater efficiency in water and energy usage will minimise the need for new infrastructure, and further reductions in carbon emissions will be delivered through the increased use of sustainable local energy sources"*, *"The distinctive characteristics of our landscapes will also be protected and enhanced. This will be achieved by shaping high-quality, well designed and beautiful new development …"* and *"Critically, our plan will have helped to achieve reductions in our greenhouse gas emissions to contribute to the national target to reduce all greenhouse gas emissions by 68% by 2030 and by 78% by 2035 compared to 1990 levels and the zero-emission target by 2050."*

2.3.6 **Policy 2: Sustainable Communities** requires that development proposals should, were relevant, address the following matters (amongst others) in order to contribute to the achievement of sustainable communities:

- *Make efficient use of land with development densities taking account of accessibility and local character consideration. …*
- *Create beautiful, well-designed places and buildings which respect the character of the local area and seek to enhance it through appropriate design, having regard to any local design guidance (including design codes).*
- *Take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption and the risk of overheating.*
- *Provide for the use of sustainable energy, local energy networks and battery storage where appropriate.*

2.3.7 **Policy 3: Environmental Protection and Enhancement.** Sub section **The Natural Environment** requires that development proposals should enhance the natural environment through, amongst things:

- *Being designed to respect, conserve and enhance natural assets, taking account of local design and other guidance such as landscape character assessment.*
- *Avoiding harm to designated and non-designated assets of the natural environment, having regard to their level of significance (local, national, and international) in accordance with the requirements of the NPPF and relevant policies in other Development Plan Documents and Neighbourhood Plans.*

- *Following a hierarchy of seeking firstly to avoid impacts, mitigate for impacts so as to make them insignificant for biodiversity, or as a last resort compensate for losses that cannot be avoided or mitigated for. Adherence to the hierarchy should be demonstrated.*
- *Undertaking a relevant assessment (such as a landscape or ecological assessment) if impacts to a natural asset might arise.*
- *Provision of new, or conservation or enhancement of existing, green infrastructure to contribute (directly or indirectly) to the strategic green infrastructure network having regard to local green infrastructure strategies (identified indicatively in Maps 8A and 8B).*
- *Respecting landscape character and retaining important views and features, having regard to landscape character assessments and sensitive areas such as landscape settings, strategic gaps and green spaces identified in Local or Neighbourhood Plans, and to the importance of the nationally designated Broads Authority area and its setting.*

2.3.8 In applying the above, regard will be given to the level of importance of the natural asset.

2.3.9 The South Norfolk Local Plan Development Management Policies Document, Adoption Version, October 2015 includes a policy on renewable energy.

2.3.10 **Policy DM 4.1: Renewable Energy** notes:

> *Proposals for renewable energy generating development requiring planning permission other than for proposals for wind energy development will be supported and considered (taking account of the impact of relevant ancillary equipment) in the context of sustainable development and climate change on the wider environmental, social and economic benefits of maximising use of renewable energy. The Council will encourage the use on-site communal-scale energy generation measures.*

2.3.11 It notes that consideration will be given to the effect of the proposal on number of factors, including the *"character and appearance of the landscape"*, and that *"Permission will be granted where there are no significant adverse effects or where any adverse effects are outweighed by the benefits."* It also notes that where appropriate, planning conditions will be imposed requiring the decommissioning and removal/dismantling of all plant and ancillary equipment and, if necessary, the restoration of land, on the cessation of use.

2.3.12 The document also contains several policies that relate directly to landscape character and the location and design of development within the landscape.

2.3.13 **Policy DM 4.5: Landscape Character Areas and River Valleys**, requires that:

> *All development should respect, conserve and where possible, enhance the landscape character of its immediate and wider environment. Development proposals that would cause significant adverse impact on the distinctive landscape characteristics of an area will be refused.*

All development proposals will be expected to demonstrate how they have taken the following elements (from the 2001 South Norfolk Landscape Assessment as updated by the 2012 review) into account:

- *The key characteristics, assets, sensitivities and vulnerabilities;*
- *The landscape strategy; and*
- *Development considerations.*

Particular regard will be had to protecting the distinctive characteristics, special qualities and geographical extents of the identified Rural River Valleys and Valley Urban Fringe landscape character types.

2.3.14 **Policy DM 4.6: Landscape Setting of Norwich** is considered in more detail at Section 7.

2.3.15 **Policy DM 4.7: Strategic gaps between settlements within the Norwich Policy Area** states:

Gaps between settlements within the Norwich Policy Area Development will be permitted in the Strategic Gaps identified on the Policies Map, between the development boundaries of the Settlements listed below, where it would not erode or otherwise undermine the openness of the Strategic Gap, and complies with other Development Plan policies.

- *Cringleford – Hethersett*
- *Hethersett - Wymondham*

2.3.16 **Policy DM 4.8: Protection of Trees and Hedgerows** states:

The Council will promote the retention and conservation of significant trees, woodlands and traditional orchards and will serve Tree Preservation Orders where necessary. 119 The Council will presume in favour of the retention of 'important' hedgerows as defined by the Hedgerows Regulations 1997.

The Council will safeguard and promote the appropriate management of protected and other significant trees and hedgerows, unless the need for, and benefits of, a development clearly outweigh their loss.

2.3.17 **Policy DM 4.9: Incorporating landscape into design** emphasises the importance of good quality design:

Where appropriate, detailed development proposals must demonstrate a high quality of landscape design, implementation and management as an integral part of the new development.

The provision for new planted features (such as tree belts, hedgerows, wild flowers and specimen trees) is expected to form part of development proposals from their outset and should provide an appropriate landscape setting for the scheme.

'Hard' landscape features (such as paving, kerb stones, street furniture, boundary treatments etc) will reflect and where possible enhance locally distinctive character and

styles where relevant; or innovative contemporary solutions reflecting local context and reinforcing or creating local distinctiveness and the setting of the development.

Landscape schemes will be required to respect the character and distinctiveness of the local landscape and should ensure that any land remodelling respects the local topographic character in terms of height, slope, angle and character. Landscape schemes should be clearly and properly specified.

2.4 Overarching National Policy Statement for Energy (EN-1)

2.4.1 Overarching National Policy Statement for Energy, dated 2024, sets out the government's policy for the delivery of major energy infrastructure.

2.4.2 In England, the National Policy Statements (NPS) may be a material consideration in decision making. Whether the policies in a NPS are material and to what extent will be judged on a case-by-case basis and will depend upon the extent to which the matters are already covered by applicable planning policy. For the purposes of Nationally Significant Infrastructure Projects (NSIPs), the NPSs represent the primary policy for decision making.

2.4.3 The government sees a need for significant amounts of new large-scale energy infrastructure to meet its energy objectives. However, *"it will not be possible to develop the necessary amounts of such infrastructure without some significant residual adverse impacts. These effects will be minimised by the application of policy set out in Parts 4 and 5 of this NPS."*

Electricity storage

2.4.4 Electricity storage is considered to have *"a key role to play in achieving net zero and providing flexibility to the energy system"*]§3.3.25]. There is currently around 4GW of electricity storage operational in Great Britain, around 3GW of which is pumped hydro storage and around 1GW battery storage.

2.4.5 Electricity Storage facilities are not generally considered to be NSIPs except for pumped hydro storage facilities above 50MW.

New electricity infrastructure

2.4.6 The NPS states that substantial reinforcement of the transmission network is required in East Anglia to handle increased power flows from offshore wind generation [§3.3.68], which may also require additional offshore connections coming to land in England.

The historical approach to connecting offshore wind resulted in individual radial connections developed project-by-project… For regions with multiple windfarms or offshore transmission projects it is expected that a more coordinated approach will be delivered. For these areas, this approach is likely to reduce the network infrastructure costs as well as the cumulative environmental impacts and impacts on coastal communities by installing a smaller number of larger connections, each taking power from multiple windfarms instead of individual point-to-point connections for each windfarm. [§3.3.71]

2.4.7 The final Phase 1 report for National Grid ESO's Offshore Coordination Project (published December 2020) found that the number of new electricity infrastructure assets, including cables

and onshore landing points could be reduced by up to 50 per cent, significantly reducing environmental impacts and impacts on coastal communities.

Heat networks

2.4.8 Heat networks are systems of insulated pipes that take heat from a central source and supply it, as hot water, to residential, commercial and public sector buildings to provide hot water and heating. There are over 14,000 heat networks in the UK with nearly 492,000 connections in total including 446,500 domestic customers.

Assessment principles

2.4.9 In considering any proposed development the Secretary of State should take into account:

- its potential benefits, and
- its potential adverse impacts, including on the environment, including any long-term and cumulative adverse impacts, as well as any measures to avoid, reduce, mitigate or compensate for adverse impacts. [§4.1.5]

2.4.10 It is stated that:

> *The overarching need case for each type of energy infrastructure, and the substantial weight which should be given to this need … is the starting point for all assessments of energy infrastructure applications.* [§4.2.6]
>
> *Applicants must apply the mitigation hierarchy, and demonstrate that it has been applied. … Applicants should demonstrate that all residual impacts are those that cannot be avoided, reduced or mitigated.* [§4.2.11]
>
> *Applicants should set out how residual impacts will be compensated for as far as possible. ... The cumulative impacts of multiple developments with residual impacts should also be considered.* [§4.2.12]

2.4.11 All proposals for projects that are subject to the Environmental Impact Assessment Regulations must be accompanied by an Environmental Statement describing the aspects of the environment likely to be significantly affected by the project.

Criteria for good design for energy infrastructure

2.4.12 The NPS notes that:

> *Whilst the applicant may not have any or very limited choice in the physical appearance of some energy infrastructure, there may be opportunities for the applicant to demonstrate good design in terms of siting relative to existing landscape character, land form and vegetation. Furthermore, the design and sensitive use of materials in any associated development such as electricity substations will assist in ensuring that such development contributes to the quality of the area.*
>
> *The Secretary of State should be satisfied that the applicant has considered 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.

Climate change adaption and resilience

2.4.13 Regarding climate change:

Applicants should demonstrate that proposals have a high level of climate resilience built-in from the outset. [§4.10.11]

Ancient Woodland and veteran trees

2.4.14 Regarding Ancient Woodland and veteran trees:

Applicants should include measures to mitigate fully the direct and indirect effects of development on ancient woodland, ancient and veteran trees or other irreplaceable habitats during both construction and operational phases. [§5.4.32]

Landscape and visual

2.4.15 Landscape and visual impacts are considered in Section 5.10 of the NPS.

The landscape and visual effects of energy projects will vary on a case by case basis according to the type of development, its location and the landscape setting of the proposed development. [§5.10.1]

Landscape effects arise not only from the sensitivity of the landscape but also the nature and magnitude of change proposed by the development, whose specific siting and design make the assessment a case-by-case judgement. [§5.10.4]

Virtually all nationally significant energy infrastructure projects will have adverse effects on the landscape, but there may also be beneficial landscape character impacts arising from mitigation. [§5.10.5]

Projects need to be designed carefully, taking account of the potential impact on the landscape. Having regard to siting, operational and other relevant constraints the aim should be to minimise harm to the landscape, providing reasonable mitigation where possible and appropriate. [§5.10.6]

The applicant should consider landscape and visual matters in the early stages of siting and design, where site choices and design principles are being established. [§5.10.19]

2.4.16 The assessment should include the effects on landscape components and character as well as the impact on views and visual amenity. The assessment should also address the landscape and visual impacts of noise and light pollution.

Applicants should consider how landscapes can be enhanced using landscape management plans, as this will help to enhance environmental assets where they contribute to landscape and townscape quality. [§5.10.24]

Adverse landscape and visual effects may be minimised through appropriate siting of infrastructure within its development site and wider setting. The careful consideration of colours and materials will support the delivery of a well-designed scheme, as will sympathetic landscaping and management of its immediate surroundings. [§5.10.27]

Depending on the 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 may mitigate the impact when viewed from a more distant vista. [§5.10.28]

The scale of energy projects means that they will often be visible across a very wide area. The Secretary of State should judge whether any adverse impact on the landscape would be so damaging that it is not offset by the benefits (including need) of the project. [§5.10.35]

Other NPSs

2.4.17 Five further technology-specific NPSs have also been published:

- EN-2: natural gas electricity generation
- EN-3: renewable electricity generation (both onshore and offshore)
- EN-4: gas supply infrastructure and gas and oil pipelines
- EN-5: the electricity transmission and distribution network
- EN-6 nuclear electricity generation

3 Methodology for the Landscape Susceptibility Study

3.1 Approach

3.1.1 The methodology for undertaking the Landscape Susceptibility Study (LSS) is based on the process set out in *An approach to landscape sensitivity assessment – to inform spatial planning and land management* (ALSA), Natural England, June 2019.[5] Reference was also made to *Guidelines for Landscape and Visual Impact Assessment,* Landscape Institute and Institute of Environmental Management and Assessment, 3rd Edition, April 2013 (GLVIA) and *Topic Paper 6: Techniques and Criteria for Judging Capacity and Sensitivity*, Countryside Agency and Scottish Natural Heritage, 2002.

3.1.2 The development of the methodology was informed by similar studies carried out by The Landscape Partnership in the past. It also took account of principles expounded in the Holford Rules (regarding the routing of overhead transmission lines) and the Horlock Rules (regarding the siting of substations, etc.).

3.1.3 The European Landscape Convention promotes achieving *"sustainable development based on a balanced and harmonious relationship between social needs, economic activity and the environment"*. [6]

3.1.4 ASLA and GLVIA adopt a similar basic approach to the assessment of sensitivity, i.e. that sensitivity is a product of:

1/ the susceptibility of a landscape or visual baseline to a specific change; and

2/ the value of the landscape and its visual characteristics.

3.1.5 However, there are some important distinctions to be made in terms of how sensitivity is considered by ALSA, compared to the approach within GLVIA:

- In GLVIA terms, sensitivity, and in particular susceptibility to change, is considered with regard to a known development, whereas ALSA allows a more strategic assessment of landscape sensitivity, and it's the principle of a particular type of development change scenario that is considered.
- Within the context of spatial planning, landscape sensitivity refers to landscape character and the associated visual resource. GLVIA on the other hand considers the landscape and visual effects separately.

3.1.6 For the purposes of landscape sensitivity assessments, landscape sensitivity can be considered as a measure of *"the resilience, or robustness, of a landscape to withstand specified change arising*

[5] An approach to landscape sensitivity assessment – to inform spatial planning and land management. Tudor, C, Natural England, 2019
[6] Council of Europe (2000), European Landscape Convention, Council of Europe, Florence, October 2000

from development types or land management practices, without undue negative effects on the landscape and visual baseline and their value."[7]

3.1.7 Similarly, Topic Paper 6 noted that landscape sensitivity relates to *"the stability of character, the degree to which that character is robust enough to continue and to be able to recuperate from loss or damage. A landscape with a character of high sensitivity is one that, once lost, would be difficult to restore; a character that, if valued, must be afforded particular care and consideration in order for it to survive*."[8]

3.1.8 Historically, there has been some confusion concerning the use of the words sensitivity and capacity, and on occasions the two terms have been used interchangeably. The ASLA notes that:

> *Sensitivity and capacity have different meanings. When dealing with an area's sensitivity the question is, 'to what'? When dealing with an area's landscape capacity perhaps to absorb a certain amount of development without unacceptable changes to landscape character – the question generally relates to, 'how much'? Importantly, a sensitivity study will identify areas of relative sensitivity to particular development scenarios, and inform place based objectives and guidance and possibly decisions concerning environmental capacity - perhaps by way of what some might call a Landscape Capacity Assessment. The latter might help decision makers to set more detailed objectives about the amount of acceptable change within a specified area, and therefore inform a more detailed strategy regarding desired amounts of development / change.*

3.1.9 ALSA states that landscape sensitivity assessment should *"enable associated decision making to be sequential, transparent and auditable."*

[7] An approach to landscape sensitivity assessment – to inform spatial planning and land management. Tudor, C, Natural England, 2019
[8] Topic Paper 6 – Techniques for judging capacity and sensitivity

3.2 Landscape sensitivity

3.2.1 The sensitivity of a landscape or visual receptor is determined by combining the value afforded to the receptor with its susceptibility to change.

3.2.2 ***Landscape value*** is based on considerations such as landscape quality/condition; landscape fabric and rarity; scenic quality; wildlife, heritage and cultural interest; recreation value; and perceptual aspects. The presence of a landscape designation can help to identify value and reasons for a designation are usually established in a supporting study. Landscapes or features without any formal designation may also express characteristics that are valued locally. Where there is no supporting evidence base, details regarding sensitivity should typically be derived from landscape character assessments.

3.2.3 ***Susceptibility to change*** assesses the relative ability of a landscape to accommodate the changes that would result from a particular type of development. This is an integral element of the landscape assessment but one that can only be judged in the context of the generic type of development being proposed. However, it is not necessary to understand the specifics of the development to make this judgement and thus susceptibility to change can be considered as part of the baseline assessment.

3.2.4 This LSS assesses the susceptibility of the different landscapes within the South Norfolk district to change from a range of energy-related development scenarios defined at Section 4.

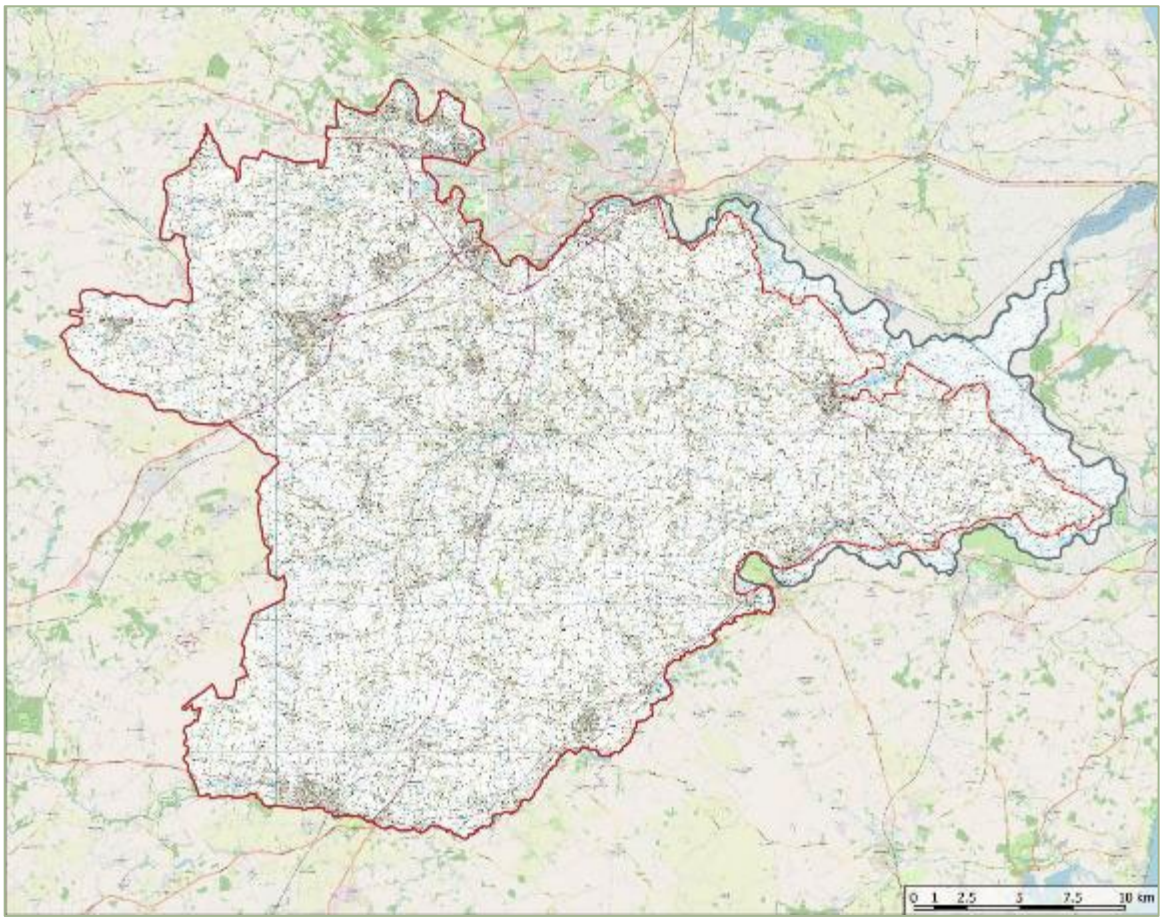
3.2.5 It considers the susceptibility of the landscape types (LTs) and landscape character areas (LCAs) defined in the South Norfolk Landscape Character Assessment to each of the generic development scenarios, assuming it is constructed somewhere within the LT or LCA. It does not consider the precise location of each scenario within the LT or LCA; however, where relevant, commentary is provided if particular parts of an LT or LCA might be more sensitive to a development scenario than others.

3.2.6 The LSS does not consider the landscape value of the various LTs and LCAs within the district. This would be a separate, further exercise. Combining such information with the corresponding susceptibility to change, using professional judgement, would give an overall landscape sensitivity.

3.2.7 As a broad generalisation, some initial indication of the value of a landscape can be ascertained by the presence (or not) of any landscape-related designations encompassing all or part of a particular LCA. Such landscape-related designations are illustrated at Appendix 1 | Figures 03-05 and, where relevant, the presence of such designations has been referred to in the analysis.

3.3 The study area

3.3.1 The study area comprises the whole of the district of South Norfolk except for the areas which fall within the Broads Authority Executive Area. It does not include the neighbouring authorities of Breckland, Broadland, the Borough of Great Yarmouth, Norwich City, East Suffolk or Mid Suffolk. Where cross-boundary issues of landscape setting exist, consultation prior to making a planning application is recommended with those authorities potentially affected.



Study area shown in red. For full size map, see Appendix 1, Figure 01

3.3.2 Whilst outside the study area, the Broads is an internationally important wetland and designated protected landscape of the highest order with the status of a national park. There is a legal duty to protect and enhance its natural beauty, wildlife, and cultural heritage, and such considerations could be relevant where an energy project situated in the South Norfolk administrative area could have an incongruous effect on the setting to the Broads landscape.[9]

[9] Part of the Broads lies within South Norfolk district area. The Levelling Up and Regeneration Act, which received Royal Assent on 26 October 2023, amended Section 17A of the Norfolk and Suffolk Broads Act 1988. Section 17A creates a general duty of public bodies and this was amended to replace 'shall have regard to' with 'must seek to further' the purpose of conserving and enhancing the natural beauty, wildlife and cultural heritage of the Broads, promoting opportunities for the understanding and enjoyment of the special qualities of the Broads by the public; and protecting the interests of navigation.

Landscape character of the study area

3.3.3 The importance of understanding the landscape character of all landscapes in England is recognised in the National Planning Policy Framework (NPPF) §187, which states that planning policies and decisions should contribute to the natural environment by: *"recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland"*.

3.3.4 The LSS considers the susceptibility of the different landscapes within South Norfolk district to various energy-related development scenarios.

3.3.5 Since different landscapes are defined by different physical and perceived qualities and attributes, it is likely that they will have differing resilience to a particular form of development. For example, a rural landscape could more readily accommodate a traditional barn, without changing the character of the area, whereas other types of development such as a distribution warehouse could potentially result in important changes to the character of the landscape.

3.3.6 To understand the different effects that the various development scenarios would have on the different landscapes within the district it was first necessary to define geographical areas of common landscape character and qualities.

3.3.7 Landscape character assessment is the process that can identify these intrinsic values and unique characteristics of the diverse landscapes within a given area, in this case South Norfolk district. It enables landscapes to be described and understood by mapping natural, physical and cultural features in order to define different landscapes and demonstrate what makes them special. These landscape character types share similar characteristics, such as underlying geology, soil type, topography and landform, the pattern and type of land/field enclosure, historic land use, the pattern of settlements and types of building that these comprise, tree and woodland cover and the general visual experience of the area.

3.3.8 It is important to note that landscape character assessments can be undertaken at a range of scales. It should also be noted that boundaries are only indicative of the change between areas and therefore when working at a site scale, especially close to boundaries between character types or character areas, users should carefully identify which landscape the land parcel belongs to, based on its characteristics. In addition, it is important to note that while drawn with a line on a map, areas close to boundaries often may be better thought of as an area of transition and may display some of the characteristics and sensitivities of both character areas.

3.3.9 Effects on landscape character can be direct (i.e. on the character area/landscape type that the site is located within) or indirect (i.e. changes to characteristics or perceptions of character that occur beyond the boundary of a character area/landscape type). In addition, effects on landscape character may be positive, neutral or negative, i.e. strengthening and enhancing the characteristic patterns and features, or eroding and losing the patterns and features that contribute to landscape character.

3.3.10 The landscape of South Norfolk has been characterised in the published South Norfolk Landscape Character Assessment, Volume 4: Landscape Character of the Rural Policy Area, dated April 2006 (final amendments January 2008). The specific purpose of the report was to *"provide a clear understanding of the character of the landscape within the Rural Policy Area. In particular, the assessment process aims to describe the distinctive features or characteristics that are important to the landscape and to provide guidance on those aspects of the landscape that are most sensitive to change"* (§1.6).

3.3.11 The South Norfolk District Landscape Character Assessment[10] describes a total of seven landscape types (LTs) within the district:

A: Rural River Valleys

B: Tributary Farmland

C: Tributary Farmland with Parkland

D: Settled Plateau Farmland

E: Plateau Farmland

F: Valley Urban Fringe

G: Fringe Farmland

3.3.12 The seven LTs have been broken down into 20 geographically discrete landscape character areas (LCAs):

A1: Tas Rural River Valley

A2: Yare/Tiffey Rural River Valley

A3: Tud Rural River Valley

A4: Wensum Rural River Valley

A5: Waveney Rural River Valley

B1: Tas Tributary Farmland

B2: Tiffey Tributary Farmland

B3: Rockland Tributary Farmland

B4: Waveney Tributary Farmland

B5: Chet Tributary Farmland

B6: Yare Tributary Farmland

C1: Yare Tributary with Parkland

C2: Thurlton Tributary Farmland with Parkland

[10] South Norfolk District Landscape Character Assessment, 2001, Prepared on behalf of South Norfolk District Council by Land Use Consultants

D1: Wymondham Settled Plateau Farmland

D2: Poringland Settled Plateau Farmland

E1: Ashwellthorpe Plateau Farmland

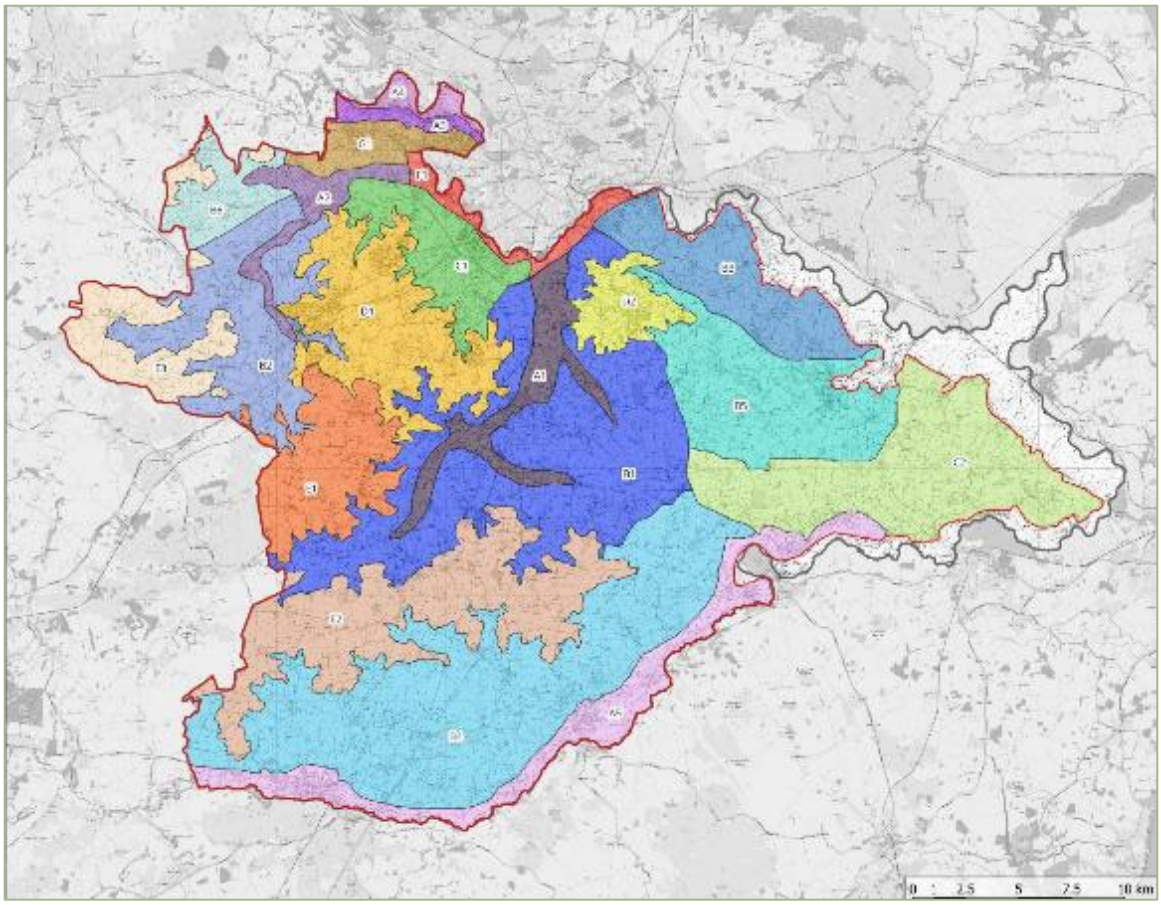
E2: Great Moulton Plateau Farmland

E3: Hingham Mattishall Plateau Farmland

F1: Yare Valley Urban Fringe

G1: Easton Fringe Farmland

3.3.13 It is these LCAs that are used to provide the areas of common landscape character whose susceptibility to change is assessed within the LSS, i.e. the baseline units for analysis. The LCAs are mapped below and at Appendix 1 | Figure 08.



Landscape Character Areas for South Norfolk Council. For full size map, see Appendix 1, Figure 08

3.4 Desktop Appraisal / sources of information

3.4.1 A desk-based study was undertaken that involved gathering and reviewing current and background information, including previous studies, environmental designations and other relevant baseline information. This included reference to:

- Natural England's National Character Area Profiles
- South Norfolk Landscape Character Assessment, 2008
- South Norfolk Local Plan
- South Norfolk Landscape Designations Review – Norwich Southern Bypass Landscape Protection Zone, 2012
- South Norfolk Landscape Designations Review – Landscape Character Areas & River Valleys in the Norwich Policy Area, 2012
- South Norfolk Landscape Designations Review – Local Designations Review, 2012
- South Norfolk District Landscape Sensitivity Study in relation to wind turbines, 2008

3.4.2 GIS data used for the LSS included OS map data, landscape-related designations, hydrology data, ecology designations (SSSI, NNR) and habitat data, heritage designations (both statutory and local, including Conservation Areas and Registered Parks and Gardens).

3.4.3 Reference was also made to Norfolk County Council's interactive map (Public Rights of Way, highways, etc.) and to the Government's Magic Map (landscape-related designations, etc.).

3.4.4 The baseline appraisal is presented as a collection of figures that can be found at Appendix 1 to the LSS.

3.4.5 The assessment findings should be read in conjunction with the figures within Appendix 1.

3.5 Susceptibility analysis

3.5.1 The susceptibility of each of the LCAs in relation to each of the development scenarios was assessed using a combination of desktop analysis and field work. The South Norfolk District Landscape Character Assessment was used to establish the key characteristics of each LT and LCA.

3.5.2 The field survey work was carried out by a team of Landscape Architects, all of whom were familiar with the qualities of the South Norfolk landscape, using a standard proforma to record data in a consistent manner.

3.5.3 Where appropriate, field notes were made to form the basis of guidance as to how the form of development might be adapted to make it more acceptable within the landscape and of any broad mitigation measures that might be appropriate to offset landscape effects or opportunities for landscape enhancements that might be delivered with development of the type proposed.

Approach to assessing the susceptibility of the landscape to change

3.5.4 The susceptibility of each LCA to the different energy-related development scenarios (as set out at Section 4) was assessed using a standard set of criteria. The criteria which were chosen reflected both the national guidance provided by Natural England and the particular circumstances of the project.

3.5.5 Each criterion was accompanied by a set of indicators to help guide the assessor in making judgements as to what factors should be considered to indicate a higher susceptibility to change, and what factors should be considered to indicate a lower susceptibility to change.

3.5.6 The selection of criteria was based on the attributes of the landscape that could be affected by energy developments. Energy developments can potentially affect the distinct and recognisable pattern of elements which create landscape character, as well as the perceptual and aesthetic qualities of the landscape.

3.5.7 The following criteria were used to assess susceptibility to change:

- Scale
- Enclosure
- Landform
- Field patterns
- Landcover
- Settlement pattern and human influence
- Perceptual aspects
- Visual characteristics
- Skylines
- Intactness

3.5.8 Relevant criteria were selected for each development scenario. The indicators of higher and lower susceptibility for each criteria are presented in Appendix 2.

3.5.9 The assessment of susceptibility has two aspects:

- The nature of the existing environment (the key characteristics of the assessment unit)
- The degree of change which is likely to occur

3.5.10 There are then variations between landscape character areas, and also variations between the different development scenarios.

3.6 Assessment of overall susceptibility to change

3.6.1 The susceptibility of the LCAs to each of the different development scenarios was assessed using a number of criteria. In each case susceptibility was assessed on a five-point scale of High, Medium-High, Medium, Medium-Low or Low. Commentary was also provided to explain the judgements. The findings of the assessments are recorded at Appendix 3. This allows the judgements made for each criterion to be viewed in a transparent, comparable and consistent manner.

3.6.2 Professional judgment was used to make an overall assessment of each LCA's susceptibility to change for each of the development scenarios, again using a five-point scale:

- Low susceptibility – Key characteristics and qualities are not vulnerable to change from this type of development. The landscape could accommodate new development with little change to its character. Care is still needed when siting and designing these developments to ensure best fit with the receiving landscape.
- Medium-Low susceptibility – Few of the key characteristics and qualities of the landscape are vulnerable to change. The landscape is likely to be able to accommodate new development with limited change in character. Care is still needed when siting and designing schemes to avoid adversely affecting local landscape character.
- Medium susceptibility – Some of the key characteristics and qualities of the landscape are vulnerable to change. Although the landscape may have some potential to accommodate development it is likely to cause a degree of change in character. Care would be needed in siting and design.
- Medium-High susceptibility – Key characteristics and qualities of the landscape are vulnerable to change. New developments of this type are likely to affect the character of the landscape. The LCA has limited potential for development of this type, and great care would be needed with siting and design.
- High susceptibility – Key characteristics and qualities of the landscape are highly vulnerable to change. New developments of this type are likely to result in a fundamental change in character i.e. they would alter the key characteristics of the landscape. The LCA has low potential for development of this type.

3.6.3 Unless effective mitigations are being provided that reduce the harm, South Norfolk Council will use this SPD as evidence against proposals that it considers to be detrimental to landscape areas with a high susceptibility to change. This, in the Council's judgement, is necessary because harmful development without adequate mitigation is unacceptable, as the landscape is intrinsic to the area's beauty and should be safeguarded for generations to come.

3.7 Limitations

3.7.1 In considering the findings of the LSS, the following limitations should be noted:

- It is important to remember that that landscape effects must be considered as a spectrum. There is no defined threshold that a development must reach in order to be considered acceptable against any of the criterion.
- When assessing the susceptibility of a landscape to change, consideration must be given to the effects of the development as perceived in neighbouring LCAs (and potentially further afield), not just the LCA in which the development is proposed.
- The landscape parcels, the LTs and LCAs, considered in the susceptibility appraisal are necessarily broad and in places extensive. As such, it is quite likely that there are variations in susceptibility within a landscape parcel itself, with some areas of the parcel being more capable of accommodating a particular development scenario than others.
- The LSS considers only the attributes and characteristics of the landscape and their susceptibility to change. There may be other very good reasons why a particular site is unsuitable or inappropriate for development of the type proposed, for example it might have poor access or be subject to flood risk. It is quite possible that an area may have relatively low sensitivity to a particular form of development in landscape terms but would be unsuitable in other respects e.g. due to the presence of important ecological habitats or heritage assets. Identification of such matters are beyond the scope of this study.
- It is important to recognise that within the LSS no weighting has been applied to any of the individual criterion. The results as presented in the tables in Appendix 3 show the range of factors that have been considered for each landscape parcel and development scenario, and where they sit in the descriptive scale for each criterion. It is not the intention to add up the entries for each criterion to give an overall numerical score. The relative importance of each criterion may vary between each landscape parcel for a range of reasons. The judgement of overall susceptibility should take into account the susceptibility in relation to the individual criteria as well as the relative importance of the criteria, which involves professional judgement.

3.7.2 The LSS provides an initial assessment of a landscape's ability to accommodate a particular type of development. Should any specific developments come forward, they would need to be tested through use of Landscape and Visual Impact Assessment to inform the emerging design and any mitigation measures necessary, and to determine any likely residual landscape and visual effects associated with that particular development proposal to assist those charged with determining the planning application.

4 Energy-related development scenarios

4.1 Energy-related development scenarios considered in the LSS

4.1.1 The types of energy-related development scenarios considered in this study are listed below. These are considered to be representative of projects that could realistically come forward within South Norfolk district within the foreseeable future. They comprise: solar photovoltaics, Anaerobic Digestion plants, battery storage and electricity transmission and distribution infrastructure.

4.1.2 For each project type, different scales of development have been considered as set out below:

Solar PV

- small-scale solar PV projects, up to 5 MW
- medium-scale solar PV projects, 5 to 15 MW
- larger-scale solar PV projects, 15 to 50 MW
- very-large solar PV projects, over 50MW

AD plants

- farm-scale, single or double tank system, up to 1ha
- larger installation, up to 5ha

Battery storage

- small-scale, up to 1ha in size
- large-scale, over 1ha is size

Overhead powerlines

- 132kV lines, utilising pylons within a nominal height of 26m
- 400kV, utilising pylons with a nominal height of 50m

Underground cable routes

- Comprising cable route and associated works

Substations

- Substations are typically required to connect generating facilities to the distribution network and so often found in association with other energy project types.

4.1.3 It is envisaged that this study will complement the South Norfolk District Wind Turbine Landscape Sensitivity Study (Land Use Consultants, 2006 – final amendments 2008). Consequently, wind turbines have not been considered in this study.

4.2 Other energy-related development types

4.2.1 Energy-related developments can also include combustion power stations (including biomass plants, advanced conversion technologies, landfill gas projects, and natural gas-fired plants) and nuclear power stations.

4.2.2 Biomass plants are already present in the local area at Thetford, Snetterton and Eye. Thetford Biomass Power Station is run primarily on poultry litter and woodchip while Snetterton and Eye are primarily straw fired. The potential for this technology is limited by the available feedstock so it is unlikely that new plants will be required in the foreseeable future.

4.2.3 Landfill gas projects have been implemented across many landfill sites in Norfolk. The potential for this technology is clearly limited geographically to existing landfill sites, so it is not considered further in this study.

4.2.4 Advanced conversion technologies (ACT) are designed to recover energy from waste. ACT is considered the next generation of thermal heat treatment and can be applied to a variety of feedstocks. Most ACT plants produce a gaseous product known as syngas. The adoption of this technology has been slow and the amount of electricity that can be generated is limited by the available feedstock.

4.2.5 Natural gas-fired power stations are large installations. Natural gas remains part of the present energy mix but will eventually be phased out. The nature of this technology means that it is limited to a few large sites, and it is therefore unlikely that this form of energy-related development would come forward within South Norfolk.

4.2.6 Nuclear power stations are situated on the coast and would not therefore be located within South Norfolk.

4.3 Overview of energy-related development scenarios

4.3.1 For each of the development scenarios considered in the LSS, the following matters are considered:

- Overview of the development type
- Development scales considered in the LSS
- Parameters assumed in the LSS
- Potential landscape effects
- Cumulative effects
- Design development guidelines

4.3.2 The design development guidelines relate to landscape susceptibility only and do not address sensitivities relating to other areas of potential environmental impact, or other non-landscape considerations which might affect the feasibility of development.

4.3.3 The guidelines are generic and apply to all the LTs and LCAs.

Generic development guidelines

4.3.4 The following siting or design development guidelines are applicable to all development scenarios:

- The effects of the proposed development on landscape and visual receptors should be tested throughout the siting and design process by landscape and visual impact assessment to ensure adverse effects are minimised.
- Trees, hedges and other woody vegetation at the site should be retained wherever possible and protected during the construction works in accordance with BS5837:2012, to ensure their long-term health and viability, and contribution to the landscape.
- Disturbance of soils should be minimised. Where necessary, the existing soils at a site should be stripped prior to works commencing, separated into topsoil and subsoil, and stored in a manner that would safeguard their long-term health. On completion of the building works the soils should be used as part of the landscape scheme.
- Development (buildings and surfaces) should be located in a manner that retains the general character of the surrounding landform, where it can be accommodated without abrupt changes in levels or steep gradients or the need for prominent retaining structures or bunds. Where possible, levels should follow the wider contours and general gradient.
- Consider the landscape effects of drainage features such as SuDs, which can have a highly engineered form and introduce ancillary infrastructure. Ensure they have sufficient space to enable shallow sides and opportunities for habitat creation, so as to create meaningful and positive additions to the landscape.
- Ensure that any earthworks, including artificial mounds that might be used to screen the development, and sensitively designed in terms of height, profile and gradient, to fit in with the surrounding landscape. Generally, such features do not provide effective growing conditions for planting.
- Boundary features such as hedges should be retained in a meaningful and continuous manner.
- Development at a site should be accompanied by a comprehensive landscape scheme with an appropriate landscape management plan to guide its implementation and ongoing maintenance and ensure its long term contribution to the landscape. The scheme should be implemented in a timely manner in the first available planting season.
- New planting should be designed using appropriate and predominantly native planting so as to reflect the character of the wider landscape, with plant species selected to minimise long term maintenance and maintenance, with a view to being resilient to future climate change.

4.4 Cumulative effects

4.4.1 Cumulative effects are effects "that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project." [11] Cumulative landscape and visual effects would result from additional changes to the landscape or visual amenity caused by the proposed development in conjunction with other development(s) (associated with, or separate to, it).[12]

4.4.2 The guidelines for minimising cumulative impact are as follows:

- When assessing the potential effects of a proposed scheme, reference should be made to the relationship between the proposal and any existing, consented or proposed energy-related developments within the district, and especially within the same character area or neighbouring landscape character areas.
- The character of existing developments in relation to the landscape should be considered. If there is a distinct pattern of development in a particular type of landscape, then continuation of this pattern would have less of an impact on character than the introduction of a different size or form of development in an undisturbed location.
- The closer developments are to each other the more likely they are to be viewed in combination (or in sequence).
- Even if developments are not visible from the same viewpoint the cumulative effects on character still need to be considered as they can have an effect on the experience of moving through a landscape (sequential effects).
- In many scenarios, locating new development in proximity to existing development could be considered to minimise its impact and preserve the more undisturbed and tranquil parts of the district. The combined effects of different developments could, however, change the fundamental character of an area if the common characteristics of the developments were to become the defining characteristics of the area.
- Cumulative effects relate primarily to the amount of development within a given landscape, as well as to intervisibility, intra-visibility and sequential effects. [13] Good design could reduce cumulative effects by avoiding intervisibility for example.
- Whilst it might be argued that only developments which are intervisible can have cumulative effects, this is not necessarily the case. Developments which are scattered across the landscape might be considered to affect a broader area, and to affect the perception of the area as a whole and/or the sequential experience of travelling through it.

[11] Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions, European Commission, 1999
[12] Guidelines for Landscape and Visual Impact Assessment, Second Edition, Landscape Institute and IEMA, 2002
[13] Intervisibility is the visibility between two points. Two points on the ground or two features are described as 'intervisible' when they are visible from each other. Intra-visibility is when two points can be seen/experienced from a third point (in many cases, this is more important that pure intervisibility); e.g. a listed building might be experienced in the same view as a new industrial building by a sensitive visual receptor.

4.5 Solar PV

Overview of the development type

4.5.1 Solar PV developments comprise arrays of solar photovoltaic panels that are mounted on frames. The back panel height is typically up to 3m. The panels are usually positioned at a fixed angle of 20-40 degrees from the horizontal facing south and sited in parallel rows with gaps between the rows for access and to prevent shading of adjacent rows. Frames can be fixed in position through piles driven into the ground or placed on concrete shoes, avoiding the need for mass concrete foundations. The solar arrays are typically accompanied by inverters, transformers, and small buildings such as substations. The proposals typically include perimeter fencing, pole-mounted CCTV cameras, and access tracks. Some security lighting may be proposed in conjunction with the buildings.

4.5.2 Solar installations tend to be measured by their capacity in megawatts. 1 MW of installed capacity occupies, on average, 2ha of land.

4.5.3 Schemes of over 50 MW are defined as NSIPs and are determined by the Secretary of State rather than the local planning authority.

4.5.4 Solar PV developments typically have an operational life of 25 to 40 years and planning permissions are usually limited in terms of their duration. The solar farm owner and landowner are responsible for the decommissioning of solar PV developments. Planning conditions can be used to ensure that installations are removed when no longer in use, and to ensure that the land is restored to its previous (or another agreed) use.

4.5.5 Whilst solar PV can in theory be installed almost anywhere, there are technical considerations such as the capacity of the local substations.

Scenarios considered in the LSS

4.5.6 Four scales of solar PV project are considered in this study:

- small-scale solar PV projects, up to 5 MW
- medium-field solar PV projects, 5 to 15 MW
- larger-scale solar PV projects, 15 to 50 MW
- very large solar PV projects, over 50 MW

Parameters assumed in the LSS

4.5.7 For the purposes of the LSS, the following parameters are assumed for solar PV developments:

- Small-scale solar PV projects, up to 5 MW – typically 5 to 10ha and contained within a single field unit.
- Medium-scale solar PV projects, 5 to 15 MW – typically 10 to 30ha and extending over a small number of fields.

- Larger-scale solar PV projects, 15 to 50 MW – typically 30 to 100ha and encompassing several fields.
- Very large scale solar PV projects, over 50 MW – encompassing substantial tracts of countryside.
- Ground mounted panels up to a maximum of 4m high.
- Appropriate fencing.
- No external lighting, save that for emergency attendance.
- Grazed or habitat enhancement land cover.
- Timely implementation of a well-considered and maintained landscape scheme to integrate the development into the surrounding landscape framework.
- A lifespan of up to 40 years, followed by full decommissioning and removal of all structures and a return to agricultural land use.

Potential landscape effects

4.5.8 Solar PV developments, although not prominent in terms of height, can occupy substantial areas of ground and may be quite visible, particularly if located on slopes. Landscape effects may include the following:

- Solar arrays may be particularly visible in open landscapes, or on slopes.
- On a sunny day they can appear blue while on a cloudy day they can appear a dark grey, both of which contrast with surrounding green areas.
- The presence of PV panels and associated infrastructure may increase the perceived human influence on the landscape and change land cover patterns of rural landscapes.
- Solar PV developments will change the land use and appearance of a field or fields, affecting land cover patterns.
- The regular edges of solar PV developments may be conspicuous in more irregular landscapes (particularly where they do not follow contours or where field boundaries are irregular in form).
- The height of the panels means that they may over-sail typical hedgerow field boundaries.
- Screen planting around solar PV development can change the sense of enclosure of a landscape (NB: some changes in management, such as allowing hedges to grow out, may enhance diversity and local landscape character resulting in positive change, but may in turn block valued longer distance views across the wider landscape).
- Mitigation for a PV development can include large scale planting schemes which can enhance the biodiversity of a field and diversify the local habitats.

- Structures may appear out of place in particularly rural landscapes which are valued for their sense of remoteness.
- Ancillary buildings and security requirements (such as fencing and/or CCTV) may introduce new and unfamiliar features into the landscape, increasing the perceived human influence on the landscape, and eroding the intrinsically rural character. Often, these elements can have more influence than the panels themselves.
- Solar PV schemes can take valuable arable land out of production for many years.
- Solar schemes might intercept or disrupt the routes of existing public rights of way, or influence the experience of those using them.
- In more open landscapes foreground mitigation planting may have the unintended effect of blocking or altering the composition of longer distance views.
- Where multiple field units are involved, consideration should be given to the sequential influence of solar PV as it is experienced by those moving through the landscape, e.g. on public rights of way.

Cumulative effects

4.5.9 There are a number of existing Solar PV developments within South Norfolk. A map of consented and proposed renewable energy schemes within South Norfolk is provided on the Council's website: Renewables mapping | Broadland and South Norfolk

4.5.10 Considering the presence of several solar PV arrays in South Norfolk district, and the continued pressure for this type of development, it is important that consideration is given to their cumulative effects when they can be appreciated in close proximity to other similar developments and/or other energy-related infrastructure that they often need to connect to, such as substations.

Design development guidelines

4.5.11 The following guidelines are relevant to the siting and design of solar PV developments in South Norfolk:

- Locate development on lower slopes/within folds in gently undulating lowland landscapes or on flat plateau sites, rather than on slopes, especially higher slopes, crests and plateau edges.
- Site solar development in landscapes with a sense of enclosure (e.g. provided by woodland or high hedges) rather than in open and unenclosed landscapes (unless on an elevated plateau lacking intervisibility with surrounding landscapes).

- Avoid areas of greater time-depth – e.g. historic landscape types such as commons, co-axial enclosures or parklands, and landscapes that form part of the setting of a conservation area, listed building, scheduled monument or registered park and garden.[14]
- Avoid development that adversely affects the setting of The Broads, the openness of the Norwich Southern Bypass Landscape Protection Zone, views to Norwich or the undeveloped approaches to Norwich.
- Consider views from local viewpoints, settlements (particularly Conservation Areas) and popular walking or cycling routes such as the Boudicca Way. If development will be visible ensure it does not dominate and detract from the experience of visiting these locations/ travelling along these routes, either in terms of individual field units or as the sequence of passing through multiple fields.
- Ensure the area or extent of development is in scale with the landscape in which it lies – larger scale developments are more suited to large scale landscapes.
- Solar PV arrays are better suited to areas with a rectilinear field pattern. Within a field the space between panels should be consistent and logical.
- The layout should avoid effects on existing trees and hedges. Since panels are unlikely to be positioned where they would be shaded by vegetation, this is usually relatively easily achieved. Panels should be set back from boundaries to maintain the legibility of field patterns (and also to assist with hedgerow management and potentially to provide habitat). Care should be taken that the associated infrastructure does not conflict with tree root protection areas.
- Panel heights should be kept as low as possible, to minimise visual effect. Where relevant, sufficient space must, however, be provided below the panels for sheep grazing or habitat creation.
- The creation of new tracks for access to solar arrays will increase the landscape impact. Where new tracks are needed, they should as far as possible follow field boundaries. Temporary trackways should be used where possible to minimise longer-term effects.
- Ancillary buildings or structures, such as substations, transformers and inverters should be located in inconspicuous locations. The local vernacular should be considered in relation to buildings – see also comments in relation to substations.
- Dark, recessive colours in non-reflective materials should be chosen for panel frames and ancillary structures, and where appropriate, fencing.
- Only install lighting that is justified. Use of infrared security cameras could avoid the need for new lighting altogether.
- Grid connections should be via underground cable.

[14] Time-depth can be described succinctly as the imprint of the past on a place. Whilst all landscapes have a history some have a more ancient history which is still apparent in the landscape. This is referred to as a greater time-depth.

- Fences should be set back from surrounding hedges, to reduce their apparent height when viewed from beyond the boundary.
- Efforts should be made to maintain land uses on the site that fit with the character of the surrounding area. The spaces between and around the solar arrays can be utilised productively for grazing or habitat creation.
- Hedgerows can be managed to provide ecological benefits as well as screening, which may include the strengthening of existing field boundaries, or introduction of new planting.
- Hedges can provide effective landscape mitigation, either by managing them at higher levels or planting new hedges. However, care should be taken that such hedges do not block long distance views or create a tunnel or corridor effect, for example where planted in association with public rights of way.
- Incorporate biodiversity net gain into any new development and consider opportunities to contribute to the delivery of the Green Infrastructure network in South Norfolk.
- As a temporary development it will be important to demonstrate that the development can be decommissioned effectively and that the landscape can be restored to at least as good a condition as it was prior to the development taking place.

4.6 AD plants

Overview of the development type

4.6.1 Anaerobic digestion (AD) is a natural process where animal or plant materials (biomass) is broken down by microorganisms in the absence of air. The resultant methane-rich biogas can be used to generate heat and/or power (Combined Heat and Power), or upgraded to biomethane for injection into the national gas grid.

4.6.2 AD plants can be classified into two general categories: those that process agricultural feedstock (such as manures, slurries, crops and crop residues), and those that use predominantly municipal, commercial and industrial waste streams as feedstock. AD plants that receive waste feedstock fall under the jurisdiction of the County Planning Authority and are assessed in accordance with the Minerals and Waste Local Plan. The LSS only applies to AD plants that do not involve waste feedstock and therefore do not constitute County Matters.

4.6.3 Built forms relating to AD plants generally comprise fermentation tanks, which can be inflatable, and associated buildings/ancillary structures including gas to grid processing units, Combined Heat and Power (CHP) units, control buildings and feedstock storage including silage clamps. The largest (and most distinctive) elements tend to be the circular storage tanks (which can vary in size from 2.75 - 30.5m in diameter and 1.5 - 33.5m in height) and the flare stack (typically 3 to 5m in height). The feedstock storage areas can be quite extensive and the total site area varies from around 2ha up to 9ha. AD Plants are assumed to be permanent.

Scenarios considered in the LSS

4.6.4 Two scenarios for AD plants are considered in this study:

- farm-scale, single or double tank system, up to 1ha
- larger installation, up to 5ha

Parameters assumed in the LSS

4.6.5 For the purposes of the LSS, the following parameters are assumed for AD plants:

- 16m high tanks
- Perimeter fencing
- Lightning conductor rods
- Timely implementation of a well-considered and maintained landscape scheme to integrate the development into the surrounding landscape framework.

Potential landscape effects

4.6.6 Landscape effects from AD plants may include the following:

- Direct loss of landscape features within the area developed.
- The tanks and/or the flare stack can be a prominent feature in the landscape.
- The bulky industrial style structures can increase the sense of human influence and introduce an industrial character in what might otherwise be a relatively rural landscape.
- Vehicle movements, ancillary activities/storage, security and flood lighting associated with these developments can also increase human influence in more naturalistic or rural landscapes.
- Introduction of artificial slopes or mounds which would have a negative effect on the landform.
- Additional adverse effects on the landscape if SuDS features are not well designed.

Cumulative effects

4.6.7 AD plants are not particularly common, and cumulative effects are therefore unlikely. A map of consented and proposed renewable energy schemes within South Norfolk is provided on the Council's website: Renewables mapping | Broadland and South Norfolk

Design development guidelines

4.6.8 The following guidelines are relevant to the siting and design of AD plants in South Norfolk:

- Aim to locate new structures close to existing built form (e.g. existing electricity substation infrastructure) or in areas which are already well screened by existing vegetation.
- Ensure the scale of development is appropriate for its context.

- The materiality and colours of the proposed structures will be important in terms of their effects on the landscape. Consultation with the LPA will be required to develop the most appropriate design.
- Protect the existing network of hedgerows, woodlands, and semi-natural habitats and aim to extend these as part of any landscape scheme associated with development.
- Enhance existing screening through planting that integrates with features such as woodland and hedgerows within the wider landscape, to reinforce local character and biodiversity.
- Protect undeveloped skylines and backdrops from encroachment – set any new built development back from valley crests and avoid highly visible slopes.
- Ensure that existing landmark features remain prominent in the landscape and new development does not detract from these features.
- Plants should be carefully sited to take advantage of existing screening. Avoid exposed locations.
- Avoid areas with greater time depth such as pre-18th century fields and common land, or areas of higher landcover interest such as unimproved grassland.
- Avoid development which adversely affects the setting of The Broads, the openness of the Norwich Southern Bypass Landscape Protection Zone, views to Norwich or the undeveloped approaches to Norwich.
- Schemes should be limited to small scale plants that can be easily contained within an existing farmyard setting and operate without the need to import material from other farms.
- Consider the landscape effects of drainage features such as SuDS, which can have a highly engineered form and introduce ancillary infrastructure. Ensure they have sufficient space to enable shallow sides and opportunities for habitat creation, so as to create meaningful and positive additions to the landscape.
- Ensure that any earthworks, including artificial mounds that might be used to screen the development, are sensitively designed in terms of height, profile and gradient, to fit in with the surrounding landscape. Generally, such features do not provide effective growing conditions for planting.
- Consider views from local viewpoints, settlements (particularly Conservation Areas) and popular routes (e.g. walking or cycling route). If development will be visible, ensure it does not dominate and detract from the experience of visiting these locations/ travelling along these routes.
- Consider use of green roofs.
- The local vernacular should be considered in relation to buildings.

- Ensure planting around the buildings reflects the underlying landscape character by using locally-appropriate species and linking to the existing green infrastructure network.
- Minimise the use of security lighting. Use full cut-off light fittings to avoid any direct upward light and ensure that lighting is designed to minimise light spill into the surrounding landscape. Consider use of infrared cameras to avoid the need for lighting.
- Consider providing enhanced management of landscape features and habitats as part of any development.
- Incorporate biodiversity net gain into any new development and consider opportunities to contribute to the delivery of the Green Infrastructure network in South Norfolk.

4.7 Battery Storage

Overview of the development type

4.7.1 Battery storage facilities enable energy from renewable sources to be stored and later transferred back to the grid. They are sometimes referred to as battery energy storage systems (BESS).

4.7.2 Battery storage facilities comprise individual battery units (which normally consist of free-standing units) and associated inverters (which convert DC battery power to AC grid power), transformers (transferring power between the grid and the batteries) and switchgear/control room building/cabin all within a fenced compound which may require ground levelling.

4.7.3 The scale of commercial battery storage schemes is highly variable, depending on the required storage capacity. There are technical constraints on where battery storage can be located as they have to be situated close to existing transmission lines. Battery storage facilities are increasingly being co-located with solar arrays to allow excess power to be stored and later transferred back to the grid, to improve the economic viability of solar farms.

4.7.4 A typical site area for a 50MW capacity battery storage is likely to be around 1ha in size, depending on the battery technology used.

4.7.5 Batteries and other components have a design life, and planning permissions are therefore issued on a temporary basis.

Scenarios considered in the LSS

4.7.6 Two scenarios for battery storage are considered in this study:

- Small-scale, up to 1ha
- Larger-scale, over 1ha in size

Parameters assumed in the LSS

4.7.7 For the purposes of the LSS, the following parameters are assumed for battery storage:

- Battery storage cabinets up to 3m high for small scale battery storage projects
- Larger and taller structures for large scale battery storage projects

- Security fencing
- Transformers inverters
- Switchgear/control room building/cabin
- Cable connection to grid
- No external lighting, save that for emergency attendance
- Timely implementation of a well-considered and maintained landscape scheme to integrate the development into the surrounding landscape framework.

Potential landscape effects

4.7.8 The following landscape effects may arise from Battery Storage:

- Direct loss of landscape features within the area developed.
- The bulky industrial style structures can increase the sense of human influence and introduce an industrial character in what might otherwise be a relatively rural landscape.
- Vehicle movements, ancillary activities/storage, security and flood lighting associated with these developments can also increase human influence in more naturalistic or rural landscapes.
- Introduction of artificial slopes or mounds which would have a negative effect on the landform.
- Additional adverse effects on the landscape if SuDS features are not well designed.

Cumulative effects

4.7.9 There are a number of approved battery storage schemes within South Norfolk including the Hornsea 3 Energy Balancing Infrastructure. A map of consented and proposed renewable energy schemes within South Norfolk is provided on the Council's website: Renewables mapping | Broadland and South Norfolk

4.7.10 There is likely to be increased pressure in the future for battery storage in the South Norfolk district. Consideration should be given to the cumulative effects on landscape features that might arise from any new battery storage (including associated substations) when they can be appreciated in close proximity to existing facilities and/or other energy infrastructure.

Design development guidelines

4.7.11 The following guidelines are relevant to the siting and design of Battery Storage developments in South Norfolk.

- Aim to locate new structures close to existing built form (e.g. existing electricity substation infrastructure) or in areas which are already well screened by existing vegetation.
- Ensure the scale of development is appropriate for its context.

- The materiality and colours of the proposed structures will be important in terms of their effects on the landscape. Consultation with the LPA will be required to develop the most appropriate design.
- Protect the existing network of hedgerows, woodlands, and semi-natural habitats and aim to extend these as part of any landscape scheme associated with development.
- Enhance existing screening through planting that integrates with features such as woodland and hedgerows within the wider landscape, to reinforce local character and biodiversity.
- Protect undeveloped skylines and backdrops from encroachment – set any new built development back from valley crests and avoid highly visible slopes.
- Ensure that existing landmark features remain prominent in the landscape and new development does not detract from these features.
- Avoid areas with greater time depth such as pre-18th century fields and common land.
- Avoid locating in open, undeveloped landscapes or areas with historical significance e.g. parklands. Avoid loss of areas of greater landcover interest, such as unimproved grassland or deciduous woodland.
- Avoid development which adversely affects the setting of The Broads, the openness of the Norwich Southern Bypass Landscape Protection Zone, views to Norwich or the undeveloped approaches to Norwich.
- Consider the landscape effects of drainage features such as SuDS, which can have a highly engineered form and introduce ancillary infrastructure. Ensure they have sufficient space to enable shallow sides and opportunities for habitat creation, so as to create meaningful and positive additions to the landscape.
- Ensure that any earthworks, including artificial mounds that might be used to screen the development, are sensitively designed in terms of height, profile and gradient, to fit in with the surrounding landscape. Generally, such features do not provide effective growing conditions for planting.
- Consider views from local viewpoints, settlements (particularly Conservation Areas) and popular routes (e.g. walking or cycling route). If development will be visible, ensure it does not dominate and detract from the experience of visiting these locations/ travelling along these routes.
- Consider use of green roofs.
- The local vernacular should be considered in relation to buildings.
- Ensure planting around the buildings reflects the underlying landscape character by using locally-appropriate species and linking to the existing green infrastructure network.
- Only install lighting that is justified. Use of infrared security cameras could avoid the need for new lighting altogether.

- Consider providing enhanced management of landscape features, habitats and heritage assets as part of any development.
- Incorporate biodiversity net gain into any new development and consider opportunities to contribute to the delivery of the Green Infrastructure network in South Norfolk.

4.8 Overhead powerlines

Overview of the development type

4.8.1 Overhead powerlines consist of overhead wires suspended on wooden poles or steel pylons. The National Grid infrastructure in England is largely made up of 400 kV and 132 kV lines. Besides this there is also infrastructure that belongs to the distribution network operator (DNO) i.e. UK Power Networks.

4.8.2 Electricity pylons were first introduced in 1928 when the National Grid was created, and the basic design of the pylon has remained largely the same since then. The National Grid initially consisted of 132 kV lines, but higher voltage lines requiring larger pylons were introduced in the 1960s.

4.8.3 Overhead powerlines are suspended on steel lattice towers (commonly known as pylons). There are three basic types of towers, straight line towers, angle towers, and terminal towers. Most lines are double circuit and feature towers with three symmetrical cross arms. Angle towers are bulkier than straight line towers. They have tensions insulators rather than suspension insulators and can be asymmetrical. 132 kV lines typically use towers of around 26m in height[15] while 400 kV lines typically use towers of around 50m in height.[16] This standard height can, however, be varied. The largest lines use two or four wire bundles separated by spacers.

4.8.4 132 kV and 400 kV overhead lines of over 2km length are defined as NSIPs and are determined by the Secretary of State rather than the local planning authority.

Scenarios considered in the LSS

4.8.5 Two scenarios for above ground energy transmission are considered in this study:

- 400kV lines that utilise the largest pylons. These are typically owned by National Grid and transmit electricity from where its generated (e.g. power stations) to substations.
- 132kV lines that utilise smaller pylons. These are operated by DNOs and distribute electricity from the substations to homes, businesses, etc.

Parameters assumed in the LSS

4.8.6 For the purposes of the LSS, the following parameters are assumed for overhead transmission lines:

- 400kV lines – pylons with a nominal height of 50m

[15] The standard height of a straight line L4 tower is 26.1m
[16] The standard height of a straight line L6 tower is 50.6m

- 132kV lines – pylons with a nominal height of 26m

Potential landscape effects

4.8.7 Overhead power lines may affect the landscape in the following ways:

- Introduction of tall (frequently the tallest) features into the landscape. As a comparison, commercial warehouses are typically have a ridge height 14m, housing a ridge height of 9m to 12m, and a mature oak 20m to 25m.
- Pylons are inevitably seen as new, and frequently dominant, features in the landscape that introduce a strong sense of modernity.
- The size of the structures and the frequency of the pylon repeat patterns is often in stark contrast with and out of scale to smaller scale, finer grain landscape patterns and features.
- Cables that contrast, in terms of colour, against the prevalent landscape colour, e.g. sky or woodland. Colouring cables green can often make them look more prominent since the green appears artificial against more muted natural tones.
- Pylon construction (and replacement) can involve considerable disruption. Pylons are frequently located in rural or remote locations and temporary access roads are often required.
- Need for ongoing vegetation clearance can affect the landscape underneath transmission lines. Vegetation management can have consequential effects on the character of the landscape below the transmission line.
- Addition of lights on lines (as ecological mitigation measure) would have consequential effects on the landscape, particularly in terms of night-time effects.

4.8.8 Consideration should be given to consequential additions to the landscape that would inevitably arise with overhead lines and pylons, such as extensions to existing or new substations.

4.8.9 Overhead power lines can in theory be decommissioned, i.e. removed when no longer needed, or replaced with underground cables. The DNO (UK Power Networks) has for example taken down power lines between Earlham and Bowthorpe and replaced them with underground cabling.

Cumulative effects

4.8.10 Cumulative effects on landscape and visual receptors might arise from any new overhead power lines when they can be appreciated in close proximity to existing lines and associated infrastructure such as pylons and substations and/or other energy facilities such as battery storage systems.

4.8.11 Existing overhead transmission infrastructure in South Norfolk includes the 400 kV Norwich Main-Bramford power line, the 400 kV Norwich Main-Walpole power line, the 132 kV Norwich Main-Earlham Grid, the 132 kV Norwich Main-Trowse Grid, the 132 kV line between Trowse and Lowestoft, and the 132 kV line between Bramford and Lowestoft.

National Grid Electricity Transmission (National Grid) are proposing to build c.184km of new electricity transmission in order to reinforce the high voltage power network in East Anglia between existing substations at Norwich Main in Norfolk, Bramford in Suffolk, and Tilbury in Essex, as well as to connect new offshore wind generation. The project is known as Norwich to Tilbury. Norwich to Tilbury meets the current criteria of an NSIP.As such, an application for Development Consent will be submitted to the Planning Inspectorate. If consent for the project is awarded, this would be granted in the form of a Development Consent Order (DCO) from the Secretary for State for Business, Energy and Industrial Strategy following a public examination of the application. Within South Norfolk the proposed route would extend southwards from the Norwich Main Substation through the district to the Mid Suffolk border.

Holford Rules

4.8.12 Guidelines on the routeing of overhead lines were first formulated in 1959 by Sir William (later Lord) Holford and became known as the Holford Rules. It is acknowledged that present day environmental assessment has a wider remit than the visual amenity that the Holford Rules concentrate on. Nonetheless, National Grid has reviewed the guidelines and concluded that they remain relevant.

Rule 1:

> *Avoid altogether, if possible, the major areas of highest amenity value, by so planning the general route of the first line in the first place, even if the total mileage is somewhat increased in consequence.*

4.8.13 A sub note to Rule 1 requires that designers should *"Investigate the possibility of alternative routes, avoiding if possible the areas of the highest amenity value"* and, importantly, that *"The consideration of alternative routes must be an integral feature of environmental statements."*

Rule 2:

> *Avoid smaller areas of high amenity value, or scientific interests by deviation; provided that this can be done without using too many angle towers, ie the more massive structures which are used when lines change direction.*

4.8.14 The sub note to Rule 2 notes that *"Where possible choose routes which minimise the effects on the setting of areas of architectural, historic and archaeological interest including Conservation Areas, Listed Buildings, Listed Parks and Gardens and Ancient Monuments."*

Rule 3:

> *Other things being equal, choose the most direct line, with no sharp changes of direction and thus with fewer angle towers.*

4.8.15 Sub note of Rule 3: *"Where possible choose inconspicuous locations for angle towers, terminal towers and sealing end compounds."*

Rule 4:

Choose tree and hill backgrounds in preference to sky backgrounds wherever possible; and when the line has to cross a ridge, secure this opaque background as long as possible and cross obliquely when a dip in the ridge provides an opportunity. Where it does not, cross directly, preferably between belts of trees.

Rule 5:

Prefer moderately open valleys with woods where the apparent height of towers will be reduced, and views of the line will be broken by trees.

4.8.16 Sub note on Rules 4 and 5: *"Utilise background and foreground features to reduce the apparent height and domination of towers from pan viewpoints"*, *"Minimise the exposure of numbers of towers on prominent ridges and skylines"*, *"Where possible avoiding cutting extensive swathes through woodland blocks and consider opportunities for skirting edges of copses and woods"*, *"Protecting existing vegetation, including woodland and hedgerows, and safeguard visual and ecological links with the surrounding landscape"*.

Rule 6:

In country which is flat and sparsely planted, keep the high voltage lines as far as possible independent of smaller lines, converging routes, distribution poles and other masts, wires and cables, so as to avoid a concentration or 'wirescape'.

4.8.17 Sub note 6 continues the commentary on cumulative effects:

In all locations minimise confusing appearance. Arrange wherever practicable that parallel or closely related routes are planned with tower types, spans and conductors forming a coherent appearance; where routes need to diverge, allow where practicable sufficient separation to limit the effects on properties and features between the lines.

Rule 7:

Approach urban area through industrial zones, where they exist; and when pleasant residential and recreational land intervenes between the approach line and the substation, go carefully into the comparative costs of the undergrounding, for lines other than those of the highest voltage.

4.8.18 Sub note for Rule 7 includes:

… Alignments should be chosen after consideration of effects on the amenity of existing development and on proposals for new development. When siting substations take account of the effects of the terminal towers and line connections that will need to be made and take advantage of screening features such as ground form and vegetation.

4.8.19 Supplementary notes include:

Avoid routeing close to residential areas as far as possible on grounds of general amenity.

Where possible choose routes which minimise the effect on Special Landscape Areas, areas of Great Landscape Value and other similar designations of County, District or Local value

Other design development guidelines

4.8.20 The following guidelines should be considered when designing overhead powerlines:

- Overhead powerlines are tall structures, with a standardised design. The mitigation of effects is therefore difficult as it is rarely possible to screen pylons with planting, nor is it possible for the structures to reflect local identity. The main aspect of good design then relates to the choice of alignment and the siting of individual pylons within the landscape.
- Power lines follow straight paths and are better suited to large-scale landscapes with rectilinear field patterns.
- Simple plateau landscapes are more able to accept overhead powerlines than areas with intricate landform.
- Whilst valleys are sometimes preferred for overhead cable routes this would be inappropriate for South Norfolk as the pylons would overwhelm the shallow valleys.
- Consider following the route of existing powerlines to minimise the area which is affected by overhead powerlines and to preserve the remaining areas of undisturbed countryside. [Conversely, in such scenario, consideration must also be given to cumulative effects].
- Angle towers are bulkier than suspension towers and include tension insulators rather than suspension insulators. Sharp changes of direction require unattractive asymmetrical towers and should be avoided. The number of angle towers should be as few as possible and angle towers should also be placed in inconspicuous locations where possible.
- Termination towers are squat and are particularly unattractive, while cable sealing ends add further infrastructure to the landscape. The number of these features should therefore be as few as possible.
- Ancillary features such as cable sealing ends and substations should as far as possible be sited in conjunction with existing infrastructure to minimise harm. These features should also be sited in inconspicuous locations.
- Consider whether use of T-pylons might reduce the potential landscape effects.
- Consult with public on different designs of pylon and other options such as following existing overhead transmission routes.

4.8.21 There is a presumption that underground cable routes are more appropriate than overhead powerlines within protected or more sensitive landscapes. The effect of overhead powerlines within the setting of the Broads will also have be considered to avoid effects on the designated landscape.

4.9 Underground cable routes

Overview of the development type

4.9.1 Underground cable routes refer to underground electricity transmission infrastructure. Cables are employed to connect energy generating infrastructure (e.g. offshore windfarms) with the National

Grid via a substation. The National Grid uses underground cable routes within particularly sensitive landscapes for example National Parks and National Landscapes, and lower voltage underground cables are also used to distribute power at the district level.

Scenarios considered in the LSS

4.9.2 The study considers a single scale of underground cable route.

Parameters assumed in the LSS

4.9.3 For the purposes of the LSS, the following parameters are assumed for underground cable routes:

- Up to six separate trenches, works corridor up to 100m wide.
- Use of trenchless crossings to avoid effects on sensitive features and habitats.
- Removal of all temporary haul routes, compounds and bellmouths at the end of the implementation phase.
- Timely implementation of a well-considered and maintained landscape scheme to reinstate landscape features and make good any damage to the landscape.

Potential landscape effects

4.9.4 For underground cabling, the most pronounced effects are generally during the implementation phases of the project.

4.9.5 Underground cable corridors can be installed via either open cut trenching or horizontal directional drilling (HDD) for shorter distances, which does not require a trench. HDD is typically used for only the most sensitive areas, such as woodland and watercourses.

4.9.6 Some larger offshore windfarms may require multiple trenches. Construction works typically include fencing, vegetation clearance and topsoil stripping and storage, temporary haul routes, the excavation of a trench, the installation of cable ducts, backfilling, cable pulling and reinstatement works. The width of land which is typically required for a cable corridor falls within the range of 30-100m. Typical buried depths are 1.2 to 2m and trenches may be up to 5m wide at the surface.

4.9.7 Following completion of trenching and laying of cable routes permanent residual effects on the landscape include inspection chambers for cable jointing bays and marker posts indicating the location of the cable routes. Cable sealing ends add physical structures that link above and below ground sections of the route. In terms of decommissioning it is understood that cables are normally left buried in the ground at the end of the operation phase.

4.9.8 Cable trenches may affect the landscape in the following ways:

- Laying of the cable can result in direct loss of landscape features along the route (such as trees and sections of hedgerows) and disturbance to ground over long distances. Whilst hedges are typically replanted, trees are not generally replaced.

- Cables are generally laid in straight lines and the temporary trench can be visible over long distances, particularly if it is located in an elevated position or on steep slopes.
- The construction activities can affect characteristics of stillness, remoteness and solitude – although this is temporary.
- Post-construction, the recovering vegetation can produce scarring of the landscape. The time taken for vegetation to recover will depend on the type of landcover and standards of post-construction maintenance. Soil compaction on clay soils can result in long term drainage issues potentially affecting productivity.

Cumulative effects

4.9.9 It is unlikely onshore cable routes would result in notable cumulative effects beyond the implementation phases.

Design development guidelines

4.9.10 The following guidelines should be considered when designing the route for underground cables:

- Minimise the width of the required corridor.
- Ensure successful ground re-instatement/restoration can be achieved.
- Use horizontal directional drilling (HDD) in sensitive locations to conserve above-ground features such as important or irreplaceable trees, hedgerows or nature reserves.
- Avoid steep slopes wherever possible and aim to route through less visible areas.
- Aim to avoid landscape features such as mature trees and woodland, historic sites such as Registered Parks and Gardens, and irreplaceable habitats such as Ancient Woodland.
- Consider views from local viewpoints, settlements (particularly Conservation Areas) and popular walking or cycling routes including the Boudicca Way. If development will be visible ensure it does not dominate and detract from the experience of visiting these locations/ travelling along these routes.
- Minimise disruption to field boundaries as far as possible – routeing through areas of historic small-scale fields will result in a greater impact than routeing through large-scale arable fields.

4.10 Substations

Overview of the development type

4.10.1 Substations transform electricity to a higher voltage to allow it to be transmitted over long distances and also transform it to a lower voltage to allow it to be distributed locally. Substations are typically required to connect generating facilities to the distribution network. The category also includes converter stations which transform one type of current to another.

4.10.2 The typical components of an electrical substation include a secure outdoor compound containing switch gear, control room buildings, and outdoor electrical equipment. There is no standard design of substations. They can be extensive in dimensions, for example, the proposed onshore substation associated with the Sheringham Shoal Extension Project includes an operational compound of up to 6ha, a building height up to 15m, and lightning masts up to 30m. Substations are assumed to be permanent development.

Potential landscape effects

4.10.3 The landscape effects of substations may include the following:

- Direct loss of landscape features in areas to be developed.
- The bulky industrial style structures can increase human influence and industrial character which may be particularly at odds in naturalistic or more remote landscapes.
- Vehicle movements and ancillary activities/storage associated with these developments can also increase human influence in naturalistic or rural landscapes.
- Introduction of artificial slopes or mounds which would have a negative effect on the landform.
- Additional adverse effects on the landscape if SuDS features are not well designed.

Cumulative effects

4.10.4 Substations are typically required to connect generating facilities to the distribution network and so are often found in association with other energy project types.

4.10.5 Consideration should be given to the cumulative effectives on landscape features that might arise from any new substations when they can be appreciated in close proximity to existing facilities and/or other energy infrastructure such as battery energy storage systems and pylons.

4.10.6 Existing substations in South Norfolk include the Norwich Main Substation (located in Stoke Holy Cross Parish), Trowse Grid and Earlham Grid.

4.10.7 The Hornsea Three offshore windfarm project includes a new onshore substation/converter station which will connect to the Norwich Main substation. The new substation will be located to the south of the A47 and east of the B1113 and will occupy a considerable area.

4.10.8 It is proposed that a new onshore substation would be installed to the south of the existing Norwich Main substation as part of the Sheringham Shoal offshore windfarm project. The proposed substation will be up to 6ha in size. The substation will include a control building, transformers, switchgear, access roads, a lightning rod, landscape screening and drainage. The largest structure will be the control building with an approximate height of 15m. The main electrical equipment will not exceed a height of 15m.

4.10.9 The proposed Norwich to Tilbury project also includes an extension to the Norwich Main substation which would be located to the west of the existing facility.

Scenarios considered in the LSS

4.10.10 Although one scale of substation is considered in this study, it should be noted that (as set out above) the scale of substations can vary widely depending on their use or purpose.

Parameters assumed in the LSS

4.10.11 For the purposes of the LSS, the following parameters are assumed for substations:

- Built structures up to 15m tall.
- Security fencing
- Lighting infrastructure for emergency use only. The substation would not typically be lit during normal operation.
- Timely implementation of a well-considered and maintained landscape scheme to integrate the development into the surrounding landscape framework.

Horlock Rules

4.10.12 National Grid's Horlock Rules provide guidance regarding the siting of substations, etc.

Overall System Options and Site Selection

1. *In the development of system options including new substations, consideration must be given to environmental issues from the earliest stage to balance the technical benefits and capital cost requirements for new developments against the consequential environmental effects in order to keep adverse effects to a reasonably practicable minimum.*

Amenity, Cultural or Scientific Value of Sites

2. *The siting of new NGC substations, sealing end compounds and line entries should as far as reasonably practicable seek to avoid altogether internationally and nationally designated areas of the highest amenity, cultural or scientific value by the overall planning of the system connections.*
3. *Areas of local amenity value, important existing habitats and landscape features including ancient woodland, historic hedgerows, surface and ground water sources and nature conservation areas should be protected as far as reasonably practicable.*
4. *Local Context, Land Use and Site Planning 4 The siting of substations, extensions and associated proposals should take advantage of the screening provided by land form and existing features and the potential use of site layout and levels to keep intrusion into surrounding areas to a reasonably practicable minimum.*
5. *The proposals should keep the visual, noise and other environmental effects to a reasonably practicable minimum.*
6. *The land use effects of the proposal should be considered when planning the siting of substations or extensions.*

Design

7. *In the design of new substations or line entries, early consideration should be given to the options available for terminal towers, equipment, buildings and ancillary development appropriate to individual locations, seeking to keep effects to a reasonably practicable minimum.*
8. *Space should be used effectively to limit the area required for development consistent with appropriate mitigation measures and to minimise the adverse effects on existing land use and rights of way, whilst also having regard to future extension of the substation.*
9. *The design of access roads, perimeter fencing, earthshaping, planting and ancillary development should form an integral part of the site layout and design to fit in with the surroundings.*

Line Entries

10. *In open landscape especially, high voltage line entries should be kept, as far as possible, visually separate from low voltage lines and other overhead lines so as to avoid a confusing appearance.*

11. *The inter-relationship between towers and substation structures and background and foreground features should be studied to reduce the prominence of structures from main viewpoints. Where practicable the exposure of terminal towers on prominent ridges should be minimised by siting towers against a background of trees rather than open skylines.*

Other design development guidelines

4.10.13 The following guidelines are relevant to the design of Substations in South Norfolk:

- Aim to locate new structures close to existing built form (e.g. existing electricity substation infrastructure) or in areas which are already well screened by existing vegetation.
- Ensure the scale of development is appropriate for its context.
- The materiality and colours of the proposed structures will be important in terms of their effects on the landscape. Consultation with the LPA will be required to develop the most appropriate design.
- Protect the existing network of hedgerows, woodlands, and semi-natural habitats and aim to extend these as part of any landscape scheme associated with development.
- Enhance existing screening through planting that integrates with features such as woodland and hedgerows within the wider landscape, to reinforce local character and biodiversity.
- Protect undeveloped skylines and backdrops from encroachment – set any new built development back from valley crests and avoid highly visible slopes.
- Ensure that existing landmark features remain prominent in the landscape and new development does not detract from these features.
- Avoid areas with greater time depth such as pre-18th century fields and common land.
- Avoid locating in open, undeveloped landscapes or areas with historical significance e.g. parklands. Avoid loss of areas of greater landcover interest, such as unimproved grassland or deciduous woodland.
- Avoid development which adversely affects the setting of The Broads, the openness of the Norwich Southern Bypass Landscape Protection Zone, views to Norwich or the undeveloped approaches to Norwich.
- Consider the landscape effects of drainage features such as SuDS, which can have a highly engineered form and introduce ancillary infrastructure. Ensure they have sufficient space to enable shallow sides and opportunities for habitat creation, so as to create meaningful and positive additions to the landscape.

- Ensure that any earthworks, including artificial mounds that might be used to screen the development, are sensitively designed in terms of height, profile and gradient, to fit in with the surrounding landscape. Generally, such features do not provide effective growing conditions for planting.
- Consider views from local viewpoints, settlements (particularly Conservation Areas) and popular routes (e.g. walking or cycling route). If development will be visible, ensure it does not dominate and detract from the experience of visiting these locations/ travelling along these routes.
- Consider use of green roofs.
- The local vernacular should be considered in relation to buildings.
- Ensure planting around the buildings reflects the underlying landscape character by using locally-appropriate species and linking to the existing green infrastructure network.
- Minimise the use of lighting.
- Consider providing enhanced management of landscape features and habitats as part of any development.
- Incorporate biodiversity net gain into any new development and consider opportunities to contribute to the delivery of the Green Infrastructure network in South Norfolk.

5 Findings of the Landscape Susceptibility Study

5.1 Overview

5.1.1 The following section summarises the findings of the LSS.

5.1.2 The detailed analysis of landscape susceptibility is contained within Appendix 3. Within each table, the susceptibility of the Landscape Type to the different development scenarios is assessed using a set of standard criteria. Finally, an overall judgement is made regarding the susceptibility of each of the LCAs to different forms of development.

5.1.3 Whilst this susceptibility assessment provides an initial indication of the relative susceptibility of different landscapes to a range of development types it should not be interpreted as a definitive statement on the suitability of a certain location for a particular development proposal. It is not a replacement for detailed studies on specific siting and design, and all developments will need to be assessed on their individual merits.

5.1.4 This assessment does not consider the cumulative impact of energy-related developments, other than as noted at Section 4 above where generic commentary is provided. It is important to note that however low the sensitivity rating for an individual type of development, the cumulative effect of multiple energy-related developments can be important, regardless of their individual size. Cumulative assessment of specific energy-related proposals will be a key part of the development process.

5.1.5 The following tables summarise the overall susceptibility of the different Landscape Character Areas to different forms of development.

Table 1: Susceptibility to Solar PV development

Landscape Character Type/Area	Small-scale (up to 5MW)	Medium-scale (5MW - 15MW)	Large-scale (15MW - 50MW)	Very large-scale (over 50MW)
A: Rural River Valley				
A1: Tas Rural River Valley	Medium-High	High	High	High
A2: Yare/Tiffey Rural River Valley	Medium-High	High	High	High
A3: Tud Rural River Valley	Medium-High	High	High	High
A4: Wensum Rural River Valley	Medium-High	High	High	High
A5: Waveney Rural River Valley	Medium-High	High	High	High
B: Tributary Farmland				
B1: Tas Tributary Farmland	Medium	Medium	Medium-High	Medium-High
B2: Tiffey Tributary Farmland	Medium	Medium	Medium-High	Medium-High
B3: Rockland Tributary Farmland	Medium	Medium	Medium-High	Medium-High
B4: Waveney Tributary Farmland	Medium	Medium	Medium-High	Medium-High
B5: Chet Tributary Farmland	Medium	Medium	Medium-High	Medium-High
B6: Yare Tributary Farmland	Medium	Medium	Medium-High	Medium-High
C: Tributary Farmland with Parkland				
C1: Yare Tributary Farmland with Parkland	Medium	Medium	Medium-High	Medium-High
C2: Thurlton Tributary Farmland with Parkland	Medium	Medium	Medium-High	Medium-High
D: Settled Plateau Farmland				
D1: Wymondham Settled Plateau Farmland	Medium	Medium	Medium-High	Medium-High
D2: Poringland Settled Plateau Farmland	Medium	Medium	Medium-High	Medium-High
E: Plateau Farmland				
LCA E1: Ashwellthorpe Plateau Farmland	Medium	Medium	Medium-High	Medium-High
LCA E2: Great Moulton Plateau Farmland	Medium	Medium	Medium-High	Medium-High
LCA E3: Hingham-Mattishall Plateau Farmland	Medium	Medium	Medium-High	Medium-High
F: Valley Urban Fringe				
LCA F1: Yare Valley Urban Fringe	Medium	Medium	Medium-High	Medium-High
G: Fringe Farmland				
LCA G1: Easton Fringe Farmland	Medium	Medium	Medium-High	Medium-High

Table 2: Susceptibility to AD plants

Landscape Character Type/Area	Farm-scale (up to 1ha)	Larger-scale (up to 5ha)
A: Rural River Valley		
A1: Tas Rural River Valley	Medium-Low	High
A2: Yare/Tiffey Rural River Valley	Medium-Low	High
A3: Tud Rural River Valley	Medium-Low	High
A4: Wensum Rural River Valley	Medium-Low	High
A5: Waveney Rural River Valley	Medium-Low	High
B: Tributary Farmland		
B1: Tas Tributary Farmland	Low	Medium-High
B2: Tiffey Tributary Farmland	Low	Medium-High
B3: Rockland Tributary Farmland	Low	Medium-High
B4: Waveney Tributary Farmland	Low	Medium-High
B5: Chet Tributary Farmland	Low	Medium-High
B6: Yare Tributary Farmland	Low	Medium-High
C: Tributary Farmland with Parkland		
C1: Yare Tributary Farmland with Parkland	Low	Medium-High
C2: Thurlton Tributary Farmland with Parkland	Low	Medium-High
D: Settled Plateau Farmland		
D1: Wymondham Settled Plateau Farmland	Low	Medium-High
D2: Poringland Settled Plateau Farmland	Low	Medium-High
E: Plateau Farmland		
LCA E1: Ashwellthorpe Plateau Farmland	Low	Medium-High
LCA E2: Great Moulton Plateau Farmland	Low	Medium-High
LCA E3: Hingham-Mattishall Plateau Farmland	Low	Medium-High
F: Valley Urban Fringe		
LCA F1: Yare Valley Urban Fringe	Low	Medium-High
G: Fringe Farmland		
LCA G1: Easton Fringe Farmland	Low	Medium-High

Table 3: Susceptibility to Battery Storage schemes

Landscape Character Type/Area	Small-scale (up to 1ha in size)	Larger-scale (over 1ha in size)
A: Rural River Valley		
A1: Tas Rural River Valley	Medium-High	High
A2: Yare/Tiffey Rural River Valley	Medium-High	High
A3: Tud Rural River Valley	Medium-High	High
A4: Wensum Rural River Valley	Medium-High	High
A5: Waveney Rural River Valley	Medium-High	High
B: Tributary Farmland		
B1: Tas Tributary Farmland	Medium	Medium-High
B2: Tiffey Tributary Farmland	Medium	Medium-High
B3: Rockland Tributary Farmland	Medium	Medium-High
B4: Waveney Tributary Farmland	Medium	Medium-High
B5: Chet Tributary Farmland	Medium	Medium-High
B6: Yare Tributary Farmland	Medium	Medium-High
C: Tributary Farmland with Parkland		
C1: Yare Tributary Farmland with Parkland	Medium	Medium-High
C2: Thurlton Tributary Farmland with Parkland	Medium	Medium-High
D: Settled Plateau Farmland		
D1: Wymondham Settled Plateau Farmland	Medium	Medium-High
D2: Poringland Settled Plateau Farmland	Medium	Medium-High
E: Plateau Farmland		
LCA E1: Ashwellthorpe Plateau Farmland	Medium	Medium-High
LCA E2: Great Moulton Plateau Farmland	Medium	Medium-High
LCA E3: Hingham-Mattishall Plateau Farmland	Medium	Medium-High
F: Valley Urban Fringe		
LCA F1: Yare Valley Urban Fringe	Medium-Low	Medium
G: Fringe Farmland		
LCA G1: Easton Fringe Farmland	Medium	Medium-High

Table 4: Susceptibility to Overhead powerlines

Landscape Character Type/Area	132kV lines	400kV lines
A: Rural River Valley		
A1: Tas Rural River Valley	Medium-High	Medium-High
A2: Yare/Tiffey Rural River Valley	High	High
A3: Tud Rural River Valley	High	High
A4: Wensum Rural River Valley	High	High
A5: Waveney Rural River Valley	High	High
B: Tributary Farmland		
B1: Tas Tributary Farmland	Medium	Medium-High
B2: Tiffey Tributary Farmland	Medium-High	High
B3: Rockland Tributary Farmland	Medium	High
B4: Waveney Tributary Farmland	Medium-High	High
B5: Chet Tributary Farmland	Medium	High
B6: Yare Tributary Farmland	Medium	Medium-High
C: Tributary Farmland with Parkland		
C1: Yare Tributary Farmland with Parkland	Medium-Low	Medium-Low
C2: Thurlton Tributary Farmland with Parkland	Medium	High
D: Settled Plateau Farmland		
D1: Wymondham Settled Plateau Farmland	Medium	Medium-High
D2: Poringland Settled Plateau Farmland	Medium	High
E: Plateau Farmland		
LCA E1: Ashwellthorpe Plateau Farmland	Medium-High	High
LCA E2: Great Moulton Plateau Farmland	Medium-High	High
LCA E3: Hingham-Mattishall Plateau Farmland	Medium-High	High
F: Valley Urban Fringe		
LCA F1: Yare Valley Urban Fringe	Medium-Low	Medium-Low
G: Fringe Farmland		
LCA G1: Easton Fringe Farmland	Medium-Low	Medium-High

Table 5: Susceptibility to Underground cable routes

Landscape Character Type/Area	Underground cable routes and associated works
A: Rural River Valley	
A1: Tas Rural River Valley	Medium-High
A2: Yare/Tiffey Rural River Valley	Medium-High
A3: Tud Rural River Valley	Medium-High
A4: Wensum Rural River Valley	Medium-High
A5: Waveney Rural River Valley	Medium-High
B: Tributary Farmland	
B1: Tas Tributary Farmland	Low
B2: Tiffey Tributary Farmland	Low
B3: Rockland Tributary Farmland	Low
B4: Waveney Tributary Farmland	Low
B5: Chet Tributary Farmland	Low
B6: Yare Tributary Farmland	Medium-Low
C: Tributary Farmland with Parkland	
C1: Yare Tributary Farmland with Parkland	Medium-Low
C2: Thurlton Tributary Farmland with Parkland	Medium
D: Settled Plateau Farmland	
D1: Wymondham Settled Plateau Farmland	Low
D2: Poringland Settled Plateau Farmland	Low
E: Plateau Farmland	
LCA E1: Ashwellthorpe Plateau Farmland	Low
LCA E2: Great Moulton Plateau Farmland	Low
LCA E3: Hingham-Mattishall Plateau Farmland	Low
F: Valley Urban Fringe	
LCA F1: Yare Valley Urban Fringe	Medium-High
G: Fringe Farmland	
LCA G1: Easton Fringe Farmland	Low

Table 6: Susceptibility to Substations

Landscape Character Type/Area	Substations
A: Rural River Valley	
A1: Tas Rural River Valley	High
A2: Yare/Tiffey Rural River Valley	High
A3: Tud Rural River Valley	High
A4: Wensum Rural River Valley	High
A5: Waveney Rural River Valley	High
B: Tributary Farmland	
B1: Tas Tributary Farmland	Medium-High
B2: Tiffey Tributary Farmland	Medium-High
B3: Rockland Tributary Farmland	Medium-High
B4: Waveney Tributary Farmland	Medium-High
B5: Chet Tributary Farmland	Medium-High
B6: Yare Tributary Farmland	Medium-High
C: Tributary Farmland with Parkland	
C1: Yare Tributary Farmland with Parkland	Medium-High
C2: Thurlton Tributary Farmland with Parkland	Medium-High
D: Settled Plateau Farmland	
D1: Wymondham Settled Plateau Farmland	Varying from Medium to Medium-High
D2: Poringland Settled Plateau Farmland	Varying from Medium to Medium-High
E: Plateau Farmland	
LCA E1: Ashwellthorpe Plateau Farmland	Medium-High
LCA E2: Great Moulton Plateau Farmland	Medium-High
LCA E3: Hingham-Mattishall Plateau Farmland	Medium-High
F: Valley Urban Fringe	
LCA F1: Yare Valley Urban Fringe	Medium-High
G: Fringe Farmland	
LCA G1: Easton Fringe Farmland	Medium-High

6 Local Landscape Character Assessment relating to Norwich Main Substation

6.1 Overview

6.1.1 The following section provides a local level Landscape Character Assessment, to set out the key characteristics and special features of a 5km radius from Norwich Main (excluding the area beyond the district boundary). This will include a judgement on landscape value. The study area considers the published Landscape Character Assessments, to establish the landscape value and susceptibility to change, and therefore the resultant sensitivity of the landscape surrounding the Norwich Main substation.

6.2 Scope

6.2.1 The importance of understanding the landscape character of all landscapes in England is recognised in the National Planning Policy Framework (NPPF), which states [§187] that planning policies and decisions should contribute to the natural environment by: *"recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland"*. Landscape character assessment is the process which can identify these intrinsic values and unique characteristics of the diverse landscapes in the UK.

6.2.2 Landscape character assessments enable landscapes to be described and understood by mapping natural, physical and cultural features in order to define different landscapes and demonstrate what makes them special. Landscape character types share similar characteristics, such as underlying geology, soil type, topography and landform, the pattern and type of land/field enclosure, historic land use, the pattern of settlements and types of building that these comprise, tree and woodland cover and the general visual experience of the area. Landscape character areas are specific geographic instances of a particular landscape type.

6.2.3 It is important to note that landscape character assessments can be undertaken at a range of scales. It should also be noted that boundaries are only indicative of the change between areas and therefore when working at a site scale, especially close to boundaries between character types or character areas, users should carefully identify which landscape the land parcel belongs to, based on its characteristics. In addition, it is important to note that while drawn with a line on a map, areas close to boundaries often may be better thought of as an area of transition and may display some of the characteristics and sensitivities of both character areas.

6.2.4 Effects on landscape character can be both direct, i.e. on the character area/landscape type that the proposed development is located within, and indirect, i.e. changes to characteristics or perceptions of character that occur beyond the boundary of a character area/landscape type. In addition, effects on landscape character may be positive or negative, i.e. strengthening and

enhancing the characteristic patterns and features, or eroding and losing the patterns and features that contribute to landscape character.

6.2.5 The published LTs and LCAs from the national to the local levels within the Norwich Main 5km study area are summarised in the Table below.

Table 4: Hierarchy of Landscape Character Types and Character Areas

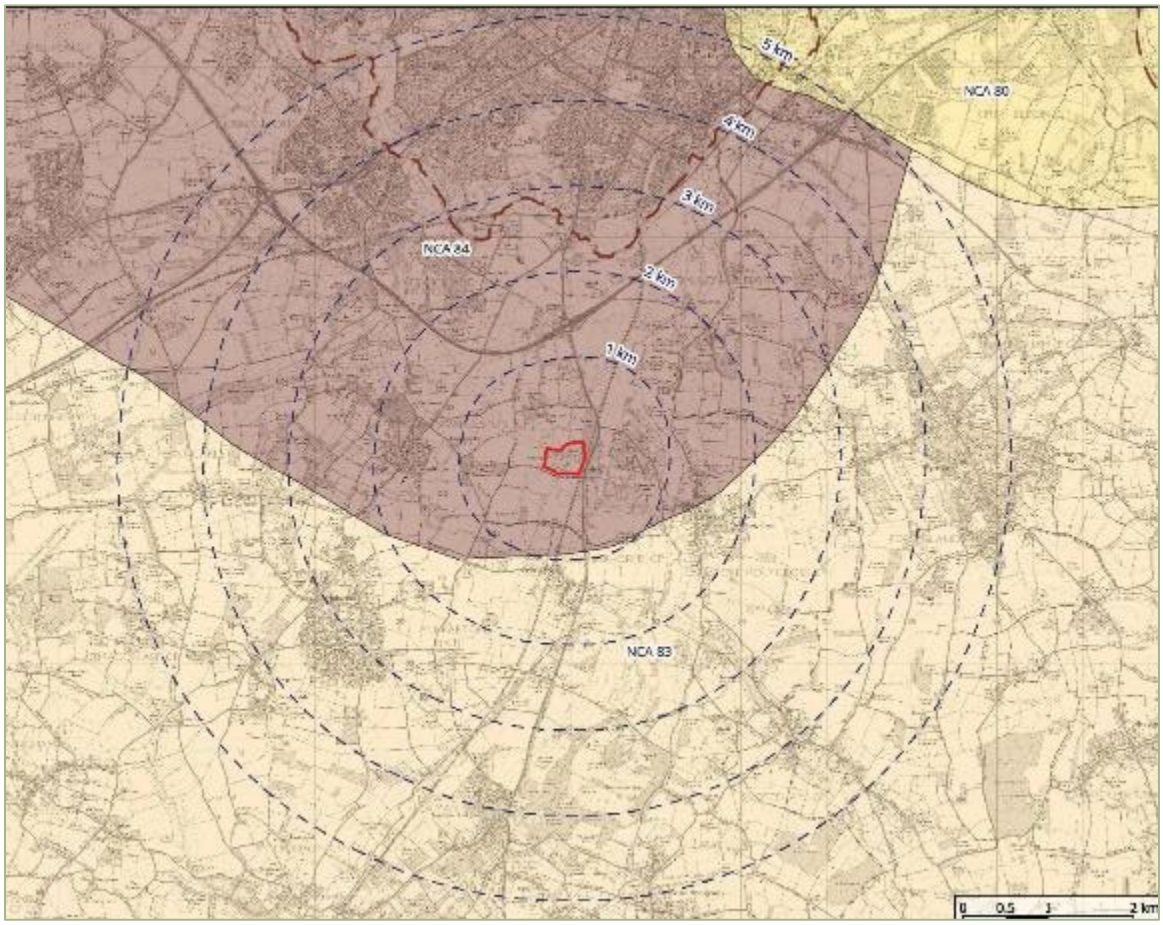
Level	Landscape Character Type (LCT)	Landscape Character Area (LCA)
National: National Character Area (NCA) Profiles (Natural England 2014)	*Site sits within;* Mid Norfolk NCA (84)	
	Neighbouring; South Norfolk and High Suffolk Claylands NCA (83)	
District: South Norfolk Council - South Norfolk Landscape Character Assessment (2001)	*Site sits within;* Tributary Farmland	*Site sits within;* B1 Tas Tributary Farmland
	Neighbouring; River Valley Tributary Farmland with Parkland Settled Plateau Farmland	*Neighbouring;* A1 Tas Rural River Valley C1 Yare Tributary Farmland with Parkland D1 Wymondham Settled Plateau Farmland D2 Poringland Settled Plateau Farmland

6.2.6 This section seeks to assess the Landscape Character Areas surrounding Norwich Main, and provide an assessment of sensitivity to the different energy-related development scenarios, as set out above in section 4.1.

6.3 National Character Baseline

6.3.1 At the national level Norwich Main is located within NCA 84: Mid Norfolk. The broadly flat, rural landscape of the Mid Norfolk National Character Area (NCA) occupies the northern section of the East Anglian Plain, becoming more undulating to the north where it merges with the Central North Norfolk NCA in a curving line across the Wensum Valley, and more rolling towards Norwich to the east. This is ancient countryside with a long-settled agricultural character, where arable land is enclosed by winding lanes and hedgerows, interspersed with woodland and heath and dissected by lush pastoral river valleys. A patchwork of cultivated land, numerous church spires, distant wooded horizons and big skies dominate the landscape.

6.3.2 The NCA notes that '*The main pressures for change to the area are posed by growth and a need to accommodate increased development, especially around Norwich. The potential for further agricultural intensification and a need for sustainable approaches to commercial farming practices are also key challenges. Maintaining the traditional farmed landscape of Mid Norfolk NCA – through sustainable land management practice to help protect its important natural processes and resources, its areas of high tranquillity and enhance the natural landscape for recreational opportunity, geodiversity and biodiversity – is also presenting further challenges into the future*.'



National Character Areas within 5km of Norwich Main.

6.3.3 Norwich Main is located close to the border with NCA 83: South Norfolk and High Suffolk Claylands, and can therefore is considered to occupy a zone of transition, at the national level.

6.3.4 The South Norfolk and High Suffolk Claylands occupy a large area of central East Anglia between the Yare Valley in the north and the Gipping Valley in the south. The area is defined by the underlying clay soils which contrast with the sandy soils of Breckland (to the west) and the Sandlings (to the East). The area was formerly well-wooded and was dominated by wood-pasture and dairy farming. The Napoleonic Wars, at the turn of the C19, coincided with the introduction of underdrainage. Because of the war wheat prices rose dramatically and the area switched to arable farming. Many of the woodlands and individual trees were removed in the C19, and the C20 has seen further hedgerow loss. The central clay belt within the county was traditionally referred to as High Suffolk (in contrast to the Brecklands and the Sandlings). The character area consists of a predominantly flat clay plateau which is incised by numerous small-scale wooded river valleys with complex slopes. The underlying chalk bedrock is overlain by a layer of glacial till. The Waveney, the largest of the NCA's rivers, forms the division between the counties of Norfolk and Suffolk. Most rivers however are small and slow following. The river valleys often contain a

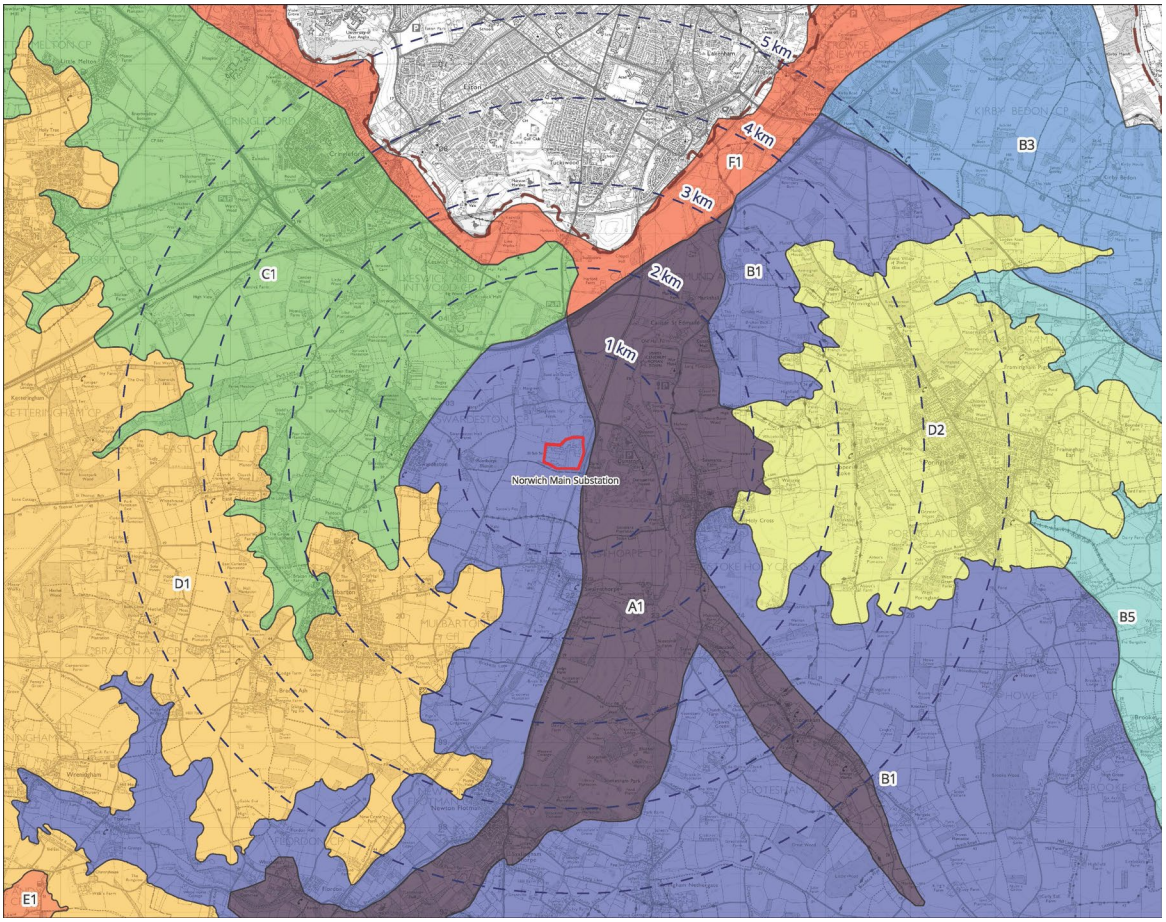
mosaic of habitats such as small-scale pasture or fens. Large areas of woodland are scarce within the current landscape.

6.3.5 The main pressures for change are described as the need to accommodate increased development in and around traditional centres, especially along the main transport corridors.

6.3.6 The landscape surrounding Norwich Main consists of arable farmland divided by native hedges, interspersed with small woods. It also contains historic lanes, while the settlement pattern consists of nucleated villages and isolated halls. It is therefore considered to be typical of both Mid Norfolk and the South Norfolk and High Suffolk Claylands NCAs.

6.4 District Landscape Character Baseline

6.4.1 Utilising the existing District Landscape Character Assessment, quotes and comments relating to susceptibility criteria and value characteristics are identified in Tables 01-10, Appendix 04.



District Landscape Character areas within 5km of Norwich Main.

6.4.2 At the district level the Norwich Main Substation is located within **B1 Tas Tributary Farmland LCA**. The Tas Tributary Farmland is a large area of land situated between the Tas Rural River Valley and

the surrounding Plateau areas at an elevation of about 30m AOD to 50m AOD. See Tables 01-02, Appendix 04.

6.4.3 To the east of Norwich Main lies **A1 Tas Rural River Valley LCA**. The Tas Rural River Valley extends from Tasburgh in the south, to the Yare Valley in the north. The boundaries are defined topographically in relation to the top of the valley sides and roughly follow the 30m contour. See Tables 03-04, Appendix 04.

6.4.4 To the north west of Norwich Main lies **C1 Yare Tributary Farmland with Parkland LCA**. The Yare Tributary Farmland with Parkland occurs to the south west of Norwich and is defined by the rural and urban reaches of the River Yare to the east and north, and by the settled plateau farmland around Hethersett and Wymondham (above the 40m AOD contour) to the south. See Tables 05-06, Appendix 04.

6.4.5 To the south west of Norwich Main lies **D1 Wymondham Settled Plateau Farmland LCA**. The Wymondham Settled Plateau Farmland occupies an area to the southwest of Norwich, above contour level 40m AOD. It includes the towns of Wymondham and Hethersett. See Tables 07-08, Appendix 04.

6.4.6 To the east of Norwich Main and east of A1 Tas Rural River Valley LCA, lies **D2 Poringland Settled Plateau Farmland**. The Poringland Settled Plateau Farmland is defined by the 40m AOD contour. See Tables 09-10, Appendix 04.

6.5 Landscape Sensitivity of the LCAs surrounding Norwich Main

6.5.1 The sensitivity of each of the five LCAs that fall within the Norwich Main study area, as set out above, was assessed using a combination of desktop and field work.

6.5.2 It is recognised that the South Norfolk Landscape Character Assessments' purpose is not to attribute relative values to different character area, in keeping with LCA guidance, which recognises that all landscapes are valued to some extent by some people, whilst the GLVIA guidance recognises that there are differences in value which will affect sensitivity, so some consideration of value is therefore required.

Susceptibility of the landscape to change

6.5.3 The susceptibility of each LCA to each of the different types of development proposed was assessed using a pre-defined set of criteria. These criteria reflect both the national guidance and the particular circumstances of the landscape the study area.

6.5.4 For each criterion, indicators of higher susceptibility and indicators of lower susceptibility were provided, to help guide judgements. The criteria, together with the indicators of susceptibility, are reproduced at Appendix 02.

6.5.5 To assess each LCA's susceptibility to change, certain assumptions were made. These were necessarily broad, since (as noted above) a Landscape Susceptibility Study assesses the principle of a particular type of development rather than a known development. For the purposes of this study, the extents and heights of the various types of energy related development are set out in

section 4.1. The tables below provide some relative comparisons of known features within the region.

Table 5: Tall structures comparison

Structure	Height
Domestic Buildings	6-10m
Mature deciduous trees (depending upon species)	10-25m
Standard lattice tower 'pylons'	15-55m
Norwich Cathedral Spire	96m

Table 6: Comparative Areas

Land use	Area (hectares)
Typical football pitch	0.6-0.8 ha
Norwich Main Substation	14 ha
Dunston Hall Golf Course	36 ha
Approved solar array in Swainsthorpe, 49.9 MW - not yet constructed.	79.6 ha

6.5.6 The susceptibility of the landscape of each LCA to change from development of the type proposed was assessed against each of the specific criteria, using a five-point scale of ***High, High/Medium, Medium, Medium/Low or Low*** susceptibility to change.

Value

6.5.7 Value is an inherent quality of the baseline conditions, which is independent of the type of development proposed. GLVIA3 recognises that landscape value is not always signified by designation. Landscape value should be determined by a review of existing assessments and, where appropriate, by new analysis. The Landscape Institute Technical Guidance Note 02/21 sets out a range of factors that can be considered when assessing landscape value. The different

aspects of value are natural heritage, cultural heritage, landscape condition, associations, distinctiveness, recreational, perceptual, and functional. The presentation of information about landscape value should be proportionate to the task at hand.

6.5.8 The landscape value of each LCA was assessed using a pre-defined set of criteria based on TGN 02/21. The LCA descriptions are drawn upon to identify any factors which add value either to the LCA or to particular elements within it. These might be special qualities associated with a designated landscape (e.g. AONB) or other aspects which could influence the sensitivity of the landscape to the identified energy related development.

6.5.9 The value of the LCA was assessed against each of the specific criteria, using a five-point scale of **High, High/Medium, Medium, Medium/Low, Low value**.

6.5.10 TGN 02/21 notes that "Value is best appreciated at the scale at which a landscape is perceived – rarely is this on a field-by-field basis." As such, the value judgements considered the sites and their landscape settings.

Sensitivity

6.5.11 The landscape units described in the district-level landscape character assessment have been used to provide the baseline data for assessing the sensitivity of the landscape character as they provide the most detailed assessment of landscape character available.

6.5.12 Landscape sensitivity is a product of susceptibility and value, and is expressed in the matrix below;

Table 7: Landscape Sensitivity

Criteria		Value				
		High	Medium / High	Medium	Medium / Low	Low
Susceptibility	High	High	High	Medium / High	Medium	Medium
	Medium / High	High	Medium / High	Medium / High	Medium	Medium
	Medium	Medium / High	Medium / High	Medium	Medium	Medium / Low
	Medium / Low	Medium	Medium	Medium	Medium / Low	Low
	Low	Medium	Medium	Medium / Low	Low	Low

6.6 Summary of LCA Sensitivity to Change

6.6.1 The **B1 Tas Tributary Farmland LCA** has no national landscape designations, whilst it does contain designated ecological assemblages and a number of County Wildlife Sites, ancient woodland and medieval deer parks, the large scale hedgerow removal and modern development influence the overall quality of the landscape baseline, considered to be of *Medium* value. Within the eastern part of the LCA a large double line of overhead powerlines traverse the landscape, with Norwich Main substation to the north west of the LCA, a large solar PV development approved (not yet under construction) to the south west, and large transmitting station west of Howe already have an adverse effect on landscape character by extending vertically above the wooded horizons, so sensitivity to modern development would be lower, but larger developments in terms of extent and vertical axis would be out of scale with the field pattern, landform and landcover.

6.6.2 Whilst this LCA may accommodate the small to medium-scale energy development scenarios, consideration must be made regarding cumulative impact, especially given the likelihood of requiring connection to the existing substation at Norwich Main, which is located within the north western part of this LCA.

6.6.3 The **A1 Tas Rural River Valley LCA** has no national landscape designations, whilst it does contain designated ecological assemblages including wet grassland and shallow fenland peat, the landscape remains predominantly pastoral with linear wet woodland following the river corridor, with good hedgerow network with mature trees, with the overall quality of the landscape baseline, considered to be of *Medium-High* value. The A140 runs along the upper slopes on the

western side of the valley, adding noise and movement to the otherwise peaceful valley landscape. Overhead power lines and pylons, along with the mainline railway into Norwich, cross the northern extent of the LCA, with the Norwich Southern Bypass forming the northern limit of the character area, reducing sensitivity in these locations.

6.6.4 This LCA is a clearly defined flat valley floor with shallow side slopes, moderately wide and following a simple valley floor. The nature of much of the LCA is a scenic and largely tranquil rural landscape which would have a relatively high level of sensitivity to any distinctly modern development.

6.6.5 The **C1 Yare Tributary Farmland with Parkland LCA** has no national landscape designations, whilst it does contain a Registered Park and Garden, Intwood Hall, the landscape presents a variety of more intimate landscape settings, with many estates and historic parklands, with a sparse hedgerow and hedgerow tree network, with occasional mature / veteran oaks forming distinctive features along the lanes. The overall quality of the landscape baseline is considered to be of *Medium-High* value. The Norwich Southern Bypass and A11 trisect the landscape, along with the Great Eastern Main Line, creating corridors of noise and movement within the otherwise peaceful landscape.

6.6.6 This LCA is a peaceful farmland landscape with small farm woodlands and intermittently wooded tributary valleys creating a quiet rural atmosphere. The nature of much of the LCA is a scenic and largely tranquil rural landscape, with a high preponderance of large parkland estates, tree-lined avenues and traditional wooded parkland.

6.6.7 The **D1 Wymondham Settled Plateau Farmland LCA** has no national landscape designations, whilst it does contain areas of ancient woodland and some village ponds, the landscape generally presents as large expanses of arable plateau, with little variation, with long views afforded from the plateau edge. The overall quality of the landscape baseline is considered to be of *Medium* value. The A11 bisects the landscape, creating a corridor of noise and movement. This study area does not extend beyond the A11, to the north of which, between Norwich, Hethersett and Wymondham is an area designated as Strategic Gap.

6.6.8 This LCA is a settled landscape with large edge of plateau towns and villages with smaller settlements dispersed across the plateau. The nature of much of the LCA is of a large scale open arable landscape often monotonous character due to the large scale arable monocultures.

6.6.9 The **D2 Poringland Settled Plateau Farmland LCA** has no national landscape designations, whilst it does contain areas of ancient woodland and some moats, the landscape generally presents as large scale arable plateau, with a wooded character to the north of the LCA and around settlements. Long views are afforded from the plateau edge towards Norwich and to the Tas Valley. The overall quality of the landscape baseline is considered to be of *Medium* value. The large telecommunications towers (radio and radar) located at the high point of the plateau in Caistor St Edmund, are visible from a large area, extending above wooded horizons.

6.6.10 This LCA has a densely settled core area, with ribbon development interconnecting to other village cores. The long distance national trail of Boudica's Way cuts across the LCA leading towards the

Tas Valley. The nature of much of the LCA is of a large scale open arable landscape, with reduced levels of tranquillity near settlements.

6.6.11 Consideration must be made regarding cumulative impact, especially given the likelihood of requiring connection to the existing substation at Norwich Main, which is located within the Tas Tributary Farmland LCA.

6.6.12 The assessment of landscape value is summarised below. Landscape value can be combined the judgements on susceptibility in Tables 1-3 to arrive at a judgement on the sensitivity of the LCA to a particular type of development.

Table 8: Landscape value

Landscape Character Area	Landscape value
B1: Tas Tributary Farmland	Medium
A1: Tas Rural River Valley	Medium-High
C1: Yare Tributary Farmland with Parkland	Medium-High
D1: Wymondham Settled Plateau Farmland	Medium
D2: Poringland Settled Plateau Farmland	Medium

7 Policy DM 4.6: Landscape Setting of Norwich

7.1 Background

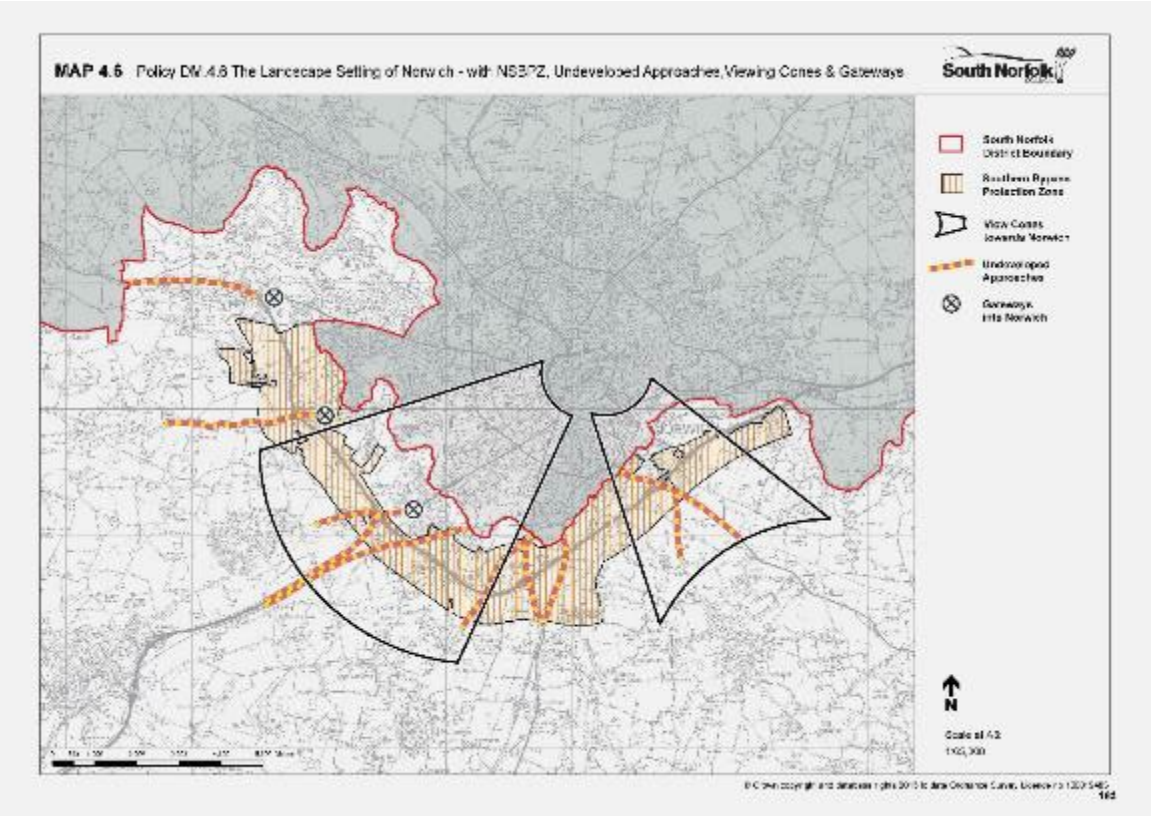
7.1.1 Chapter 4.5 of the South Norfolk Local Plan Development Management Policies Document, Adopted October 2015, considers the landscape setting of Norwich. §4.53 notes that *"As the dominant centre of the sub-region, the city of Norwich will continue to act as the focus of significant development pressures."* Although the Norwich Policy Area is the preferred focus for growth, there has been a history of local planning policies designed to *"protect the City's surroundings from "inappropriate development" and to "preserve those attributes of the City's natural setting which contribute to its environmental quality."* In particular, there has been concern that *"development pressure at the junctions on the Southern Bypass is not allowed to outweigh the environmental protection of important landscape characteristics in these locations."*

7.1.2 The A47 Norwich Southern Bypass is recognised to have been *"well designed to fit into the landscape through which it passes and it is accepted that it should not be regarded as a boundary up to which development is acceptable"* [§4.54]. Within South Norfolk a Landscape Zone has been identified where there is a high level of visual accessibility to and from the bypass to a predominantly open rural area, that positively enhances the setting of Norwich.

7.1.3 Any development proposed within the landscape setting of Norwich will be assessed against South Norfolk Local Plan Development Management Policies Document, Policy DM 4.6: Landscape Setting of Norwich. This policy seeks to ensure that all development proposals will not harm and will, where possible, enhance the landscape setting of Norwich with regard to:

- the Norwich Southern Bypass Landscape Protection Zone (NSBLPZ)
- Key Views – identified long distance view cones into and out of the city
- Undeveloped Approaches to Norwich
- Gateways marking the arrival at and departure from Norwich

7.1.4 These designations are all as identified on the policies map as illustrated on the figure below. It is noted that *"Development which would significantly harm the NSBLPZ or the landscape setting of the Norwich urban area will not be permitted."*



Map extract from South Norfolk Development Management Policies Document, Adopted October 2015

7.2 Norwich Southern Bypass Landscape Protection Zone

7.2.1 Policy DM 4.6 notes:

> *All development proposals within the Norwich Southern Bypass Landscape Protection Zone (NSBLPZ), as shown on the Policies Map, should have regard to protecting the openness of the Zone and, where possible, enhancing the landscape setting of the southern bypass, including the practice of wild flower planting and management regimes.*

7.2.2 The supporting text notes [§4.56]:

> *A Landscape Zone has been identified where there are high levels of visual accessibility to and from the road to a predominantly open rural area that plays an important part in making the landscape setting of Norwich. This Zone does not have a distinct or special landscape character in its own right.*

and [§4.58]:

> *Any development to be permitted within the Landscape Zone (including that within the highway and other transport corridors) should have regard to protecting the openness of the Landscape Zone and, where possible, enhancing the landscape setting of the Southern Bypass, including the practice of wild flower planting and management regimes.*

7.2.3 Within South Norfolk, the Norwich Southern Bypass Landscape Protection Zone (NSBLPZ) encompasses land from Bawburgh in the north-west to Whitlingham in the east, following the edge of the city and the route of the bypass. In doing so, it encompasses land in the following LCAs:

- G1: Easton Fringe Farmland
- F1: Yare Valley Urban Fringe
- A2: Yare/Tiffey Rural River Valley
- C1: Yare Tributary Farmland with Parkland
- B1: Tas Tributary Farmland
- A1: Tas Rural River Valley
- B3: Rockland Tributary Farmland

Considerations for the LSS

7.2.4 The following paragraphs provide commentary on how the various development scenarios identified at Section 4 would accord with the objectives of the NSBLPZ.

7.2.5 Openness is understood to mean freedom from development and, as such, it is not possible to mitigate the effect on openness per se.

Solar PV

7.2.6 Solar PV projects tend to cover large areas and would therefore have a correspondingly large effect on the openness of the NSBLPZ. Although Solar PV projects retain the soil and vegetation cover beneath the panels, and are theoretically a temporary land use, they are nonetheless a form of development and represent an urbanising feature within the landscape. Solar PV then conflicts in principle with the aims of the policy. Whilst it is sometimes possible to screen Solar PV with planting this is less likely to be achievable in the NSBLPZ as the landscape zone encompasses the slopes of the Yare Valley. Screening is also made more difficult by embanked sections of the A47 which look across the Yare Valley.

AD plants

7.2.7 AD Plants include large structures and represent substantial developments. AD Plants therefore would be incompatible with maintaining the openness of the NSBLPZ, and would not enhance the setting of the bypass.

7.2.8 The landscape zone does however include occasional farms, and AD Plants which are proposed for processing farm materials in a sustainable way should not be discouraged, as long as they are sited within the existing farmyard.

Battery Storage

7.2.9 Battery Storage represents a smaller form of development, but would nonetheless compromise the openness of the NSBLPZ and the landscape setting of the bypass. Battery storage represents a type of infrastructure development which is at odds with the countryside. This form of development tends to have a utilitarian appearance which would not enhance the setting of the road. The effect could potentially be reduced by more appropriate rural forms of fencing, hedging, and by painting the cabinets dark green.

Overhead powerlines

7.2.10 Overhead powerlines have a small physical footprint which would not compromise the openness of the NSBLPZ. They would however have a negative effect on the views from the road to the surrounding countryside.

Underground cable routes

7.2.11 Underground cable routes would not affect the openness of the NSBLPZ. Whilst there might be some temporary visual effects which are experienced during installation this particular type of development would not alter the nature of the landscape zone.

Substations

7.2.12 Substations would by their nature affect the openness of the NSBLPZ and would introduce a strong developed character. If substations are located away from the existing urban edge this would tend to increase their impact as they would represent isolated development within the countryside.

7.3 Key Views

7.3.1 Policy DM 4.6 notes:

> *All development proposals located within the Key Views 'cones' shown on the Policies Map should ensure they do not obstruct the long distance views to and from the City.*

7.3.2 The supporting text notes [§4.59]:

> *The opportunities for long distance views into the city of Norwich from the south of the city are limited by the topography and screening effect of vegetation. However, fieldwork has identified important opportunities to view the city from the northern edge of the plateau to the south west and south east of the city. (These locations lie within the Landscape Character Areas of Wymondham Settled Plateau Farmland and Poringland Settled Plateau Farmland respectively.) In these areas, broad Key Views 'cones' have been identified (see Map DM 4.6). Within these 'cones' all development proposals should ensure they do not obstruct the long views to and from the city.*

Considerations for the LSS

7.3.3 The following paragraphs provide commentary on how the various development scenarios identified at Section 4 would accord with the objective of the Key Views.

Solar PV

7.3.4 Given their height Solar PV panels are unlikely to completely obstruct views to or from Norwich.

AD plants

7.3.5 AD plants include large structures and clamps which are likely to obstruct views. Any proposed mitigation planting would further obstruct views.

Battery Storage

7.3.6 Battery storage tends to consist of low elements which are unlikely to completely obstruct views. Mitigation planting associated with a battery storage facility could however reduce views across the landscape. Battery storage may be visible in views from Norwich, particularly if it is located on the valley-side.

Overhead power lines

7.3.7 An overhead power line would detract from existing views but would not obstruct them per se.

Underground cable routes

7.3.8 An underground cable route would not obstruct views to or from Norwich.

Substations

7.3.9 Substations represent large developments with moderately tall structures which could potentially obstruct views to or from the city. Any proposed mitigation planting is likely to obstruct views.

7.4 Undeveloped Approaches to Norwich

7.4.1 Policy DM 4.6 notes:

> *All development proposals on the approaches to defined Gateways (shown on the Proposal Map) shall reinforce and avoid undermining the significance of these Gateways as the visual points of the landscape and townscape change marking the 'arrival' at and 'departure' from the city of Norwich.*

7.4.2 Policy DM 4.6 notes:

> *All development proposals within the visual zone of influence viewed from the identified Undeveloped Approaches to Norwich should reinforce and avoid undermining the rural character of the Undeveloped Approaches to Norwich.*

7.4.3 The supporting text notes [para 4.60]:

> *There are several road and rail corridors approaching the city that have a very distinctive rural character and that afford views across the surrounding countryside and to Norwich. These Undeveloped Approaches are defined on the Proposal Map (and Map DM 4.6) as the full breadth of these transport corridors, but the Policy will ensure all development within the wider zone of visual influence visible from the transport corridors is designed to reinforce*

and avoid undermining the rural character experienced when travelling along the Undeveloped Approaches into Norwich.

Considerations for the LSS

7.4.4 The following paragraphs provide commentary on how the various development scenarios identified at Section 4 would accord with the objective of the undeveloped approaches.

Solar PV

7.4.5 Although Solar PV preserves the existing soils and vegetation cover beneath the panels it nonetheless represents a form of development. Whilst it might be possible to screen Solar PV from the undeveloped approaches this would not be within the spirit of maintaining a genuinely undeveloped approach.

AD plants

7.4.6 AD plants include large structures and clamps and are not compatible with the aims of the policy.

Battery Storage

7.4.7 Battery Storage represents a utilitarian form of development which is not compatible with the aims of the policy.

Overhead power lines

7.4.8 Overhead powerlines increase the sense of human influence and are a form of development. It is considered that new Overhead powerlines would have an adverse effect on the undeveloped approaches.

Underground cable routes

7.4.9 Underground cable routes would have no perceived effect on the undeveloped approaches.

Substations

7.4.10 A substation would have a substantial negative effect on the undeveloped approaches. Whilst it may be possible to screen a substation with planting this would not be within the spirit of maintaining a genuinely undeveloped approach to the city.

7.5 Gateways

7.5.1 Policy DM 4.6 notes:

7.5.2 All development proposals on the approaches to defined Gateways (shown on the Proposal Map) shall reinforce and avoid undermining the significance of these Gateways as the visual points of the landscape and townscape change marking the ‘arrival’ at and ‘departure’ from the city of Norwich.

7.5.3 The supporting text notes [para 4.61]:

In line with the Joint Core Strategy the submitted Norwich Local Plan has identified important Gateways where the landscape and townscape changes, marking the 'arrival' into Norwich urban area. South Norfolk Council has similarly identified three such points within the district.

Considerations for the LSS

7.5.4 The following paragraphs provide commentary on how the various development scenarios identified at Section 4 would accord with the objective of the gateways.

Solar PV

7.5.5 The gateways mark the transition from the countryside to the city. Development which alters the character of the countryside will similarly affect the character of the gateway and alter the sense of arrival. Solar PV is not particularly typical of the town or the countryside, and in this sense has a character of its own. Although Solar PV would not be perceived as an extension of the urban area it would have an adverse influence on the landscape setting of the city, which would make the gateway less effective.

AD plants

7.5.6 Farm-scale AD plants which are related to an existing farm would be seen as part of the countryside and would not therefore affect the gateway, which represents the transition from the rural area to the city.

7.5.7 Larger AD Plants clearly have a developed character which would compromise the landscape setting of the city, and the experience of the gateway. AD plants might be separated from the urban area itself, but would be seen as a type of urban fringe development which would create a poor entrance to the city.

Battery Storage

7.5.8 Battery storage installations have a developed, utilitarian character in common with other types of infrastructure. Battery storage would have a negative effect on the landscape setting of Norwich and the sense of transition which is represented by the gateway. Battery storage may however consist of lower elements which have some potential for screening.

Overhead power lines

7.5.9 Overhead powerlines are not seen as a form of urban development and would not alter the position of the gateway. Whilst overhead powerlines could alter the character of the countryside they would not affect the gateway as such.

Underground cable routes

7.5.10 Underground cable routes would not have any material effect on the gateways.

Substations

7.5.11 Grid and main substations are typically found on the edges of settlements and may be separated from the urban area (due to noise). The substations themselves include taller structures and security fencing and are urbanising features within the landscape. Substations therefore are likely to compromise the clean transition between the countryside and the urban area which is represented by the gateways. Substations offer limited opportunities for mitigation but could be screened with substantial planting.