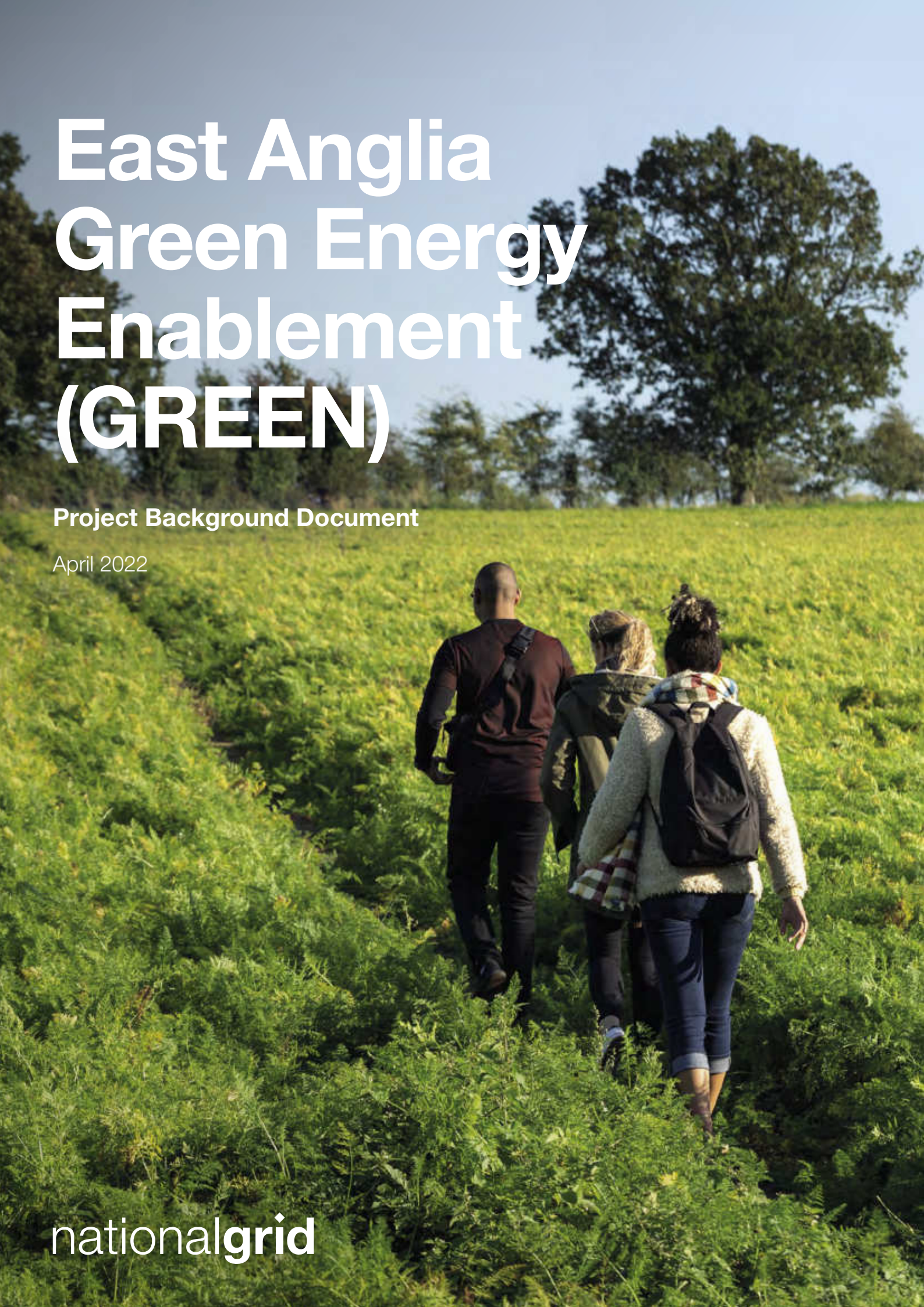
East Anglia Green Energy Enablement (GREEN)

Project Background Document

April 2022



nationalgrid

This Project Background Document explains our proposals to reinforce the electricity transmission network between Norwich Main substation in Norfolk and Tilbury substation in Essex.

Our proposals include building a new high voltage network reinforcement between Norwich and Tilbury, work at existing substations in Norwich, Bramford and Tilbury and a new substation in Tendring.

This information has been prepared to support the first stage of public consultation in spring 2022.

Contents

Executive summary

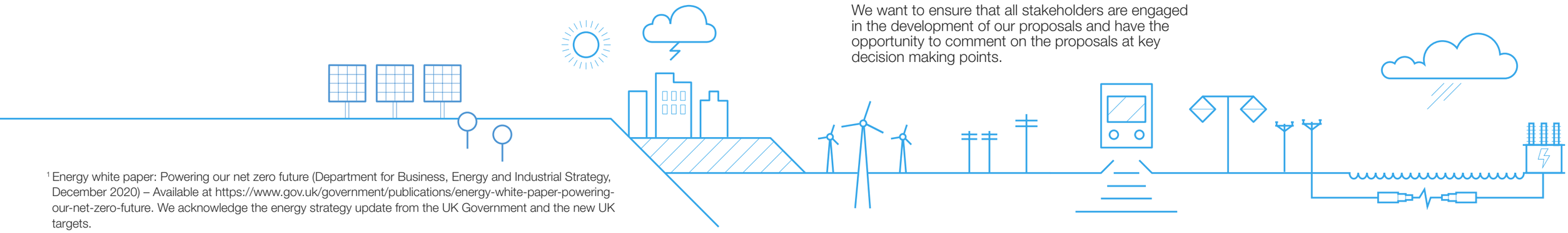
The UK Government has indicated its ambition to achieve net zero emissions by 2050. This means achieving a balance between the greenhouse gases put into the atmosphere and those taken out. The energy industry plays a key part in this transition, from developing renewable energy generation technology, to upgrading the existing transmission network to allow communities across the country to benefit from this clean energy.

The decarbonisation of the energy system is one of the biggest challenges facing our world, and we at National Grid have a critical role to play in the acceleration towards a cleaner future.

In Great Britain, we are in the middle of a transformation, with the energy we use increasingly coming from cleaner, greener sources. In 2019, for the first time since the industrial revolution, most of our electricity came from low carbon sources. National Grid is at the heart of that energy transformation – investing around £1.3bn each year to adapt and develop our transmission network to connect new sources of low carbon and green energy to our homes and businesses.

Whilst it is vital that more of the energy we use comes from low carbon and renewable sources, both National Grid and the Government recognise it is also important to keep the impact as low as possible on bills, people, communities and our natural environment. National Grid is committed to finding the right balance between these factors to ensure our projects have a sustainable, positive impact.

Great Britain already has 8.5 gigawatts (GW) of offshore wind energy in operation, and another 1.9 GW under construction. The Government's recent Energy White Paper outlines a plan to increase energy from offshore wind to 40 GW by 2030 – **enough to power every home in the UK.**[1]



[1] Energy white paper: Powering our net zero future (Department for Business, Energy and Industrial Strategy, December 2020) – Available at https://www.gov.uk/government/publications/energy-white-paper-powering-our-net-zero-future. We acknowledge the energy strategy update from the UK Government and the new UK targets.

The East Anglia Green Energy Enablement project (East Anglia GREEN) will support the UK's net zero target through the connection in East Anglia of new low carbon energy generation, and by reinforcing the local transmission network.

East Anglia GREEN is a proposal by National Grid Electricity Transmission (National Grid) to reinforce the high voltage power network in East Anglia. The reinforcement is needed because our existing power lines do not have sufficient capacity for all the new energy we expect to connect to the network over the next ten years and beyond. Building East Anglia GREEN together with other new reinforcements will meet this future energy transmission demand.

Our proposals include building a new 400,000 volts (400 kV) electricity overhead transmission line, work at existing substations and building a new substation to connect new proposed offshore wind farms to the electricity transmission network.

Our public consultation

East Anglia GREEN is classified as a Nationally Significant Infrastructure Project (NSIP) and we will need to obtain 'development consent' under procedures governed by the Planning Act 2008. We will submit a consent application to the Planning Inspectorate, who will consider it and make a recommendation to the Secretary of State, who will decide on whether development consent should be granted for the project.

We want to ensure that all stakeholders are engaged in the development of our proposals and have the opportunity to comment on the proposals at key decision making points.

From 21 April 2022 until 16 June 2022, we are holding our first stage of public consultation to introduce the project, explain why additional capability is needed on this part of the network, outline the process that we have been through so far to present our preferred route corridor, and gather public feedback.

We want to carry out genuine and meaningful consultation on our proposals and this document sets out information on our plans, what we are consulting upon and how you can get involved. It also signposts to where we are publishing more detailed technical information.

We are holding a range of both online and in person consultation events and this is your opportunity to comment on our proposals at an early stage of the project development.

It is important that we hear the views of local people. Your feedback is important. Knowing what matters to you, matters to us, so that we can take it into account where we can as we develop our plans. Please therefore take time to give us your feedback as we start work to develop our proposals to deliver a cleaner, greener future.

This will be the first stage of consultation on our proposals, and we will carry out further consultation on our project as it develops. We will report all feedback and our responses to your comments in a Consultation Report which, will be submitted with our application for development consent.

The project

National Grid is proposing to reinforce the transmission network between the existing substations at Norwich Main in Norfolk, Bramford in Suffolk, Tilbury in Essex as well as connect new offshore wind generation.

This would be achieved by the construction and operation of a new 400 kV electricity transmission line over a distance of approximately 180km and a new 400 kV connection substation.

The reinforcement would comprise mostly overhead line (including pylons and conductors – the 'line' part) and underground cabling through the Dedham Vale Area of Outstanding Natural Beauty (AONB) and a new 400 kV connection substation in the Tendring district.

The new substation site would be fenced and would contain high voltage electrical equipment, such as transformers, circuit breakers and shunt reactors, support structures, control buildings, a permanent access road and parking areas.

Works would be required at the existing 400 kV substations at Norwich, Bramford and Tilbury. Cable sealing end (CSE) compounds would be required to connect sections of underground cable with the overhead lines. Each CSE compound would be fenced, and contain electrical equipment, support structures, a small control building and a permanent access track.

Other ancillary activities would be required to facilitate construction and operation of the project. These include, but are not limited to, the following:

- temporary land for construction activities including working areas for construction equipment and machinery, site offices, welfare, storage and access; and
- land required for mitigation, compensation and enhancement of the environment as a result of the environmental assessment process and Biodiversity Net Gain.

Why we need to build East Anglia GREEN

East Anglia's 400 kV electricity transmission network was built in the 1960s. It was built to supply regional demand, centred around Norwich and Ipswich. With the growth in new energy generation from offshore wind, nuclear power and interconnection with other countries, there will be more electricity connected in East Anglia than the network can currently accommodate.

The existing network in East Anglia currently carries around 3,200 megawatts (MW) of electricity generation. Over the next decade we expect more than 15,000 MW of new generation and 4,500 MW of new interconnection to connect in the region.

Our existing power lines do not have sufficient capacity to accommodate this new generation. We are already carrying out work to upgrade the existing transmission network in East Anglia, however even with these upgrades the network will not be sufficient. East Anglia GREEN is a key part of our wider investment programme to upgrade our electricity transmission network in East Anglia to ensure we meet this future energy transmission demand.

East Anglia GREEN would also connect new offshore wind farms off the Essex coast to the electricity transmission network. Two offshore wind farms - the **North Falls Offshore Wind Farm** and **Five Estuaries Offshore Wind Farm** - are currently in development. If they are consented, both are expected to be operational by the end of the decade.

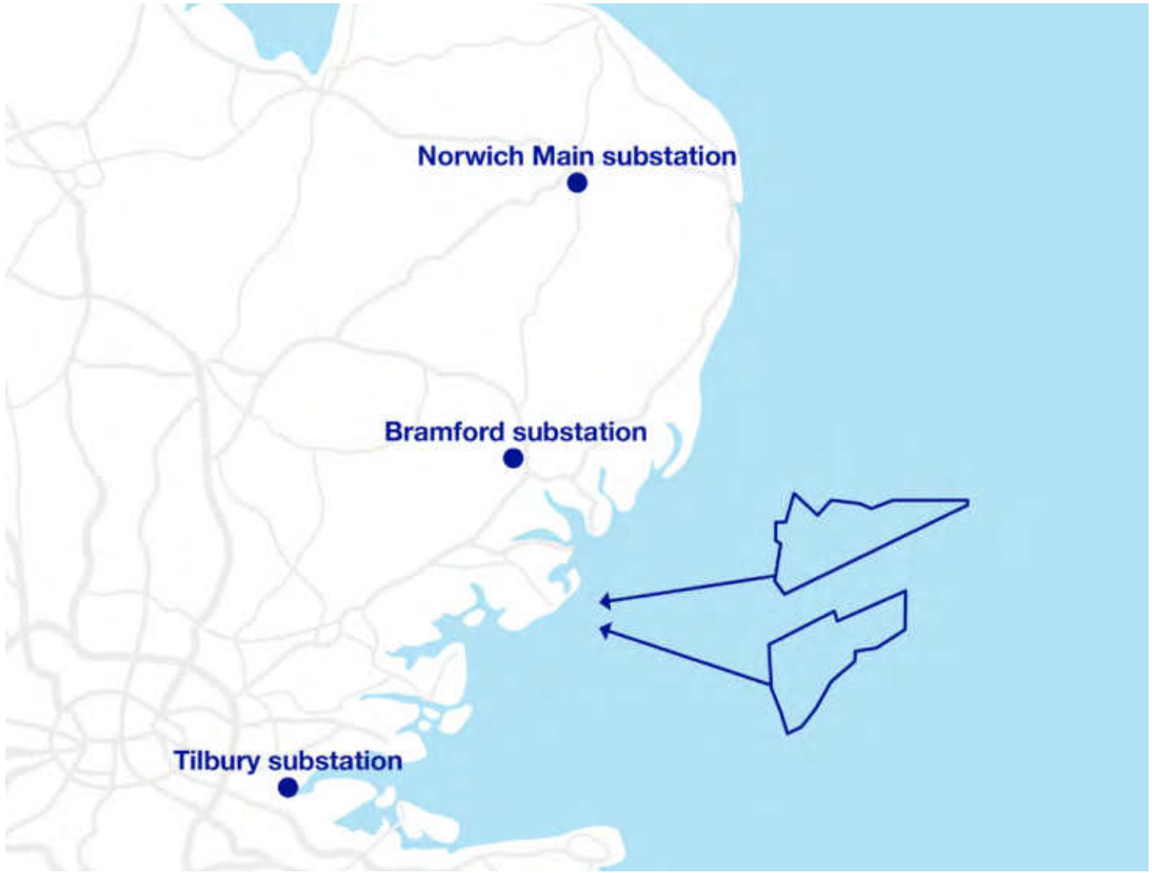


Figure 1 East Anglia GREEN customer connections

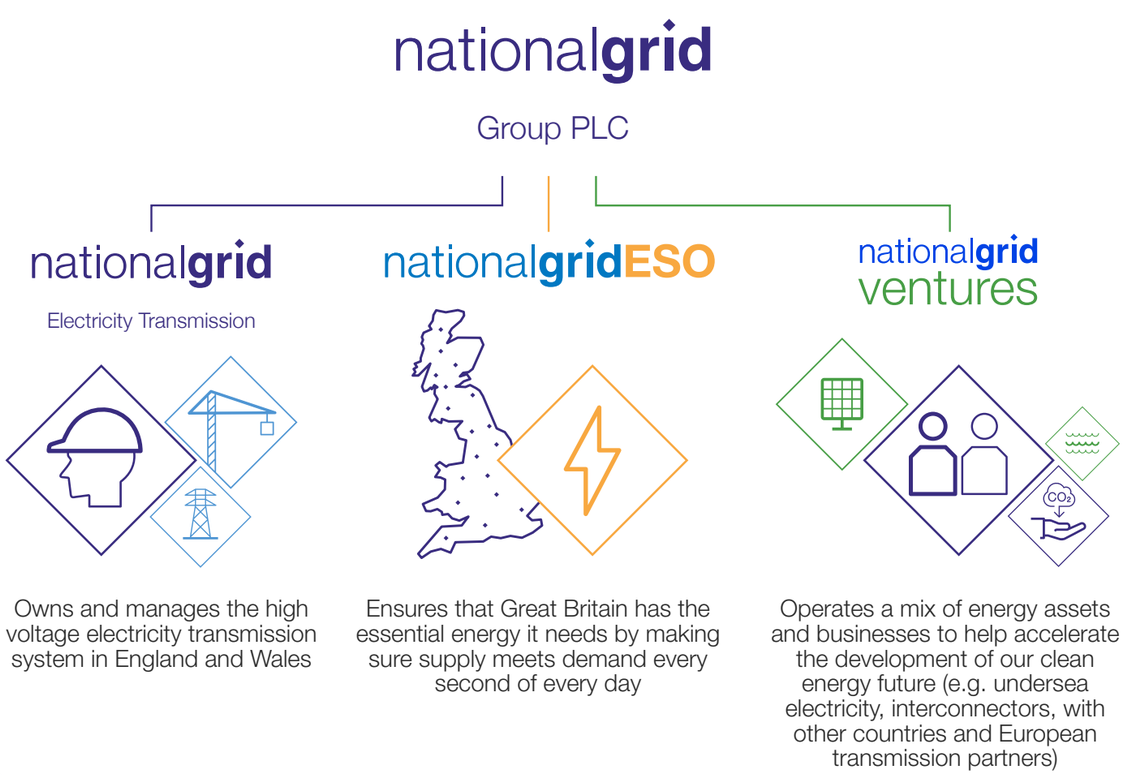
About National Grid

National Grid sits at the heart of Britain's energy system, connecting millions of people and businesses to the energy they use every day. We bring energy to life – in the heat, light and power we bring to our customers' homes and businesses; in the way that we support our communities and help them to grow; and in the way we show up in the world. It is our vision to be at the heart of a clean, fair and affordable energy future.

National Grid Electricity Transmission owns, builds and maintains the network in England and Wales. It is National Grid Electricity Transmission that is developing plans for East Anglia GREEN.

Within the National Grid Group there are distinctly separate legal entities, each with their individual responsibilities and roles. These are shown in the following diagram.

Each of the different entities within the National Grid Group are working to build a cleaner, fairer and more affordable energy system that serves everyone – powering the future of our homes, transport and industry.



Owns and manages the high voltage electricity transmission system in England and Wales

Ensures that Great Britain has the essential energy it needs by making sure supply meets demand every second of every day

Operates a mix of energy assets and businesses to help accelerate the development of our clean energy future (e.g. undersea electricity, interconnectors, with other countries and European transmission partners)

Our General Duties

Under the Electricity Act 1989, National Grid ESO and National Grid Electricity Transmission must develop transmission network proposals in an efficient, coordinated, and economical way, and in a way which considers people and places. Options to deliver additional network capability and the options we take forward are evaluated against these statutory duties.

1. Establishing need

We only seek to build new electricity infrastructure where existing infrastructure cannot be upgraded, where forecasted increases in demand cannot be met by other means, where customer connections are required, or where existing infrastructure has been identified for replacement.

2. Involving stakeholders and communities

We promote genuine and meaningful engagement, meeting and, where appropriate, exceeding the requirements for consultation or engagement.

3. Routeing networks and selecting sites

If we need to build new infrastructure, where possible we seek to avoid areas which are nationally or internationally designated for their landscape, wildlife or cultural significance.

4. Minimising the effects of new infrastructure

When we are developing new infrastructure, we seek to reduce the effect of our work on communities by having regard to safety, noise and construction traffic.

5. Mitigating effects of works

We carry out relevant environmental investigations and report on these when we apply for consent for new works. Additionally, we use best practice environmental impact assessment techniques to assess possible effects of our works and identify opportunities for mitigation measures.

How we will meet our amenity responsibilities and involving stakeholders and communities is outlined in our **commitments when undertaking works in the UK**[2].

6. Offsetting where mitigation is not practicable

When we cannot mitigate the impacts of our proposals, we offset these impacts in practical and sustainable ways that are developed through engagement with local stakeholders.

7. Enhancing the environment around our works

When undertaking works, we consider what practicable measures can be taken to enhance nearby and surrounding areas for the benefit of local communities and the natural and historic environment.

8. Monitoring and learning for the future

We monitor, evaluate and review our engagement processes to learn from previous experiences to improve our working practices.

9. Reviewing our commitments

We review these commitments at least every five years, and make additional revisions in response to new legislation, policy and guidance.

10. Working with others

We require other organisations working on our behalf to demonstrate these same commitments and continue to create an environment where we can share and deliver best practice.

[2] National Grid's commitments when undertaking works in the UK: Our stakeholder, community and amenity policy (National Grid, December 2019) – Available at https://www.nationalgrid.com/sites/default/files/documents/National%20Grid_s%20commitments%20when%20undertaking%20works%20in%20the%20UK.pdf

Many other statutory organisation also have a key role to play in delivering a cleaner energy future.

Department for Business, Energy & Industrial Strategy

The Department for Business, Energy & Industrial Strategy (BEIS) is the ministerial department with primary responsibility for energy.

In November 2020, the Prime Minister set out a **Ten Point Plan for a Green Industrial Revolution**[3]. This was followed by a White Paper, which sets out the Government's proposals for future legislation. The Energy White Paper, entitled Powering our Net Zero Future, sets out how, as a country, we will transform the way we produce and use energy to tackle climate change, meet net zero emissions by 2050 and build back greener.

The White Paper focuses on the Government's ambitions to increase energy generation from offshore wind and interconnectors, as well as hydrogen, carbon capture utilisation and storage (CCUS), and heat and transport decarbonisation.

BEIS, working with input from National Grid ESO, is also conducting a review of how offshore wind is connected, with the aim of removing barriers to **achieving Government ambitions for offshore wind**[4].

The Secretary of State for BEIS is also the ultimate decision maker for new electricity transmission network proposals under **The Planning Act 2008**[5].

Planning Inspectorate

The Planning Inspectorate is the Government agency responsible for examining proposals for NSIPs. In energy terms, those include offshore wind farms, new nuclear power stations and new overhead lines greater than 2 km in length.

The East Anglia GREEN reinforcement is a NSIP.

ofgem

Ofgem (the Office of Gas and Electricity Markets) is the Government regulator for gas and electricity markets in Great Britain. Ofgem is a non-ministerial Government department and an independent National Regulatory Authority, whose role is to protect consumers as a greener, fairer energy system is delivered. Ofgem works with Government, industry and consumer groups to help deliver net zero from an energy perspective at the lowest cost possible to consumers.

nationalgridESO

National Grid ESO is the Electricity System Operator for the whole of Great Britain. National Grid ESO ensures electricity is always where it is needed and the network remains stable and secure in its operation. Generators apply to National Grid ESO when they wish to connect to the network and National Grid ESO leads the work to consider how the network may need to evolve to deliver a cleaner greener future.

[3] The Ten Point Plan for a Green Industrial Revolution (UK Government, November 2020) – Available at https://www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution

[4] BEIS Offshore Transmission Network Review – Available at https://www.gov.uk/government/groups/offshore-transmission-network-review

[5] Planning Act 2008 (UK Government, December 2020) – Available at https://www.legislation.gov.uk/ukpga/2008/29/contents

Moving towards net zero

The world we live in is changing, and the UK is at a turning point as we embrace the enormous opportunities a cleaner, greener future brings. The Government has made it clear that a key part of recovery from the coronavirus pandemic is building back cleaner and greener.

The UK has set a world-leading target to tackle climate change, which is to achieve net zero by 2050. Put simply, this means that we will remove the same amount of greenhouse gases from the atmosphere as we produce.

As a country we are already making progress. The UK has the largest offshore wind capacity in the world, with some 8.5 GW operating and a further 1.9 GW under construction.

2020 was the greenest year on record for Britain's electricity system. Spring 2020 saw the longest run since the industrial revolution without burning coal, stretching almost 68 days. 2020 was also a record-breaking year for renewables. Wind generation records were broken several times during the year, peaking at 59.9 per cent of the electricity mix on August 26. Solar power too set new records with 9.7 GW of power being produced, and its highest share of the electricity mix reaching 34 per cent on several occasions in May.

In April 2021, Great Britain's electricity transmission network set a record for being the greenest it has ever been and in May 2021, wind power generated more than it ever has with 17.7 GW contributing to meeting our energy needs.

But more needs to be done. A healthier, greener future for Britain requires significant upgrades to our energy infrastructure to deliver clean green energy from where it is produced to where it is needed.

Decarbonising the energy system means replacing – as far as it is possible to do so – fossil fuels with clean energy technologies such as from wind turbines and nuclear power for electricity production.

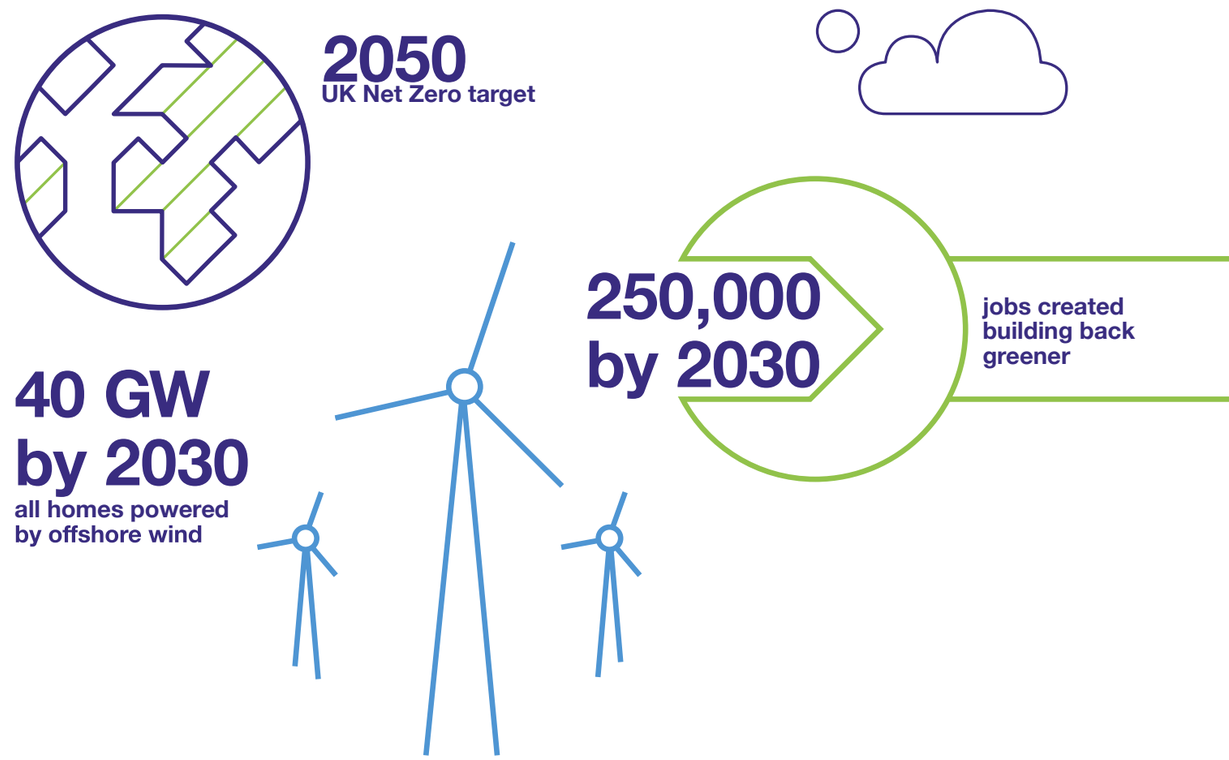
Growth in energy generated from offshore wind is a key part of achieving net zero and the Government's **Energy White Paper** sets an ambitious target to deliver 40 GW of offshore wind connected to the network by 2030 – enough to power every home in the UK. Growth in offshore wind also offers significant opportunities for economic growth and job creation. There are up to 60,000 jobs expected to be created in the offshore wind sector alone in this decade. Up to 250,000 jobs are also expected to be created by 2030 across the proposals in the Prime Minister's **Ten Point Plan for a Green Industrial Revolution**.

The **Climate Change Committee** anticipates that electricity demand will at least double by 2050 as we shift to clean energy to drive electric vehicles, heat our homes and power our industry[6]. The Committee's **Sixth Carbon Budget**[7] published in December 2020 recommends deployment of renewables at scale, including 40 GW of offshore wind by 2030 and sustaining that build rate to support deployment up to 140 GW of offshore wind by 2050, raising further opportunity for growth and job creation. By 2050, our own analysis indicates that the energy sector needs to fill around 400,000 jobs to **build the net zero energy workforce**[8].

Our mission at National Grid is to support these aims. We believe by acting now, the UK can become the world's first major clean economy, with net zero carbon emissions by 2050, creating growth and jobs for communities across Britain.

Watch - East Coast infrastructure project

(National Grid, April 2021) Available at https://www.youtube.com/watch?v=ek4BkKYMHpc



[6] Net Zero – The UK's contribution to stopping global warming (Committee on Climate Change, May 2019) – Available at https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/

[7] The Sixth Carbon Budget: The UK's path to Net Zero (Committee on Climate Change, December 2020) – Available at https://www.theccc.org.uk/publication/sixth-carbon-budget/

[8] Building the Net Zero Energy Workforce (National Grid, January 2020) – Available at https://www.nationalgrid.com/document/126256/download

Delivering a cleaner, greener future

To meet the 2030 target and 2050 legislative requirement and move to a low carbon future using energy from offshore wind, nuclear power and interconnectors, we need to transport that energy from where it is produced or comes ashore, to where it is needed.

The electricity transmission network, which moves energy at scale around the country, will play a vital role in this.

The existing network was designed to connect and transport energy from coal, nuclear and gas fired power stations. In many parts of the country those power stations were closely located to the larger centres of population, with power flowing mostly north to south around the country.

With around 60 per cent of all offshore wind developments looking to bring their energy onshore up and down the East Coast, we need to rewire the network for a different low carbon future; one where we deliver offshore energy from the East Coast to the entire UK population.

To achieve this, it will be critical to strike the right balance between the need to connect the growing amount of offshore wind power, the cost to UK consumers and the impact to local communities and the environment. Our aim is to work with stakeholders and the communities who will host this infrastructure to find the best solution, balancing the needs of the UK, the environment and the regions we directly work in.

How the need for network reinforcement is identified

National Grid ESO leads an annual cycle which looks at how much energy needs to be carried on the network in the future, and where network capability needs to be improved to accommodate that.

The overall effect of that process is to ensure that the right efficient, coordinated and economical proposals are brought forward to deliver what the country requires from the electricity transmission system in a way that represents best value to electricity consumers.

National Grid ESO reviews how the network needs to adapt by preparing:

1. A range of **Future Energy Scenarios**[9] which are discussed with stakeholders and published each summer. Future Energy Scenarios represent different credible scenarios for how quickly we might make the transition to a cleaner greener energy future as we strive towards net zero by 2050.

2. The Future Energy Scenarios inform the analysis in the **Electricity Ten Year Statement**[10] which is published each November, setting out National Grid ESO's view of future transmission requirements and where the capability of the transmission network might need to be addressed over the next decade.

3. Transmission Owners respond with solutions to address the requirements identified in the Electricity Ten Year Statement. National Grid ESO assesses and publishes its recommendations as to which proposals should proceed in a **Network Options Assessment**[11] report (NOA) each spring.

4. National Grid Electricity Transmission responds to NOA recommendations in its **Network Development Policy**[12] which is published each summer. The Network Development Policy sets out which network proposals National Grid Electricity Transmission will take forward.

In planning and operating the network, transmission licence holders – onshore and offshore – are required by their licence to comply with the **National Electricity Transmission Security and Quality of Supply Standard**[13]. These set out criteria and methodologies for planning and operating the network in Great Britain – in essence, minimum requirements designed to ensure secure and stable electricity supplies.

The need to reinforce the network between Norwich and Bramford (AENC in NOA) and between Bramford and Tilbury (ATNC in NOA) has been identified as critical to take forward in both the 2021 and 2022 editions of the NOA reports.

The 2022 edition of the NOA confirmed that East Anglia GREEN is a critical network reinforcement to proceed in all Energy Scenarios. We confirmed in 2021, that we will be taking forward work to deliver the reinforcement identified in our **Network Development Policy** statement.

The Network Options Assessment (NOA)

The NOA is an annual report published by National Grid ESO which outlines its recommendations for projects to take forward during the coming year. When a new edition of the NOA is released, National Grid Electricity Transmission will use this to identify where it needs to build new lines and will back check and review the need case for projects that are in progress.

[9] Future Energy Scenarios 2021 Report (National Grid ESO, July 2021) – Available at https://www.nationalgrideso.com/future-energy/future-energy-scenarios/fes-2021

[10] Electricity Ten Year Statement 2021 (National Grid ESO, November 2021) – Available at https://www.nationalgrideso.com/research-publications/etys

[11] Network Options Assessment 2021/22 (National Grid ESO, January 2022) – Available at https://www.nationalgrideso.com/document/233081/download

[12] Network Development Policy Decisions (National Grid, June 2021) – Available at https://www.nationalgrid.com/electricity-transmission/document/137041/download

[13] Security and Quality of Supply Standard (National Grid ESO, March 2021) – Available at https://www.nationalgrideso.com/industry-information/codes/security-and-quality-supply-standards/code-documents

The need for reinforcement in East Anglia

The network today in East Anglia

Like much of the high voltage electricity transmission network across the country, the network in East Anglia was largely developed in the 1960s. It was built to supply regional demand, centred around Norwich and Ipswich, and fed from our Bramford substation.

A large loop runs from Walpole in the north of the region to Pelham and Rayleigh/Tilbury in the south, via Norwich and Bramford. Two 400 kV overhead lines connect Sizewell B, and an unenergised 132 kV overhead line used to connect the now decommissioned Bradwell A nuclear power station.

Historically there was relatively limited generation and low consumer demand in East Anglia, when compared with other parts of the country. In recent years, peak demand for electricity in the region has fallen slightly – from a peak of 1,426 MW in 2019 to 1,346 MW in 2021.

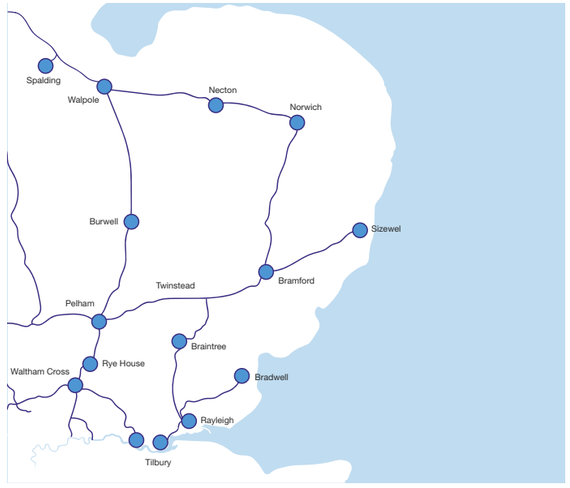


Figure 2 The existing transmission network in East Anglia

Current generation and demand in East Anglia

To understand current and future demands on the electricity network, the concept of network boundaries is used. A boundary splits the system into sections and shows where there are high-power flows between parts of the network. When flows across a network boundary are forecast to be above the capability of the network, there are two options to manage this:

1. pay electricity generators on one side of the boundary to reduce the energy they produce (and in turn pay generators on the other side of the boundary to compensate for the shortfall). This then reduces the flows of electricity across the boundary. When National Grid ESO pay generators to do this, these are called 'constraint payments'; and/or
2. increase the capability of the network to allow more electricity to flow.

At present, generation in the region currently totals 4,100 MW. Most of this generation (3,160 MW) is directly connected to our network and 940 MW is connected via the UK Power Networks distribution network. We call the locally-connected generation 'embedded'. This is shown in the table opposite.

Project name	Customer	Connection site	Contracted generation (MW)	Type of generation
Sizewell B	EDF Energy Nuclear Generation Ltd	Sizewell	1230	Nuclear
Dudgeon	Dudgeon Offshore Wind Ltd	Necton	400	Offshore wind
Greater Gabbard	Greater Gabbard Offshore Wind Ltd	Leiston	500	Offshore wind
Galloper	Galloper Wind Farm Ltd	Leiston	350	Offshore wind
East Anglia 1	East Anglia One Ltd	Bramford	680	Offshore wind
Sheringham Shoal	Scira Offshore Energy Ltd	Norwich (embedded)*	315	Offshore wind
Gunfleet Sands	Gunfleet Sands Ltd	Bramford (embedded)*	99.9	Offshore wind
Gunfleet Sands II	Gunfleet Sands II Ltd	Bramford (embedded)*	64	Offshore wind
Great Yarmouth	RWE Generation UK plc	Norwich (embedded)*	420	Gas (CCGT)
Thetford	EPR Thetford Ltd	Bramford (embedded)*	41	Biomass

*connected via the distribution network

The Security and Quality of Supply Standard

The network is planned and operated under a set of standards designed to ensure there are no widespread electricity supply interruptions, even if two circuits are out of service.

Each line of pylons on the network carries two electrical circuits.

For example, if one circuit is switched out for planned maintenance and another is impacted by a fault at the same time, the Security and Quality of Supply Standard is designed to ensure:

- electricity system frequency is maintained within statutory limits
- no part of the network is overloaded beyond its capability
- voltage performance stays within acceptable statutory limits
- the system remains electrically stable.

National Grid ESO oversees the standards, and they are approved by a Security and Quality of Supply Standard panel and Ofgem.

Future generation and demand

While the network in East Anglia can accommodate the level of generation and demand that there is today, this situation will change over the next decade. New connections for new offshore wind and nuclear power generation projects and for interconnectors are expected into East Anglia by 2030. These are being constructed or expected into substations at Necton, Norwich Main, Bramford, Friston and Sizewell.

Additionally, agreements are in place with two offshore wind farm projects on the basis of their connection into the new East Anglia Connection substation (EAC).

National Grid has a duty to facilitate new connections and maintain a safe national transmission system.

Studies by National Grid ESO considered the capability of the existing network.They took into account the planned upgrades to existing circuits and the proposed Bramford to Twinstead Reinforcement. The assessments, in line with the analysis of credible Future Energy Scenarios, concluded that the existing high voltage electricity network in East Anglia does not have the capability needed to reliably and securely transport all the energy that will be connected while meeting the Security and Quality of Supply Standard (NETS SQSS).

The network arrangements, as shown in Figure 3 on the following page, are not sufficient for the National Transmission System (NTS) to continue to operate safely under the conditions of the loss of a double circuit route.

To address this and meet its statutory duties, National Grid needs to reinforce the electricity network in East Anglia. The reinforcement is needed to allow power to be imported to, and exported from, East Anglia and to provide additional capability to allow power flows into and out of the south-east area to connect with areas of demand and interconnectors to Europe. This reinforcement is considered ‘critical’ in all Future Energy Scenarios.

Increasing the capability of the existing network

Before we consider building new parts of the network, we first must consider whether we can achieve more capability by upgrading and strengthening the existing network.

This can involve changing the conductors/wires on some of our existing overhead lines and adding smart power control devices to control the flow of electricity on parts of the network to transport it to where it is needed.

In East Anglia and in the first half of this decade, we are:

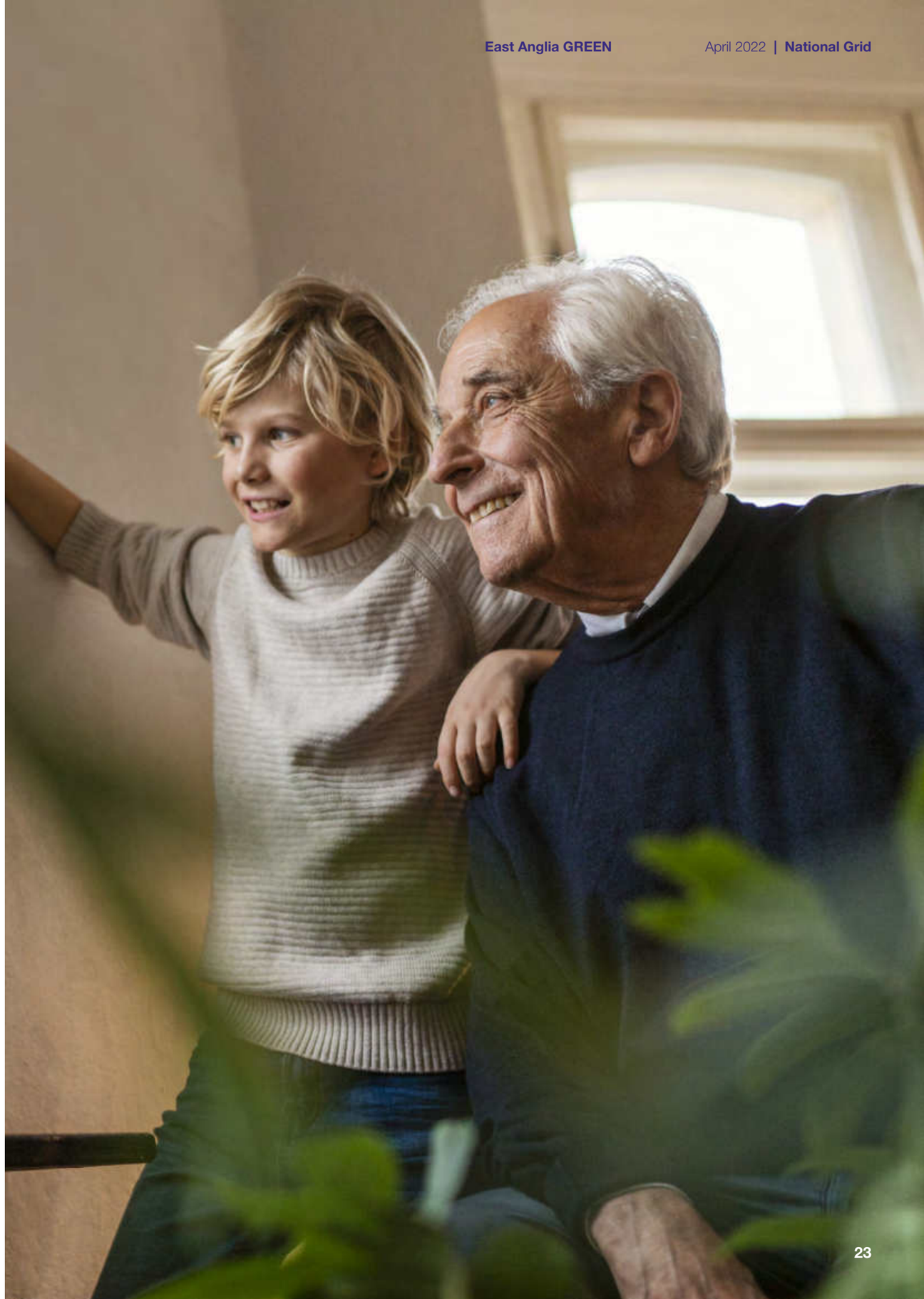
- installing power control devices at key substations in the region – at Pelham, Rye House and Waltham Cross, to make more use of an existing route to the west of the region
- increasing the voltage of a section of line from Waltham Cross south into London to 400 kV to increase the capability of that part of the network into the capital
- re-wiring existing overhead lines with conductors that can carry more power – for example on the existing overhead lines from Bramford to Braintree to Rayleigh to Tilbury, Twinstead and Pelham and between Norwich and Bramford.

Making these improvements will increase the capability of the existing network, but it is still insufficient to deliver the capability that National Grid ESO advises is required to deliver cleaner, greener energy to homes and businesses beyond the region in line with Government ambitions.

As National Grid ESO has outlined in the last two published NOAs, new reinforcements are needed in the region to deliver on the Government’s ambition to see 40 GW of offshore wind connected by 2030.

Watch - The East Coast Story

(National Grid January 2022)
Available at https://www.youtube.com/watch?v=pjazSaOKmpo



The table below shows the work needed on the network in the south east over the next decade as identified in the NOA published in 2022[14].

Option description	Earliest in Service Date (EISD)
Reconductor remainder of Rayleigh to Tilbury	2021
Power control devices at Burwell Main2	2022
Reconductor remainder of Coryton South to Tilbury circuit2	2022
Reconductor remainder of Bramford to Braintree to Rayleigh route	2023
Commercial solution for East Anglia – Stage 1	2024
Commercial solution for East Anglia – Stage 1	2024
Power control devices at Pelham	2024
Power control devices at Pelham	2024
Power control devices at Rye House	2024
Power control devices at Rye House	2024
Elstree to Sundon reconductoring	2024
Reconductor Bramford to Norwich double circuit	2024
Uprate Hackney, Tottenham and Waltham Cross 275 kV to 400 kV	2027
Reconductor the newly formed second Bramford to Braintree to Rayleigh Main Circuit	2028
New 400 kV double circuit between Bramford and Twinstead	2028
New offshore HVDC link between Suffolk and Kent option 1	2029
New 400 kV double circuit in north East Anglia	2030
New 400 kV double circuit in south East Anglia	2030
Thames Estuary reinforcement	2030

[14] https://www.nationalgrideso.com/research-publications/network-options-assessment-noa

The Bramford to Twinstead Reinforcement was included as part of the baseline network configuration when the need for the East Anglia GREEN project was assessed.

In addition to East Anglia GREEN, National Grid is developing two new reinforcements in East Anglia:

- Bramford to Twinstead Reinforcement – a new 400 kV transmission line between Bramford in Suffolk and Twinstead Tee in Essex
- Sea Link – a new high voltage DC link between East Anglia and Kent.

Key

- Substation
- Cable
- Overhead line 132 kV
- Overhead line 275 kV
- Overhead line 400 kV

Indicative map for reference
- not all features shown are to scale

Figure 3 Anticipated baseline network configuration

The BEIS Review of offshore coordination

The BEIS department's Offshore Transmission Network Review is currently looking at how the offshore electricity transmission network can be delivered in a more coordinated way to deliver net zero emissions by 2050, and we fully support that work.

We will work closely with Government, stakeholders and coastal communities to ensure we play our part to deliver the infrastructure needed to achieve net zero in a way that reduces impacts on communities.

In meeting that challenge there are two key considerations. The first is the way in which we best connect and coordinate the growth of offshore wind farms and interconnectors to the electricity transmission network along the immediate coastline. The second is the network reinforcements required further inland to accommodate the increased demand on the network and to ensure we can effectively transport the power to where it is needed across Great Britain.

This offshore coordination work by Government is ongoing. As explained in the Energy White Paper, Government will be looking to redesign the current regime to bring more extensive coordination and mitigate environmental, social and economic costs for the 2030s and beyond[15].

While developers will be encouraged, where early opportunities for coordination exist, to consider becoming pathfinder projects, National Grid ESO explains in the 2021 NOA, that onshore reinforcement is still needed.

The System Operator's analysis found that the viable offshore options, in the scenario where 40 GW of offshore wind is achieved by 2030, do not displace any of the onshore reinforcement requirements that have been identified.

Notwithstanding how offshore coordination is developed, major onshore development and electricity network reinforcement will therefore still be necessary. To put this into perspective, successfully delivering the Government's 40 GW of offshore wind ambition will require around 500km of onshore and around 400km of offshore electricity transmission network being consented and delivered within this decade across the east side of the country.

Reinforcing the network between Norwich to Bramford and Bramford to Tilbury is an integral part of this and was confirmed as 'critical' for 2030 by National Grid ESO in the January 2022 edition of the NOA for all of the Future Energy Scenarios. As further reports become available, we will back check our proposals against these to ensure that they remain appropriate.

[15] Energy White Paper, page 80 (BEIS, December 2020) – available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/945899/201216_BEIS_EWP_Command_Paper_Accessible.pdf

How we develop projects

Our project development process includes the following key stages:

Project development and delivery

1

Strategic Proposal

Identify network options to meet need case, undertake strategic options appraisal and select Strategic Proposal.

2

Options Identification & Selection

Identify and appraise project options, engage stakeholders and seek consultees feedback to shape the development of the project.

3

Defined Proposal and Statutory Consultation

Develop project design in response to feedback, identify preliminary environmental information and undertake statutory consultation on the proposal.

4

Assessment & Land Rights

Refine project design in response to feedback, assess the project impacts and seek voluntary land rights. Prepare the application documents.

5

Application, Examination & Decision

Submit application, respond to Examining Authority's questions and support through examination hearings.

6

Construction

Discharge Requirements, deliver project, implement reinstatement, mitigation and post construction monitoring.

We undertake a phased options appraisal and assessment process when developing proposals to reinforce our network.

The options appraisal process has been designed to meet our duties and also follows other relevant policy and guidance when making judgments and decisions on the project. This has included consideration of the relevant National Policy Statements, the Holford Rules (which apply to the routeing and design of overhead lines) and the Horlock Rules (which apply to the location and design of substations).

Further details on these policies and guidance can be found in the Corridor Preliminary Routeing and Substation Siting (CPRSS) report April 2022.

We are currently at the Options Identification and Selection stage of the process and we are seeking feedback during this consultation on our work to date. Your feedback will help to shape our project as we move forward.

The Holford and Horlock Rules

National Grid employs two sets of rules and guidelines for the routeing and siting of new energy transmission infrastructure:

The Holford Rules provide guidelines for the routeing of high voltage overhead transmission lines. These are important guidelines during the development of a preferred alignment and considerations of whether certain sections should be undergrounded.

The Horlock Rules provide guidelines for, the design and siting of substations (in addition to cable sealing end compounds and line entries). When considering new electricity infrastructure, National Grid has regard to the degree to which options comply or deviate from these rules.

Identifying the Strategic Proposal for East Anglia GREEN

We have considered a range of connection points on the existing network and the use of different technologies to identify how we should provide the additional capacity needed in East Anglia.

To narrow down the options to take through to detailed appraisal, we carried out some initial filtering using professional judgement. Further details of our assessments can be found in the CPRSS report April 2022.

Alternative technologies

We considered different types of technologies which could be used to reinforce the network. Each technology has different features which affect how, when and where it should or could be used.

Our assessment concluded that the appropriate technologies to take forward for further assessment were:

- onshore connection made up of Alternating Current (AC) overhead lines and underground cables (e.g. through nationally designated areas)
- offshore High Voltage Direct Current (HVDC) cables
- onshore HVDC cables.

In addition, we concluded we would consider opportunities to upgrade existing transmission infrastructure to 400 kV if currently operating at lower voltages.

Technology Options

Example of a 400 kV steel lattice angle pylon

Overhead lines

Our starting assumption for building new transmission infrastructure is to use overhead lines. This is in line with existing and emerging Government policy set out in National Policy Statements[16].

National Grid typically uses steel lattice pylons to support overhead lines. The size, height and spacing of pylons are determined by safety, topographical, operational and environmental considerations. A typical 400 kV pylon is 45-50 metres tall.

The main impact of overhead lines is generally considered to be visual, with effects on landscape and views.

Constructing underground cable

Underground cables

We may propose to use underground cables in sensitive protected areas, such as National Parks or Areas of Outstanding Natural Beauty (AONB), to reduce visual impact.

For installing cables underground a large cable swathe is required. This is typically between 65 and 100 metres wide depending on the number and size of cables to be installed, with additional working areas beyond this. Once the cables have been installed, the construction swathe will be reinstated and normal agricultural practices can be resumed. The East Anglia GREEN reinforcement will comprise up to 18 cables.

We need to build joint bays at intervals of approximately 500 metres to 1,000 metres to allow for the individual sections of cable to be joined together. In these areas a wider corridor swathe may be needed. The work required to bury cables is likely to affect archaeology, vegetation and wildlife along the construction corridor.

Cable sealing end compound

Cable sealing end compounds

We need to build cable sealing end compounds where the underground cables join to the overhead lines. These sealing end compounds are generally around 30 x 80 metres.

[16] Overarching National Policy Statement for Energy (EN-1) and National Policy Statement for Electricity Networks Infrastructure (EN-5) - Available at www.gov.uk/government/publications/national-policy-statements-for-energy-infrastructure

Geographic scope of strategic options

Building shorter reinforcements generally represent the most efficient development; they are usually associated with lower levels of environmental effects, capital and lifetime costs, and are, in general terms, more compliant with relevant policy guidance.

Reinforcement solutions

The existing network configuration and the complexity of the system operating conditions mean that building a single connection between two points on the network would not address all the identified constraints on the network in East Anglia.

To address this, we considered a series of connection reinforcement solutions - each of which included a number of different elements and geographically dispersed developments.

They fall into three main geographical themes.

- **Eastern** - to transport power from the north of East Anglia into the south-east England area connecting with existing substations such as Tilbury and Grain.
- **Northern** - creating additional capacity by connecting into the north of the existing London area network and then into the south-east England area connecting with existing substations such as Wymondley, Pelham, and Waltham Cross.
- **Western** - creating additional capacity by transporting power westward around London and down into the south-east England area connecting with existing substations such as East Claydon and West Weybridge along with additional reinforcement to the south of London.

We identified a total of 23 reinforcement solution options. The options collectively tested various combinations of both onshore and offshore developments, the use of AC and DC technologies, and some uprating of existing lines to 400 kV.

Identifying the preferred reinforcement solution

We carried out further appraisals for each of the options. The factors considered included:

- deliverability of the option
- system benefit which each option would provide
- environmental impacts
- socioeconomic impacts
- cost benefit analysis.

Taking all the above factors into account, we concluded that the reinforcement solution which provides the highest overall value to consumers combines both offshore and onshore connections with three distinct elements:

- offshore reinforcement between the south coast and East Anglia (Sea Link)
- onshore reinforcement between Tilbury and Grain*
- onshore reinforcement between Norwich and Tilbury (East Anglia GREEN).

We have only focussed on the development of the onshore reinforcement between Norwich and Tilbury, referred to as East Anglia GREEN. The other elements described above are being progressed as separate schemes due to the general geographic separation of potential effects.

* The ESO's NOA 2022 has subsequently identified that onshore reinforcement between Tilbury and Grain should not proceed and identified other options to reinforce the network in this area.

Refining East Anglia GREEN

We carried out further studies to consider the most appropriate routeing for the reinforcement. This was an iterative process with careful attention paid to the implications of different route and site alternatives, although for presentational clarity we discuss it as a series of comparisons.

We needed to factor in the requirement to build a new 400 kV connection in East Anglia to connect two new offshore wind farms off the East Coast. We considered various options for the connection substation for landing points in the Clacton area.

This was considered likely to have greater effects on AONBs than a new substation associated with Clacton area landing points.

We also considered a combination of different start, end and intermediate locations for the reinforcement – alongside the strategic options for connecting between them.

Necton or Norwich Main

Our network studies showed that the reinforcement could be built from either of these existing substations towards the existing substation at Bramford or to a new substation in the vicinity of Twinstead Tee.

The connection distances to Twinstead are comparable from both Necton and Norwich Main, however the shortest route length would be from Norwich Main to Bramford at approximately 60 km.

Bramford or Twinstead area

To maintain system integrity (maintaining supplies under a range of fault and outage conditions), we need to connect the reinforcement into the network in either the Bramford or Twinstead area.

To connect in the Twinstead area, we would need to build a new 400 kV substation. To connect into Bramford, we would need to build an extension within the existing substation compound.

A new Grid Supply Point substation has been proposed as part of the Bramford to Twinstead reinforcement in the Twinstead area. It will only provide a connection to the 132 kV distribution network and is not appropriate technically for the 400 kV interconnectivity required for this reinforcement.

We selected Norwich Main substation as the start location and Bramford substation as the preferred connection point. This would provide the shortest connection length which, in turn, would reduce the potential for environmental effects and would be more compliant with the Holford Rules.

The new connection can be accommodated within the existing Bramford substation compound, which would involve less impacts and costs than building a new substation in the Twinstead area.

Connection substation siting options

We looked at different options for building a new substation to connect new offshore wind projects. As noted earlier, our studies found that combining the customer connection works as part of the East Anglia GREEN reinforcement would need less new infrastructure and involve less overall costs when compared with building a separate standalone substation and connection.

When identifying a suitable location for a new connection substation, we took into consideration the developers' requirements for cable landing points, onward routeing and siting for substations.

Tendring Peninsula

There are potential landing points in the Clacton area and a number of potentially suitable locations for a new substation on the Tendring Peninsula. The area is also likely to offer suitable location opportunities for the developers' sites.

The onward 400 kV connections could be integrated as part of the reinforcement from Bramford to Tilbury and initial assessments suggest it would be possible to route a new line either to the west or east of Colchester.

Bramford substation to connection substation, through or around Dedham Vale AONB

We considered how we could route the reinforcement from Bramford substation to a connection substation location on the Tendring Peninsula. And whether this would be best achieved by crossing through the Dedham Vale AONB (we assumed that we would use buried cable within the AONB) or around the AONB (via a third connection between Bramford and the Twinstead area).

While both options have landscape constraints, along with the potential to interact with properties, habitats including woodland, heritage assets and a range of other constraints, they are both considered deliverable subject to normal routeing and siting practices.

Generally, we would seek to avoid routeing through an AONB, partly to avoid impacting the nationally designated area and partly to avoid incurring the high additional costs of using underground cables to mitigate landscape effects.

However, here the route around the AONB would be approximately twice the length of the more direct alignment and would cross the Stour Valley Project Area (SVPA). The SVPA area has previously been identified as requiring mitigation (underground cabling) during the development of the Bramford to Twinstead reinforcement proposals. On this basis, our assessments suggest that both routes could require a similar length of underground cabling.

The onward route from Twinstead to the connection substation could be particularly constrained should a connection from the substation to Tilbury also need to route to the west of Colchester, due to presence of internationally protected wildlife areas - Special Protection Areas (SPAs) east of Colchester.

Hence the longer length of the route around the AONB and the potential for additional constraints around Colchester led us to conclude that routeing through the AONB, using underground cable, is preferred. In addition, it would not put a third connection in the Bramford and Twinstead area.

Connection substation to Tilbury substation routeing options

There aren't any national landscape designations along this section of the route although there is a network of estuarine and marsh sites to the east with many associated internationally protected wildlife areas designations.

Impacts on these designations would be reduced with a more inland route.

Overall, our assessments concluded that it would be possible to develop a suitable route for the reinforcement in this area.

Our strategic proposal for East Anglia GREEN

Our strategic proposal is for an onshore 400 kV line. The connection points are Norwich Main, Bramford and Tilbury substations, with a new connection substation in the Tendring Peninsula. Following our appraisals, we have confirmed our strategic proposal to take forward to the next stage of assessment as an onshore reinforcement made up of:

- approximately 60 km of new 400 kV transmission line between Norwich Main and Bramford substations
- approximately 120 km of new 400 kV transmission line between Bramford and Tilbury substations via a new connection substation to be located in the Tendring district.

We expect the majority of the new reinforcement to be made up of steel lattice pylons supporting overhead line, with the use of underground cables through the Dedham Vale AONB.

We expect some associated work to be needed at substations and elsewhere to connect the reinforcements to the existing network and to ensure the safe construction and operation of the reinforcement.

Following the confirmation of the strategic proposal, our next steps were to consider options for detailed routeing and siting for the proposed reinforcement.

Options identification and selection process

In developing our preferred route and site, we have followed National Grid's Approach to Consenting. Our work is set out in full in our CPRSS report.

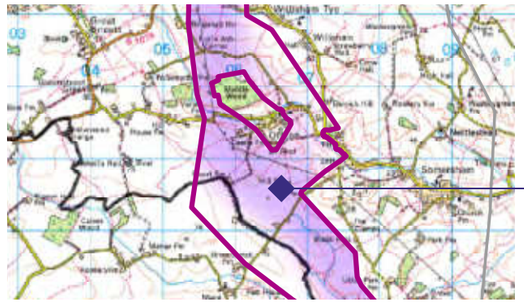
Define the study area

For each section of our route, we defined a study area informed by factors including:

- the connection end points identified in the Strategic Proposal
- the location of large towns and other built-up areas
- the location of physical features such as estuaries, or protected sites like AONBs, National Parks or nature conservation areas.

Constraint mapping

We then map out key features in the landscape that we want to avoid or minimise contact with. These have been informed by planning policy and our professional judgement. At this stage, we only consider features that would make a difference to our routeing decisions.These include the built-up areas where people live and other features that may be sensitive in terms of ecology, heritage or landscape, as well as features that may represent planning or technical constraints. The full list is in the CPRSS.



Option identification, appraisal and selection

Considering the constraints and opportunities available, using a combination of computer modelling and expert professional judgement, we devise and refine various routes from one connection end to another. These seek to represent different high-level options for making the connection avoiding the identified constraints, for example, routeing on one side of a town or the other.

We then carry out an appraisal of each option with engineers, environmental experts, town planners and other specialists using their professional judgement to consider the implications of each option. This allows us to compare between options on a consistent basis, on topics which are likely to influence the decision. Through this appraisal we may also identify further options or combinations and do further assessment if needed.

We then consider the relative merits of each option to reach our balanced conclusion on a preferred corridor. The decision is informed by National Grid's statutory duties, the options appraisal and planning policy - including the Holford and Horlock Rules.

Developing a graduated swathe

Following the selection of a preferred corridor, we produced a graduated swathe which indicates where an alignment could be routed. This shaded area is darker where an alignment is more likely when taking into account the identified constraints but remains indicative only until further assessment work is done. We will consider feedback from public consultation and further information from surveys and stakeholder engagement as we develop a firm proposal for the alignment.

The graduated swathe

The graduated swathe shows the area considered more likely to be developed as a darker colour than areas considered less likely.

Identifying our preferred corridor and substation site

Routeing and siting considerations are an iterative process, and we need to carefully consider the implications of different combinations when making a balanced overall decision.

To help set out the process we have taken, we have separately described discrete connection sections and siting elements in the following section.

Norwich to Bramford

Our study area is between Norwich Main and Bramford substations, with the Broads National Park and Suffolk Coast AONB to the east, and the Breckland designations (SAC and SPA) to the west. There is already a National Grid 400 kV overhead line between the two substations, which is in the middle of our study area.

Options considered

The high level options we considered for the new line were:

- to run as close as possible and in parallel to the existing line
- to offset the line (subject to other constraints and Holford Rule principles) to the east and west of the existing line at a distance that reduced cumulative impacts.

Close parallel line

We found that trying to route our line close to the existing line meant that we could not avoid features along that route:

- rail, road and river crossings at Flordon, and Beacon Hill would be very difficult to build because of other nearby constraints in these areas
- to avoid properties and other features, several diversions of the new line, requiring more angle towers, which can be more prominent. This would also leave residential and commercial buildings between the lines or bring additional technical challenges and an unacceptable risk to the programme to connect new renewable energy sources
- we would not be able to avoid woodland close to the existing route without more angle towers or removing some woodland.

Taking these considerations into account, noting in particular the Holford Rules' emphasis towards fewer angles towers, on balance we have chosen not to take close paralleling forward.

Our preferred option

On balance, a corridor offset to the west of the existing line is our preferred corridor. Overall, it performs best when considering landscape impact, heritage, technical considerations and cost.

Close paralleling options were less preferred for the reasons above and a route corridor to the east has greater potential impacts on heritage than the others and is technically very constrained at its southern end.

Figure 4 Norwich Main substation to Bramford substation preferred corridor showing graduated swathe

Connection substation

Before identifying a route south away from Bramford substation we considered potential locations for the connection substation.

As set out earlier, our study area is the Tendring Peninsula. The area is bounded by the estuaries to the north and south-west which, along with Hamford Water to the east, are internationally protected for wildlife. As our study area is the Tendring Peninsula, the windfarm export cables will come ashore to align to that area, nominally between Clacton and Frinton-on-Sea. There is an existing 132 kV line in the middle of the area, running between substations near Lawford and Clacton.

Option drivers

We first identified a longlist of sites (including clusters of sites) that might be technically and environmentally suitable. These would need to be sufficiently large for our substation, and we also considered the opportunities for the windfarm substations to be located either on the same site or nearby. We concentrated our search in areas that:

- provide a balance between the effects arising from the onshore windfarm export cables and the 400 kV line noting that with two lines out from the substation this places an emphasis on reducing the length of 400 kV overhead line required to connect
- are close to the existing 132 kV line in case it offered opportunities for mitigation
- are accessible from A or B roads.

We then filtered down to a shortlist by considering:

- scope for mitigation
- nature of adjacent roads
- proximity to existing woodland blocks (providing screening for substation infrastructure)
- proximity of adjacent residential properties or listed buildings
- public rights of way and cycle routes
- the presence of any potentially valuable landscape elements
- the relative length of overhead line and cable.

Our shortlisting gave us four options to appraise.

Our preferred option

Our preferred connection substation site is in the vicinity of the existing 132 kV substation to the south of Lawford. The site, when considered in conjunction with the electrical connections required to it (two 400 kV lines and windfarm export cables), is preferred in terms of ecology, landscape impact, technical considerations and cost.

This is because as it is furthest from the protected wildlife sites, it is least likely to affect the bird populations there. As this site has the shortest distance of overhead line to connect it, it has the least potential visual impact as it requires fewest pylons.

This shorter overhead line also reduces potential technical issues and overall cost even allowing for the additional effects and costs for longer onshore windfarm export cable requirements.

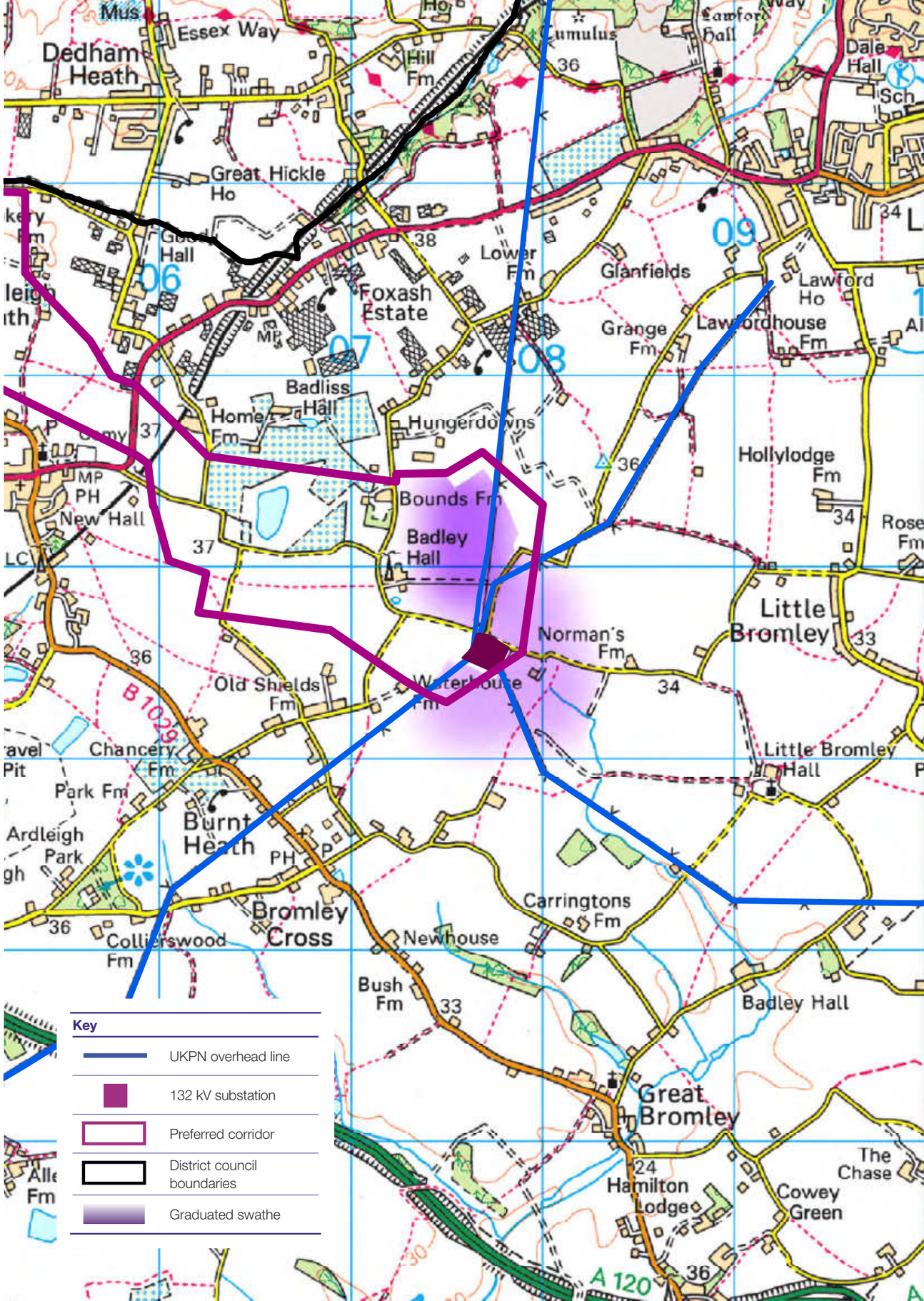


Figure 5 Preferred connection substation site – showing graduated swathe

Bramford to connection substation

Our study area is between Bramford substation and the study area for our proposed connection substation. The Dedham Vale AONB is a significant feature of this. There are both 400 kV and 132 kV overhead lines in the area, and the area is also proposed to be the location for our Bramford to Twinstead 400 kV reinforcement project.

Options considered

The high level choice is whether to route our corridor around the AONB or through it. National planning policy would expect us to seek to avoid the AONB where possible. Routes around the AONB would need to consider potential interactions with the existing 400 kV line to the north, and our Bramford to Twinstead Reinforcement project.

Due to the distance around the AONB and potential effects (including on the Stour Valley Project Area which is assumed to also require the use of cables) we also considered the use of underground cables for a route through the Dedham Vale AONB. We identified five route corridor options: two corridors around the AONB and three corridors with cable through the AONB.

Our preferred option

The most westerly of the cable corridors through the AONB is our preferred corridor. Overall, it is preferred when considering landscape impact, ecology, heritage and socio-economic effects.

This is because while an underground cable within the AONB may have a temporary impact on the landscape during construction, there is potential for overhead lines around the AONB to have a long-term impact on the setting of the AONB and it is assumed that underground cables would be required through the SVPA with associated significant costs.

Of the routes through the AONB, the preferred corridor is furthest away from the bird populations in the estuary, so is likely to have least effect on them and also avoids conservation areas and the key tourist area at Flatford Mill, which might have been affected by construction in the other two corridors with cable through the AONB.

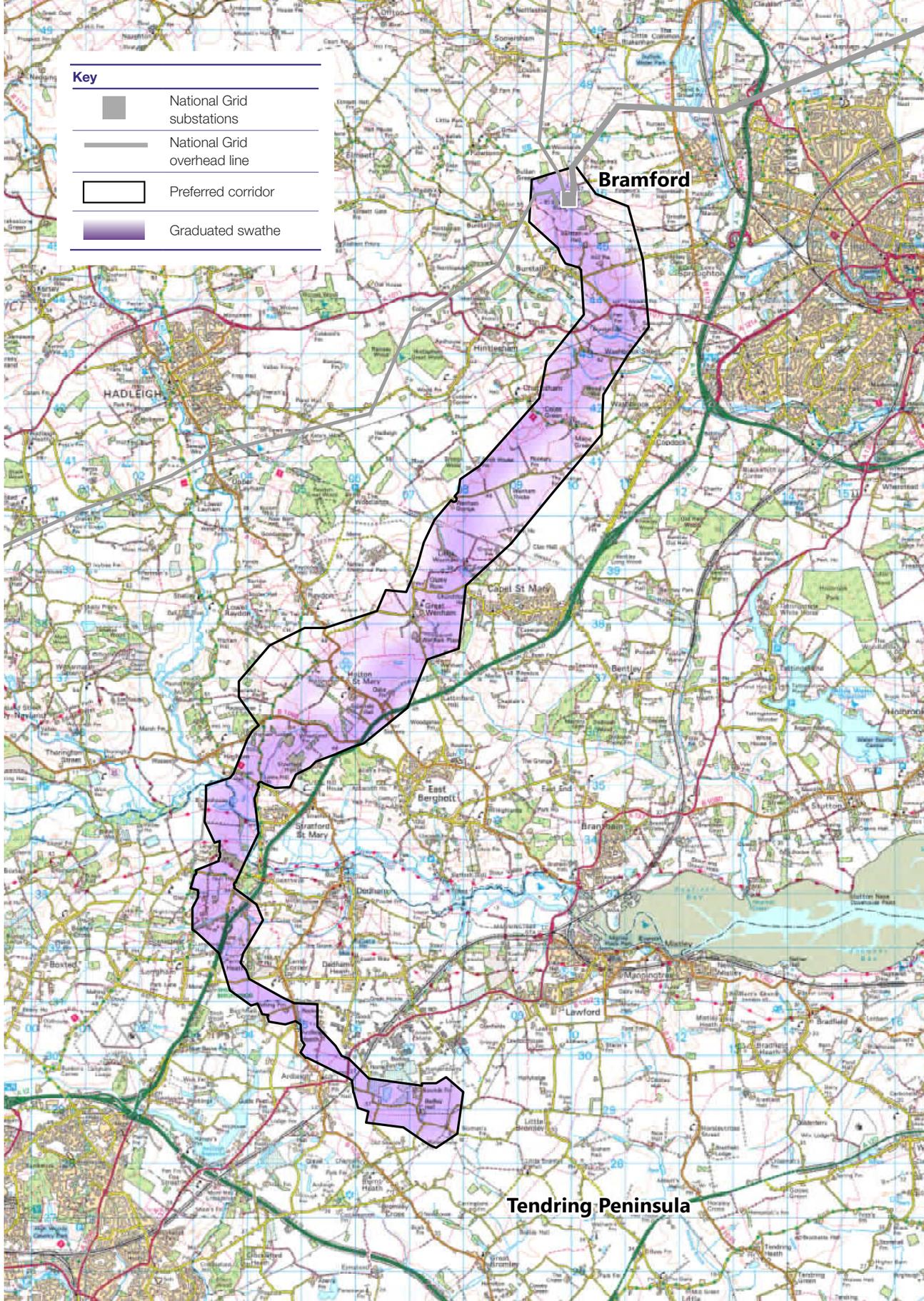


Figure 6 Bramford substation to connection substation preferred corridor showing graduated swathe

Connection substation to Tilbury

Our study area is between the area for our proposed connection substation and Tilbury substation. It is defined to the east by the coast, much of which is internationally protected for wildlife. We extended the study area to the west to allow for the consideration of various inland options. There are both 400 kV and 132 kV overhead lines in the area, including a north-south route through Rayleigh to Tilbury.

We identified two high level options, plus various combinations of ways to connect between them:

- a more direct route, closer to the coast
- a longer route, further inland.

Options considered

A total of 14 individual sections were appraised independently, so that we could combine the best performing sections. We identified six viable end-to-end corridors with different combinations of sections for consideration.

Our preferred option

The most western, more inland corridor is our preferred corridor. Overall, it is preferred when considering ecology, heritage, technical considerations and cost.

This is because the more coastal corridor, and any option which uses sections of it, has the potential to affect the bird populations in the estuaries. These populations are protected by the Habitats Regulations, which direct that we must consider alternative options if they are available. Our preferred corridor is least likely to have an effect as it is furthest inland.

This corridor also avoids the conservation area affected by most other options. Our preferred option is least complex to build and thus cheaper and whilst crossing the existing 400 kV line avoids complex interactions with it.

Figure 7 Connection substation to Tilbury substation preferred corridor showing graduated swathe

Our proposals for public consultation

Following our detailed assessments, we are proposing to build a network reinforcement between the existing Norwich Main substation in Norfolk to the existing substation at Bramford, and from Bramford to the existing Tilbury substation in Essex as well as connect new offshore wind generation.

This would be achieved by the construction and operation of a new 400 kV electricity transmission line over a distance of approximately 180 km and building a new 400 kV connection substation.

The 400 kV electricity line would comprise mostly steel lattice pylons and conductors (wires) with some underground cabling through the Dedham Vale AONB.

We would need to build two cable sealing end (CSE) compounds to connect the overhead lines to the underground cables. Each CSE compound would be fenced, and contain electrical equipment, support structures, a small control building and a permanent access track. Potential sites for these will be assessed after this first phase of public consultation. We will carefully consider any local landscape features which may help to screen the CSEs as well as the impacts on the AONB.

We are proposing a 400 kV new substation sited in the Tendring district. The substation would be fenced, contain high voltage electrical equipment, such as circuit breakers and shunt reactors, support structures, control buildings, a permanent access road and parking areas.

We would also need to carry out work at the existing 400 kV substations at Norwich, Bramford and Tilbury.

Other ancillary activities would be required to facilitate construction and operation of the project.

These include, but are not limited to:

- temporary land to facilitate construction activities including working areas for construction equipment and machinery, site offices, welfare, storage and access; and
- land required for mitigation, compensation and enhancement of the environment including Biodiversity Net Gain.

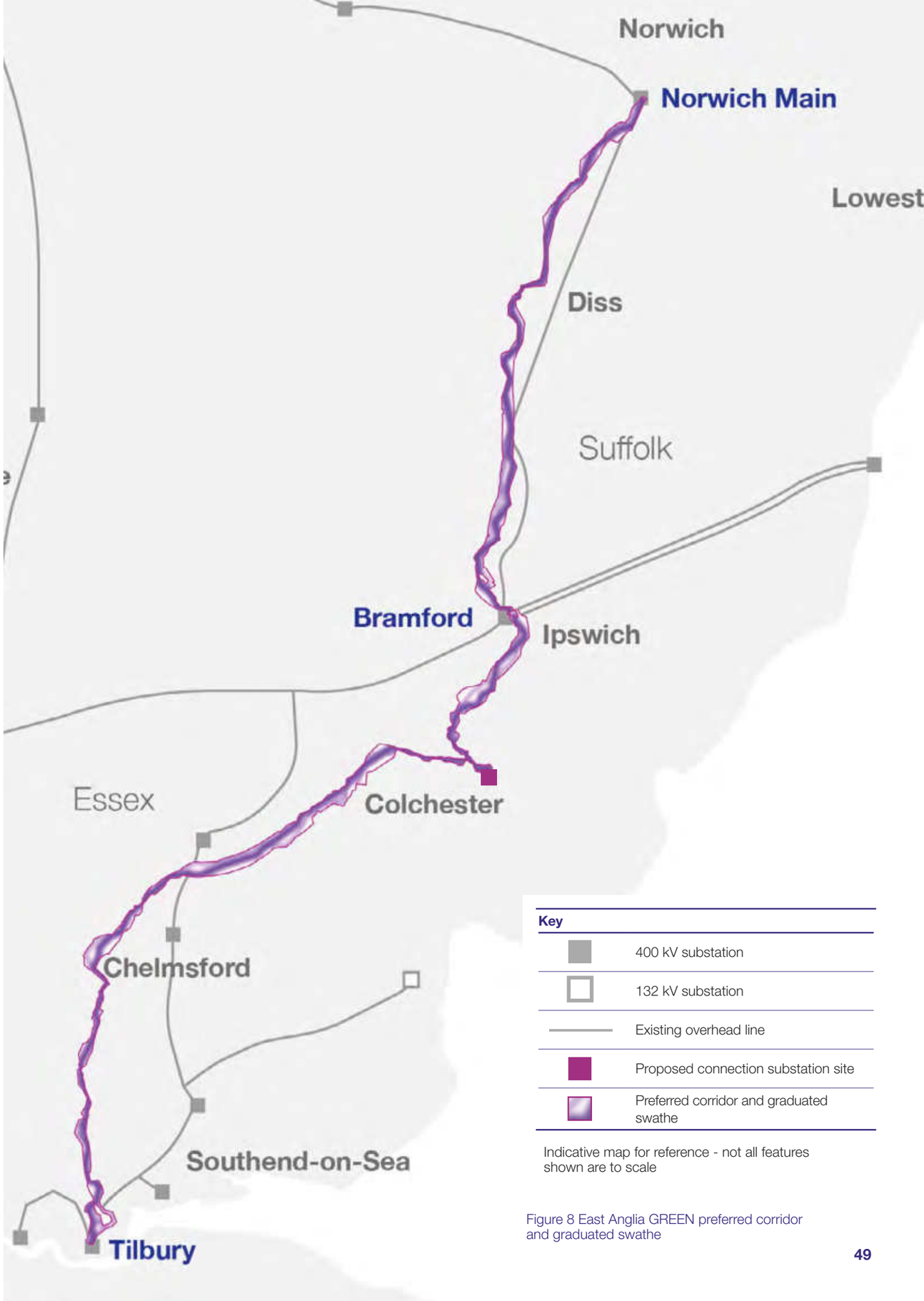


Figure 8 East Anglia GREEN preferred corridor and graduated swathe

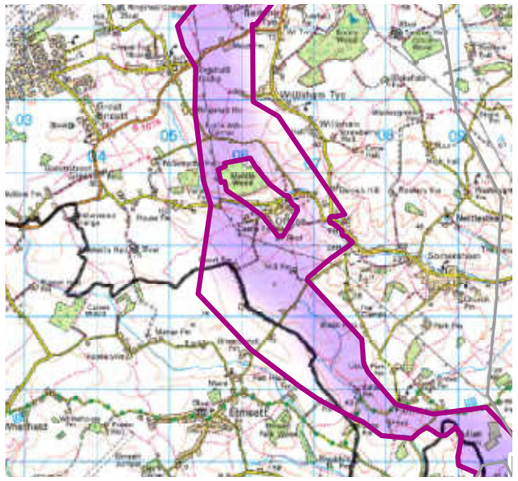
For the majority of the route, we are proposing to build a new overhead line supported by steel lattice pylons.

Steel lattice pylons are the most common pylons that you see in the landscape. The pylons we are proposing are similar to the existing ones between Norwich and Bramford and would be approximately 45-50 m in height.

Where the proposed route corridor crosses the designated AONB, we are proposing to install underground cables.

The graduated swathe

The graduated swathe has been identified considering areas of greatest sensitivity. The darker areas of the swathe show our preferred location for infrastructure based on our studies to date, but the final locations will depend on any potential modifications following feedback from the public and stakeholders to our initial consultation.



To help make our proposals more relevant to local communities we have divided the route by local authority sections. This is to make it easier to identify which section is most relevant to you and provide feedback as required.

South Norfolk
(including Norwich substation)

Mid Suffolk (and Babergh north of substation)
(including Bramford substation)

Babergh, Tendring and Colchester
(including the Dedham Vale AONB and preferred substation site)

Braintree

Chelmsford

Basildon and Brentwood

Thurrock
(including Tilbury substation)

Our proposals in South Norfolk

(including Norwich Main substation)

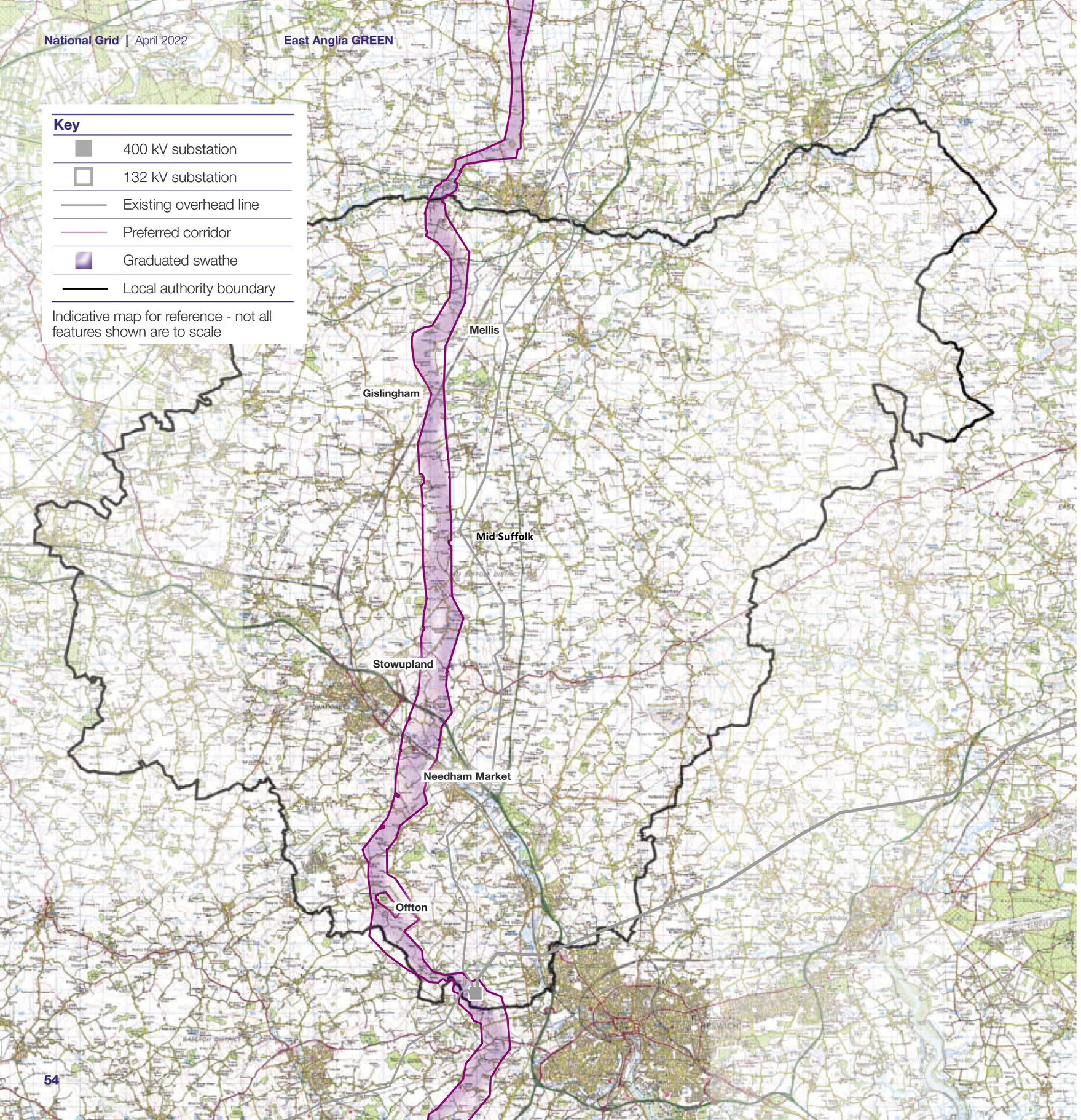
The proposed reinforcement starts with a connection into the Norwich Main substation in Norfolk.

Two new wind farms (Equinor and Hornsea) will be connecting into Norwich Main in the next few years and we will need to extend the substation to enable this. The extension will free up space for the connection of East Anglia GREEN.

We expect to submit plans for the extension for approval through the Town and Country Planning process. We will publish more information when the plans have been developed.

Out of Norwich Main the corridor heads south, running past the villages of Mulbarton, Tacolnecton and Shefanger before routeing to the west of Roydon.

The map identifies a swathe within the broad preferred corridor running broadly south where the new overhead line could be routed. We expect the reinforcement in this section to consist of new overhead line supported by steel lattice pylons.



Our proposals in Mid Suffolk (and Babergh north of substation)

(including Bramford substation)

From the county boundary between South Norfolk and Mid Suffolk, the preferred corridor runs south, passing Mellis and Gislingham and crossing the railway.

The route corridor continues south past Stowupland and Needham Market where it crosses back over the railway before it turns eastwards to connect into Bramford substation.

The graduated swathe splits around Offton and we are considering which route would be most appropriate here.

We expect the reinforcement in this section to be made up of new overhead line supported by steel lattice pylons.

We would need to carry out some work at the Bramford substation to connect the new line into it. We expect the work to be contained within the existing boundary of the substation.

Key

- 400 kV substation
- 132 kV substation
- Existing overhead line
- Proposed connection substation site
- Preferred corridor
- Graduated swathe
- Dedham Vale AONB
- Local authority boundary

Indicative map for reference - not all features shown are to scale

ergh
Washbrook and Copdock
Dedham Vale
East Bergholt
Dedham
Langham
West Bergholt
Marks Tey
Colchester
Tendring

Our proposals in Babergh, Tendring and Colchester

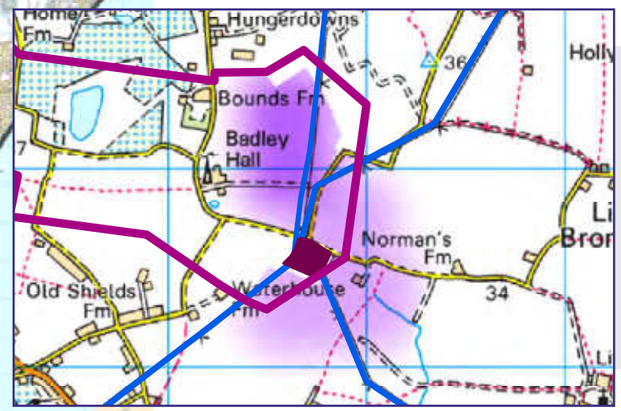
(including the Dedham Vale AONB and preferred substation site)

This section includes the preferred corridor from Bramford substation to the proposed site for the new connection substation, and the preferred corridor from the connection substation towards Tilbury.

From Bramford substation the corridor crosses immediately into the district of Babergh. It runs south easterly past Washbrook and Copdock, and East Bergholt to the south of the route until it crosses the border into the Colchester district briefly, running past Dedham, Langham and crossing the A12.

We expect the reinforcement in this section to consist of new overhead line supported by steel lattice pylons except where the route corridor intersects the Dedham Vale AONB. We expect to install underground cables where we cross this designated landscape.

The route then moves into the Tendring district turning eastwards into Tendring Peninsula to connect into the site of the East Anglia Connection substation (EAC). The route then moves out of the new substation site heading west, crossing back over the A12 to continue the route running past West Bergholt and Marks Tey to the south.



We need to build a new substation in this area to connect two offshore wind farms. We have identified a graduated swathe where we might build the new substation in the vicinity of the existing 132 kV substation to the south of Lawford.

Our proposals in Braintree

After crossing into the Braintree district, the preferred corridor continues south west parallel to the north of the A12 and railway. Passing Witham to the south and Silver End to the north before crossing the railway again heading north and continuing west towards the Chelmsford district.

We expect the reinforcement in this section to be made up of new overhead line supported by steel lattice pylons.

Our proposals in Chelmsford

Having routed into the Chelmsford district in the north east area, the preferred corridor then travels around the north of Chelmsford and begins to head south on the western side, with Writtle and Chelmsford to the east of the corridor. The route continues south passing Margaretting and crossing over the A12 on the Brentwood district border.

We expect the reinforcement in this section to be made up of new overhead line supported by steel lattice pylons.

Our proposals in Basildon Brentwood

Passing Ingatestone on the west the route crosses the A12 and the railway in the north of the Brentwood district. The route then travels directly south crossing multiple times between the Basildon and Brentwood districts. Passing Hutton on the west and Billericay on the east. Continuing to then cross the A127 and railway on the border of the Thurrock district.

We expect the reinforcement in this section to be made up of new overhead line supported by steel lattice pylons.

Our proposals in Thurrock

(including Tilbury substation)

The preferred corridor continues travelling south passing Bulphan on the west and then Hornden on the Hill on the east.

The route crosses the A13 and heads towards Linford and East Tilbury where the corridor then splits around. At this point we are considering which route would be most appropriate here.

We expect the reinforcement in this section to be made up of new overhead line supported by steel lattice pylons.

We would need to carry out some work at Tilbury substation to connect the new line. We expect the work to be contained within the existing boundary of the substation.

Our public consultation

Our commitment to you

As we upgrade the electricity transmission network and develop proposals to allow more energy to flow on our network, we will work with a wide range of stakeholders and experts.

Listening to communities gives us valuable feedback and insight as we develop our proposals and look to minimise any impacts.

Where our plans affect you or your community, we encourage you to let us know your opinions on our proposals.

Your views are important to us and we will carefully consider all feedback we receive. It will help shape our plans as our infrastructure projects develop.

Our approach to public consultation

Certain types of energy infrastructure fall within the classification of NSIPs, which require a DCO under the Planning Act 2008.

For National Grid, NSIPs include new overhead lines. Applications for DCOs are submitted to and examined by the Planning Inspectorate. They are determined by the Secretary of State for Business, Energy and Industrial Strategy (BEIS), not by a local planning authority, who remain an important consultee in the process. The East Anglia GREEN project falls into this category.

Consultation to support our DCO application is planned to take place over two stages this year and next. This first stage of public consultation is being held at an early stage of development to introduce the project and ensure we capture the views and knowledge of local people before developing our plans further.

The aim of this consultation is to:

- introduce and provide an overview of the project to the public
- explain why we need to build the reinforcement
- set out options that have been considered and how we made the decision on the preferred corridor and graduated swathe being proposed
- present and explain our preferred corridor with graduated swathe
- present and explain our preferred substation site
- ensure all stakeholders have the opportunity to provide feedback on our work to date
- outline next steps and programme and how we will further develop our proposals.

We are using a blend of both traditional and digital consultation tools to reach the widest possible audience. Information about our proposals and access to the project team will be equally available both online and offline.

We are committed to engaging with all stakeholders and we recognise that some people have particular needs or may not have access to the internet.

Our consultation has been designed to ensure we understand these different needs and are accessible to everyone. If you or anyone you know has difficulty accessing project information or providing feedback, please contact us using the details on page 75. We want to make our consultation as inclusive as possible, and our community relations team will be pleased to try and help.

Who are we consulting?

Our consultation is open to anyone who may have an interest in our proposals.

We are consulting with residents, communities, landowners, local businesses and interest groups, as well as elected representatives and prescribed consultees, such as the Environment Agency, Natural England and Historic England.

During the consultation we will reach out to hard to reach groups, including younger people, time-constrained people, and those groups identified in discussions with local authorities.

What information is available?

We have published the below materials to provide information on our proposals.

Paper copies of the newsletter and feedback form are available at information points along the route for collection. The locations of these are shown on our project website or you can contact us for this information. The feedback form is also available on our website to complete or download.

We are committed to making project information accessible to all users. If you need any information or documents in an alternative format such as large print, Braille or audio tape or if you would like a paper copy of any of our consultation or technical documents, please get in touch using the contact details on page 75.

Please note there may be a charge for supplying printed copies of technical documents.

Project Background Document	Providing an overview of the project and detailing our proposals and how we are consulting.
Corridor Preliminary Routeing and Substation Siting report	Providing more technical information on the project and the need for the project, the options considered, the routing and siting options assessed and our preferred options.
Overview map and individual route section maps	Showing the location of the preferred route and the graduated swathe.
Newsletter	Summarising details of the project and public consultation.
Feedback form	To gather comments and feedback.
Website nationalgrid.com/east-anglia-green	Hosting all project information, including downloadable versions of all the above documents, FAQs, an online feedback form and interactive map.

What we are asking for feedback on

Throughout this document we have explained the need case for East Anglia GREEN and our approach to routeing and siting. We want to know your views on our approach, our preferred corridor and graduated swathe, and the proposed substation site. Along with any aspects of the routeing and mitigation that you would like to see in relation to our proposals through the AONB.

We are asking for your local knowledge on the most appropriate location within the swathe to route the pylons and associated infrastructure and if there is anything we should consider as we develop our proposals further.

We also want to know about any concerns or questions you might have about our proposals, or any local factors we should consider.

The feedback received through this first consultation stage will inform how we develop East Anglia GREEN.

Consultation events

Throughout the consultation we are holding a series of face to face and online events. This provides the opportunity to present information, and members of the project team will be available to talk through our proposals and answer any questions.

Public information events

Visit one of our face to face public information events being held at the following locations across the proposed route to find out more and speak to experts within the team.

Date and Time	Venue
Thursday 28 April 12-6:30pm	Ingatestone and Fryerning Community Centre, 7 High Street, Ingatestone CM4 9ED
Wednesday 4 May 12-6:30pm	Witham Public Hall, Collingwood Road, Witham CM8 2DY
Saturday 7 May 10am-4pm	West Bergholt Orpen Memorial Hall, 45-57 Lexden Rd, West Bergholt CO6 3BG
Monday 9 May 12-7pm	Chadwell Village Hall, Waterson Road, Chadwell St Mary RM16 4NX
Wednesday 11 May 1-6:30pm	Mulbarton Village Hall, The Common, Mulbarton NR14 8AE
Saturday 14 May 10am-4pm	The Palgrave and District Community Centre, 10 Rose Lane, Palgrave IP22 1AP
Tuesday 17 May 12-7pm	Holton St Mary Village Hall, Holton St Mary, Hadleigh CO7 6NW
Wednesday 18 May 12-7pm	Burstall Village Memorial Hall, Burstall, Ipswich IP8 3DR
Saturday 21 May 1-6pm	Laindon Community Centre, Aston Road, Laindon SS15 6N
Tuesday 24 May 11am-5.30pm	Writtle Village Hall, 18 The Green, Writtle, Chelmsford CM1 3DU
Friday 27 May 1-7pm	Needham Market Community Centre, School Street, Needham Market IP6 8BB
Saturday 28 May 10am-4pm	Lawford Venture, Centre, Bromley Road, Lawford, Manningtree CO11 2JE

Online webinars

Attend an hour online webinar where we will present details of the proposals followed by an open Q&A. We are holding webinars that provide a general overview of the proposals as well as webinars that cover each section of the route in more detail.

One overview webinar will be supported by a BSL interpreter and will be recorded and made available on the project website for those who require it.

Date and Time	Topic
Friday 22 April 2pm	Overview of project
Saturday 23 April 10am	Overview of project
Monday 25 April 7pm	Overview of project
Tuesday 26 April 2pm	Our proposals in the South Norfolk district
Friday 6 May 10am	Our proposals in the Babergh, Tendring and Colchester districts
Tuesday 10 May 2pm	Our proposals in the Chelmsford district
Friday 13 May 10am	Our proposals in the Thurrock district
Thursday 19 May 2pm	Our proposals in the Mid Suffolk districts
Friday 20 May 10am	Our proposals in the Braintree district
Wednesday 25 May 2pm	Our proposals in the Basildon and Brentwood districts
Wednesday 8 June 2pm	Overview of project
Thursday 9 June 7pm	Overview of project

Ask the expert sessions

Members of the public with specific questions can book a ‘one to one’ session with a member of the project team. These can be held via telephone call back or video conferencing session. Please call or email us to book an appointment.

Have your say

How to give feedback

Our consultation runs from 21 April until 16 June 2022.

We want to hear the views of local people. Knowing what matters to you, matters to us, so please find out more about our proposals and provide your feedback.

You can get involved in the consultation and provide feedback in a range of ways:

Online feedback form

The website provides an online feedback form for you to fill in and submit digitally.

Paper feedback forms

These are available to pick up from our public information events and the information points listed on our website. Alternatively, please get in touch with us and we will send one to you.

Please send your completed feedback form to **Freepost EAST ANGLIA GREEN** (no stamp or further address details are required).

Email us

If you prefer to send us your comments via email, you can send them to us at **EastAngliaGREEN@nationalgrid.com**

Send us a letter

You can write to us at **Freepost EAST ANGLIA GREEN** (No stamp or further address details are required).

Call us

Freephone 0800 151 0992
(lines are open Monday to Friday 9:00am – 5:30pm)

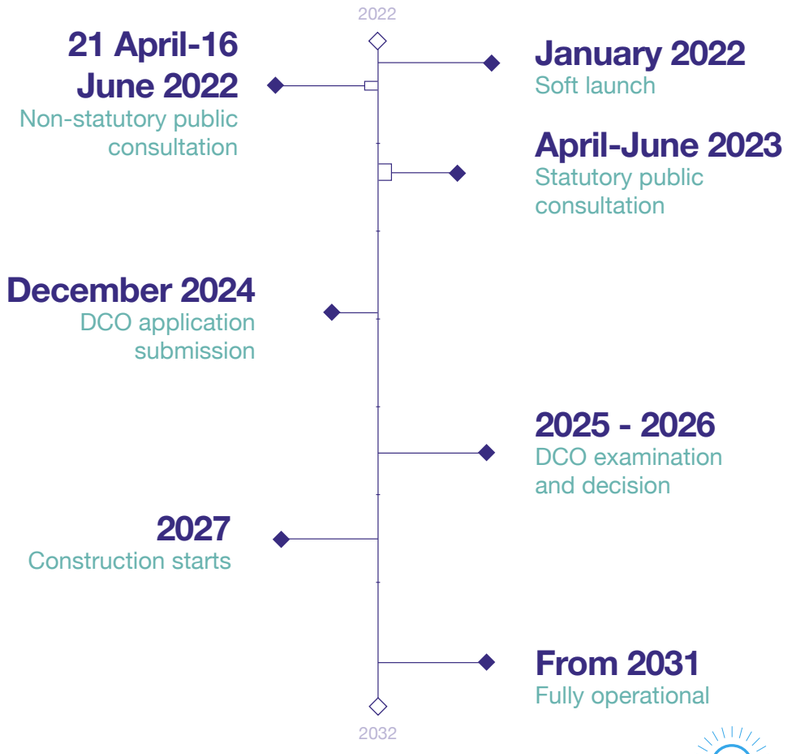
If you would prefer to receive any information relating to the consultation through the post, or you need it in another format, please get in touch.

If you have particular difficulty writing down your feedback, a member of the Community Relations team will be able to take comments over the phone.

Next steps

The feedback received throughout the first stage of consultation will inform how East Anglia GREEN is developed further and will influence the next stage in the design of the project.

Indicative timeline



Over the coming months we will be in discussions with landowners and people with an interest in land which interacts with the project.

We'll also carry out environmental impact assessment work and undertake surveys along the route. We will discuss with local authorities what we need to consider as part of these formal environmental assessments and this will be set out within a scoping document.

The findings of our assessments will be detailed in a Preliminary Environmental Information Report which will be presented at the next stage of consultation.

When the non-statutory consultation closes, we will review all the responses as we continue to develop the designs.

Our next stage of consultation is planned for in 2023, when we will present more detailed proposals and the findings from this consultation. At that point people will be able to see how we have taken their views into account, and provide further feedback on the project, which will help us further refine the project design.

Following further project design, the East Anglia GREEN DCO application, including a Consultation Report to show how we have taken your views into consideration, would be submitted and examined by the Planning Inspectorate who would make a recommendation on the application to the Secretary of State for BEIS. The Secretary of State makes the final decision on a DCO application.

Contact us

Please get in touch if you have any questions on the East Anglia GREEN development.

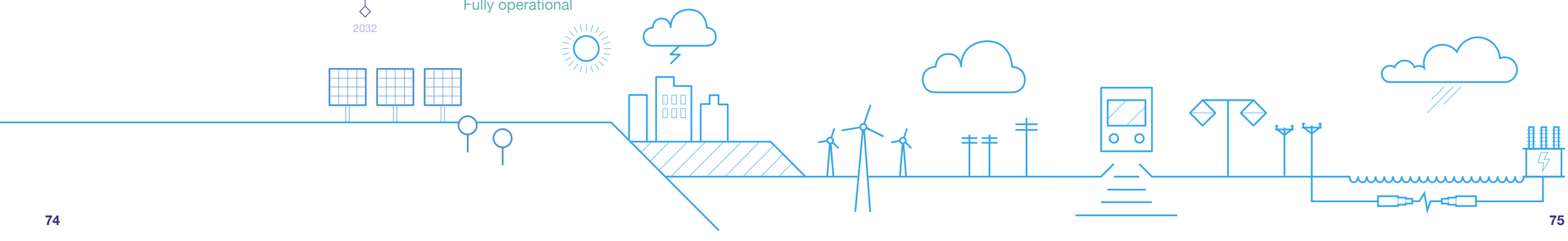
Call our Community Helpline: **0800 151 0992**
(Lines are open Monday to Friday
9:00am – 5:30pm)

Email us: **EastAngliaGREEN@nationalgrid.com**

Write to us: **Freepost EAST ANGLIA GREEN**
(No stamp or further address details are required)

If you feel your land may be affected by these proposals, please contact the East Anglia GREEN Land Team at Fisher German by calling **03450 131 864** or by emailing **EastAngliaGreen@fishergerman.co.uk**.

Alternatively, you can write to East Anglia GREEN Lands Team at Fisher German, The Estate Office, Norman Court, Ivanhoe Business Park, Ashby de la Zouch, LE65 2UZ.



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