



Ardleigh Parish Council
North Falls Off-shore Windfarm Examination
Deadline 1 update

This document summarises the verbal submission made to the Open Floor Hearing on 29 January 2025 and highlights some additional concerns and documents which we would urge the examining authority to take into account when considering the application.

Oral submission.

The thrust of our oral submission was to express concern about the number of proposals impacting Ardleigh – of which North Falls is one- and the difficulty engaging meaningfully with the consultation processes due to their complexity and time required.

Ardleigh is the proposed location of the National Grid East Anglia Connection Node (EACN) which would link the Pylons and cabling from the Norwich to Tilbury project with various substations and interconnectors including the one for North Falls which is the subject of this examination. We consider Ardleigh to be at the epicentre of the proposals.

We are concerned about the cumulative impact of the range of energy infrastructure and the harms which would be caused. In addition, Ardleigh faces cumulative impact from a number of other major schemes including the Tendring Colchester Borders Garden Community, proposed Minerals extraction at new sites in the parish alongside other business and some housing developments.

Our residents tell us that they are experiencing anxiety, fear and powerlessness. It is hard for us to engage without spending (public) money for specialist help and our capacity is limited by the size of our team and other commitments. Most Councillors work full time, and we have fewer than 1 full time equivalent member of staff. This is in contrast to the developers and their teams of specialist staff and lawyers. We are expected to engage with multiple consultations, events, examinations, each with significant volume of documents which are often highly technical. This feels almost impossible for us to do effectively and we feel out of our depth. We are not sure how to best focus our limited resources and capacity.

The oral submission confirmed that Ardleigh PC support the Essex Suffolk Norfolk Pylons campaign which is calling for an integrated offshore grid. Recent publication by NG of a video showing the benefits of more offshore Infrastructure to reduce the impact on communities demonstrates that there must be some work to consider this possibility, and we would strongly support a pause to allow this to be done properly and in good faith. A copy of the video can be found here:

https://players.brightcove.net/2346984621001/SyFryO5sb_default/index.html?videoId=6348824385112

The oral submission also made reference to submissions the previous day including from Aldeburgh Town Council which emphasised the importance of sharing not duplication of infrastructure and of real innovation to enable projects to work together to minimise negative impacts and optimise positive opportunities through projects working together.

There are a lot of different projects happening at once, we ask those involved in putting forward schemes and examining them to be mindful of the impact on us and our neighbours and to take/ encourage steps to minimise impact and harm through collaboration and by identifying creative solutions- including those offshore.

Coordination and integration

The requirement for a more coordinated approach to offshore-onshore transmission is strongly incorporated in the latest National Policy Statements from the Department for Energy Security & Net Zero, which came into force on 17 January 2024 (for example: EN-3 & EN-5). We would draw attention to the 'OCSS Review' report produced as a collaboration between Ardleigh Parish Council and the Essex, Suffolk Norfolk Pylons campaign group following the termination of the Offshore Co-ordination Support Scheme. A key point from this analysis is that viable co-ordination options were not explored and that *'as the benefits of offshore co-ordination and conversely the harms of independently pursuing radial connections, are so clearly recognised it is unacceptable that further options are not being pursued.'*

Our Council and its residents are frustrated that integrated offshore options have never been given full consideration. The more that each distinct radial project progresses, the more money is sunk into each project and the less it seems cost effective to consider alternatives. We would ask that the big picture is considered including the potential for challenges to be made to this piecemeal approach adding further cost and delay to the process.

Harms to Ardleigh and surrounding areas Our recently made Neighbourhood Plan describes Ardleigh *'a small rural Parish which comprises largely of good quality agricultural land, supported by dispersed farmsteads. The main point of settlement is the historic nucleated village of Ardleigh which lies at the heart of the Parish. Other smaller hamlets, including Ardleigh Heath, Burnt Heath and Crockleford Heath intersperse the wider rural area. It is believed that the Parish has been settled in excess of 3000 years'*. (Ardleigh Neighbourhood Plan p15). Most homes currently have a rural outlook and the close connection to agriculture and other rural businesses is a benefit identified our residents.

Other submissions to this and other consultations refer to the potential harm in Ardleigh, for example *'Most of the setting of Ardleigh, to the west, north and east will be permanently negatively significantly affected by these proposals.'* Norwich to Tilbury NSIP Preliminary Environments Impact Report (PEIR) Place Services Single Response Place Services 2024 p 104

The attached 'OCSS review' provides summary information and images, taken from the National Grid interactive map for the Norwich to Tilbury project which show the visual impact on Ardleigh of some of the proposed infrastructure. This will change the views within and towards the Parish for ever and will irreversibly harm important heritage assets.

As stated in 'TDC Local Impact Report : North Falls Development Consent Order' : *"Although screening and mitigation planting is proposed which may reduce the visual effects, it does little to reduce the landscape effects on the site itself and its immediate setting which will be permanently changed from an open productive agricultural landscape to a semi-industrial environment surrounded by trees."*

Some of the harms are summarised as follows

'These include the following:

- i. Harm to heritage assets including numerous listed buildings (including a Grade II* listed church), the conservation area and a scheduled monument site.*
- ii. Harm to businesses – during both construction and operation. One fruit farm business in this section is expecting to close with the loss of 200 jobs if the scheme proceeds.*
- iii. Harm to agriculture – due to loss of productive farmland, noting the extensive use of BMV land in the proposed scheme. This will severely impact the rural economy in the predominantly agricultural communities of Ardleigh and the adjacent Parishes.*
- iv. Harm to nature – huge amounts of unspoilt countryside will be industrialised.*
- v. The circuitous route of the OHL results in numerous breaches of the Holford Rules.*
- vi. The proposed rural location of the proposed EACN substation results in numerous breaches of the Horlock Rules.*
- vii. Large scale visual impact from the OHLs and the proposed substations. This will cause harm throughout the area with visibility also in the adjacent Dedham Vale National Landscape, noting the legal purpose with National Landscapes is 'to conserve and enhance the beauty of the area'.*

- viii. *The plans are also directly in conflict with the recently adopted Neighbourhood Plan for Ardleigh, including for example the associated green spaces.’ (OCSS review, Rev C Feb 2025 p21)*

Further it is notable that North Falls own analysis shows substantial additional environmental harms resulting from an onshore connection relative to an offshore connection:

“Grid Connection Optionality – Worst Case Assessment”: https://www.northfallsoffshore.com/wp-content/uploads/2023/05/004784846-03_Appendix-6.1_Grid-connection-optionality-Worst-case-assessment.pdf

For every Environmental Impact Assessment topic listed in this report, the worst case arose from the onshore connection option

Local Impact Assessment (LIA)

We have seen a draft of the LIA prepared by Tendring District Council and would support its findings. In particular, we would emphasise and add the following local impacts for Ardleigh.

Impact Report:

Health, Socio-Economic & Business impacts

- Any employment opportunities from the scheme need to be weighed against the loss of >300 jobs as a consequence of the various schemes making up the EACN. These jobs comprise of ~200 at Peake Fruit, 60-70 at Elm Park brain injury centre, plus Skylark, Ardleigh Caravan & Camping Park and others.

Reconsideration of cable route

- The location of the substation and cabling routes are incompatible with the ongoing viability of Peake Fruit farm. Without amendments to the plan the scheme could face a multi-million pound compensation claim from that business entity

Community Benefit

- Our Council do not feel we could secure community consent for any NSIP in the absence of formal compensation to homeowner and business owners for loss of property and business value. The parish is not affluent and accrued house price value is a key source of savings and retirement income for a large number of Ardleigh’s aging population. Residents are already reporting falling house prices some have been unable to sell their homes.

Appendix 1 (referring to TDC Local Plan):

- Policy HP1: In Ardleigh we would seek a Health Impact Assessment (HIA) for residents in proximity to the substation, in particular the brain Injury residents of Elm Park care home. Also for employees of Peake Fruit and any other outdoor workers who might be impacted
- HP3: the substation will actively undermine existing green infrastructure as opposed to enhance it
- HP4 Important visual amenities will be lost or irreversibly harmed including the fishing lake on Peake Fruit site and associated holiday cottages
- PPL5: The irrigation lake at Peake Fruit will be irreparably harmed by the proposed substation and drainage and flood risk have not been properly evaluated
- PPL7: See also OCSS review attached and for potential damage to Heritage assets and potential loss of Archaeological sites (Roman road etc)

*Ardleigh Parish Council
18 February 2025*



OCSS Review

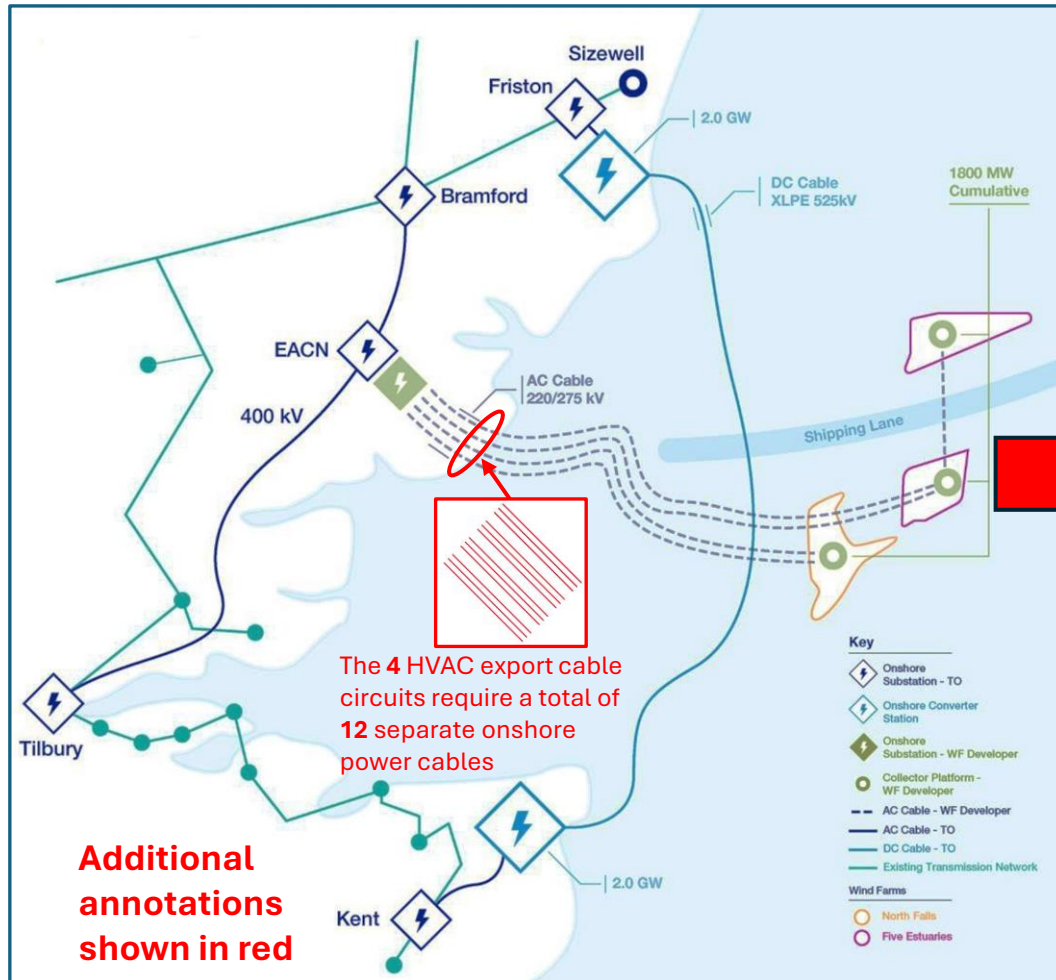
Executive Summary (1/3)

- This report was produced as a collaboration between Ardleigh Parish Council and the Essex, Suffolk, Norfolk, Pylons campaign group to discuss the termination of the Offshore Coordination Support Scheme (OCSS), as announced by the Department for Energy Security and Net Zero (DESNZ) on 3 September 2024.
- The OCSS funding award was announced in December 2023 and the high-level feasibility study report issued to DESNZ in April 2024. The scheme was then silent until the DESNZ announcement in September 2024.
- The limited exercise resulted in only a small fraction of the originally assigned funds being utilised. In addition, by restricting the offshore coordination between Five Estuaries and North Falls to a connection with Sea Link, unresolvable technical constraints applied from the outset. Also, through a combination of technology choice and changes to landfall location other viable coordination options are available which would greatly reduce the overall harm resulting from the proposals.
- The huge benefits of offshore coordination and integration relative to the radial connections that have been used in the past are widely recognised. The requirement for a more coordinated approach to offshore-onshore transmission is strongly incorporated in the latest National Policy Statements from the Department for Energy Security & Net Zero, which came into force on 17 January 2024.

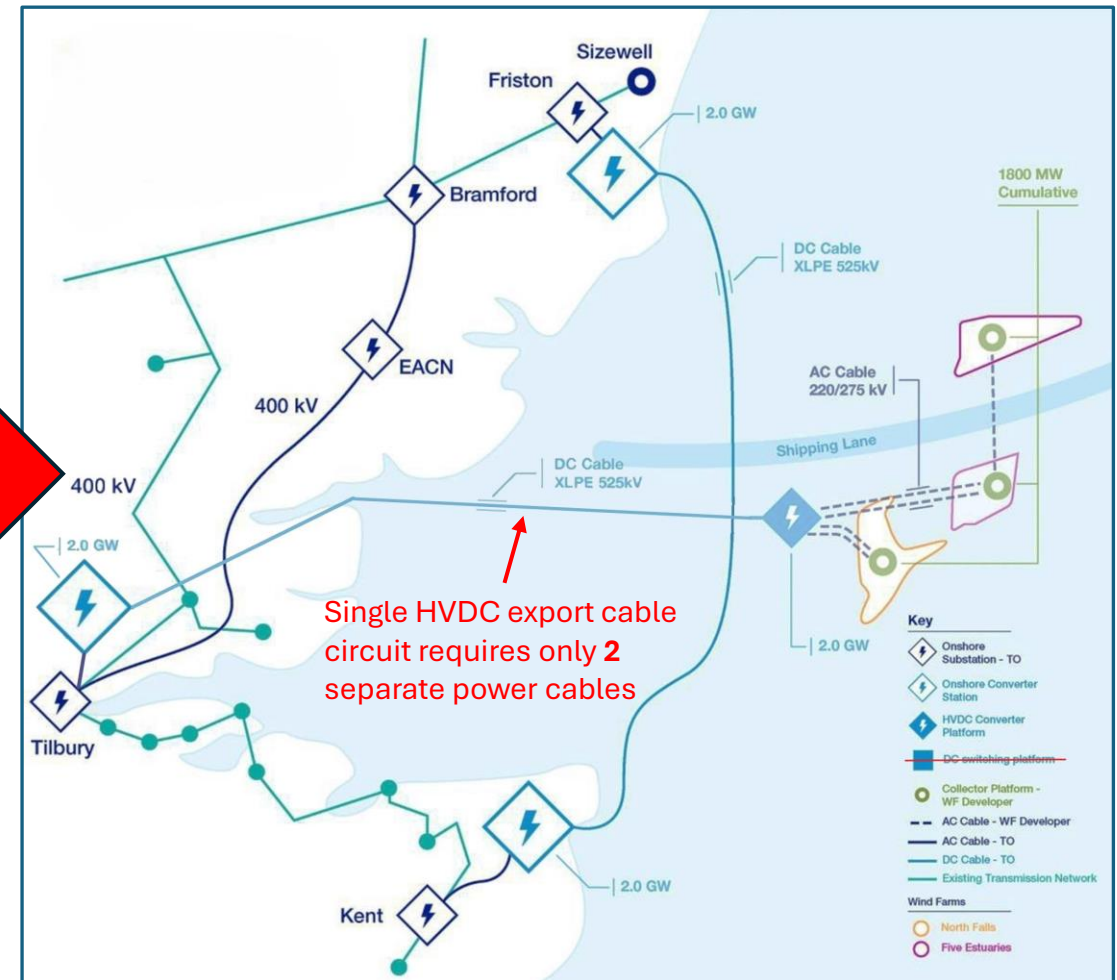
Executive Summary (2/3)

- The response of the Five Estuaries project to the OCSS announcement was conveyed to Ardsleigh Parish Council at a meeting held on 7 October 2024, where it was confirmed that the project would not be exploring further options for offshore coordination. As it currently stands the consequence of this is that Five Estuaries and North Falls are intending to default to radial connections, with the severe additional harms that this entails.
- In this report the options reviewed in the OCSS are discussed. In addition, a further offshore coordination option is presented which is not reliant on Sea Link. This builds on the OCSS work and is included as an example to illustrate that other viable coordination options are available which would greatly reduce the overall harm. The building blocks required for this option are currently being employed as the new standard for such infrastructure in Europe. The transmission capacity of these systems matches the OCSS requirement, and implementation is proceeding in the same timeframe as the Five Estuaries and North Falls projects.
- In the next slide the default radial connection is denoted as “OCSS Baseline” and the further offshore coordination option devised is denoted as “OCSS Alternative Solution”. Details are provided in the report.

OCSS Baseline



OCSS Alternative Solution



Executive Summary (3/3)

- The report also discusses the interaction between the Five Estuaries and North Falls projects and the NGET Norwich to Tilbury proposal.
- The reduction in the Norwich to Tilbury capacity requirement that would result from an alternative windfarm connection point illustrates the potential for further benefits from the proposed alternative. It would also lead to improved resilience. This further reinforces widely acknowledged views on the benefits that can be achieved through integration.
- In brief, this report concludes that:
 - I. the OCCS scheme ended prematurely
 - II. it was too restricted in scope
 - III. viable coordination options were not explored
- It is not acceptable for the Five Estuaries and North Falls projects to simply default to very harmful radial connections.

OCSS

- On 3 September 2024 the Minister for Energy, Michael Shanks MP, announced the decision to not continue funding for an offshore network coordination proposal in East Anglia, as part of the Offshore Coordination Support Scheme (OCSS).
- The proposal involved coordination between three projects: North Falls Windfarm (NF), Five Estuaries Windfarm (VE) and National Grid Sea Link (SL).
- The aim of the OCSS was to “*encourage advanced offshore energy projects to develop coordinated options for offshore transmission*” and “*learn lessons to inform future projects*”.
- At a meeting held in Ardreigh on 7 October 2024, VE informed representatives from Ardreigh and other parish councils located in the vicinity of the proposed windfarm substation sites that, following the termination of the OCSS, the VE project was not considering any other options for offshore coordination.
- The stark consequence of this is the VE and NF projects both defaulting to the very harmful option of radial onshore connections.

Benefits of Offshore Coordination

- The benefits of offshore coordination relative to individual radial connections are well known.
- A key study by ESO (now NESO) from 2020 demonstrated benefits in a wide range of areas. The benefits were particularly marked in relation to environmental impacts, social & local impacts and cost. <https://www.neso.energy/document/182936/download>
- The requirement for a more coordinated approach to offshore-onshore transmission is strongly incorporated in the latest National Policy Statements from the Department for Energy Security & Net Zero, which came into force on 17 January 2024.
- For example, in paragraph 2.8.35 of National Policy Statement for Renewable Energy Infrastructure (EN-3) the following is stated: *“The previous standard approach to offshore-onshore connection involved a radial connection between single wind farm projects and the shore. A coordinated approach will involve the connection of multiple, spatially close, offshore wind farms and other offshore infrastructure, wherever possible, as relevant to onshore networks.”*
- The intent in the latest National Policy Statements is clearly to steer developers away from pursuing individual radial connections and there are a multitude of very good reasons for this.

Harms

- The substantial additional environmental harms resulting from an onshore connection are outlined by NF in its “Grid Connection Optionality – Worst Case Assessment” report. https://www.northfallsoffshore.com/wp-content/uploads/2023/05/004784846-03_Appendix-6.1_Grid-connection-optionality-Worst-case-assessment.pdf
- For every Environmental Impact Assessment topic listed, the worst case arose from the onshore connection option.
- Due to the similarities in cable routing and substation location, it is reasonable to assume that very similar conclusions would be drawn for the VE project.
- These harms are greatly exacerbated by the intended colocation of the associated substations in the vicinity of the proposed NGET EACN substation.
- This would lead to the cumulative impact of four potential projects: the NGET EACN substation, the VE substation, the NF substation and the Tarchon interconnector substation (the exact location of which is still to be defined).
- The siting of the projects in this location would result in functional interdependence. They cannot function without each other.

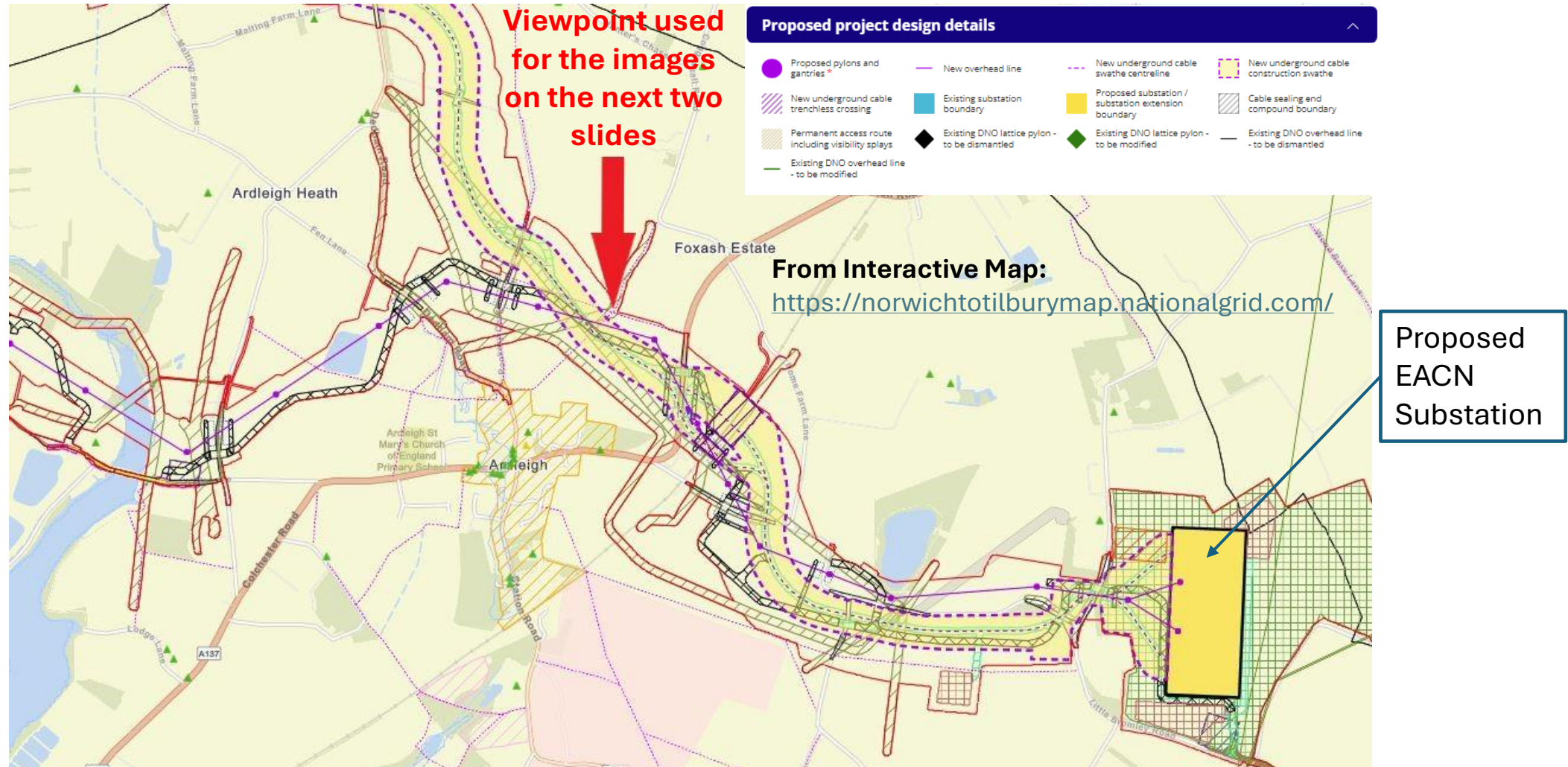
Harms

- The already referenced NF “Grid Connection Optionality – Worst Case Assessment” report outlines the harms that would result from the current default onshore connection due to the impact of the windfarm export cables (both onshore and offshore) and other onshore infrastructure such as the large substations.
- The proposal to locate all the proposed substations in an area of unspoilt countryside, as opposed to brown field sites, will greatly increase the harm caused by the radial connections.
- The nominated grid connection point, and hence location for the proposed onshore VE and NF substations is at the proposed EACN substation site in Ardleigh.
- The EACN substation is part of NGET’s Norwich to Tilbury proposals and was conceived to serve the VE and NF windfarms.
- To provide this connection involves a major diversion to the Norwich to Tilbury route and entails the associated grid infrastructure (overhead lines and underground cables) being wrapped closely around the historic centre of the village of Ardleigh.

Harms

- The following three slides show part of NGET's current proposals for the Norwich to Tilbury project in Ardleigh.
- The first slide shows the location of the proposed EACN substation and the route of the associated grid infrastructure (overhead lines and underground cables) around the village centre. The image was obtained from the Norwich to Tilbury Interactive Map. This slide also shows the viewpoint used for the two subsequent visualisation slides.
- The two visualisations were produced by NGET during the statutory consultation stage. Models of the proposed OHLs have been superimposed on a representation of the existing landscape around the village of Ardleigh. These have then been annotated to show the location of some the heritage assets that would be harmed by the proposed development due to the OHLs encircling the village centre.

NGET Norwich to Tilbury Proposed Infrastructure



NGET proposal for new overhead lines to wrap around the village of Ardleigh: *View to the South East*

Disclaimer: [Click here to view our full disclaimer.](#)

Proposed location
of NGET EACN
Substation

Scheduled Monument
(1002146)

Conservation Area (CA26)

**In this section it is also proposed
by NGET that 18 underground
HVAC cables closely follow the
proposed OHL route shown to
the proposed EACN Substation**

Toggles ⓘ

Season



Elevation



< Return to map

NGET proposal for new overhead lines to wrap around the village of Ardleigh: *View to the West*

Disclaimer: [Click here to view our full disclaimer.](#)

Conservation Area (CA26)

Grade II* listed St. Mary's
Church, Ardleigh (1112060)

Toggles 

Season 

Elevation 

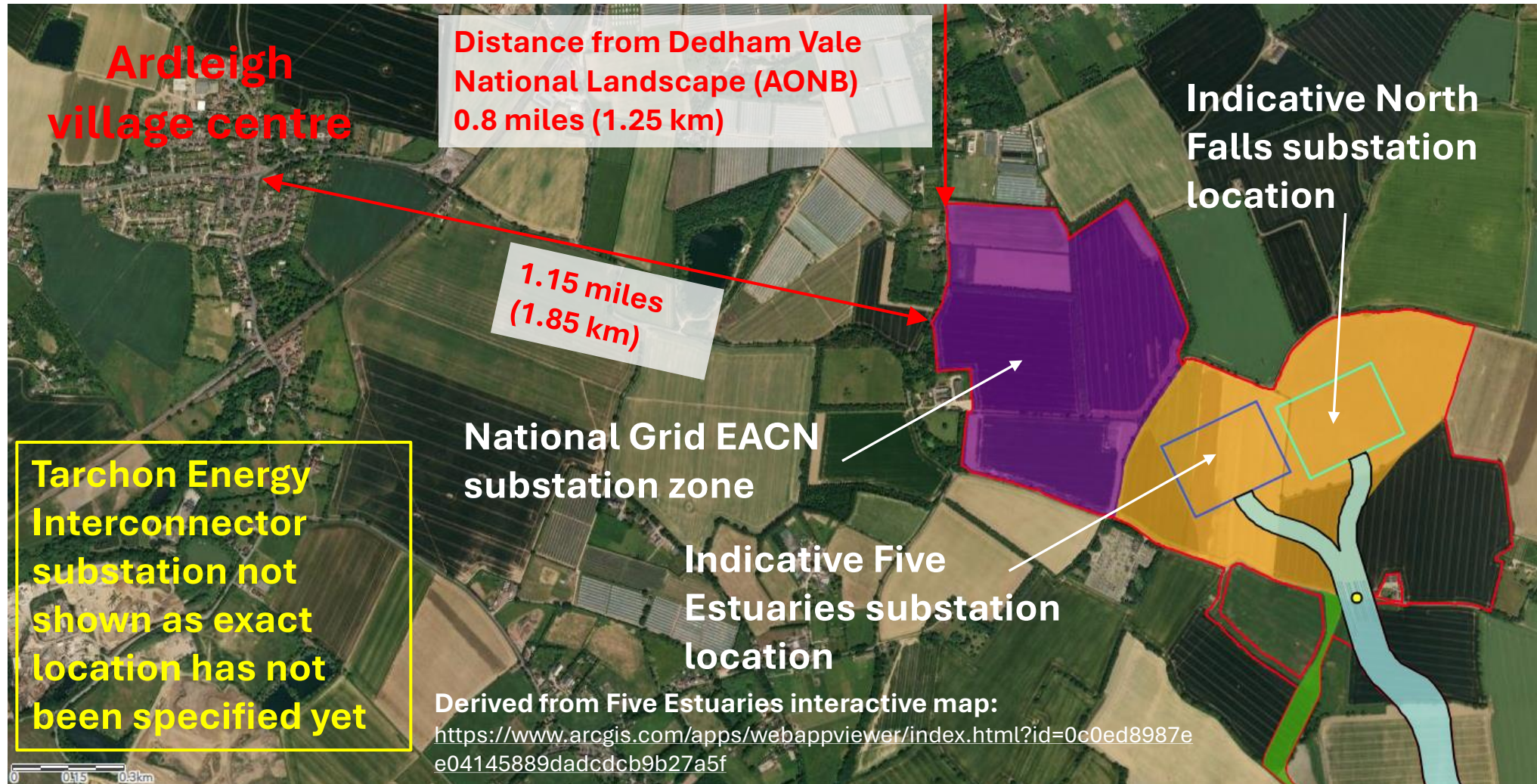
[Return to map](#)



Harms

- The following slide shows the proposed location of the windfarm substation sites in relation to the proposed NGET EACN site, as indicated earlier on the map section from the NGET Norwich to Tilbury proposal.
- This is followed by a slide to illustrate the scale of the proposed substations relative to established landscape features.

Proposed Substation Sites



Substation Land Area

- Each of the onshore windfarm substations has a total land requirement to the perimeter fence of 58,800 square metres (5.9Ha or 14.5Acres), as well as “*additional land required for the TCC, roads, drainage and cut/fill*”. <https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010115/EN010115-000470-6.1.1%20Onshore%20Project%20Description%20Revision%20B.pdf>
- The white square overlaid in the image to the right illustrates how 58,800 square metres, compares with the Stane Retail Park site in Colchester.
- As can be seen, the land area of **each** of the substations is roughly equivalent to that of the whole of the retail park site (which includes a B&Q warehouse, a M&S superstore and other stores plus a carpark etc.).
- The current proposal is that two windfarm substations of this size are built on BMV farmland in unspoilt countryside.
- No details are available yet, but a third substation for the Tarchon interconnector is also proposed to be built adjacent to these. This will require a large AC/DC converter.



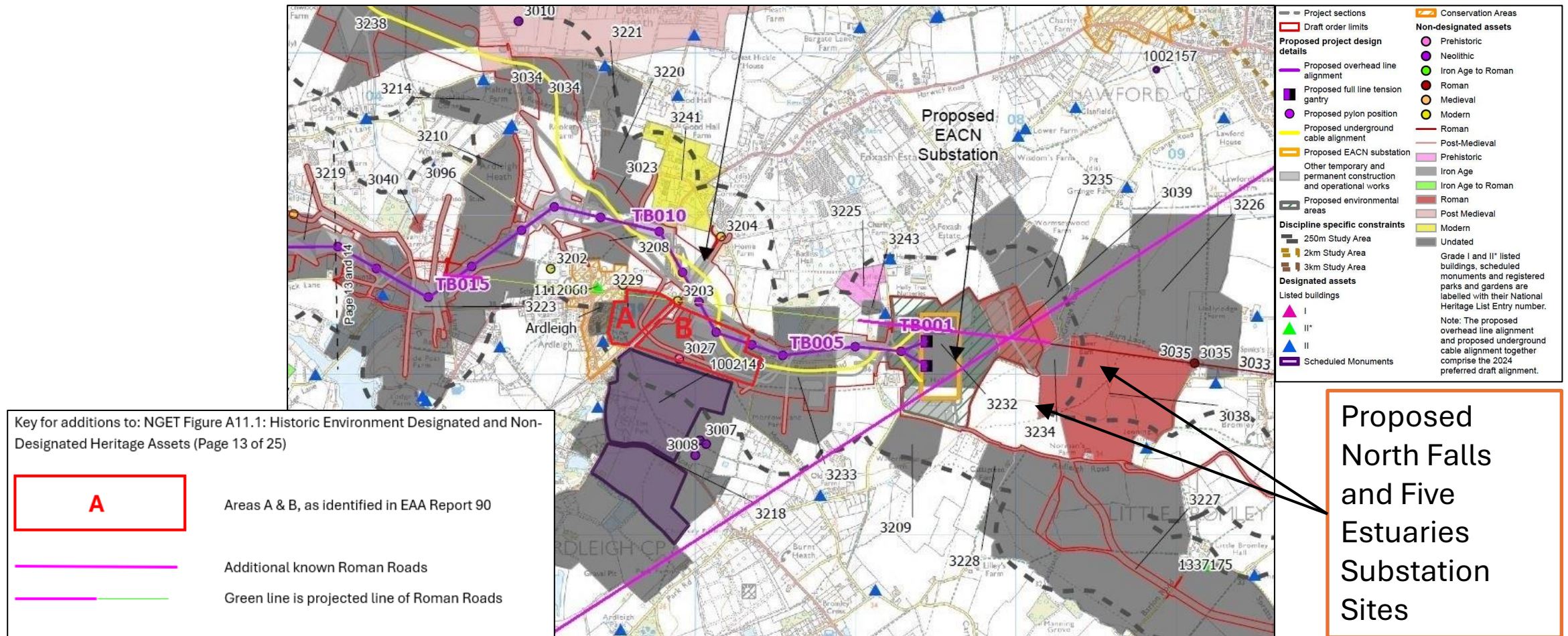
Harms

- With the currently proposed onshore substation locations for the FE and NF windfarms, the Tarchon Interconnector and National Grid's (NGET) Norwich to Tilbury EACN the projects are functionally interdependent. This would result in substantial cumulative harm. Many of these harms are irreversible.
- The harms are detailed in consultation submissions from Ardleigh Parish Council.
<https://ardleigh.website/pylons-and-substations>
- These include the following:
 - i. Harm to heritage assets including numerous listed buildings (including a Grade II* listed church), the conservation area and a scheduled monument site.
 - ii. Harm to businesses – during both construction and operation. One fruit farm business in this section is expecting to close with the loss of 200 jobs if the scheme proceeds.
 - iii. Harm to agriculture – due to loss of productive farmland, noting the extensive use of BMV land in the proposed scheme. This will severely impact the rural economy in the predominantly agricultural communities of Ardleigh and the adjacent Parishes.
 - iv. Harm to nature – huge amounts of unspoilt countryside will be industrialised.
 - v. The circuitous route of the OHL results in numerous breaches of the Holford Rules.
 - vi. The proposed rural location of the proposed EACN substation results in numerous breaches of the Horlock Rules.
 - vii. Large scale visual impact from the OHLs and the proposed substations. This will cause harm throughout the area with visibility also in the adjacent Dedham Vale National Landscape.
 - viii. The plans are also directly in conflict with the recently adopted Neighbourhood Plan for Ardleigh, including for example the associated green spaces.

Harms: Heritage Assets

- Ardleigh has a very rich historical and archaeological character. It is believed that the Parish has been continuously settled for more than 3000 years and therefore since Neolithic times.
- Within the parish there are 71 listed buildings (69 Grade II and 2 Grade II*) and many other heritage assets. 47 of the listed buildings are located within 1km (0.6 miles) of the proposed Norwich to Tilbury infrastructure. Many of these are a risk of harm, along with many other heritage assets including a Scheduled Monument.
- The current proposals would also cause direct and irreversible harm to non-designated heritage assets of archaeological interest that are of equivalent significance to the adjacent to the Scheduled Monument. In accordance with Overarching National Policy Statement for energy (EN-1) these are afforded the same protection as a Scheduled Monument. These are referenced as “Areas A & B” in this document.
- The following slide provides an illustration of how extensively heritage assets are at risk. The map was produced by NGET, but further details have been added. It can be seen that the routes of two Roman Roads intersect the proposed EACN substation site. Please note that a very limited number of the listed buildings are shown, as the majority had not been included in the NGET study. These and other heritage assets that are not included in the NGET consultation documents are detailed in the Norwich to Tilbury Historic Environment submission produced by Ardleigh Parish Council, along with detailed information on the harm that would result.

Heritage Assets at Risk Due to Proposed Substations



OCSS Options

- As the benefits of offshore coordination, and conversely the harms of independently pursuing radial connections, are so clearly recognised it is unacceptable that further options are not being pursued.
- It is clear from the research previously outlined that the direction of travel should be towards an integrated offshore grid. As an absolute minimum though the number of cables laid radially onshore and offshore should be minimised and this can be assisted greatly with the widely recognised benefits that HVDC technology brings. Recent proposals in the UK utilising HVDC technology include Eastern Green Link 2 and Celtic Sea .

OCSS Options

- In the next section a potential option for offshore coordination is explored, which builds on the existing OCSS work.
- This is considered to be one of many potential solutions, but this alone illustrates some of the huge benefits available. The scope here has been limited to the connection of VE and NF, as per the OCSS, but it could form a starting point for an integrated offshore grid thereby forming a far more future proof solution.
- All the illustrations used have been derived from the Arup OCSS report (<https://www.nationalgrid.com/document/152786/download>). These have been annotated as necessary in this document.
- The OCSS Baseline and the two options considered in the existing OCSS work are discussed in the next two slides

- In the current HVAC based proposal, a total of 4 export cable circuits are required for North Falls and Five Estuaries.
- As the 3 phases of the AC circuits each require a separate power cable, a total of 12 power cables are needed with the current proposal.
- The result is 4 x 3 core offshore export cables* and 12 separate onshore export power cables (each in their own cable duct), as denoted by the annotations added to the figure on the right.

The 4 HVAC export cable circuits require a total of 12 separate onshore power cables

1800 MW Cumulative

Key

- Onshore Substation - TO
- Onshore Converter Station
- Onshore Substation - WF Developer
- Collector Platform - WF Developer
- AC Cable - WF Developer
- AC Cable - TO
- DC Cable - TO
- Existing Transmission Network

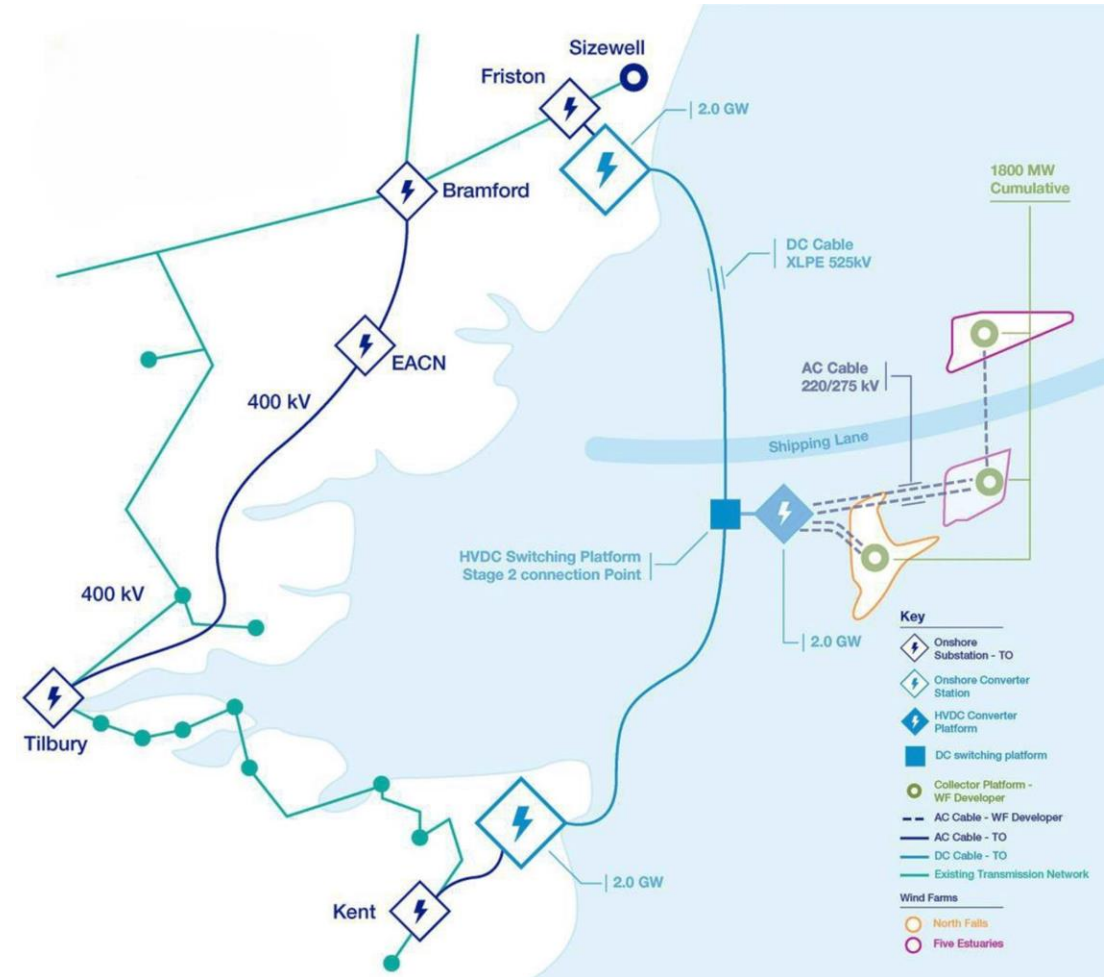
Wind Farms

- North Falls
- Five Estuaries

Additional annotations shown in red.

OCSS Options 1 & 2

- In both the existing OCSS options conversion to HVDC is required to enable connection to Sea Link. This is achieved using a 2GW Offshore Converter Platform
- OCSS Option 1 involved the use of an Omega Loop to enable connection into the proposed Sea Link project.
- In OCSS Option 2, shown here, connection into Sea Link is achieved via a HVDC Switching Platform.

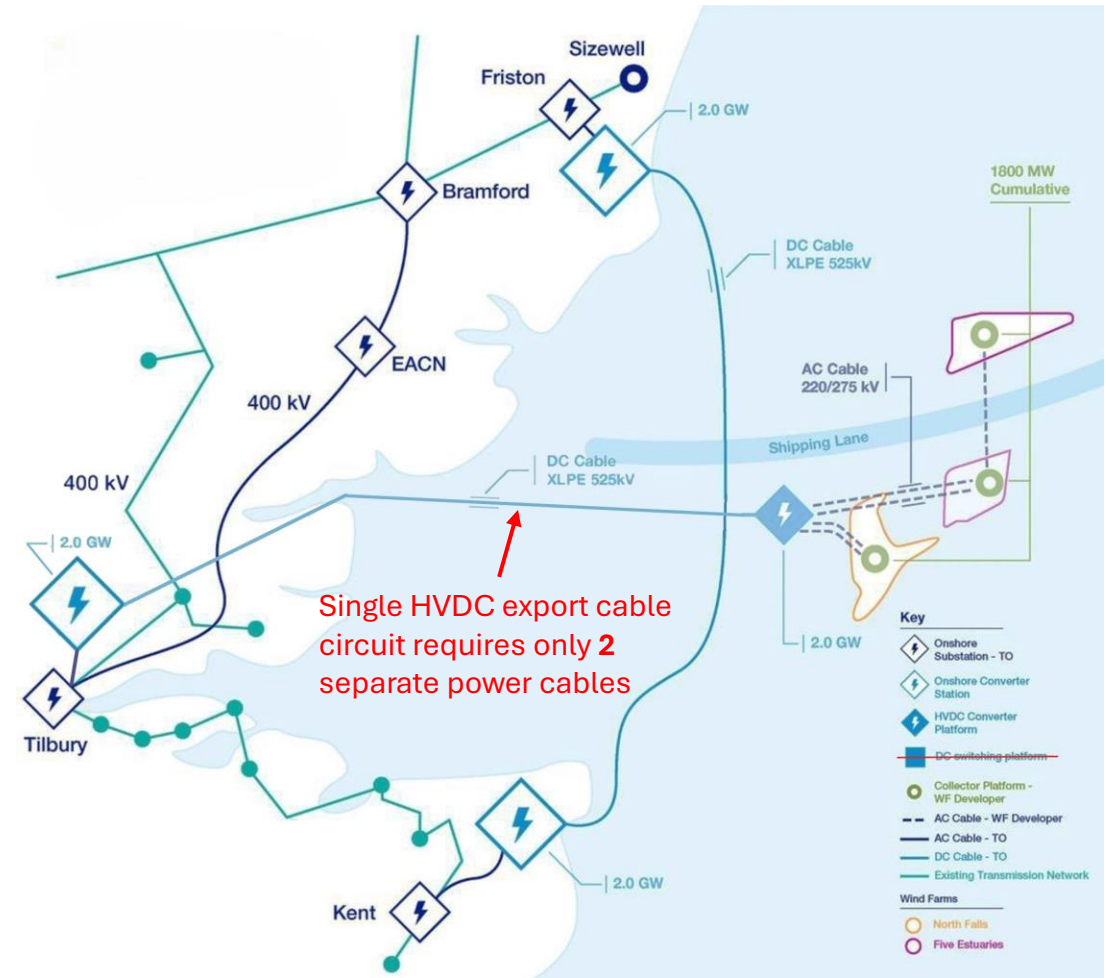


OCSS Alternative Solution

- The proposal for an alternative OCSS solution involves a 2GW offshore HVDC converter station located within the NF array area, as per the two options explored as part of the OCSS. However, instead of connecting to SL, a dedicated 2GW HVDC cable system would be used to deliver the combined power from VE and NF to the grid using brownfield sites where possible.
- The suggestion here is that the cable makes landfall at Bradwell-on-Sea but then continues underground to Tilbury as HVDC, where conversion to HVAC takes place at a brownfield site. This would provide a connection to the grid at the destination of the NGET Norwich to Tilbury project so that the power is delivered to where it is needed. It therefore avoids the need for a converter station on a greenfield site or on a protected coastline.
- Only one HVDC cable pair would be required to deliver the export power specified for the OCSS scheme, due to the significant capacity advantages over HVAC. This would result in a dramatic reduction in the number of windfarm export cables required and therefore a corresponding reduction in the harm caused both onshore and offshore.
- As per the OCSS it removes the need for VE and NF to each have a separate substation. The HVDC solution suggested here would instead involve just one converter station serving both windfarms and this would be located on a brownfield site at Tilbury.
- The proposal is illustrated in the next slide.

OCSS Alternative Solution

- Huge reduction in the number of onshore & offshore export cables, substantially reducing harm.
- 2 x single core HVDC cables (onshore & offshore) instead of 4 x 3 core offshore export cables & 12 x single core onshore export cables in the current HVAC Baseline proposal.
- Utilises the 2GW Offshore Converter Platform proposed as part of the OCSS.
- 1 x onshore substation instead of 2 (one for VE and one for NF) in the current HVAC baseline proposal. Substation will though need to be a HVDC converter.
- Uses brownfield site for substation instead of greenfield.
- Connects to the grid at Tilbury where the power is needed.



OCSS Alternative Solution

- The increased cable lengths relative to the OCSS Baseline would be greatly offset by the reduction in the number of cables.
- Connecting directly at Tilbury would also build in greater resilience as with a direct HVDC link it would remove the reliance on the overhead lines proposed for Norwich to Tilbury to transmit the power from the windfarms to Tilbury.
- This also removes the potential need for extra infrastructure in the current scheme to allow for power flow in a northerly direction should a fault condition develop in the OHL south of the windfarm connection point on the Norwich to Tilbury circuit.
- A variant of this option could be an entirely offshore solution by routing the offshore HVDC cable directly from the proposed offshore HVDC converter located in the NF array to Tilbury.
- Alternatively, the HVDC export cable pair from the windfarms could connect into an Offshore Hybrid Asset and the power brought ashore using one of the planned interconnectors, such as Tarchon, with the proviso that the landfall point and substation were in suitable locations.

OCSS Alternative Solution: Consenting Risk

- The reduction in harm resulting from the reduction in the number of cables and the need for just one converter station located on a brownfield site to serve both windfarms is likely to greatly increase community support, noting the huge unpopularity of the current Norwich to Tilbury related proposals.
- Consent is also likely to be much easier to obtain for HVDC underground cables. In addition to the greatly reduced cable requirement, HVDC also has the inherent benefit of allowing less separation between the cables than HVAC and this therefore results in further reductions in the space needed for trenching. An informative video produced by TenneT shows laying of underground HVDC cables of the type needed to provide the 2GW capacity discussed in this proposal: <https://www.youtube.com/watch?v=FjPFpJnOUrg>

OCSS Alternative Solution: Consenting Risk

- It is also noted that redundant HVAC OHLs currently exist between Bradwell and Tilbury. Local sentiment could potentially be enhanced by removing these assets as part of the underground cabling project. It might even be possible to use some redundant infrastructure from the Bradwell power station by, for example, routing the new cables via the now disused cooling water intake tunnels to minimise environmental harm.
- It is interesting to note that the combined output of VE & NF windfarms that would be brought ashore at Bradwell with this scheme would be greatly in excess of the now decommissioned Bradwell nuclear power station. It would in fact be approximately equal to the output of the now stalled Bradwell B proposal. This would be achieved without requiring a substation in Bradwell. It would only require a pair of 2GW HVDC underground cables to pass through the area.

OCSS Alternative Solution: Consenting Risk

- As VE and NF have been pursuing an offshore connection in parallel with the onshore connection, work has already been carried out to mitigate the risk of consenting delays if an offshore connection is pursued.
- In the VE “Offshore Wind Farm Offshore Connection Scenario” the following is stated: *“In circumstances where there is a viable and available coordinated offshore connection VE have considered how consenting could be approached making the most use of the information in this current application, including all of the environmental assessment undertaken in support of the application”*
<https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010115/EN010115-000430-9.29%20Offshore%20Connection%20Scenario.pdf>
- In relation to NF, according to the independent OCSS report from Arup *“it is understood that North Falls has allowed for an offshore HVDC platform in their DCO”*. This would serve both VE and NF in the proposed alternative solution.

OCSS Alternative Solution: HVDC Technology

- The 1.8GW combined output from VE and NF assumed for the OCSS falls within the HVDC “*2GW Program*” as standardised for offshore grid connection systems in Europe. This is therefore important for the HVDC elements in the proposed OCSS Alternative Solution.
- TenneT for example claims it will “*build at least 13 high-voltage direct current (HVDC) offshore grid connection systems with a transmission capacity of 2 gigawatt (GW) each in the Dutch and German North Sea by 2031*” <https://www.tennet.eu/about-tennet/innovations/2gw-program>
- The application described by TenneT corresponds exactly with the “OCSS Alternative Solution” proposed here: using a 2GW HVDC offshore converter platform to pool windfarm output resulting in a huge reduction in the number of export cables. In addition, this is being delivered in timeframes consistent with the VE and NF project requirements.
- The solution chosen by NESO in its “*Celtic Sea Final Design Recommendation*” announced in August 2024 involved a HVDC link from one of the windfarms to shore, which therefore further demonstrates viability. The four criteria of: economic and efficient, deliverability and operability, environmental impact and impact on local communities were used to assess the different design options.

OCSS Alternative Solution: Connection Point

- A barrier that has been raised in the past to any change in the plans is that the connection point that has been offered to both VE & NF is the proposed NGET East Anglia Connection Node (EACN) Substation. However, by definition, the Norwich to Tilbury project results in a connection point at Tilbury, as required for this alternative proposal.
- Furthermore, as the VE connection point was originally at Friston it shows that changes can be made.
- It is also noted from the NESO TEC Register dated 25-10-2024 that the connection site for the Five Estuaries Offshore Wind Farm is stated as “*Five Estuaries 220/66 kV Offshore Substation*” and for the North Falls Offshore Wind Farm it is stated as “*North Falls Offshore Platform Substation*”. This therefore already indicates offshore connections for both windfarms, perhaps as a result of the OCSS work.

OCSS Alternative Solution: Connection Point

- The approval of the Norwich to Tilbury DCO is currently a key dependency in the project plans for both windfarms.
- A key point from the NESO “Clean Power 2030” report issued on 5 November 2024 is that it indicates that the criticality of getting Norwich to Tilbury built quickly is down to connecting the North Falls and Five Estuaries windfarms and the Tarchon Interconnector.
- This is outlined in pages 8 & 9 of Annex 2 of the Clean Power 2030 documents: <https://www.neso.energy/document/346796/download>
- Completely removing the dependency on Norwich to Tilbury, as proposed in this report, and connecting North Falls and Five Estuaries directly to the grid at Tilbury would therefore help greatly in achieving the Clean Power 2030 targets.

OCSS Limitations

- The OCSS work ended prematurely, and it appears that very little of the proposed funding was used.
- It was stated that “*the project will receive an initial sum of up to £1.7 million funding, with potential for up to £11.7 million of further funding in financial year 2024/2025*”. The OCSS project was announced on 5 December 2023 and the associated Arup report is dated April 2024 (although public release and the announcement on termination of the scheme did not occur until September 2024). The total pot of funding available was £100 million. It appears though that just £1.7 million was spent, as it didn’t progress beyond the first phase.
- As “*the coordination being proposed by developers via the OCSS*” was used as the baseline in the ESO East Anglia Network Study, it means that all the scenarios that were explored by ESO are no longer valid. Very importantly though, the study revealed the benefits and viability of HVDC technology. <https://www.neso.energy/document/304496/download>

OCSS Limitations

- By limiting the scheme to the VE and NF windfarms coordinating their connections through Sea Link the scope was far too restricted and other options should have been explored.
- This is very relevant as there are two very significant issues associated with the VE and NF windfarms connecting through Sea Link:
 - i. As it was necessary to allow for a fault condition on SL to the south of the VE and NF connection point, the result was that additional infrastructure would be needed to run from Suffolk to Tilbury to take excess power south from the SL landfall in Suffolk.
 - ii. Connecting the VE and NF windfarms to SL would severely limit the ability of SL to fulfil the design intent to function as a bootstrap link between Suffolk and Kent, as the total capacity of the windfarms equates to that of SL.
- These are fundamental flaws. Neither of these issues would apply to the OCSS Alternative Solution presented here.
- The first issue would not apply as the power would be delivered directly to Tilbury and not by connecting partway along already designated network reinforcement.
- The second issue would not apply because the power from two windfarms would be transmitted using a dedicated export cable.

OCSS Limitations

- The reasons given for the decision to not continue funding of the OCSS relate to “*an increase in capital costs...*”, “*constraint costs associated with an outage on Sea Link...*” and “*a programme delay for North Falls and Five Estuaries...*” <https://www.nationalgrid.com/the-great-grid-upgrade/sea-link>
- It is not possible to interrogate the capital costs associated with the OCSS as they have been redacted in the public version of the Arup report: “*Independent Review of OCSS Qualifying Coordinated Project...*” . It is worth noting though that the HVDC Switching Platform required for Option 2 in the OCSS report would not be needed as the OCSS Alternative Solution proposed here is a simple point to point connection. This therefore reduces cost and avoids the compromises noted in the Arup report due to current lack of availability.

OCSS Limitations

- The interrelationship between VE, NF and SL within the OCSS is also likely to have added significant costs as the various elements would need to be brought in and out of service during the complex multistage construction process that the project would entail. With the OCSS Alternative Solution proposed here there would be no “*constraint costs associated with an outage on Sea Link*” because this scheme is completely isolated from SL.
- Likewise, there is no reason to suspect “*a programme delay for North Falls and Five Estuaries*” because of the self-contained nature of the OCSS Alternative Solution proposal.
- By connecting directly to Tilbury, the proposal is in fact also completely isolated from the NGET Norwich to Tilbury project as power could enter the grid at Tilbury without the proposed power lines from Norwich. As it stands the Norwich to Tilbury project DCO approval is a key dependency in the VE and NF project plans. Progress with the VE and NF projects would be much easier and quicker without this dependency by enabling the projects to advance in parallel with Norwich to Tilbury project. Similarly, the dependency on Sea Link is removed. The removal of both of these dependencies could result in substantial savings in constraint costs.

OCSS Limitations

- It is widely acknowledged that, if carried out properly, a coordinated design will provide benefits in all areas. Therefore, if the benefits are not being realised it indicates that the proposed scheme is suboptimal. It is very unfortunate that the OCSS scheme was stopped at a very early stage as other options could have been explored. With any scheme of such significance a wide range of alternative solutions should be properly appraised. This should be undertaken using the HM Treasury Green Book, including the critical natural capital element, to conduct the necessary trade-offs. It cannot be acceptable to proceed acknowledging the severe additional harms from a radial connection and the many potential advantages to all parties in exploring other options.
- It is interesting to note from the “*Independent Review of OCSS Qualifying Coordinated Project*” produced by Arup that the two options reviewed were deemed to be “*technically feasible*”. This therefore bodes well for the simpler OCSS Alternative Solution presented here.

Impact on the NGET Norwich to Tilbury project

- As the OCSS Alternative Solution proposal presented here essentially removes VE and NF from the Norwich to Tilbury project, the capacity requirements for Norwich to Tilbury project are significantly reduced. In round terms, with around 2GW of power from the VE and NF windfarms independently transmitted to Tilbury the 6GW requirement for Norwich to Tilbury reduces to 4GW.
- The ESO East Anglia Network Study demonstrated the potential that a HVDC underground system would offer. With a substantially reduced power requirement, the HVDC option for Norwich to Tilbury becomes even more viable for both onshore and offshore variants.
- The current Norwich to Tilbury proposal entails burying the HVAC cables where they pass through the Dedham Vale National Landscape (AONB) and in other highly sensitive areas. The currently proposed HVAC system requires a total of 18 separate cables to transmit the planned 6GW capacity. Reducing the requirement to 4GW, by transmitting the VE and NF output separately to Tilbury, and using HVDC technology, would require 2 bipolar circuits instead. This would therefore result in 4 separate cables instead of 18.
<https://www.nationalgrid.com/electricity-transmission/document/154556/download>
- For reference, some of the options explored by ESO as part East Anglia Network Study also enabled the capacity of the Norwich to Tilbury project to be reduced to 4GW. Upgrading the existing network by using reconductoring and other grid enhancing technologies could reduce the requirement for new infrastructure even further.

Impact on the NGET Norwich to Tilbury project

- It is also noted that the need case for Norwich to Tilbury has changed as the generating capacity of the North Falls' site was significantly reduced due to the offshore array area changing from two areas totalling approximately 150 square kilometres to one area totalling 90 square kilometres, following the North Falls' 2023 statutory consultation .
- The greatly reduced number of cables and the narrower cable separation that result from HVDC would greatly reduce the harm caused in this very environmentally sensitive area. HVAC cables require a much wider construction swathe, which is stated as typically being 120m for this project. However, there are significant sections of this project, including in the Dedham Vale National Landscape (AONB), where the plans show the width to be around twice this figure, and the draft order limits extend significantly beyond this.
<https://norwichtotilburymap.nationalgrid.com/>
- An offshore bootstrap circuit from Norwich to Tilbury would also become a lot more viable by the combination of using HVDC technology and the lower power requirement of 4GW. The much narrower construction swathe for the onshore segments would greatly reduce the harm caused in a similar manner to that described for the Dedham Vale National Landscape. With just 2 cables the offshore harms would also be greatly reduced. Without the need to connect in the VE and NF windfarms the expensive offshore platform priced into the offshore option investigated by NGET would not be needed. It would instead be a simple point to point connection.

Impact on the NGET Norwich to Tilbury project

- A HVDC Norwich to Tilbury circuit (either onshore or offshore) combined with an independent HVDC connection from the VE and NF windfarms to Tilbury would also result in economies of scale as all the conversion from HVDC to HVAC and connection to the grid would occur at Tilbury.
- It is noted that the 2.9GW HVDC circuit from Hornsea 3 is routed onshore to Norwich. This offers further potential synergies with a HVDC Norwich to Tilbury scheme by the power continuing as HVDC to Tilbury and conversion taking place there instead of Norwich.
- A further consideration in relation to Norwich to Tilbury is the proposed Tarchon interconnector. Currently this is shown as connecting at the proposed Norwich to Tilbury “East Anglia Connection Node 400kV Substation” (<https://www.tarchonenergy.net/>)
- Like all other offshore infrastructure, brownfield sites must be prioritised for landfall. Therefore, should the project proceed, locations such as Tilbury and Grain must be used for Tarchon. With VE and NF connecting offshore, as outlined in the “OCSS Alternative Solution” proposal in this document, and Tarchon connecting elsewhere this would remove the need for the East Anglia Connection Node 400kV Substation from the Norwich to Tilbury project.
- This would significantly reduce the harms caused by the Norwich to Tilbury project as the infrastructure would also no longer need to wrap around the village of Ardleigh and an unresolved pinch point on the route would be removed. The reduction in infrastructure from removing this loop would also result in a significantly reduced cost.
- The projects should therefore not be treated in isolation as the benefits accrue from integration.