

Appendix: The Requirement for Good Design

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1. Summary

This report discusses key areas of the Norwich to Tilbury project that are essential to meeting the requirement for “good design”.

Good design is a fundamental requirement within the National Policy Statements for Energy, and it provides the route to meeting many of the policy objectives. Critically, the Secretary of State has a statutory duty to achieve good design.

As emphasised in Section 4.7.1 of the Overarching National Policy Statement for Energy, EN-1 (2023 & 2025): “...high quality and inclusive design goes far beyond aesthetic considerations. The functionality of an object – be it a building or other type of infrastructure – including fitness for purpose and sustainability, is equally important.”

The requirement for good design applies to Critical National Priority (CNP) projects as much as any other project. The associated principles provide the means to ensure that the mitigation hierarchy for such projects is properly addressed.

The Design Principles for National Infrastructure published by the National Infrastructure Commission (NIC) in February 2020, are embedded in the National Policy Statements for Energy. The NIC report states: “We are moving into a decade where many big infrastructure projects will begin. Their legacy will be defined by the quality of their design. We owe it to present and future generations to make them the best they can be. These principles are here to show the way”.

Noting the scale and planned lifespan of the proposed infrastructure, “legacy”, as referenced in the above NIC quotation, is a very important consideration. The Norwich to Tilbury project has been stated by the Applicant to be one of the largest DCO applications. With ongoing refurbishment, the lifespan could exceed 100 years: the harm caused could extend significantly beyond this.

Key observations are outlined below:

- The Applicant only consulted on and progressed one design option, despite other valid alternatives being available. The planning system allows more than one option to be kept open at the DCO application stages and, if necessary, at the consent stages. Alternative technologies that deserved full consideration include offshore and underground HVDC options and the use of cable ploughing.
- The benefits of offshore coordination in reducing environmental impacts, social and local impacts and cost have been widely known since 2011, and this is highlighted in the National Policy Statements for Energy. Despite this there is no offshore coordination on this project.
- The Applicant has shown disregard to the Holford and Horlock Rules, which are the key design guidelines in National Policy Statement EN-5 for the routing of new overhead lines and for the design and siting of substations.

- The Applicant has not used the HMT Green Book “*Enabling a Natural Capital Approach*” methodology referenced in the National Policy Statements for Energy. This is vital for evaluating options to achieve best outcomes.
- Due to the interaction with other projects, the additional complexity that the Norwich to Tilbury project would bring is difficult to imagine and probably unprecedented for the region. The interaction applies to projects that are both related and unrelated to this development. It is far from clear that this has been properly addressed by the Applicant and there is a lack of awareness of the potential cumulative impact in affected communities. These considerations are fundamental when assessing how the current proposal would compare with other alternatives, such as offshore or underground HVDC.
- Contrary to the guidance issued by the National Infrastructure Commission in 2020, and the resulting advice being referenced in subsequent National Policy Statements for Energy, the Applicant did not assign a design champion or arrange for independent design reviews to be held throughout the project development stages. Ignoring such key guidance excludes vital sources of external input and impartiality from the design process.
- As design reviews inform the design as it is progressed, they need to take place from the start of the design process and then at appropriate stages. They serve little purpose if only added at the end.
- Two examples are provided where the National Infrastructure Commission guidance has been applied in another sectors. Like the Norwich to Tilbury project, the examples selected apply to the design of linear infrastructure projects where the developers are statutory undertakers.
- For a project of this scale and nature, it is essential that best practice is employed in all areas. The issues highlighted in this document show this was not the case for the proposed Norwich to Tilbury project.

2. Pylons East Anglia's Position

The Pylons East Anglia campaign group (also known as ESNP) was formed when the Norwich to Tilbury project was first announced in 2022. The group was born out of concerns relating to the harm to communities and the environment that the project would cause and that, in essence, the only option being presented was an onshore HVAC pylons-based solution.

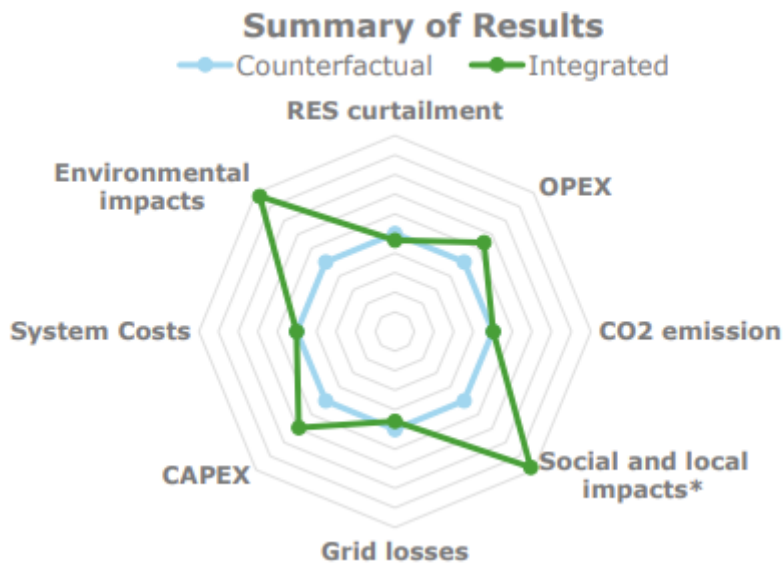
The project was initially named by National Grid as “East Anglia Green Energy Enablement (GREEN)”. In the NGET April 2022 Community newsletter¹, under the heading “*Why is East Anglia GREEN needed?*” the following was stated: “... *With new offshore wind generation, a new nuclear power station at Sizewell C and greater interconnection with countries across the North Sea being proposed, there will be a huge increase in the amount of renewable and low carbon electricity generation connecting along the East coast.*”

With the emphasis in the stated need on connecting offshore wind generation, a coastal nuclear power station and incorporating North Sea interconnections it was questioned why the proximity to the coast was not being utilised and the power instead delivered directly to Tilbury, or indeed other locations closer to demand, via offshore cables. It also became clear that the project would have a huge cumulative impact on the region due to the very significant impact from associated projects and the fact that there was already a 400kV overhead line running from Norwich to Tilbury. In relation to the latter, there are for instance locations along the route where people currently living with a view of 400kV line on one side of their property would be faced with a similar view on the other side of their property.

The group also became aware of a key study by ESO (now NESO) from 2020² demonstrating the significant benefits that result from offshore integration. The economic appraisal methodology used in the study was based on HM Treasury Green Book guidelines. The report showed that the benefits were particularly pronounced in relation to environmental impacts, social and local impacts and cost. These are illustrated in the following diagram from the report “*Figure 0-1 Summary of valuation results for quantitative KPIs*”.

¹ <https://www.nationalgrid.com/document/342451/download>

² <https://www.neso.energy/document/182936/download>



In its summary of the report ESO state that in addition to significant savings in capital and operating expenditure “*There are also significant environmental and social benefits with an integrated approach, as the number of new electricity infrastructure assets, including cables and onshore landing points, could be reduced by around 50 per cent*”³.

It is important to note that the Pylons East Anglia campaign group is not objecting to decarbonising the electricity grid in the region. The fundamental principle is that this must be executed in the least harmful way. To achieve this, alternatives must be fully explored and proper consideration given to the environment and communities by using best practice tools and processes in all areas.

³ <https://www.neso.energy/news/final-phase-1-report-our-offshore-coordination-project>

3. The Requirement for Good Design

- 3.1. The Planning Act 2008 places great importance on the need for “*good design*”. Good design is also embodied within many of the requirements in the National Policy Statements for Energy.
- 3.2. A search using the term “*good design*” shows that it is used 22 times in EN-1 and 9 times in EN-5, in both the 2023 and 2025 versions, plus there are many less direct references.
- 3.3. Guidance on achieving good design has been provided by the Planning Inspectorate in the form of webinars and various documents.
- 3.4. The Overarching National Policy Statement for Energy, EN-1, states in Section 4.7.2 (2023 and 2025) that: “*Applying good design to energy projects should produce sustainable infrastructure sensitive to place, including impacts on heritage, efficient in the use of natural resources, including land-use, and energy used in their construction and operation, matched by an appearance that demonstrates good aesthetic as far as possible. It is acknowledged, however that the nature of energy infrastructure development will often limit the extent to which it can contribute to the enhancement of the quality of the area*”.
- 3.5. And from Section 4.7.3: “*Good design is also a means by which many policy objectives in the NPSs can be met, for example the impact sections show how good design, in terms of siting and use of appropriate technologies, can help mitigate adverse impacts such as noise...*”.
- 3.6. Both the 2023 and 2025 versions of the Overarching National Policy Statement for Energy (EN-1) refer to the Design Principles for National Infrastructure published by the National Infrastructure Commission (NIC)⁴.
- 3.7. The NIC report, which was published in February 2020, established four key principles “*climate, people, place, and value*” to guide the design of major infrastructure projects in the UK. The report’s introduction states: “*We are moving into a decade where many big infrastructure projects will begin. Their legacy will be defined by the quality of their design. We owe it to present and future generations to make them the best they can be. These principles are here to show the way*”.
- 3.8. The report then goes on to state: “*The Assessment’s recommendations are the start for improving the quality of design of national infrastructure. Design champions and design panels will take forward the spirit of the design principles. They will push for designs that create great places, respond to what people need and want, mitigate society’s climate impact and provide good*

⁴ The 2023 and 2025 versions of EN-1 state: “Design principles should take into account any national guidance on infrastructure design, this could include for example the Design Principles for National Infrastructure published by the National Infrastructure Commission, the National Design Guide and National Model Design Code, as well as any local design policies and standards.”

*value. They will do this by appreciating the wider context, engaging meaningfully and continually measuring and improving*⁵.

- 3.9. Advice from the NIC report is embedded in the Planning Inspectorate webinar: *“Achieving good design in Nationally Significant Infrastructure Projects”*. The slides from the webinar highlight that the *“(relevant) Secretary of State”* [has a] *“Statutory duty to achieve good design”*⁶.

⁵ <https://majorprojects.org/wp-content/uploads/2024/10/NIC-Design-Principles.pdf>

⁶ Achieving good design in Nationally Significant Infrastructure Projects, A Planning Inspectorate Webinar, 13 December 2024
https://assets.publishing.service.gov.uk/media/67603830cfbf84c3b2bcfa6d/Achieving_good_design_in_Nationally_Significant_Infrastructure_Projects.pdf

4. The Norwich to Tilbury Project

Many aspects of the design of the Norwich to Tilbury project are discussed in detail in previous submissions from Pylons East Anglia Ltd and from other interested parties. These points will therefore will not be discussed in great length here. Instead, some examples are highlighted.

4.1. Consideration and Evaluation of Alternatives

4.1.1. From the outset the Applicant showed commitment to a single option for the Norwich to Tilbury project, based on a new 400kV overhead line with limited underground sections. This is recorded in the Inception Meeting held with the Planning Inspectorate on 4 April 2022⁷. The appropriate section from the meeting notes is copied below:

From: Inception Meeting, 4 April 2022

The project comprises of:

- A new 400Kv overhead line – Between Norwich and Bramford
- A new 400Kv overhead line – Between Bramford and Tilbury, with an underground section within Dedham Vale Area of Outstanding Natural Beauty
- A new 400Kv substation – To facilitate the connection of North Falls and Five Estuaries offshore wind farm projects

4.1.2. It is noted that at the Inception Meeting the Planning Inspectorate advised that birds and flight paths “*would be an important consideration*”.

4.1.3. Commitment to this option remained throughout the pre-application stage to form the basis of the DCO application. The proposal recorded in the Applicant’s DCO document “5.6 *Planning Statement (Final Issue A) [APP-085], dated August 2025*”⁸ is based on a new 400kV overhead line with limited underground sections, as shown in the section from the document copied below:

From: “5.6 Planning Statement (Final Issue A) [APP-085]”, August 2025

Overview of the Project

The Project would include the following elements:

A new 400 kilovolt (kV) electricity transmission connection of approximately 180 km overall length from Norwich Main Substation to Tilbury Substation via Bramford Substation, a new East Anglia Connection Node (EACN) Substation and a new Tilbury North Substation, including:

⁷ <https://nsip-documents.planninginspectorate.gov.uk/published-documents/EN020027-M-49441685-East%20Anglia%20GREEN%20-%20Project%20Inception%20Meeting%20Note%2004.04.2022.pdf>

⁸ <https://nsip-documents.planninginspectorate.gov.uk/published-documents/EN020027-000552-2%20Norwich%20to%20Tilbury%20Examination%20Library%20%20PDF%20.pdf>

Approximately 159 km of new overhead line supported on approximately 509 pylons, either standard steel lattice pylons (approximately 50 m in height) or low height steel lattice pylons (approximately 40 m in height) and some of which would be gantries (typically up to 15 m in height) within proposed Cable Sealing End (CSE) compounds or existing or proposed substations

Approximately 21 km of 400 kV underground cabling, some of which would be located through the Dedham Vale National Landscape (an Area of Outstanding Natural Beauty (AONB))... **[the description then expands on some of the details]**

- 4.1.4. Early opposition to the proposed scheme and preference for an offshore alternative were acknowledged by the Applicant. This was, for example, recorded at a meeting with the Planning Inspectorate on 4 July 2022: *“The Applicant has seen opposition to new onshore overhead power lines through consultation feedback. Local people have raised concerns about the visual impact of pylons, property values and diminished ability to sell in the future. Further concerns about health issues of overhead lines and mental health due to stress during development were raised. Many consultees believe that the infrastructure should go in the sea...”*⁹
- 4.1.5. At the same meeting the potential for the proposed scheme to cause a high level of harm was also acknowledged: *“The Applicant stated that there are some areas of high sensitivity in the currently proposed route corridor and further work will be done to reduce the impacts where practicable, including the use of appropriate mitigation”*.
- 4.1.6. This statement does not show regard to the mitigation hierarchy. The first stage in the mitigation hierarchy, as outlined in the Glossary of EN-1, is *“avoid”*.
- 4.1.7. Even a very high-level assessment would reveal the potential for high levels of harm along the whole route, noting the risk to communities, nature, the valued landscapes (many of which are very flat), important agricultural land and very high value heritage assets such as scheduled monument sites. These issues were raised by consultees.
- 4.1.8. Noting the concerns, and the fact the prevailing 2011 version of National Policy Statement EN-5 allowed underground and sub-sea alternatives to be considered¹⁰, at least one further option should have been added to the consultation process from this point onwards.

⁹ <https://nsip-documents.planninginspectorate.gov.uk/published-documents/EN020027-M-50900146-East%20Anglia%20GREEN%20Meeting%20Note%20with%20Applicants%20amendments%2004072022.pdf>

¹⁰ For example, the 2011 version of EN-5 references “underground and sub-sea cables” <https://assets.publishing.service.gov.uk/media/65a79559867cd800135ae9a2/1942-national-policy-statement-electricity-networks-en5-withdrawn.pdf>

- 4.1.9. Alternative technologies that deserved full consideration include offshore and underground HVDC options.
- 4.1.10. In relation to offshore solutions, Section 4.2 of this report outlines the significant benefits that can arise from offshore coordination.
- 4.1.11. The use of cable ploughing as an installation techniques for underground cables is also very relevant as it provides a method that is quicker, cheaper and less damaging than open trenching. When used with HVDC technology, which requires significantly less cables, the benefits are compounded.
- 4.1.12. The need to “avoid” nationally designated landscapes was further emphasised in the 2023 version of EN-5¹¹. This is very relevant, as the Applicant’s proposal crosses the Dedham Vale National Landscape.
- 4.1.13. Should it not be possible to “avoid” the National Landscape, and indeed the other areas with high amenity value, the second stage of the mitigation hierarchy applies which is to “reduce”. Underground HVDC would for example cause much less harm than the proposed underground HVAC, due to the requirement for 6 cables instead of 18. It is only when all options have been fully exhausted that the “mitigate” stage of the mitigation hierarchy should be applied.
- 4.1.14. The strength of feeling in the region that the Applicant’s proposed scheme is the most harmful solution is indicated in part by over 40,000 people signing a petition to “SAY NO TO 180km of Essex Suffolk Norfolk pylons - and build a strategic offshore grid instead”¹². The number of signatories is therefore close to the 2022 non-statutory consultation mail-out of 50,000¹³ (which was increased to approximately 75,000 for the statutory consultation). There are also over 7,000 members in the campaign Facebook Group.
- 4.1.15. Reports submitted by Pylons East Anglia in relation to the statutory and non-statutory consultations highlight that the Applicant was not receptive to other alternatives. The paragraph below from the Pylons East Anglia report on the 2023 Norwich to Tilbury non-statutory consultation¹⁴ relates the experiences to the findings from an academic study on the Applicant’s Hinkley Connection project¹⁵.

¹¹ E.g. sections 2.9.14, 2.9.23 & 2.9.24

¹² <https://you.38degrees.org.uk/petitions/say-no-to-180km-of-essex-suffolk-norfolk-pylons-and-build-a-strategic-offshore-grid>

¹³ <https://nsip-documents.planninginspectorate.gov.uk/published-documents/EN020027-M-51216755-East%20Anglia%20Green%20Project%20Update%20Meeting%2030-01-23.pdf>

¹⁴ Report: “10 Consultation Strategy”

<https://drive.google.com/drive/folders/1GPqx9r5Ms6UXcLgzKil96ljqCO8pUdUV>

¹⁵ Putting pylons into place: a UK case study of public perspectives on the impacts of high voltage overhead transmission lines. Matthew Cotton and Patrick Devine-Wright. Journal of Environmental

“It is disappointing and concerning to discover that issues experienced in this consultation process are not new and that lessons have not been learnt. The process was flawed from the outset by not properly and openly consulting on multiple options and not doing so in a manner that was respectful to the level of technical detail participants needed to fully understand potential options. The experience reflects many aspects of the findings from an academic study undertaken approximately 10 years ago relating to the NG Hinkley Connection. That research stated for example that *“The findings challenge the ‘not-in-my-back-yard’ assumption that citizens are selfish place-protectionists that lack the technical sophistication necessary to take a strategic viewpoint on transmission system development. They also reveal how decision making under the former UK Infrastructure Planning Commission’s (IPC) (and its successor body the Planning Inspectorate) presents a challenge to procedural justice, as front-loaded developer-led consultation practices curtail citizen input to key decisions on alternative technologies (for example, underground or undersea lines). This is likely to exacerbate public mistrust of transmission system operators and provoke further organised protest.”* It is also to be noted that according to this report the NG Hinkley Connection project consulted on multiple distinct routes, whereas Norwich to Tilbury is limited to one.”

4.1.16. Planning Inspectorate guidance *“Nationally Significant Infrastructure Projects: Advice on Preparing Applications for Linear Projects”*¹⁶ outlines how options can be kept open within DCOs at the application and consent stages. This can allow for example *“flexibility for future commercial delivery alternatives or technological advancement”*. The example mentions options for *“routeing”* and *“...high voltage alternating current (HVAC) or high voltage direct current (HVDC)...”*.

4.1.17. Under the heading *“DCO drafting which includes options”*, it states:

“Examples include:

Hinkley Point C Connection which had two versions of the DCO depending on whether route option A or B went ahead

Norfolk Boreas Offshore Windfarm (OWF) contained optionality within one DCO for whether it would be developed alone or alongside another OWF

Hornsea Project Three left the decision over HVAC or HVDC or a combination of both, to be made post-consent by the undertaker. Works for both were contained in the DCO, including a requirement to explain the choice to the relevant planning authority...”

4.1.18. The use of either onshore or offshore HVDC technology was dismissed by the Applicant at a very early in the development process and options involving this technology were not consulted on.

Planning and Management Vol. 56, No. 8, October 2013, 1225–1245

https://www.researchgate.net/publication/263605163_Putting_pylons_into_place_A_UK_case_study_of_public_perspectives_on_the_impacts_of_high_voltage_overhead_transmission_lines

¹⁶ <https://www.gov.uk/guidance/nationally-significant-infrastructure-projects-advice-on-preparing-applications-for-linear-projects#evolution-of-design-including-alternatives>

- 4.1.19. The benefits of HDVC are well known and, given the acknowledged constraints with the planned network reinforcement, the ability of the technology to greatly reduce harm is particularly important.
- 4.1.20. The technical viability of HVDC for Norwich to Tilbury was confirmed by NESO in the East Anglia Network Study¹⁷, although the short duration of the study resulted in limited options being explored.
- 4.1.21. Pylons East Anglia made requests for further options to be investigated, but these were not granted¹⁸.
- 4.1.22. Issues with the availability of HVDC equipment reported by Transmission Owners during the East Anglia Network Study resulted in NESO voicing concerns about delivery delays. Since the study, the Applicant has been very successful in securing supplies of HVDC cable, as reported in National Grid's RIIO-T3 Business Plan¹⁹:

“In the case of HVDC orders, this has resulted in our supply chain partners investing in a new factory, a new ship and a significant expansion of a UK facility on the back of the long-term order book certainty we have given them.”

- 4.1.23. The Applicant has highlighted supply issues with HVDC circuit breakers. These are not required with point-to-point connections, noting the Applicant's current plans for other HVDC projects such as EGL3, EGL4 and Sea Link.
- 4.1.24. In contrast the UK has shown leadership elsewhere in HVDC technology. The 2024 report *“Multi-terminal HVDC Grid: Current Status and Next Steps”*²⁰ was written for the U.S. Department of Energy (DOE) but strongly references UK and other European examples. This includes the Caithness Moray Shetland multi-terminal HVDC system²¹.
- 4.1.25. A slide from the report showing *“Future developments”* is provided in Appendix A. The *“Radial multi terminal Europe”* project shown for 2023 is the three-terminal radial Caithness Moray Shetland (CMS) multi-terminal HVDC system. This and the *“Multi-terminal grids & islands Europe”* shown in the diagram are current technologies which make overhead lines look increasingly outmoded and incongruous for a project that is principally transmitting offshore power.
- 4.1.26. In addition to the developments in HVDC technology, rapid developments in other areas are also very relevant to how the grid should develop.

¹⁷ <https://www.neso.energy/document/304496/download>

¹⁸ <https://drive.google.com/file/d/1XtALTecpWS4SYLK89fUPosuY8Qo2C3dt/view>

¹⁹ <https://www.riio3.nationalgrid.com/>

²⁰ https://www.energy.gov/sites/default/files/2024-05/DNV_Multi-terminal%20HVDC%20Grid_Current%20Status%20and%20Next%20Steps_Farshid%20Salehi.pdf

²¹ <https://www.hitachienergy.com/news-and-events/customer-stories/cms-hvdc-links-the-first-regional-dc-grid-in-europe>

4.1.27. For example, from recent news reports, on 25 March 2026 Centrica and Ceres announced a partnership “to enable and accelerate deployment of multi-gigawatt, on-site, grid-independent power across the UK and Europe” using a “British-designed low carbon fuel cell solution”²².

4.1.28. And in an interview with The Times on 27 March 2026, Greg Jackson, the Founder and CEO of Octopus Energy argues that the planned UK electricity grid expansion “is based on outdated assumptions” and called for a “a huge rethink”. An extract from the interview follows.

Extract from an interview in The Times with Greg Jackson, Founder and CEO of Octopus Energy (27 March 2026)

...[Jackson] thinks the bigger prize would be an HS2-style reversal, trimming the potential £90 billion spend on upgrading the national electricity grid in coming years. He argues that the expansion, bigger even than the one seen in the 1960s, is based on outdated assumptions.

Grid-scale batteries are already cheaper than planners assume, he says. Combined with EV batteries, they could act as a “buffer” for electricity supply and demand, reducing the length of the roughly 1,000 miles of pylons expected to be needed between 2030 and the 2040s. “We need a huge rethink. Until you’ve built something, you can always cancel it. Look at what we’ve done with HS2.”²³

²² <https://www.centrica.com/media-centre/news/2026/centrica-and-ceres-sign-strategic-partnership-to-bring-multi-gw-on-site-fuel-cell-power-to-the-uk-and-europe/>

²³ <https://www.thetimes.com/uk/politics/article/greg-jackson-octopus-ceo-interview-kjf6j2s20>

4.2. Offshore Coordination

- 4.2.1. EN-1 Overarching National Policy Statement for Energy (2023) discusses the benefits of a “*more integrated approach to offshore transmission, which included efficient planning of the onshore network*”. The relevant section is copied below:

3.3.75 The final Phase 1 report for National Grid ESO’s Offshore Coordination Project (published December 2020) found that a more integrated approach to offshore transmission, which included efficient planning of the onshore network, could deliver consumer benefits of up to £6 billion by 2050, depending on how quickly it could be implemented. It also found that the number of new electricity infrastructure assets, including cables and onshore landing points could be reduced by up to 50 per cent over the same period, significantly reducing environmental impacts and impacts on coastal communities.

- 4.2.2. This approach is backed up by studies dating back to the Offshore Transmission Network Feasibility Study (OTNFS) in 2011 published by the Crown Estate and National Grid. The 2011 study has disappeared from previously published links, but the conclusions are quoted in a submission to the Planning Inspectorate relating to the Norfolk Vanguard Offshore Wind Farm²⁴.
- 4.2.3. At a CIGRE workshop in 2011 National Grid outlined in its presentation “*Developing offshore grids: An integrated approach*” the potential of offshore grids, including benefits in areas aspects such as security and resilience²⁵. A slide from the workshop is provided in Appendix B.
- 4.2.4. The DNV report associated with the 2020 ESO Offshore Coordination Project referenced in NPS EN-1 clearly demonstrated how the benefits from offshore coordination are particularly marked in relation to environmental impacts, social and local impacts and cost ²⁶.
- 4.2.5. Both the 2023 and 2025 versions of EN-5, emphasise the importance of offshore coordination. For example, Sections 2.12.4 and 2.12.6 from EN-5 2023 are copied below.

2.12.4 As identified in EN-1, it is important that the network planning for offshore transmission is much more closely co-ordinated with the planning and development of the onshore transmission network than previously. This includes all types of offshore

²⁴ https://nsip-documents.planninginspectorate.gov.uk/published-documents/EN010079-003084-ExA%3B%20Comments%3B%2010.D8.4A_Appendix%201_Integrated%20Offshore%20Transmission%20Project%20Conclusions%20and%20Recommendations.pdf

²⁵ <https://cigre.org.uk/web-cont1001/uploads/Cigre+Workshop+on+Offshore+Networks+Jan+2011+-+Presentations.pdf>

²⁶ <https://www.neso.energy/document/182936/download>

transmission including interconnectors, multi-purpose interconnectors (MPIs) and subsea ‘onshore’ transmission or ‘bootstraps’ reinforcing the onshore transmission network. Further details on the different types of offshore transmission are provided in the Glossary.

2.12.6 In addition, a more co-ordinated approach to designing offshore transmission is expected to be adopted compared with the previous standard approach of radial routes to shore. This applies to spatially close groups of offshore windfarms, subsea ‘onshore’ transmission or bootstraps, interconnectors and multi-purpose interconnectors.

4.2.6. The technology is available now. TenneT is for example building “*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*”²⁷.

4.2.7. Despite the acknowledged benefits there is no offshore coordination within the Norwich to Tilbury project. Current plans for the proposed connections of the East Coast Generation Group at the EACN substation represent the most harmful means of connection. This is due to:

- The use of HVAC for the export cables. Converting to HVDC would greatly reduce the number of cables required and offer much greater flexibility in the location of the grid connection.
- The need for separate radial connections for each windfarm.
- The currently proposed siting of the EACN substation and the cable routing required to reach it.

4.2.8. From an early stage the East Coast Generation Group windfarms (North Falls and Five Estuaries) indicated a desire to connect offshore.

4.2.9. Provision was made in the North Falls DCO application for an offshore platform for this purpose, with the intention that this could also serve Five Estuaries. In fact, an offshore substation is shown as the “*Connection Site*” for both the North Falls and Five Estuaries windfarms in the NESO “*Transmission Entry Capacity*” (TEC) Register²⁸.

4.2.10. It has been stated that North Falls and Five Estuaries plan to coordinate onshore cable excavation activities, but this is something that should happen as a matter of course and it does not amount to offshore coordination.

4.2.11. With proper offshore coordination, the number of radial cables can be reduced dramatically. Report “*OCSS Review*”²⁹, illustrates how the total

²⁷ <https://www.tennet.eu/about-tennet/innovations/2gw-program>

²⁸ NESO TEC Register: “tec-register-27-february-2026.csv” https://www.neso.energy/data-portal/transmission-entry-capacity-tec-register/tec_register

²⁹ <https://drive.google.com/file/d/1wAKcVFtsK2ewaBhF90W8gJ0TrdLiNOEH/view>

number of separate onshore cables for North Falls and Five Estuaries would be reduced from 12 to 2, greatly reducing the impact.

- 4.2.12. The location of connections can also be moved, as illustrated for example by National Grid changing the connection point for the Nautilus interconnector project in 2025³⁰.
- 4.2.13. Noting the cost and the harm resulting from connecting at the currently proposed location of EACN, and the ability to connect in less harmful ways, this location should not be treated as a fixed constraint in the design.
- 4.2.14. Section 2.13.9 of EN-5 (2023 & 2025) states: *“Radial offshore transmission options to single windfarms should only be proposed where options assessment work identifies that a co-ordinated solution is not feasible. For projects which had firm connection agreements in place prior to completion of the HND (formerly known as ‘Early Opportunities’ projects)³⁷, co-ordinated design work should be brought forward by applicants”*.
- 4.2.15. Report *“OCSS Review”*³¹ illustrates how other credible offshore coordination options were available despite the cancellation of the Government’s OCSS project.
- 4.2.16. The *“OCSS Review”* report also questions why the 2.9GW HVDC circuit from Hornsea 3 does not continue to Tilbury, as this would deliver half the required Norwich to Tilbury capacity with just 2 pairs of HVDC cables. The remainder of the requirement could be delivered directly to the Tilbury area by the small amount of offshore coordination proposed in the *“OCSS Review”* report.
- 4.2.17. Every effort should have been made by the Applicant to support the East Coast Generation Group in connecting offshore as allowed for in their respective DCO applications. The offshore coordination enabled by this would greatly reduce the harm caused. It would only require two HVDC export cables (one pair) instead of 12 HVAC export cables.
- 4.2.18. This would also show commitment to the Holistic Network Design (HND) methodology introduced by NESO July 2022 where the equally weighted objectives of *“cost to consumer”*, *“deliverability and operability”*, *“impact on environment”* and *“impact on local communities”* are applied^{32, 33}.

³⁰ <https://www.bbc.co.uk/news/articles/c3w11djn022o>

³¹ <https://drive.google.com/file/d/1wAKcVFtsK2ewaBhF90W8gJ0TrdLiNOEH/view>

³² <https://www.neso.energy/publications/beyond-2030/holistic-network-design-offshore-wind>

³³ <https://www.neso.energy/document/262681/download>

4.3. Application of the Holford and Horlock Rules

4.3.1. The Holford and Horlock Rules are the key design guidelines in NPS EN-5 for the routing of new overhead lines and for the design and siting of substations.

4.3.2. Rule 1 from Applicant's document on the Holford Rules³⁴ is shown below:

Rule 1:

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

Note on Rule 1

Investigate the possibility of alternative routes, avoiding if possible the areas of the highest amenity value. The consideration of alternative routes must be an integral feature of environmental statements.

Areas of highest amenity value are:

Areas of Outstanding Natural Beauty

National Parks

Heritage Coasts

World Heritage Sites

4.3.3. Instead of avoiding an area of "highest amenity value", current proposals entail the infrastructure crossing the Dedham Vale National Landscape. This is despite the enhanced protection afforded by the change from "Area of Outstanding Natural Beauty" to "National Landscape".

4.3.4. Even if it was accepted that the only viable option for the project was to cross the National Landscape, the least harmful solution should have been chosen. Significantly less harm would be caused by a fully underground HVDC solution for the project instead of the proposed underground HVAC sections.

4.3.5. The significantly narrower swathe would greatly reduce construction damage in the Dedham Vale, particularly if combined with cable ploughing. The visual impact in the Dedham Vale from the proposed overhead lines and cable sealing end compounds just outside the Dedham Vale would also be removed.

³⁴ <https://www.nationalgrid.com/sites/default/files/documents/13795-The%20Holford%20Rules.pdf>

- 4.3.6. The change to underground HVDC would therefore assist in meeting the National Landscape legal duty and it would also reduce the harm to other valued landscapes and high value heritage assets along the proposed route.
- 4.3.7. Rules 2 and 3 from the Applicant’s document on the Holford Rules are copied below:

“Rule 2: Avoid smaller areas of high amenity value, or scientific interests by deviation; provided that this can be done without using too many angle towers, ie the more massive structures which are used when lines change direction.

Note on Rule 2

Some areas (e.g. Site of Special Scientific Interest) may require special consideration for potential effects on ecology (e.g. to their flora and fauna). Where possible choose routes which minimise the effects on the setting of areas of architectural, historic and archaeological interest including Conservation Areas, Listed Buildings, Listed Parks and Gardens and Ancient Monuments.

Rule 3: Other things being equal, choose the most direct line, with no sharp changes of direction and thus with fewer angle towers.

Note of Rule 3

Where possible choose inconspicuous locations for angle towers, terminal towers and sealing end compounds.”

- 4.3.8. As an example, submission [AS-065]³⁵ by Simon Bell on behalf of Ardleigh Parish Council and Little Bromley Parish Council highlights large scale non-compliance with these two Rules in the Ardleigh and Little Bromley area. This includes not avoiding “*smaller areas of high amenity value*” and creating a severe impact on the setting of “*areas of architectural, historic and archaeological interest including Conservation Areas, Listed Buildings, Listed Parks and Gardens and Ancient Monuments*”. The proposed OHL route results in encirclement of the historic village centre, includes many “*sharp changes of direction*” and results in an excessive number of angle towers in an area of high amenity value.
- 4.3.9. Submission [AS-065] also highlights how the site selection process used for the proposed East Anglia Connection Node (EACN) substation shows very little regard to the guidelines in the Applicant’s document on the Horlock Rules³⁶.

³⁵ https://nsip-documents.planninginspectorate.gov.uk/published-documents/EN020027-001068-Route%20alignment%20and%20substation%20siting%20in%20Ardleigh_1.pdf

³⁶ <https://www.nationalgrid.com/sites/default/files/documents/13796-The%20Horlock%20Rules.pdf>

4.3.10. For example, in relation to *“the land use effects of the proposal that should be considered when planning the siting of substations...”*, the Horlock Rules state that *“issues for consideration include potential sterilisation of nationally important land, eg Grade 1 agricultural land and sites of nationally scarce minerals”*.

4.3.11. As shown in [AS-065] the proposed site for the EACN substation is centred on an area of Grade 1 BMV land. It is also an area which also holds valuable mineral reserves, including silica sand, as demonstrated at the nearby Martells Quarry site.

4.4. Natural Capital and Socio-economic Impacts

- 4.4.1. It is widely accepted that infrastructure projects can have very significant socio-economic and natural capital impacts. It is therefore vital that best practice is employed to understand these impacts when assessing alternatives. The established tool for this is the HMT Green Book.
- 4.4.2. Since the initial consultations on the Norwich to Tilbury project, Pylons East Anglia Ltd has requested the Applicant to show adherence with the Green Book, but this has been without success.
- 4.4.3. Use of the Green Book is referenced in the 2023 and 2025 versions of the National Policy Statements for Energy.
- 4.4.4. Overarching National Policy Statement for Energy (EN-1) references use of the “*Enabling a Natural Capital Approach*”, which is a key process in the HMT Green Book.
- 4.4.5. Section 4.6.16 of both the 2023 and 2025 versions of EN-1 states:
“Applicants should make use of available guidance and tools for measuring natural capital assets and ecosystem services, such as the Natural Capital Committee’s ‘How to Do it: natural capital workbook’, the government’s guidance on Enabling a Natural Capital Approach (ENCA), and other tools that aim to enable wider benefits for people and nature”.
- 4.4.6. The Natural Capital Committee (NCC), who were authors of the Green Book guidance, were very clear on the applicability to infrastructure projects. Its “*End of Term Report*” stated: “*The NCC recommends that all infrastructure projects should take full account of natural capital by including it in the project appraisal process as per the Green Book guidelines.*”³⁷
- 4.4.7. The “*Appraisal of Sustainability*”³⁸ report for the 2023 National Policy Statements for Energy endorses “*Alignment with HM Treasury Green Book principles*” when “*conducting strategic options appraisal*”. This is to “*help ensure that development proposals are approached in a holistic way that optimises the social / public value and will help ensure a joined-up approach to development*”.

³⁷ <https://assets.publishing.service.gov.uk/media/5f9c3befe90e070428701525/ncc-end-of-term-report.pdf>

The above NCC reports also available at: <https://www.theoep.org.uk/our-reports-and-publications>

³⁸ <https://assets.publishing.service.gov.uk/media/655dff3d544aea000dfb3287/appraisal-sustainability-main-report.pdf>

Extract from: National Policy Statements for Energy, Appraisal of Sustainability - Main Report November 2023 (page 73):

- **Alignment with HM Treasury Green Book principles**
- consideration of HM Treasury Green Book approaches when conducting strategic options appraisal. While this guidance is aimed primarily at public servants and decision makers, its use by all would help ensure that development proposals are approached in a holistic way that optimises the social / public value and will help ensure a joined up approach to development.

- 4.4.8. Both the 2023 and 2025 versions of the Overarching National Policy Statement for Energy (EN-1) point to national guidance on infrastructure design and reference the “*Design Principles for National Infrastructure*” published by the National Infrastructure Commission (NIC) in 2020³⁹.
- 4.4.9. In February 2021 the NIC published “*Natural capital and environmental net gain: A discussion paper*”⁴⁰. This report recognises the importance of natural capital and references HM Treasury’s Green Book appraisal guidance and the associated Defra guidance on “*enabling a natural capital approach*”.
- 4.4.10. To illustrate the importance of using the HM Treasury Green Book an exercise was carried out by Pylons East Anglia in 2025. This is discussed in report “*Norwich to Tilbury Project Green Book Analysis*” which was included as part of the representation by Pylons East Anglia Ltd submitted on 26 November 2025^{41, 42}.
- 4.4.11. The most compelling use of the Green Book on this project is for the balanced analysis of alternatives for best outcomes. Without this harm is not properly assessed.
- 4.4.12. The Pylons East Anglia analysis highlighted, for example, the significance of the costs imposed on communities through loss of natural capital, impact on property values and impact on businesses.
- 4.4.13. The importance of considering natural capital is highlighted in HM Government report “*Global biodiversity loss, ecosystem collapse and*

³⁹ The 2023 and 2025 versions of EN-1 state: “Design principles should take into account any national guidance on infrastructure design, this could include for example the Design Principles for National Infrastructure published by the National Infrastructure Commission, the National Design Guide and National Model Design Code, as well as any local design policies and standards.”

⁴⁰ Updated-Natural-Capital-Paper-Web-Version-Feb-2021.pdf

⁴¹ <https://national-infrastructure-consenting.planninginspectorate.gov.uk/projects/EN020027/representations/100013331>

⁴² https://nsip-documents.planninginspectorate.gov.uk/published-documents/EN020027-000805-Norwich%20to%20Tilbury_Green%20Book%20Analysis_1.pdf

national security”, published on 20 January 2026⁴³. Some stark warnings from the report are copied below:

“Without significant increases in UK food system and supply chain resilience, it is unlikely the UK would be able to maintain food security if ecosystem collapse drives geopolitical competition for food. The UK relies on imports for a proportion of both food and fertiliser and cannot currently produce enough food to feed its population based on current diets. Countries best placed to adapt are those that invest in ecosystem protection and restoration, and resilient and efficient food systems.”

“The UK relies on global markets for its food and for fertiliser”

“The UK is unable to be food self-sufficient at present, based on current diets and prices”

“UK food production is vulnerable to ecosystem degradation and collapse. Biodiversity loss, alongside climate change, is amongst the biggest medium to long term threat to domestic food production - through depleted soils, loss of pollinators, drought and flood conditions. Ecosystem collapse would place the UK’s agriculture system under great stress, leaving it struggling to pivot to the new approaches and technologies that would be required to maintain food supply.”

4.4.14. In the report: *“The role of natural capital in the green economy: Government Response”* the Government refers to *“...the critical role natural capital plays in delivering the Government’s mission to secure sustained economic growth”*⁴⁴. The report also endorses use of the HMT Green Book and the Enabling a Natural Capital Approach (ENCA).

4.4.15. In the HM Government report: *“Enabling a Natural Capital Approach guidance”*, updated 10 February 2026, it is stated that: *“Natural capital has become a standard analytical approach to thinking about nature.”*

“Understanding nature as a set of assets that benefit people and society in all kinds of ways can support better decision-making. This helps us to give the best public value given that there are scarce resources and trade-offs between objectives. It reduces the risk of the value of the natural environment being ignored in decision making. Natural capital has become a standard analytical approach to thinking about nature, following the seminal UK National Ecosystem Assessment (2011 and 2014) and the work of the Natural Capital Committee. It offers a balanced focus on natural assets in ecological

⁴³

https://assets.publishing.service.gov.uk/media/696e0eae719d837d69afc7de/National_security_assessment_-_global_biodiversity_loss_ecosystem_collapse_and_national_security.pdf

⁴⁴ <https://committees.parliament.uk/publications/48960/documents/257100/default/>

*terms (their quantity, condition and sustainability) and the social and economic benefits that derive from those assets”.*⁴⁵

4.4.16. For reference, the Deadline 2 comments from Pylons East Anglia Ltd relating to the HMT Green Book were provided in [REP2-056]⁴⁶.

⁴⁵ <https://www.gov.uk/government/publications/enabling-a-natural-capital-approach-enca-guidance/enabling-a-natural-capital-approach-guidance>

⁴⁶ <https://nsip-documents.planninginspectorate.gov.uk/published-documents/EN020027-002095-Pylons%20East%20Anglia%20Ltd-Appendix%20G.pdf>

4.5. Cumulative Impact

- 4.5.1. There are various locations where the current proposals for the Norwich to Tilbury project would result in severe cumulative impact from both proposed and consented developments.
- 4.5.2. This applies to related infrastructure projects as planned for grid connections in places such as Bramford and Ardleigh. It also applies to other non-related developments such as the consented Lower Thames Crossing and Tilbury 3 port expansion.
- 4.5.3. Within communities there is a lack of understanding of the cumulative impact, even among those living near the proposed locations.
- 4.5.4. The lack of suitable plans showing all the associated developments around the proposed East Anglia Connection Node (EACN) substation site was highlighted by the ExA in ExQ1 “GEN 1.14”. This question was issued on 20 March 2026, demonstrating that the issue persisted significantly into the Examination stage of the DCO.
- 4.5.5. The scale of the infrastructure developments also presents significant safety, resilience and security issues, as highlighted in submissions from Burstall PC, Little Bromley PC and Ardleigh PC.

4.6. Cost

4.6.1. As discussed in the Pylons East Anglia report “*Norwich to Tilbury Project Green Book Analysis*”⁴⁷, Ofgem, as the economic regulator, has previously made it clear that financial costs are not the only consideration. Ofgem does not always approve the lowest cost option.

4.6.2. In the past Ofgem has highlighted that “*companies must take into account the environmental impacts of new investment. This includes the visual impact of new infrastructure. The companies must demonstrate they have considered and consulted on alternative options, such as different routes, undergrounding and subsea cables.*”^{48 49}

4.6.3. The message was reinforced in a letter dated 31 July 2025 from Akshay Kaul, Director General for Infrastructure, to NESO and transmission owners, such as the Applicant^{50, 51}. The letter states the following, for example:

“...These solutions may not always be the cheapest option but rather the ones that drive long-term consumer benefit alongside clear evidence of the benefits to, and consideration of, local communities”.

“We expect NESO and TOs to work together, fully considering environmental and community impacts at the design stage before recommending major infrastructure projects.”

“NESO must take into account views of the local communities and incorporate those into its strategic plans where appropriate.”

“TOs must give proportionate consideration of wider socio-economic impacts when designing their projects.”

“As the economic regulator, Ofgem will continue to support project designs and network solutions that are in the consumers’ best interest, finding the balance between present and future needs. While Ofgem will continue to scrutinise project costs to ensure these are efficient, it does not mean that we will always approve the lowest cost

⁴⁷ https://nsip-documents.planninginspectorate.gov.uk/published-documents/EN020027-000805-Norwich%20to%20Tilbury_Green%20Book%20Analysis_1.pdf

⁴⁸ <https://www.ofgem.gov.uk/guidance/visual-amenity-and-network-regulation-factsheet>

⁴⁹ https://www.ofgem.gov.uk/sites/default/files/docs/2011/10/109-visual-amenity-factsheet_0.pdf

⁵⁰ <https://www.ofgem.gov.uk/transparency-document/public-consultation-and-engagement-infrastructure-build-letter-neso-and-transmission-owners>

⁵¹ <https://www.ofgem.gov.uk/sites/default/files/2025-08/20250731%20Letter%20from%20Ofgem%20to%20NESO%20and%20TOs%20RE%20Community%20Engagement%20and%20Consultation.pdf>

option. We recognise there are long-term benefits and community considerations that must be considered in a proportionate way alongside financial costs”.

5. Design Reviews

The use of design reviews at predefined stages throughout the design process is recognised as established best practice for engineering projects, and indeed for many other types of design projects. Design reviews are an essential requirement of the BS EN ISO 9001 Quality Management System, which is stated by the British Standards Institution (BSI) to be “*the most widely recognized quality management standard in the world*”⁵².

5.1. The Requirement for Design Review Panels on NSIPs

- 5.1.1. Both the 2023 and 2025 versions of EN-1 reference the “*Design Principles for National Infrastructure*” published by the National Infrastructure Commission (NIC) in 2020. This is referenced in Footnotes 122 and 102 respectively. It states the following: “*Design principles should take into account any national guidance on infrastructure design, this could include for example the Design Principles for National Infrastructure published by the National Infrastructure Commission...*”.
- 5.1.2. The NIC “*Design Principles for National Infrastructure*” document is also referenced in the “*Energy National Policy Statements, Appraisal of Sustainability - Appendices Supporting Evidence Volume I, November 2023*”.
- 5.1.3. The NIC report states: “*The National Infrastructure Commission established an expert design group because we believe the UK needs renewed ambition for the quality of our infrastructure*”⁵³.
- 5.1.4. The report is clear on the requirement for design reviews panels on every nationally significant infrastructure project: “*The first National Infrastructure Assessment also recommended that design review panels should be set up for every nationally significant infrastructure project. Design review panels exist on some projects currently and there are some good examples. But the opportunity to do better should not be missed—all major infrastructure projects deserve to have design review panels...*”

⁵² BS EN ISO 9001:2015+A1:2024 – TC: <https://knowledge.bsigroup.com/products/quality-management-systems-requirements-1>

⁵³ “climate, people, places, value” “DESIGN PRINCIPLES FOR NATIONAL INFRASTRUCTURE” <https://majorprojects.org/wp-content/uploads/2024/10/NIC-Design-Principles.pdf>

5.2. The Need for Design Reviews on NSIPs to be Independent

5.2.1. The need for design reviews to be independent on projects of this type is confirmed in advice from the Design Council, the Ministry of Housing, Communities & Local Government and the Planning Inspectorate.

5.2.2. The Design Council's report "*Design Review: Principles and Practice*"⁵⁴ states: "*Design Review is an independent and impartial evaluation process in which a panel of experts on the built environment assess the design of a proposal*"... "*...gives decision makers the confidence and information to support innovative, high quality designs that meet the needs of their communities and customers, and to resist poorly designed schemes.*"

5.2.3. The Design Council's report outlines ten fundamental principles of Design Review, and this further underlines the importance of independence:

Independent

It is conducted by people who are unconnected with the scheme's promoters and decision makers, and it ensures that conflicts of interest do not arise.

5.2.4. Similar comments are made by the Ministry of Housing, Communities & Local Government:

Design review is an independent assessment of development proposals by a panel of multidisciplinary professionals and experts, which can inform and improve design quality in new development.⁵⁵

5.2.5. The Planning Inspectorate "*Nationally Significant Infrastructure Projects: Advice on Good Design*"⁵⁶ references the Design Principles for National Infrastructure published by the National Infrastructure Commission (NIC) in February 2020. The Planning Inspectorate advice makes numerous references to "*independent*" input to the design process.

5.2.6. The advice states that during the "*Research*" stage "*engagement and consultation with statutory parties, affected persons, local communities and independent design panels should inform the project's design evolution. This should be explained*".

5.2.7. Under the "*Co-ordinate*" heading it states: "*Further iteration must be undertaken to refine choices for details and parameters. This should incorporate consultation responses, independent design input and ensure that design principles are being met. There may be choices to be made.*"

⁵⁴

https://www.designcouncil.org.uk/fileadmin/uploads/dc/Documents/Design%2520Review_Principles%2520and%2520Practice_May2019.pdf

⁵⁵ <https://www.gov.uk/guidance/design#effective-community-engagement-on-design>

⁵⁶ <https://www.gov.uk/guidance/nationally-significant-infrastructure-projects-advice-on-good-design>

Decisions need to be taken using strong design leadership, driven by the vision. This stage must set out the process by which future post-consent decision-making will be made”.

5.2.8. The need for “*Independent design review*” is listed on the checklist of “*Good design issues to consider*”. This checklist is referred to as an “*Acceptance checklist*” in the Planning Inspectorate “*Achieving good design in Nationally Significant Infrastructure Projects*” webinar ⁵⁷.

Extract from the Planning Inspectorate checklist included in the “*Advice on Good Design*” for Nationally Significant Infrastructure Projects:

| | |
|---------------------------|---|
| Independent design review | Has the design development been the subject of an independent design review? |
| | If so, what were the main comments and how has the design responded to them? |
| | Is it the intention to include design reviews post-consent? If so, how are these secured? |

Design review ‘s 10 principles include the need to be “Independent”⁵⁸

⁵⁷ Achieving good design in Nationally Significant Infrastructure Projects, A Planning Inspectorate Webinar, 13 December 2024

https://assets.publishing.service.gov.uk/media/67603830cfbf84c3b2bcfa6d/Achieving_good_design_in_Nationally_Significant_Infrastructure_Projects.pdf

⁵⁸

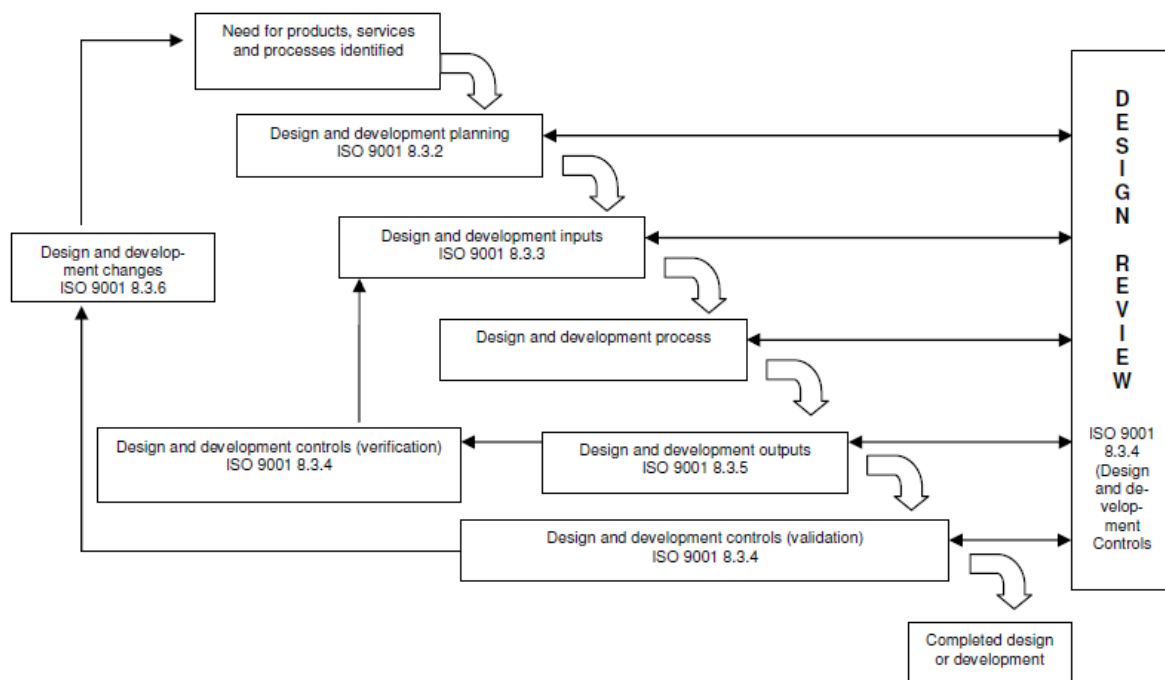
https://assets.publishing.service.gov.uk/media/67603830cfbf84c3b2bcfa6d/Achieving_good_design_in_Nationally_Significant_Infrastructure_Projects.pdf

5.3. The Timing of Design Reviews

5.3.1. Design reviews need to be carried out at planned stages throughout the design process. The NIC report *“Design Principles for National Infrastructure”* states: *“Like design champions, review panels need to be involved early enough for their advice to shape project design. They will advocate for improvements to design that will improve the outcomes of the project, taking advantage of opportunities to achieve better value.”*

5.3.2. Section 4.7.4 from both the 2023 and 2025 versions of Overarching NPS for Energy EN-1 highlights the importance of addressing issues in the early development phases : *“Given the benefits of good design in mitigating the adverse impacts of a project, applicants should consider how good design can be applied to a project during the early stages of the project lifecycle.”*

5.3.3. The following diagram illustrates how design reviews are tied into the key stages of the BS EN ISO 9001 Quality Management System. This shows the iterative nature of the process and how it relies on feedback from design reviews.



Outline of the Design and Development Process⁵⁹

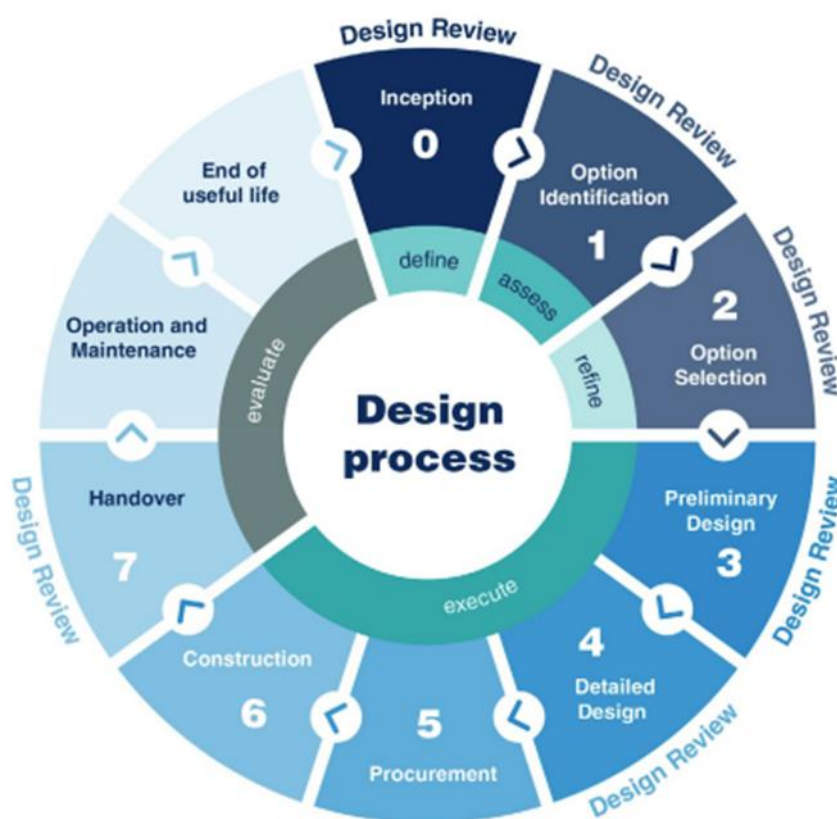
59

<https://committee.iso.org/files/live/sites/tc176/files/documents/ISO%209001%20Auditing%20Practices%20Group%20docs/Auditing%20to%20ISO%209001%202015/APG-Design%26Development2015.pdf>

5.3.4. To obtain further reference examples, the design processes employed by National Highways and Network Rail were investigated. Similarities that these organisations have with the Applicant is that they are both responsible for linear infrastructure and are both statutory undertakers.

5.3.5. Both organisations reference the National Infrastructure Commission's Design Principles for National Infrastructure^{60,61}. Their processes are tailored to suit their individual requirements, but both include independent design reviews throughout the design process.

5.3.6. The following diagram from the document “*Design review at National Highways: A guide (2022)*”⁶² illustrates how design reviews are held at key stages in the process from “*Inception*” to “*Handover*”.



Design review covers the core elements of the life cycle of a scheme.

5.3.7. Further information on the design processes used by National Highways and Network Rail is provided in Appendix C-1 and C-2 respectively.

5.3.8. A selection of quotes from Appendix C-1 and C-2 are copied below:

⁶⁰ https://nationalhighways.co.uk/media/wasbanju/on-the-road-to-good-design_design-review-at-national-highways.pdf

⁶¹ https://www.networkrail.co.uk/wp-content/uploads/2021/06/NR_GN_CIV_100_01-Design-Advice-Panel.pdf

⁶² https://nationalhighways.co.uk/media/xl3hdqfz/design-review-at-national-highways_a-guide.pdf

National Highways

“Our design review process gives decision makers the confidence and information to support innovative, high-quality schemes that meet the needs of users and communities...”

“...membership of the Design Panel includes representation from credible experts and relevant stakeholders, as appropriate...”

“...Advice from our Design Panel is given through our design review process. Design review helps to reduce the risks and costs of delays in the planning process that can result from poor design quality. It points out opportunities for design changes that could improve the quality of the proposals in cost effective ways, to make the scheme more satisfactory for its users and help realise wider benefits”.

“**Independent** It is conducted by people who are unconnected with the scheme’s promoters and decision makers, and it ensures that conflicts of interest do not arise.”

“**Timely** It takes place as early as possible in the design process, because this can avoid a great deal of wasted time. It also costs less to make changes at an early stage.”

“...Design review also gives project leaders the confidence that their project has been through a rigorous evaluation of design quality before seeking consent”.

“Design review allows National Highways to tap into a wide range of independent expert design advice. The process adds an extra layer of insight. This is especially true when there is a need to develop innovative ideas or approaches on projects”.

“...It supplements the advice of statutory consultees and offers fresh perspectives on design that project teams may be too close to see”.

“This widespread adoption of design review emphasises the growing awareness and importance of good design which National Highways endorses.”

Network Rail

“Design Reviews are closed meetings between independent built environment experts and Network Rail project teams, and are an opportunity for project teams to seek impartial and independent design advice. As an advisory service it provides critical feedback, observations and suggestions to improve projects. It does not seek to redesign them.”

“The Principles of Good Design 'People Ignore design that ignores people' is an enlightened quote that sits at the core of user experience based design. Infrastructure is designed for people, not for architects or engineers. The National Infrastructure Commission's Design Principles for National Infrastructure (Fig 1.1) together with Network Rail's Principles of Good Design (Fig 1.2) should underpin all projects at early conception, and be consulted at the earliest possible stage by sponsors, project managers, and design consultants”

“National Infrastructure Commission The National Infrastructure Commission (NIC) has concluded that design should be embedded into the culture of infrastructure planning, to save money, reduce risk, add value, support environmental net gain and to create a legacy that looks good and works well. This is achieved by the government ensuring that all nationally significant infrastructure projects, including those authorised through any necessary hybrid parliamentary bills, have a board level design champion and use a design panel to maximise the value provided by the infrastructure”.

“Network Rail is dedicated to implementing this initiative in several ways - through the development of our 10 Principles of Good Design, the work of our independent Design Advice Panel, and also the establishment of a National and Regional network of Design Champions supported by the Executive board and empowered by our National and Regional Programme Leads, including Engineering Services, Technical Authority and System Operator.”

“All infrastructure is intended to benefit people, whether directly or indirectly. However, infrastructure that is intended to create economic or social benefit to one set of people may cause detriment to others. Good design should ensure that the widest possible benefits are gained with the least negative impact on affected communities National Infrastructure Commission.”

5.3.9. It is noted that Section 4.7.14 from Overarching NPS for Energy EN-1 (2023 and 2025 versions) states: *“The Secretary of State should consider taking independent professional advice on the design aspects of a proposal. In particular, the Design Council can be asked to provide design review for nationally significant infrastructure projects”*. However, this is no substitute for the established process of design reviews being performed throughout the design cycle, as these allow the design to be informed from the initial stages onwards, resulting in better outcomes.

5.3.10. A secondary benefit with independent design reviews can be in helping to build community engagement and acceptance.

5.3.11. Design reviews are therefore not effective if applied retrospectively. When the outcome has largely been determined there is very limited opportunity

to inform the design. The danger is that the review becomes a “rubber stamping” exercise instead of a genuine and constructive part of the process.

5.4. The Norwich to Tilbury Design Review

- 5.4.1. The National Infrastructure Commission (NIC) Design Principles for National Infrastructure report was published in February 2020, 2 years before the first non-statutory consultation on the Norwich to Tilbury project in 2022.
- 5.4.2. There was therefore sufficient time for the advice to be applied to the Norwich to Tilbury project before it became embedded in the 2023 Overarching National Policy Statement for Energy (EN-1).
- 5.4.3. NIC advice such as the appointment of design champions and the incorporation of design reviews simply represents established best practice. It represents tried and tested ideas.
- 5.4.4. In various pre-application meetings, the Planning Inspectorate provided Section 51 (s51) advice to the Applicant that related to the NIC guidance on issues such as the use of design champions and design panels.
- 5.4.5. At the s51 meeting with the Planning Inspectorate on 30 January 2023, the Applicant was reminded of the NIC guidance, including regarding design champions and design panels: *“The Inspectorate advised the Applicant to consider and track the issue of design principles throughout the pre-application stage, particularly regarding the design of the substations. The Applicant was advised to take on board comments and guidance within the National Infrastructure Commission Report, including regarding design champions and design panels. The Applicant explained that its team has a well-integrated design process, noting the relationship between the engineers and environment team and how this optimised the design from an environmental perspective”*⁶³.
- 5.4.6. The response from the Applicant did not therefore show commitment to engage with the NIC guidance.
- 5.4.7. The actions from the s51 meeting state: *“The Inspectorate requested that the Applicant provide an overview of its approach to scheme design at the next project update meeting”*. There are no references to any actions relating to the NIC design principles within the scheme design in the notes from the subsequent meeting held on 6 September 2023.
- 5.4.8. Further advice on good design was provided by the Planning Inspectorate to the Applicant at the next two s51 meetings.
- 5.4.9. From the s51 meeting held on 23 October 2024: *“Advice Note The Inspectorate advised the Applicant that the Nationally Significant Infrastructure Projects: Advice on Good Design has been published today*

⁶³ <https://nsip-documents.planninginspectorate.gov.uk/published-documents/EN020027-M-51216755-East%20Anglia%20Green%20Project%20Update%20Meeting%2030-01-23.pdf>

and by mid-November an advice note on linear projects will be published^{64,65}.

5.4.10. From the s51 meeting held on 14 January 2025: *“Good Design The Inspectorate advised the Applicant to view the recent webinar on Achieving good design in Nationally Significant Infrastructure Projects. This follows on from the good advice page that was signposted in the previous meeting. It is important that the Applicant demonstrates regard to these in the design documents, demonstrating how the design has evolved during the pre-application stage following advice and feedback*^{66, 67}.

[<https://www.youtube.com/watch?v=fN68G6vFObY>]

5.4.11. The advice from both of these s51 meetings refers to NIC guidance, such as use of design champions and independent design reviews.

5.4.12. There does not appear to be any further reference to the NIC advice during the s51 meetings held on 19 March 2025 and 17 April 2025. However, at the s51 meeting held on 30 June 2025: *“The Inspectorate also asked whether the project had been subject of an independent design review, to which the applicant confirmed it had not, providing its reasons for this. The Inspectorate advised the applicant to clearly explain the rationale and design decisions within its application, demonstrating its regard to the good design and linear project advice pages*⁶⁸.

5.4.13. The advantages of design reviews are outlined in the Design Council’s report *“Design Review: Principles and Practice*⁶⁹. It states, for example, that *“Design Review is a well-established way of improving the quality of design outcomes in the built environment, and it is now recognised in the National Planning Policy Framework”*.

5.4.14. The report also outlines *“How Design Review adds value”*:

⁶⁴ <https://nsip-documents.planninginspectorate.gov.uk/published-documents/EN020027-M-59922909-Norwich%20P10%20-%20Pre-application%20s51%20Advice%20Log%20template%20-%20October%202024%20FINAL.pdf>

⁶⁵ <https://www.gov.uk/guidance/nationally-significant-infrastructure-projects-advice-on-good-design>

⁶⁶ <https://nsip-documents.planninginspectorate.gov.uk/published-documents/EN020027-M-60876287-Norwich%20to%20Tilbury%20P10%20-%20Pre-application%20s51%20Advice%20Log%20template.pdf>

⁶⁷

https://assets.publishing.service.gov.uk/media/67603830cfbf84c3b2bcfa6d/Achieving_good_design_in_Nationally_Significant_Infrastructure_Projects.pdf

⁶⁸ <https://nsip-documents.planninginspectorate.gov.uk/published-documents/EN020027-000144-EN020027-000022-Pre-application%20s51%20Advice%20Log%20template%20-%20%20Norwich%20to%20Tilbury%2030%20June%202025.pdf>

⁶⁹

https://www.designcouncil.org.uk/fileadmin/uploads/dc/Documents/Design%2520Review_Principles%2520and%2520Practice_May2019.pdf

“When it is done well, Design Review is highly efficient, and it often saves time and money. The cost of the service is never more than a small proportion of the total development budget, and is massively outweighed by the value it adds.”

5.4.15. In the initial Examination hearings held on 10 and 11 February 2026, the Applicant emphasised the large scale of the project by stating it to be “*one of the largest DCOs to date*” and “*the longest DCO ever sought*”.

5.4.16. The scale of the project combined with the potential for the infrastructure to last in excess of 100 years⁷⁰, and with effects that will last significantly longer, warrants best practice in all areas. This includes fully adhering to the NIC guidance.

5.4.17. The NIC guidance was produced because of acknowledged poor performance in the UK on infrastructure projects. The need to change the approach to infrastructure projects is echoed in the government’s 10 Year Infrastructure Strategy published on 19 June 2025:

“In the 10 Year Infrastructure Strategy, the government is doing things differently to fix the failures of the past, prioritising long-term outcomes over short-term announcements, providing the certainty and stability needed to attract investment, boosting British supply chains and jobs, and taking a joined-up view to improve planning and delivery across all types of infrastructure.”⁷¹

5.4.18. The use of independent design reviews can also help to build meaningful and constructive engagement with communities. It is after all the public who will interact with and ultimately pay for the resulting infrastructure.

5.4.19. Any such project will cause largescale disruption to people’s lives and livelihoods. Much of this is not compensated for. It is therefore essential that the process is informed and scrutinised by independent experts from a suitably wide range of disciplines and that this is carried out in a transparent manner.

5.4.20. The Applicant’s document “7.15 Design and Access Statement (Final Issue A)” [APP-353], includes “Internal Design Review Note” in “Appendix B”.

5.4.21. This is dated July 2025 and would therefore appear to be in response to the s51 meeting held on 30 June 2025 where, as discussed earlier, the Inspectorate asked: “...whether the project had been subject of an independent design review, to which the applicant confirmed it had not, providing its reasons for this. The Inspectorate advised the applicant to

⁷⁰ “We expect our towers to last in excess of 100 years (typically two conductor lifetimes, depending on environmental factors)” <https://www.nationalgrid.com/document/332521/download>

⁷¹ <https://www.gov.uk/government/publications/uk-infrastructure-a-10-year-strategy>

*clearly explain the rationale and design decisions within its application, demonstrating its regard to the good design and linear project advice pages*⁷².

5.4.22. It is noted therefore that the Applicant had not adopted the s51 advice provided by the Planning Inspectorate on 30 January 2023, where the Applicant was reminded of the NIC guidance, *“including regarding design champions and design panels”*.

5.4.23. As the *“Internal Design Review Note”* in APP-353 was produced after the event it did not inform the design. As highlighted earlier, design reviews need to be held at appropriate stages in the process from inception to completion to inform the design as it progresses. On projects of this type, an independent panel is also essential.

5.4.24. Even accepting that the report in APP-353 was an *“Internal Design Review”* and not an independent design review, some form of feedback on improvements that could be made and *“lessons learnt”* from the project would be expected.

5.4.25. The *“Internal Design Review”* was carried out through a very narrow lens. Noting the NIC guidance and other best practice referenced in this report the conclusion from the Internal Design Review *“that an independent design review prior to the application being submitted is not considered necessary”* cannot be substantiated.

⁷² <https://nsip-documents.planninginspectorate.gov.uk/published-documents/EN020027-000144-EN020027-000022-Pre-application%20s51%20Advice%20Log%20template%20-%20%20Norwich%20to%20Tilbury%2030%20June%202025.pdf>

6. Conclusions

- The Applicant only consulted on and progressed one design option, despite other valid alternatives being available. The planning system allows more than one option to be kept open at the DCO application stages and, if necessary, at the consent stages. Alternative technologies that deserved full consideration include offshore and underground HVDC options and the use of cable ploughing.
- The benefits of offshore coordination in reducing environmental impacts, social and local impacts and cost have been widely known since 2011, and this is highlighted in the National Policy Statements for Energy. Despite this there is no offshore coordination on this project.
- The Applicant has shown disregard to the Holford and Horlock Rules, which are the key design guidelines in National Policy Statement EN-5 for the routing of new overhead lines and for the design and siting of substations.
- The Applicant has not used the HMT Green Book “*Enabling a Natural Capital Approach*” methodology referenced in the National Policy Statements for Energy. This is vital for evaluating options to achieve best outcomes.
- Due to the interaction with other projects, the additional complexity that the Norwich to Tilbury project would bring is difficult to imagine and probably unprecedented for the region. The interaction applies to projects that are both related and unrelated to this development. It is far from clear that this has been properly addressed by the Applicant and there is a lack of awareness of the potential cumulative impact in affected communities. These considerations are fundamental when assessing how the current proposal would compare with other alternatives, such as offshore or underground HVDC.
- Contrary to the guidance issued by the National Infrastructure Commission in 2020, and the resulting advice being referenced in subsequent National Policy Statements for Energy, the Applicant did not assign a design champion or arrange for independent design reviews to be held throughout the project development stages. Ignoring such key guidance excludes vital sources of external input and impartiality from the design process.
- As design reviews inform the design as it is progressed, they need to take place from the start of the design process and then at appropriate stages. They serve little purpose if only added at the end.
- Two examples are provided where the National Infrastructure Commission guidance has been applied in another sectors. Like the Norwich to Tilbury project, the examples selected apply to the design of linear infrastructure projects where the developers are statutory undertakers.
- For a project of this scale and nature, it is essential that best practice is employed in all areas. The issues highlighted in this document show this was not the case for the proposed Norwich to Tilbury project.

Appendix A: Slide from “Multi-terminal HVDC Grid: Current Status and Next Steps” (DNV)

Future developments



https://www.energy.gov/sites/default/files/2024-06/Multi%20terminal%20HVDC%20Grid%20Current%20Status%20and%20Next%20Steps%20by%20Farshid%20Salehi_v3.pdf

Appendix B: Slide from 2011 CIGRE workshop

An integrated network solution has multiple benefits **nationalgrid**
THE POWER OF ACTION

- ~25% potential savings for UK consumers
- Reduces planning consent issues
- Better management & utilisation of valuable resources
- "Future proof" for network evolution & greater European integration

Other benefits include:

- Meeting / potentially exceeding developer timelines
- Strengthening security of supply
 - More resilient / reliable network
- Maximising deliverability:
 - Reduces supply chain pressures through lower asset volumes
 - Better secures resources to enable a step-up in UK supply chain capacity
 - Supports vital technology development
 - Facilitates a move towards standardisation
- Minimising environmental impact
- Strengthening UK role in EU energy
 - Enabler of a North Seas grid
 - Increased potential for UK to export excess wind power
 - Step towards engaging and influencing the EU landscape

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2011 CIGRE workshop: "Developing offshore grids: An integrated approach"⁷³

⁷³ <https://cigre.org.uk/web-cont1001/uploads/Cigre+Workshop+on+Offshore+Networks+Jan+2011+-+Presentations.pdf>

Appendix C-1: Design Reviews in Other Organisations – National Highways

National Highways

National Highways is “...a government owned, publicly funded company”⁷⁴.

From: “Design review at National Highways: A guide”⁷⁵ (2022)

“It draws on ‘Design Review Principles and Practice’ (Design Council, 2019)⁷⁶”

“Our design review process gives decision makers the confidence and information to support innovative, high-quality schemes that meet the needs of users and communities, and to resist poorly designed schemes, together with means of understanding where improvements could be made.”

“The National Highways Licence (Department for Transport, 2015) requires a focus on good design. Paragraph 5.26 of the Licence states, “The holder must have due regard to relevant principles and guidance on good design, to ensure that the development of the network takes account of geographical, environmental and socio-economic context.”

“National Highways must establish a Design Panel to get advice on design issues, and ensure that: a. The membership of the Design Panel includes representation from credible experts and relevant stakeholders, as appropriate...”

“...Advice from our Design Panel is given through our design review process. Design review helps to reduce the risks and costs of delays in the planning process that can result from poor design quality. It points out opportunities for design changes that could improve the quality of the proposals in cost effective ways, to make the scheme more satisfactory for its users and help realise wider benefits”.

“Independent It is conducted by people who are unconnected with the scheme’s promoters and decision makers, and it ensures that conflicts of interest do not arise.”

“Timely It takes place as early as possible in the design process, because this can avoid a great deal of wasted time. It also costs less to make changes at an early stage.”

⁷⁴ <https://nationalhighways.co.uk/about-us/who-we-work-with/>

⁷⁵ https://nationalhighways.co.uk/media/xl3hdqfz/design-review-at-national-highways_a-guide.pdf

⁷⁶

https://www.designcouncil.org.uk/fileadmin/uploads/dc/Documents/Design%2520Review_Principles%2520and%2520Practice_May2019.pdf

From: ‘On the road to good design: Design review at National Highways’ (2022)⁷⁷

“The importance of design review

Design review provides an independent view on the design quality of schemes and standards. It supports design development through constructive assessment against the principles of good road design. Design review also gives project leaders the confidence that their project has been through a rigorous evaluation of design quality before seeking consent.

Design review allows National Highways to tap into a wide range of independent expert design advice. The process adds an extra layer of insight. This is especially true when there is a need to develop innovative ideas or approaches on projects.

Design review is used regularly across other nationally significant infrastructure projects, for example High Speed 2 and the Thames Tideway Tunnel. It supplements the advice of statutory consultees and offers fresh perspectives on design that project teams may be too close to see.

The National Infrastructure Commission (2020) recommends design review panels be set up for every nationally significant infrastructure project. A Design Council guide, Design Review: Principles and practice (2019), shows how a wide range of groups benefit from design review on projects of all sizes. This includes local authorities, developers and community groups.

The National Planning Policy Framework (Ministry of Housing, Communities & Local Government, 2021) endorses design review. Many local authorities across England now regularly use design review panels (Place Alliance/UDG, 2017). The use of expert independent design advice is also encouraged in the National Policy Statement for National Networks (Department for Transport, 2014) to ensure principles of good design are embedded into infrastructure proposals.

This widespread adoption of design review emphasises the growing awareness and importance of good design which National Highways endorses.”

[The document also presents a range of case studies.]

⁷⁷ https://nationalhighways.co.uk/media/wasbanju/on-the-road-to-good-design_design-review-at-national-highways.pdf

Appendix C-2: Design Reviews in Other Organisations – Network Rail

Network Rail

Network Rail is “...a public sector arm’s length body of the Department for Transport”⁷⁸

From: Network Rail Design Advice Panel (DAP) Project Guidance⁷⁹

“Design Reviews are closed meetings between independent built environment experts and Network Rail project teams, and are an opportunity for project teams to seek impartial and independent design advice. As an advisory service it provides critical feedback, observations and suggestions to improve projects. It does not seek to redesign them.”

“**The Principles of Good Design** 'People Ignore design that ignores people' is an enlightened quote that sits at the core of user experience based design. Infrastructure is designed for people, not for architects or engineers. The National Infrastructure Commission's Design Principles for National Infrastructure (Fig 1.1) together with Network Rail’s Principles of Good Design (Fig 1.2) should underpin all projects at early conception, and be consulted at the earliest possible stage by sponsors, project managers, and design consultants”

“**National Infrastructure Commission** The National Infrastructure Commission (NIC) has concluded that design should be embedded into the culture of infrastructure planning, to save money, reduce risk, add value, support environmental net gain and to create a legacy that looks good and works well. This is achieved by the government ensuring that all nationally significant infrastructure projects, including those authorised through any necessary hybrid parliamentary bills, have a board level design champion and use a design panel to maximise the value provided by the infrastructure”.

“Network Rail is dedicated to implementing this initiative in several ways - through the development of our 10 Principles of Good Design, the work of our independent Design Advice Panel, and also the establishment of a National and Regional network of Design Champions supported by the Executive board and empowered by our National and Regional Programme Leads, including Engineering Services, Technical Authority and System Operator.”

“All infrastructure is intended to benefit people, whether directly or indirectly. However, infrastructure that is intended to create economic or social benefit to one set of people may cause detriment to others. Good design should ensure that the widest possible

⁷⁸ <https://www.networkrail.co.uk/who-we-are/>

⁷⁹ https://www.networkrail.co.uk/wp-content/uploads/2021/06/NR_GN_CIV_100_01-Design-Advice-Panel.pdf

benefits are gained with the least negative impact on affected communities **National Infrastructure Commission.**”