

# M25 junction 28 improvement scheme

TR010029

## 9.108 Highways England's Design Process Summary

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Infrastructure Planning (Examination Procedure) Rules 2010

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## 1. Introduction

- 1.1.1 Highways England has considered further whether the designs of structures should be subjected to an independent design review and requirement 3 of the dDCO adjusted accordingly.
- 1.1.2 Highways England has explained in this note the process that the design has undergone so far. It also explains the process that will be followed at the detailed design stage to ensure that the Scheme adheres to the principles of good design. Highways England hopes that this note offers the ExA and interested parties sufficient assurance that the Scheme has passed an appropriately rigorous review and will continue to be designed appropriately.

## 2. Initial design of the Scheme

- 2.1.1 Highways England's main aims are to ensure the SRN is more dependable, durable and most importantly safe. Highways England is also committed to delivering the public value for money. It is with these aims in mind that all investments by Highways England are planned.
- 2.1.2 Road design is more bound to place and function than other design fields, with specific demands of technical design and safety that must be met. Since aesthetic considerations must accept these demands, the potential for variation is more challenging, but still possible and Highways England is committed to delivering visually pleasing structures as far as possible.
- 2.1.3 Highways England has ensured that the Scheme has been compliant with the NPS NN and has considered the design principles set out in the Road to Good Design published by Highways England in 2018.
- 2.1.4 Before designing the Scheme, Highways England carried out site visits of the area as part of the initial scoping exercise.

## 3. Key people

- 3.1.1 Highways England first ensured that the design team was sufficiently qualified and experienced to design the Scheme. This team includes chartered engineers and chartered landscape architects so that an appropriate compromise between practicality and visual appearance can be achieved.
- 3.1.2 These personnel designed the project with the objectives in the NPS NN and Road to Good Design in mind.

## 4. Development of initial design and adherence to policy

### 4.1 Study of Scheme area

4.1.1 As described in detail in the Landscape and Visual chapter of the Environmental Statement (REP5-015), the landscape of the M25 north of junction 28 and the land to the northwest of Brentwood is characterised by:

- wooded gently to strongly undulating hills/ridges;
- semi enclosed character due to the presence of numerous small woods, large interlocking blocks of ancient and mature woodland and frequent hedgerow trees;
- dense linear settlement pattern along major south west to north east road/rail routes;
- narrow, tree-lined roads; and
- a sense of tranquillity exists away from main road corridor.

4.1.2 The M25 south of junction 28 and the land to the southwest of Brentwood is characterised by:

- strongly undulating wooded farmland/ wooded hills with extensive patches of ancient and mature woodland;
- small-scale field patterns with mature tree lined field boundaries; and
- narrow, quiet and sinuous rural lanes connecting small-scale settlements.

4.1.3 Noise and movement associated with the M25 and A12 road corridors are apparent, and a strong sense of place and orientation is provided by views towards London, North Kent and across the Thames Chase Community Forest.

### 4.2 Adherence to NPS NN in relation to “good design”

4.2.1 The design of the structures of the Scheme was made with the landscape in mind as well as policy guidance.

4.2.2 As noted by the ExA at the ISH3, the NPS NN sets out the criteria for “good design” for national network infrastructure. This note explains that the NPS NN has been considered in detail and that the Scheme adheres to the relevant principles set out in the NPS NN. The Case for the Scheme and Schedule of Accordance with National Policy Statement (APP-095) was submitted and demonstrates general compliancy with national policy and legislation. Highways England has set out below relevant extracts of the NPS NN in relation to “good design”:

<p><b>Criteria for “good design” for national network infrastructure (pg.36 onwards of NPS NN – emphasis added)</b></p>	<p><b>How the M25 junction 28 Scheme has incorporated the NPS NN principles of “good design”</b></p>
<p>Applicants should include design as an integral consideration from the outset of a proposal.</p>	<p>Highways England has adhered to this and has demonstrated this via the numerous site visits that were undertaken to inform the design. Key personnel kept the surrounding landscape in mind, and other design considerations, whilst producing the initial design. The team also kept the Highways England principles of good design in mind as explained in the submission at Deadline 4 (<a href="#">REP4-023</a>)</p> <p>Highways England wishes to bring to the ExA’s attention that the NPS NN states that “design” should be considered. “Design” encompasses “visual appearance” but is not limited to it.</p>
<p>Visual appearance should be a key factor in considering the design of new infrastructure, <b>as well as functionality, fitness for purpose, sustainability and cost.</b> Applying “good design” to national network projects should therefore produce <b>sustainable infrastructure sensitive to place,</b> efficient in the use of natural resources and energy used in their construction, <b>matched by an appearance that demonstrates good aesthetics as far as possible.</b></p>	<p>As the ExA has stated, visual appearance is a key factor in considering the structures of the Scheme. Highways England agrees with this principle, and has committed to “good aesthetics as far as possible”.</p> <p>As stated in the NPS NN there are numerous key factors to be considered in “good design”. Highways England must prioritise these key factors in line with scheme specific attributes. The highest priority for all Highways England schemes is ensuring public safety.</p> <p>An example of where it was appropriate to prioritise visual appearance, above other factors, is detailed at section 6 of this note.</p> <p>As stated in the NPS NN, other key factors to the design of new structures are functionality, fitness for purpose, sustainability and cost. Highways</p>

<p><b>Criteria for “good design” for national network infrastructure (pg.36 onwards of NPS NN – emphasis added)</b></p>	<p><b>How the M25 junction 28 Scheme has incorporated the NPS NN principles of “good design”</b></p>
	<p>England has considered all of these factors, alongside visual appearance, and considers the Scheme to have a design which gives the appropriate weight to all of these factors.</p>
<p>It is acknowledged however, that given the nature of much national network infrastructure development, particularly SRFIs, there <b>may be a limit on the extent to which it can contribute to the enhancement of the quality of the area.</b></p>	<p>There is a combination of significant space and other constraints within the Scheme which has required innovative thinking in order to accommodate the constraints as well as meet the policy and stakeholder requirements.</p> <p>The Scheme is being built for function and durability and it is important that the structures fit within the local environment. The finishes need to be self-maintaining and generally a concrete finish is used where access is difficult. The concrete is then treated as appropriate for the local environment. The specific finishes will be finalised as part of the detailed design process. The options that Highways England will consider are a concrete panel finish, if space is limited or, if there is space, an exposed vegetated face, which could be planted to blend into the environment.</p>
<p><b>A good design should meet the principal objectives of the scheme by eliminating or substantially mitigating the identified problems by improving operational conditions and simultaneously minimising adverse impacts.</b> It should also mitigate any existing adverse impacts wherever possible, for example, in relation to safety or the environment. <b>A good design will also be one that sustains the improvements to operational efficiency for as many years as is practicable, taking into</b></p>	<p>The Scheme meets this definition of good design.</p> <p>The principal purpose of the Scheme is to improve journey time reliability and reduce delays through the junction during peak and off-peak periods. The Scheme will also improve the performance of the A1023, A12 and M25 approaches to the roundabout, reducing the risk of queuing from the junction 28 roundabout onto the M25 motorway. The Scheme will also address safety issues, reducing the</p>

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<p><b>account capital cost, economics and environmental impacts.</b></p>	<p>number and severity of accidents and support economic growth.</p> <p>The preferred junction 28 configuration option is single two-lane cloverleaf like loop road which is more advantageous in terms of future maintenance and avoiding disruption to traffic compared to a single-lane loop road. Collaborative workshops with Highways England and other stakeholders including the police, Connect Plus Services (M25 maintainer) and Transport for London have been undertaken to understand the safety and operational challenges and identify design features to address these. Safe maintenance access has also been discussed and incorporated into the design for those parties affected by the Scheme. For additional security, installation of digital signage, variable message signs and CCTV which provide facilities to manage road space safely and provides rapid incident response, are included within the design. Deer fencing and other mitigation measures are being proposed to avoid and minimise the risk of deer collisions.</p> <p>The bridges have been designed to ensure that they are sustainable. This has been done through the structural design and the choice of materials so as to minimise maintenance requirements and thereby the impacts on the environment. This ensures that the improvements to operational efficiency from the Scheme will be felt for as many years as is practicable.</p>
<p>Scheme design will be a material consideration in decision making. <b>The Secretary of State needs to be</b></p>	<p>The Scheme is sustainable and as aesthetically sensitive, durable,</p>

<p><b>Criteria for “good design” for national network infrastructure (pg.36 onwards of NPS NN – emphasis added)</b></p>	<p><b>How the M25 junction 28 Scheme has incorporated the NPS NN principles of “good design”</b></p>
<p><b>satisfied that national networks infrastructure projects are sustainable and as aesthetically sensitive, durable, adaptable and resilient as they can reasonably be</b> (having regard to regulatory and other constraints and including accounting for natural hazards such as flooding).</p>	<p>adaptable and resilient as it can reasonably be.</p> <p>Highways England maintains that the Scheme has been designed with all these principles in mind. Given the constraints to the Scheme location and the necessity of being cost-efficient, especially when using public funds, the Scheme design achieves the appropriate balance between all the key factors of good design.</p>
<p>The applicant should therefore <b>take into account, as far as possible, both functionality (including fitness for purpose and sustainability) and aesthetics (including the scheme’s contribution to the quality of the area in which it would be located)</b>. Applicants will want to consider the role of technology in delivering new national networks projects. The use of professional, independent advice on the design aspects of a proposal <b>should be considered</b>, to ensure good design principles are embedded into infrastructure proposals.</p>	<p>Highways England has considered these factors since the start of the design of this Scheme, and will continue to do so in the process of detailed design.</p> <p>In relation to the structures of the Scheme, they have been designed to ensure that they are fit for purpose and are sustainable. These factors have permeated the design of the structures, the proposed materials and finish.</p> <p>Highways England has, as mentioned throughout the examination, considered how the Scheme and the structures in it will be appropriate for the location. The Scheme will contribute to increased public safety in the area, and releases congestion. The Scheme is an improvement to the current layout of the junction in terms of efficiency and visually.</p> <p>The Scheme fits in with the existing context of the local area as the design follows the contours of the existing land. Where existing vegetation is removed to accommodate the construction of the Scheme, mitigation planting is proposed to integrate the</p>

<p><b>Criteria for “good design” for national network infrastructure (pg.36 onwards of NPS NN – emphasis added)</b></p>	<p><b>How the M25 junction 28 Scheme has incorporated the NPS NN principles of “good design”</b></p>
	<p>Scheme within the local landscape (See Figure 2.2 (APP-039)). The planting design will reflect and respond to the existing landscape character of the area.</p> <p>Highways England did consider the use of professional, independent advice on the design aspects of the Scheme. Highways England has detailed the rigorous testing process that the design has gone through at section 5 of this note (which included the input of independent professionals), and scrutiny within the detailed design stage is summarised at section 7.</p> <p>In light of this process, Highways England does not consider it necessary to include another review of the design by an independent panel. Highways England consider that this extra stage of scrutiny should be used for schemes that are complex or are in particularly sensitive areas such as Areas of Outstanding Natural Beauty. This is considered further at sections 6 and 8 of this note.</p>
<p><b>Whilst the applicant may only have limited choice in the physical appearance of some national networks infrastructure, there may be opportunities for the applicant to demonstrate good design in terms of siting and design measures relative to existing landscape and historical character and function, landscape permeability, landform and vegetation.</b></p>	<p>There is limited choice in the physical appearance of the structure of the Scheme. The structures are, as mentioned, constrained and Highways England is committed to being cost efficient with public funds.</p> <p>Despite these constraints, Highways England has committed to utilising opportunities for good design relative to the landscape. This has been done through the choice of materials and the form of the structures and associated landscaping have been selected to try</p>

Criteria for “good design” for national network infrastructure (pg.36 onwards of NPS NN – emphasis added)	How the M25 junction 28 Scheme has incorporated the NPS NN principles of “good design”
	to harmonise with the existing structures and landscape in the vicinity.
<p>Applicants should be able to <b>demonstrate in their application how the design process was conducted and how the proposed design evolved.</b> Where a number of different designs were considered, applicants <b>should set out the reasons why the favoured choice has been selected.</b> <b>The Examining Authority and Secretary of State should take into account the ultimate purpose of the infrastructure and bear in mind the operational, safety and security requirements which the design has to satisfy.</b></p>	<p>Highways England has briefly summarised how the design process was conducted and evolved in this note. There is consideration of the alternative options to the Scheme in section 3 of the Introductory Chapters of the Environmental Statement (<a href="#">APP-026</a>). This chapter also explains why the Scheme was chosen as the preferred option.</p> <p>The structures of the Scheme have been designed with the NPS NN in mind. The primary purpose of this Scheme, as is the purpose of all Highways England DCOs, is increasing public safety and improving the SRN for public use.</p> <p>Highways England has adhered to the principles of good design and will continue to do so throughout the detailed design stage.</p>

4.2.3 Highways England understands that the ExA is concerned primarily with the visual appearance of the structures of the Scheme, particularly bridges. Highways England notes that apart from the Maylands bridge, these bridges are not visible to the public in the main or at all.

4.2.4 Highways England has proposed that Maylands Bridge, Grove Bridge and Duck Wood Bridge will be steel beam bridges in keeping with the material used for existing bridges over the A12 at junction 28. Alder Wood Bridge is proposed as a precast concrete beam bridge. The choice of materials minimises their operational and construction footprints and minimises their impacts to the surrounding woodland and flood plain. The design and materials proposed for these bridges helps to minimise adverse impacts and ensures operational efficiency of the structures.

- 4.2.5 The orientation of the bridges aligns with the existing contours of the land and the design of tree planting and other landscape works would help to further assist in softening their visual appearance and integrate them into their surroundings. The bridges represent a balance between structural integrity, ensuring they are functional and cost efficient while taking account of their environmental impacts. Site specific constraints including the existing electricity pylons and existing flood plain have informed the design which is as sustainable and as aesthetically sensitive, durable, adaptable and resilient as it can reasonably be.

## 5. Review of design to date

- 5.1.1 As mentioned in the ISH1, the Scheme has been subjected to the review of its design on numerous occasions. The proposal had been developed through liaison with Highways England specialists and has been developed in accordance with feedback from the local interested parties.
- 5.1.2 Regular weekly meetings were conducted between the engineering and environmental teams, including landscaping experts, to ensure a thorough understanding across the teams of the potential constraints and opportunities for efficiencies. The environmental considerations fed into the design through these meetings and provided the opportunity to influence and develop a robust and visually appealing design proposal for the Scheme.
- 5.1.3 The collaborative approach allowed the team to draw on experienced team members across the UK and globally, whilst contributing to driving operational efficiencies for a more considered design by understanding of the environmental and engineering constraints and find appropriate solutions
- 5.1.4 Each design discipline has followed an internal four stage review process (Originate, Check, Review, and Authorise). This review flow is tracked and documented. Each review level has set objectives and procedures. At the end of the internal review, all full development design was independently reviewed by one or more Project Technical Reviewers, which were suitably skilled and experienced professionals not directly involved in the design production. Project Technical Reviewers skills are recorded so that the appropriate reviewers can be matched to a given project, based on its level of complexity and risks.
- 5.1.5 Notwithstanding the above, the Scheme has also been subject to an extensive pre-application process involving consultation and engagement with the local community. The findings of those consultations are contained within the Consultation Report (APP-022) which supports the draft DCO application and the aesthetic appearance of the Scheme has not been identified as a particular concern.

## 6. The A21 Scotney Castle green bridge

- 6.1.1 The ExA brought to the attention of Highways England the green bridge over the A21 from the Road to Good Design (page 16). Highways England agrees with the ExA that this bridge displays an extremely high finish and is extremely visually pleasing. The high cost of the A21 Scotney Castle green bridge was justified as it is in a particularly sensitive location and was designed to provide an ecological pathway and connectivity for protected species.
- 6.1.2 The A21 Scotney Castle green bridge was constructed as part of a Highways England improvement scheme for a new dual carriageway by-pass around Lamberhurst village, near Tunbridge Wells, Kent. The bridge is located within the High Weald Area of Outstanding Natural Beauty. The proposals concerned a 3.2km section of new road passing to the East of Lamberhurst village across open countryside, crossing the Teise valley and re-joining the existing A21 just below Spray Hill and Ruffets Wood. The National Trust, through its consultants, worked with Highways England to design the scheme with the inclusion of a green bridge. The green bridge enabled the West Drive, which was laid out in 1842, to be reinstated on its original line providing landscape and habitat connectivity.
- 6.1.3 Scotney Castle is widely recognised as one of the most important and complete 'Picturesque' landscapes of England, shaped by Edward Hussey III, incorporating the ancient castle and the 'new house' of 1837 - 43, and managed by his successors. In planning the new house, Edward also laid out his grounds and the new West Drive with the assistance of William Sawrey Gilpin, a renowned leader of the Picturesque movement. The gardens of the castle have been designated a Site of Special Scientific Interest. The green bridge provided the opportunity to avoid severance and the dislocation of the West Lodge and to maintain the presentation of the historic drive. The bridge is 92m long, 29m at narrowest point, 55m at widest.
- 6.1.4 It is for this unique landscape character, that the cost of this structure was deemed appropriate by Highways England. The green bridge was considered key for a unique historical purpose.
- 6.1.5 The Scheme is not comparable in terms of landscape with the area surrounding the A21 Scotney Castle green bridge. Highway England would not be able to justify such expenditure on this Scheme, and it is not feasible given the space constraints to design a bridge comparable to the A21 Scotney Castle green bridge in the space available to the Scheme.

## 7. Review process in detailed design stage

- 7.1.1 As set out in the response to LV 7.7 (REP5-041), during the detailed design stage, Highways England and the Principal Contractor would undertake a review of the design to ensure it complies with:
- the standards provided for in the Design Manual for Roads and Bridges, the Manual Contract Documents for Highway Works and any specific agreements entered into with interested parties;
  - the DCO as made; and
  - all other permissions, authorisations, agreements or similar made in connection with the Scheme.
- 7.1.2 The design would then be subject to the following design submission procedures and acceptance criteria:
- 7.1.3 Particulars of each element of the design would be submitted to the Project Manager for the Principal Contractor for acceptance and certification against the standards noted above at least 21 calendar days before carrying out the work relating to the design.
- 7.1.4 The Project Manager returns the certificate within 21 calendar days, endorsing either:
- accepted;
  - accepted with comments; or
  - not accepted.
- 7.1.5 Where the submission is accepted, the construction activities for that design element may proceed.
- 7.1.6 Where the submission is accepted with comments, the construction activities for that design element may proceed once methods of resolving the comments with the Project Manager are agreed.
- 7.1.7 Where the submission is not accepted, the Project Manager considers that there are areas where the submission fails to meet the requirements of the contract and the Scope. The design for such works would need to be resubmitted triggering a repeat of the above process.
- 7.1.8 The detailed design must be compatible with the preliminary design. Highways England must, under Requirement 3, build the Scheme in accordance with the preliminary design and is in discussion with relevant statutory bodies and others now as to the preliminary design which has been shaped through the consultation process and continues to be shaped as the application proceeds through examination. Any further consultation over the design will be in accordance with the DCO, for example under the Protective Provisions and the requirements, a number of which involve organisations other than Highways England as consultees.

- 7.1.9 During the consultation on the Scheme leading to the preliminary design which forms the Application in front of the ExA, landowners, community and environmental groups, members of the public and employer groups have had the opportunity to comment on and thereby influence the preliminary design. They continue to have that opportunity as the application progresses through the examination process. The opportunity to influence the detailed design is therefore through the examination of the preliminary design, and otherwise as provided for under the DCO.

## 8. DCO Requirement and A14 Cambridge and Huntingdon Improvement Scheme 2016

- 8.1.1 The ExA, at ISH3, proposed that Highways England should include a requirement in the DCO to subject the Scheme to an independent panel review, similar to a requirement included in the A14 scheme.
- 8.1.2 Highways England undertook to consider inserting this requirement into the DCO. Highways England has considered this and remains of the view that this is not necessary for this Scheme. The A14 scheme was the first Highways England DCO to be made, and this was before Highways England has established its own design panel.
- 8.1.3 The A14 scheme is also substantially different to the Scheme in terms of both the scheme itself, its location and its landscape and visual impacts.
- 8.1.4 The A14 scheme covers a much larger area of land than the Scheme. The A14 scheme involved the improvement and upgrading of a 23-mile length of strategic highway between Cambridge and Huntingdon, the widening of a 2-mile stretch of the A1 between Alconbury and Brampton, and the modification and improvement of the associated local-road network within this corridor. The A14 scheme itself, was complex as it involved the creation of a new 6-lane elevated highway across the Ouse flood plain and other sensitive areas of the countryside. In contrast, the Scheme is a localised improvement to a junction that is already in existence.
- 8.1.5 Secondly, in relation to the landscape, the A14 scheme was located in a more sensitive area. It runs across the Ouse flood plain which is an area that had much support to be designated an Area of Outstanding Natural Beauty. The importance of the context of the landscape was apparent through the numerous concerns raised by interested parties, particularly the South Cambridgeshire District Council and Campaign for Better Transport. The aesthetic appearance of the Scheme has not been identified as a particular concern from the numerous rounds of consultation.
- 8.1.6 Lastly, the A14 scheme was predicted to have greater landscape and visual impacts, even after mitigation measures than the Scheme. The severity of the residual landscape and visual impacts was a focus of the examination and resulted in the additional requirement for review of the design from an independent panel. Highways England has minimised landscape and visual impacts of this Scheme, and continues to do so as seen by the further proposed changes to landscape mitigation measures to improve the impacts faced by Grove Farm.
- 8.1.7 The A14 scheme is a unique scheme due to specific factors in relation to the scheme and location, as well as the fact that Highways England processes for DCO development had not been fully established at the time of the A14 DCO approval. No other Highways England DCO includes this requirement and Highways England does not consider this Scheme to be sufficiently different to those to warrant such a deviation to precedent.

## 9. Conclusion

- 9.1.1 Highways England remains strongly of the view that a separate requirement to impose an independent panel review of the Scheme is unnecessary and that an independent panel review would not bring about substantial design changes.
- 9.1.2 A number of project technical reviewers from Atkins, not directly involved in the design production have reviewed the proposed Scheme design, working with Highways England, providing professional advice on the design aspects and ensuring good design principles are embedded into the infrastructure proposals.
- 9.1.3 Road safety auditing and Construction Design and Management Coordinator roles have been carried out, providing further independent advice. Furthermore, wide consultation has been carried out with a range of stakeholders and interest groups that has influenced the proposed design and has not raised the visual appearance of the Scheme as a concern.
- 9.1.4 In relation to this Scheme, Highways England considers further independent review, beyond that described, is not necessary due to the level of professional input into the development of the scheme and consultation that has influenced the scheme design.

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