

## 4 Main alternatives

### 4.1 Introduction

4.1.1 This chapter outlines the main alternative scheme options that have been considered during development of the A14 Cambridge to Huntingdon improvement scheme, following the withdrawal in 2010 of the A14 Ellington to Fen Ditton scheme over questions of affordability.

#### Recent scheme history

4.1.2 Following withdrawal of the earlier scheme it was recognised that a solution was still needed to the growing problem of traffic congestion in the trunk road corridor between Huntingdon and Cambridge. In late 2011, the Department for Transport (DfT) commissioned a multi-modal study (the A14 Study) to identify 'cost-effective and practical proposals which bring benefits and relieve congestion' through the A14 corridor between Cambridge and Huntingdon. Over a period of 12 months, the study examined options for addressing traffic congestion and resilience in the A14 corridor, together with road safety and sustainability issues.

### 4.2 A14 Study (Department for Transport 2011 – 2012)

4.2.1 One of the purposes of the A14 Study was to generate and sift options for addressing the transport issues along the A14 corridor and to recommend a shortlist. The A14 Study identified a range of measures which were divided into a public transport package, a rail-freight package and a road package.

#### A14 Study Outputs

4.2.2 Output 1 provided an analysis of the current and future transport issues in the A14 corridor between Huntingdon and Cambridge. It considered the current issues and priorities and assessed the impact of growth, in terms of traffic movement and the wider socio-economic and environmental issues. Output 2 comprised the identification and review of possible transport options in the A14 corridor, the initial sifting of these options, the shortlisting of more suitable options, and the production of a strategic outline business case. A long-list of options was prepared, which included on-line widening of the existing trunk road, off-line highway improvements including northern and southern bypasses of Huntingdon and a southern bypass of Cambridge, junction modifications, public transport improvements, rail freight improvements, and travel demand management schemes. Output 3 comprised an appraisal of the shortlisted public transport, rail freight and highway packages identified in the previous stage of the study. More detail on these packages is provided in the following section.

### 4.3 A14 Study packages

#### Public transport package

4.3.1 The public transport package involved a park and ride site at Alconbury, a new local bus service between Cambridge city centre, Bar Hill and Cambridge Science Park as well as an express bus service between Peterborough and Cambridge. However, the A14 Study showed that the

public transport package in itself would not be sufficient to address issues of congestion along the A14 corridor, since it was forecast to result in only a one to two per cent increase in public transport trips within the study area.

### Freight package

- 4.3.2 The package of freight measures was aimed at reducing heavy goods vehicle (HGV) traffic on the A14 by encouraging transfer of freight movements from road to rail. The recommended freight package was forecast to reduce HGV traffic in the core study area by up to 11%, which would offset 60 to 80 per cent of the forecast growth in HGV traffic on the A14 between 2011 and 2031. It was therefore assumed the freight package would be implemented in order to create the baseline for assessing the highway packages as part of the A14 Study. These schemes have all been included within Network Rail Control Period 4 or 5. To date, the Ipswich Chord has been constructed. Other measures to enhance rail capacity on the Felixstowe to Nuneaton rail line are programmed during the Network Rail Control Period 5 (2014 to 2019). These will include double tracking near Ely and some passing loops and signalling re-modelling at Ely station. In addition, as part of Midland mainline electrification, some re-modelling of the track layout at Leicester is proposed during the same period. The predicted modal shift of freight from road to rail was included in the traffic forecasts used in the testing of the roads packages in the A14 Study.

### Roads package

- 4.3.3 A long-list of options was considered in the A14 Study; these included: on-line widening of the existing trunk road, off-line highway improvements including northern and southern bypasses of Huntingdon and a southern bypass of Cambridge, junction modifications and travel demand management schemes. These were evaluated against the following ambitions set out in relation to the alleviation of transport problems in the A14 corridor around Cambridge and Huntingdon:

- reduction of lost productive time;
- supporting the growth of the wider UK economy;
- supporting the growth of Greater Cambridgeshire;
- improving access to labour markets;
- improving quality of life and welfare;
- reducing the number of accidents on the A14; and
- reducing air quality and noise impact.

- 4.3.4 As a result of this evaluation process, six highway options emerged (*Figure 4.1*). Further appraisal of these options against economic, environmental and social and community criteria was carried out as part of the study. The environmental appraisal was carried out in accordance with methodology set out in DfT Transport Analysis Guidance (TAG):

<https://www.gov.uk/transport-analysis-guidance-webtag>

- 4.3.5 The main elements of the six options (titled Options 1 – 6) are outlined in *Table 4.1*, along with an outline of the key environmental issues relating to each option and the decisions made regarding each of those options.
- 4.3.6 The best-performing highway options were those which:
- were larger, thereby offering solutions to a greater number of problems, including congestion between Girton to Huntingdon, impacts on Huntingdon town centre and congestion at Spittals roundabout;
  - provided a full Huntingdon Southern Bypass (HSB) and local access roads between the HSB and Girton; and
  - enhanced the Cambridge Northern Bypass.
- 4.3.7 However, the appraisal was less clear-cut on the issue of retention or downgrading of the existing A14 alignment through Huntingdon. Whilst the monetised elements of the appraisal tended to support retaining the existing route, most of the non-monetised elements were more favourable with regard to downgrading the existing A14.

### **Tolling**

- 4.3.8 In June 2012 the government indicated that the proposed scheme might be part-funded through tolling. In response, the scope of the final stages of the A14 Study was broadened to include consideration of whether a highway option existed which was both beneficial in economic, environmental and social terms, and which could be partly self-funding through the application of a toll.

### **Discounting of options and the emergence of Option 7**

- 4.3.9 Following assessment of the six shortlisted options as part of the A14 Study, Options 3 and 5 were identified as the two best un-tolled options, based on the economic and environmental appraisal presented in the *A14 Study Output 3 - Package Testing & Appraisal* report (Department for Transport, November 2012).
- 4.3.10 Option 3 and Option 5 were identified as offering the best overall solutions and providing the best value for money as:
- Option 3 offered the best route around Huntingdon and enabled the A14 to be de-trunked through the town.
  - Option 5 included the most effective solution for dealing with local traffic between Huntingdon and Cambridge.
- 4.3.11 The key differences between these two options were that Option 5 retained the A14 viaduct over the East Coast mainline railway (Huntingdon A14 Viaduct) for strategic traffic to and from the A1(M) going north, whilst Option 3 removed the viaduct and downgraded the A14 through Huntingdon to county road status.
- 4.3.12 Due to the need to provide a scheme that performed well in economic, environmental and social terms, the best performing aspects of Options 3 and 5 were combined to provide a seventh option which offered an effective

- tolled scheme. In essence this was Option 5 but with Huntingdon A14 Viaduct removed as per Option 3 and inclusion of a tolled component.
- 4.3.13 Option 7 built upon the key characteristics identified by the study as contributing to the most successful end-to-end solution and included:
- a dual-carriageway bypass to the south of Huntingdon, from Brampton Hut to Trinity Foot;
  - on-line widening of the existing A14 from Fen Drayton to Girton;
  - local access roads from Fen Drayton to Girton;
  - realignment of the Girton interchange to provide improved free-flow movements;
  - enhancement of the Cambridge Northern Bypass from Milton to Girton;
  - de-trunking of the existing A14 through Huntingdon and removal of the A14 viaduct over the railway; and
  - a replacement local road network in Huntingdon to retain local access.
- 4.3.14 Option 7 was further refined and modelled as per the previous six options. The modelling showed that the proposed Option 7 achieved the strategic aims of the road regarding reduction of congestion on the A14 and local roads, and a positive impact on safety. Additionally, this option had a positive impact on the centre of Huntingdon, due to the removal of the road viaduct and the environmental and socio-economic opportunities that this presents.
- 4.3.15 Option 7 therefore emerged from the A14 Study as the preferred option to be taken forward into more detailed development. This option is also illustrated in *Figure 4.1*. The environmental issues relating to the options emerging from the A14 Study were considered as part of that study. For completeness, a summary of key environmental issues associated with Option 7 is presented in *Table 4.1*, alongside those for Options 1 to 6.
- 4.3.16 For further information on the options, refer to the A14 Study Output 3: Package Testing and Appraisal Report (Atkins/Department for Transport November 2012) which is available at:
- [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/15238/3b-package-testing-and-appraisal-v6-1.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/15238/3b-package-testing-and-appraisal-v6-1.pdf)
- 4.3.17 A paper copy is obtainable from the Highways Agency at the address given in *Chapter 1*.
- 4.3.18 It should be noted that potential toll revenue was not a significant factor in the decision to remove the Huntingdon A14 viaduct. The removal of the structure was included as part of Option 7 on the basis that its retention would be a constraint to local regeneration and economic development and would be in conflict with the local plans.
- 4.3.19 As stated above, the options defined as part of the A14 Study (Options 1 to 7) were the subject of an environmental appraisal as part of the study

process. Because these options have previously been assessed and reported, they are not revisited in detail in this *Environmental Statement (ES)* but *Table 4.1* provides a summary of the key environmental issues and outcomes for these options. Therefore the main alternatives for the purpose of this assessment are those arising from the review and further preliminary design carried out as part of the development of the scheme between December 2013 and November 2014, as set out in paragraphs 4.5 onwards.

**Table 4.1: Shortlisted highway options from Department for Transport A14 Study, including Option 7**

	Key elements of option	Outline of key environmental issues <sup>1</sup>	Decision outcomes
Option 1	Improvement of Cambridge Northern Bypass, enhancement of Girton interchange, and the provision of local access roads between Girton and Trinity Foot. Retention of the existing A14 trunk road between Trinity Foot and Ellington.	No significant change in air quality in Huntingdon. Slightly adverse effect on landscape; neutral effect on townscape and a moderately adverse effect on heritage. Neutral effect on biodiversity (no impacts on designated sites).	Option discounted as, although cheaper, was forecast not to resolve many of the problems experienced in the A14 corridor. Also discounted as it retained the Huntingdon A14 Viaduct.
Option 2	No improvement of Cambridge Northern Bypass, limited enhancement of Girton interchange, on-line widening and new junctions between Trinity Foot and Girton. Construction of dual three lane Huntingdon Southern Bypass between Trinity Foot and Ellington with A1 junction at Brampton. De-trunking of bypassed sections of A14 and removal of the A14 viaduct across the East Coast mainline railway.	71% reduction in traffic emissions affecting air quality in Huntingdon. Large adverse effect on landscape from Huntingdon Southern Bypass and its impact on the Great Ouse valley. Slightly beneficial effect on townscape in Huntingdon from removal of the Huntingdon A14 Viaduct. Moderately adverse impact on heritage through visual intrusion at Offord Cluny Conservation Area and potential impact on buried archaeological remains. Slightly beneficial to Fenstanton Conservation Area. Moderately adverse impact on biodiversity, resulting from loss of habitat along Huntingdon Southern Bypass.	Discounted on the basis that online widening between Trinity Foot and Girton performed less well than local access roads at reducing delays and emissions.
Option 3	Improvement of Cambridge Northern Bypass, limited enhancement of Girton interchange, on-line widening and new junctions between Trinity Foot and Girton. Construction of dual three lane Huntingdon Southern Bypass between Trinity Foot and Ellington with A1 junction at Brampton. De-trunking of bypassed sections of A14 and removal of the Huntingdon A14 Viaduct.	71% reduction in traffic emissions affecting air quality in Huntingdon. Landscape, townscape, heritage, and biodiversity effects similar to those for to Option 2.	This option generated relatively high benefits and costs, with a lower benefit-cost ratio than Option 5. However, the removal of the A14 Viaduct in Huntingdon resulted in considerable improvements in air quality in Huntingdon which were not captured in the monetised cost-benefit analysis. More positive elements were taken forward into Option 7.

<sup>1</sup> These environmental effects are summarised from appraisal information set out in Atkins (November 2012). A14 Study: Output 3, Package Testing & Appraisal Report. Department for Transport.

	<b>Key elements of option</b>	<b>Outline of key environmental issues<sup>1</sup></b>	<b>Decision outcomes</b>
<b>Option 4</b>	Improvement of Cambridge Northern Bypass, limited enhancement of Girton interchange, on-line widening and new junctions between Trinity Foot and Girton. Construction of dual two lane Huntingdon Southern Bypass between Trinity Foot and Ellington (no junction with A1). Existing A14 past Huntingdon retained.	30% reduction in traffic emissions affecting air quality in Huntingdon. Landscape, heritage, and biodiversity effects as Option 2. Neutral effect on townscape as route through Huntingdon is retained. Moderately adverse effect on heritage (as Option 2).	Discounted on the basis that online widening between Trinity Foot and Girton performed less well than local access roads at reducing delays and emissions. Also discounted as it retained the Huntingdon A14 Viaduct.
<b>Option 5</b>	Improvement of Cambridge Northern Bypass, full enhancement of Girton junction, on-line widening and new junctions between Trinity Foot and Girton, together with new local access road. Construction of dual two lane Huntingdon Southern Bypass between Trinity Foot and Ellington (no junction with A1). Existing A14 past Huntingdon retained.	30% reduction in traffic emissions affecting air quality in Huntingdon. Landscape, heritage, and biodiversity effects as Option 2. Neutral effect on townscape as route through Huntingdon is retained. Moderately adverse effect on heritage (as Option 2).	This option performed well in benefit-cost analysis. However, the retention of Huntingdon A14 Viaduct was determined to have greater social and environmental costs not captured in the benefit cost analysis. More positive elements of the option were taken into Option 7.
<b>Option 6</b>	Improvement of Cambridge Northern Bypass, enhancement of Girton junction to enable free-flow. A428 widening to dual four lane carriageway between Girton and Caxton Gibbet. A1198 widened to dual three lane carriageway north of Caxton Gibbet to intersection with dual two lane Huntingdon Southern Bypass, which continues west to Ellington with junction onto A1 at Brampton. Existing A14 de-trunked between Girton and A1/A1(M).	68% reduction in traffic emissions affecting air quality in Huntingdon. Large adverse effect on landscape (as Option 2, but also impacts the settlements of Offord Cluny, Buckden and Brampton). Affects three registered parks and gardens in the A428 corridor. Effects on townscape as Option 2, but with moderately adverse effect on Papworth Everard. Effects on heritage as Option 2, but additional potential adverse effects on two scheduled monuments near A1198 and Madingley Hall historic mansion. Moderately adverse effect on biodiversity as A428/A1198 is within 1km of three ancient woodland and 4 SSSI sites.	Discounted on the basis that it was forecast to offer low value for money. The option would generate fewer benefits than the other options, but have a high cost.

	<b>Key elements of option</b>	<b>Outline of key environmental issues<sup>1</sup></b>	<b>Decision outcomes</b>
<b>Option 7</b>	Tolled between Ellington and Swavesey. Improvement of Cambridge Northern Bypass. Dual 3 lane carriageway Huntingdon Southern Bypass between Swavesey and Brampton. Dual 2 lane carriageway from Brampton to Ellington. Single carriageway local access roads between Trinity Foot and Girton. Full enhancement of Girton interchange. Huntingdon A14 Viaduct removed and bypassed sections of A14 from Brampton Hut to Swavesey de-trunked.	The change in traffic emissions affecting air quality in Huntingdon specifically was not quantified. However, it is likely to be a large reduction of the order seen for Options 2, 3, and 6 due to the removal of the Huntingdon A14 Viaduct and de-trunking: i.e. possible 71% reduction in traffic emissions affecting air quality in Huntingdon. Landscape, townscape, heritage, and biodiversity effects largely as with Option 2.	This option was selected as the proposed option in the A14 Study on the basis that it had a higher benefit-cost ratio than the other options that included removal of Huntingdon A14 Viaduct (Options 2, 3 and 6). Removal of the viaduct provides significant benefits to Huntingdon town centre and other settlements along the de-trunked A14, particularly reduced congestion and improved air quality.

#### 4.4 Development of Options 7A and 7B

- 4.4.1 The Highways Agency's Options Phase (options identification and option selection) began in late 2012 and continued for approximately one year, to December 2013, following the A14 Study and the decision to take forward Option 7. The conclusions from output 3 of the Department for Transport's A14 Study formed the basis for developing the A14 Cambridge to Huntingdon improvement scheme during the Options Phase.
- 4.4.2 When the scheme entered the Highways Agency's programme, an initial review of the scheme design was undertaken at the start of the Options Phase work. The purpose of the review was to confirm that the broad design concept of Option 7, as defined, was an appropriate starting point for the Options Phase. The review focused on the appropriateness of the overall extent of the scheme, forecast traffic flows and volume / capacity ratios on a link by link basis and also on weaving issues between junctions.
- 4.4.3 The design review concluded that the design of Option 7 was broadly sound, but that the standard of the A14 mainline between Swavesey and Bar Hill should be increased to three lane dual carriageway (from dual two lane in Option 7) and between Bar Hill and Girton should be increased to four lane dual carriageway (from dual two lane in Option 7). This revised option became known as Option 7A. The key environmental issues for Option 7A are equivalent to those for Option 7, set out in *Table 4.1*.
- 4.4.4 Following on from the identification of Option 7A, a value engineering exercise was undertaken which looked specifically at junctions along the scheme and at the cross-section. Various refinements were made to this scheme which included junction and access arrangements, crossings for local access vehicles and public rights of way and the proposed tolling aspects of the scheme. The value engineered option also incorporated online widening of the A1 between Brampton Hut and Alconbury. The refined option became known as Option 7B.
- 4.4.5 The Highways Agency carried out a public consultation in autumn 2013 on Options 1 to 7. *Chapter 5* provides more information on consultations.

#### 4.5 Decision not to toll

- 4.5.1 Tolling proposals generated significant opposition from both the public and politicians, which became particularly apparent during the consultation in autumn 2013. In December 2013, the Government announced that plans to toll the A14 would be dropped and that the scheme would continue to progress using Central Government and Local Authority funding.
- 4.5.2 As a result of this decision, the Highways Agency re-evaluated the Business Case for the then proposed scheme alongside the alternatives previously considered. Of the alternative schemes, one alternative (Option 5A, a minor variant of Option 5) was similar to the proposed scheme but was approximately £200 million lower in cost. Option 5A would provide a dual two-lane southern bypass around Huntingdon but would retain the existing A14 corridor through the town for traffic from the A14 to the A1(M) North (and vice versa). Whilst Option 5A would offer higher value for money than the proposed scheme, it would only offer short term relief of

congestion and would require further improvements to provide additional capacity within 10 to 15 years. These would be likely to include additional lanes on the Huntingdon Southern Bypass, a junction between the bypass and the A1, and speed restrictions on the A14 through Huntingdon. The likely cost of the potential future upgrade would be at least £200 million at today's prices.

- 4.5.3 In addition, local authorities in Huntingdon and Cambridgeshire have stated that they would not support any scheme which retained the A14 viaduct over the East Coast mainline railway as it would constrain local regeneration and economic development and is therefore in conflict with their Local Plans. Promoting Option 5A would therefore put the £100 million local authority contribution at significant risk.
- 4.5.4 As part of the business case re-evaluation the Highways Agency also reconsidered the environmental benefits of the two options. The key difference between the two options is the retention of the A14 through Huntingdon. On the basis of an environmental appraisal exercise of the scheme options, it was clear that the key environmental differences between the two schemes were those relating to traffic flow (air quality, noise and to a limited extent water) and the townscape/landscape effects around removal of the A14 Huntingdon viaduct.

#### **Summary of 5A/7B environmental appraisal**

- 4.5.5 Option 7B, by removing A14 through traffic from Huntingdon town centre and the existing A14 west of Fen Drayton would have potential beneficial effects on sensitive receptors in Huntingdon and at other locations on the A14. These include Portholme special area of conservation (SAC), south of Huntingdon town centre, the air quality management areas (AQMAs) in Huntingdon and between Huntingdon and Fen Drayton, and listed buildings close to this section of the A14.
- 4.5.6 Option 7B has potential adverse impacts on the setting of the scheduled monuments at Mill Common and Huntingdon Castle. Detrunking would reduce the traffic through Huntingdon Conservation Area and therefore have a beneficial impact; however, this would be partially offset by possible adverse impacts from the proposed revised road layouts in this area of Huntingdon.
- 4.5.7 Option 5A, whilst avoiding local impacts in Huntingdon town centre from the proposed new road layout forming part of Option 7B, would not achieve the direct benefits of the latter option on significant receptors including the Huntingdon and Huntingdon to Fen Drayton AQMAs, Portholme SAC and Hemingford Grey Meadow site of special scientific interest (SSSI) and listed buildings close to the current A14. It would also not achieve the potential legacy benefits of Option 7B in the town centre area deriving from the complete removal of A14 through traffic and demolition of the Huntingdon Viaduct.
- 4.5.8 Landscape, biodiversity (other than air quality related impacts), noise, cultural heritage and water impacts are common to both options along the line of the proposed HSB, and of a similar scale. Air quality impacts along this section of Option 5A would be lower than Option 7B due to lower traffic

flows. On balance, although both options give rise to similar adverse impacts in some areas, particularly the proposed HSB, it is considered that Option 7B has the potential to achieve more beneficial effects on key receptors along the section of existing A14 that would be detrunked as part of this option.

#### 4.6 Early 2014 design review

4.6.1 A thorough review of all elements of the scheme was undertaken in early 2014, with the aim of challenging the previous engineering basis. Numerous potential opportunities to modify the layout were identified and assessed with consideration for comparative merits of each opportunity. The design changes that were incorporated in January 2014 as part of this process are listed in *Table 4.2* below.

**Table 4.2 Key design changes incorporated at January 2014:**

Description	Reason for inclusion
Employ parallel asymmetric widening of the A1 on east side with landtake.	Speed and ease of construction, simpler traffic management and construction safety.
A review of the need for a roundabout at old A14/Barns Lane junction concluded that it was not required.	Roundabout removed, existing junction retained as traffic figures have required that local access road from Swavesey remains dual carriageway, rather than the short single carriageway section in the inherited design.
Moving some of the local roads online through use of parallel, asymmetric widening from Fen Drayton to Bar Hill and symmetrical widening from Bar Hill to Girton.	Simplified construction.
Three span overbridges, with no central support in the central reserve, are included.	Cost reduction and aesthetic considerations.
A1198 Ermine Street Junction now shown off-line.	Simplified construction and shortened programme.
Amended Swavesey Junction included.	Design development including improved layout of the slip roads beneath the dumbbell roundabout. Provides a NMU link directly into the business park using the existing bridge earthworks and successfully separates Cambridge Services traffic from local access road traffic.
Amended Bar Hill Junction is included.	Design development including changes to the layout on the southern side of the junction which include a new access route to Bar Hill that removed the need for a Departure from Standard on the Westbound off-slip road and re-use the existing structure.
Cambridge Northern Bypass to be asymmetrically widened on northern side rather than within existing land.	Speed and ease of construction. Reduce impacts on south side.

- 4.6.2 Each proposed change to the inherited design (Option 7B), was appraised for its potential impact on environmental receptors as part of the review process. In this regard the most significant changes were:
- asymmetric widening of the A1, which gives rise to increased loss of roadside vegetation and habitat, and requires additional culverting and realignment of watercourses;
  - asymmetric widening between Fen Drayton and Bar Hill, leading to increased loss of existing vegetation alongside existing A14;
  - Ermine Street bridge offline, giving rise to increased loss of trees from an adjacent group tree preservation order (TPO); and
  - additional slip into Cambridge Services as part of revisions at Swavesey junction giving rise to additional land take and vegetation loss.
- 4.6.3 The reasons for the decisions to incorporate these design changes were as set out in *Table 4.2* and took into account the environmental effects set out in that table and *paragraph 4.6.2* above.

## 4.7 The April 2014 scheme

- 4.7.1 The scheme presented at the public consultation during spring 2014 retained the key elements of Option 7B, with amendments key parts of which are outlined above. It also included further refinements at some junctions. These were developed as the result of testing of junction performance against predicted traffic flows.
- 4.7.2 Up until January 2014, the design under development had involved the separation of the A14 and A1 carriageways at Brampton because that layout had allowed for tolling. However, following the Government's decision in December 2013 not to toll the proposed scheme, the design in this area was reviewed and an alternative layout was developed. This layout involved the A14 crossing the A1 near Brampton Hut on an elevated section of road.
- 4.7.3 Due to clear construction and operational benefits this layout was subsequently adopted as part of the scheme and formed part of the April 2014 scheme design as presented in the A14 Cambridge to Huntingdon improvement scheme spring 2014 consultation material. The layout was considered to make best use of the existing A1 infrastructure and would avoid the need for construction adjacent to live traffic, improving safety for construction workers, and removing the need for speed restrictions during construction of this section. Improved connection for pedestrians, cyclists and equestrians between Brampton and the Brampton Hut Services and Brampton Woods was another potential benefit.
- 4.7.4 A comparison of the potential environmental impacts of the two alternatives was carried out as part of the design review process. This concluded that for most environmental topics the effects would be of similar significance with both layouts. It identified potential reduced adverse impacts with regard to noise, landscape, nature conservation and all travellers arising

from the revised layout, with potential for increased adverse impact under the materials heading due to an increased fill requirement.

#### 4.8 Changes arising from ongoing preliminary design

4.8.1 Development of the scheme continued through 2014. A review process was put in place to assess potential changes arising from responses to the April 2014 consultation and from the ongoing preliminary design process. This considered changes on the basis of potential benefits and disadvantages in engineering, safety, traffic and environmental terms, by comparison to the April 2014 scheme, as well as effects on scheme cost and programme. The process led to a number of further changes being adopted. Most of the changes were relatively modest in nature, typically due to affected land owners requesting detail changes to reduce the impact of the scheme on their land usage. Others included refinements to junction layouts to improve traffic flow and safety.

##### Design changes incorporated

4.8.2 The main changes to the scheme made as a result of this process, and the reasons for them, are summarised below. The decision to incorporate each design change described below took into account the environmental effects and other considerations referred to in the preceding paragraph and in the paragraphs below.

##### *River Great Ouse Viaduct*

4.8.3 The river Great Ouse is a large waterway in a low river valley which is regularly used for navigation and recreational activities, and also supports aquatic and non-aquatic wildlife along the riverside.

4.8.4 In July 2014, the Environment Agency provided a new flood model for the river Great Ouse catchment, and requested that this be used as the basis for flood modelling and risk assessment for the scheme. Results from this process showed that the then proposed configuration of the viaduct and associated embankments across the Great Ouse floodplain would give rise to unacceptably high flood risk upstream from the crossing. As a result the crossing was reviewed, and a new design developed. Key aims of the design review were to

- Stay within the original scheme footprint in this location;
- maintain the existing vertical alignment to avoid increasing visual and noise impacts associated with the structure; and
- retain the general form and proportions of the viaduct structure.

4.8.5 The revised design for the river Great Ouse crossing now consists of two viaduct structures separated by a small 'island' earthwork with an associated attenuation pond to facilitate surface water drainage and allow the original vertical and horizontal alignments to be maintained. Environmental appraisal of the changes was carried out as part of an iterative design process. The key differences in environmental terms are summarised below.

- The revised arrangement reduces the potential flood risk from a 1 in 100 year event to within parameters acceptable to the Environment Agency;
- The additional structure provides more open views up and down the valley for users of the Ouse Valley Way recreational route west of the river; and
- The more open configuration allows increased opportunity for wildlife movement along the east side of the river valley.

#### *Changes to flood compensation areas*

- 4.8.6 The size and number of flood compensation areas to be excavated has increased due to the provision of updated flood models from the Environment Agency, which showed greater potential flood impact than had previously been advised. Besides reduction of flood effects, other key considerations included land use and landscape.

#### *Alignment and level changes at Brampton Hut to Brampton interchange*

- 4.8.7 The line of the A14 running east from Ellington has been modified to avoid taking land from the corner of the Brampton Hut service area. The line of the A1 has been modified to facilitate visibility of a gantry positioned to the south of the A1/A14 crossing. The modifications have led to local increases in the proposed road level of up to 0.9m on the A1 and 0.8m on the A14. The implications for noise levels and effects on air quality, landscape and visual impacts were considered to be not materially different from the original design. This was taken into account in the decision to incorporate this design change.

#### *Changes in Huntingdon at Mill Common*

- 4.8.8 The Pathfinder Link, connecting the Huntingdon Ring Road to the A14, has been modified to reduce land take from Mill Common, reducing impacts on land use, townscape and cultural heritage. A proposed roundabout has been replaced with a signalised junction allowing the link to be moved closer to the existing Mill Common road.

#### *Changes at Ermine Street crossing*

- 4.8.9 The proposed Ermine Street crossing of the A14 has been moved from the west of the existing A1198 to the east side in order to reduce impact on land holdings. Environmental issues including landscape and visual impacts and nature conservation were considered to be not materially different from the original design. This was taken into account in the decision to incorporate this design change.

#### *Changes at Swavesey junction*

- 4.8.10 A northbound off slip road linking in to the services roundabout has been introduced to reduce the distance traffic would need to travel to access the services. The link between the service roundabout and the Swavesey junction southern roundabout has been moved closer to the A14. This facilitates an improved non-motorised user (NMU) bridge which crosses the realigned link road reducing the number of at-grade pedestrian movements. Environmental issues, including effects on pedestrians and others,

landscape and visual impacts, and effects on land use, were considered to be not materially different from the original design. This was taken into account in the decision to incorporate this design change.

#### *Changes at Bar Hill*

- 4.8.11 A dual carriageway link heading north on Hattons Road has been extended to improve access for the future construction of a highway linking the future Northstowe development to the Bar Hill junction. Further information on predicted traffic flows from the future development of the Northstowe site has led to changes to the form of the Bar Hill junction. The loop connector road to the west of Hattons Road has been removed and the loop to the east is now signalised. The decision to incorporate this design change included consideration of land use, landscape, cultural heritage and the water environment. Findings showed no material difference between the original design and the proposed change.

#### *Improved NMU provision at Bar Hill*

- 4.8.12 The NMU provision at Bar Hill Junction has been improved through development of the design including developing the design of the bridge carrying the NMU route crossing of the A14 and south facing slip roads. One connector road from the local access road to the B1050 Hatton Road has been designed out and the NMU crossing of the remaining link is now signal controlled with central pedestrian reserves. The crossing of Saxon Way is also improved with a pedestrian reserve on the splitter island. An NMU link has been added to the rear of the service area connecting Bridleway 16/1 to Footpath 150/5. The decision to incorporate this change considered the requirements of pedestrians and other NMUs, and also took into account design aesthetics and effects on land use, views and the landscape. The proposed change offered slight improvements for NMUs relative to the original design, and other effects were considered to be not materially different from the original design.

#### *Changes at Girton interchange*

- 4.8.13 A link from the nearside of the M11 southbound link to an eastern roundabout on the local access road has been introduced in place of the offside diverge from the A14, connecting into Huntingdon Road further south. Environmental issues, including effects on pedestrians and others, landscape and visual impacts, and effects on land use, were considered to be not materially different from the original design. This was taken into account in the decision to incorporate this design change.

#### **Bridge and viaduct options considered**

- 4.8.14 The designs of all bridges and viaducts have been subject to an optioneering process. Environmental considerations have been reviewed as part of this process and taken into account in decisions on the different alternatives. The environmental issues in general centred on aesthetics, and landscape and visual effects, although all topics were considered.

Key structures options considered are described below.

### *Huntingdon Southern Bypass overbridges*

- 4.8.15 For the overbridges along the proposed new section of the A14, the Huntingdon Southern Bypass, the optioneering has focused around the design of abutments, considering whether it would be advantageous to incorporate 'open abutments' as opposed to 'closed abutments'. The general approach adopted for the overbridges is to provide open abutments. This type of structure incorporates sloping embankments below the bridges, up to the edge of the carriageway, and small abutments and has more pleasing aesthetics.

### *Possible green bridge*

- 4.8.16 Suggestions were made regarding the possible benefits of including a 'green bridge' as part of the scheme, particularly at the Silver Street crossing. Consultees suggested there could be landscape and/or ecology benefits from this. The potential benefits of this were considered in both nature conservation and landscape terms, but the conclusions were that any benefits that might arise were relatively limited and could not justify the significant additional cost of a green bridge structure. Landscape and nature conservation issues are considered in more detail in *Chapters 10 and 11* of the *ES*.

### *River Great Ouse Viaduct*

- 4.8.17 In addition to the design change incorporated in the current design, described in the preceding section, consideration was also given to the form of the bridge or viaduct structure.
- 4.8.18 The objective for the design was to protect and enhance the navigational, recreational and nature conservation features of the Ouse by designing a structure that would remain as environmentally unobtrusive as practicable, when viewed from the surrounding area, and which also would allow unobscured views of the flat open countryside from the A14. For this reason, options such as arches or long spans with deep and obtrusive beams were avoided. Various span arrangements were considered before settling on a medium span solution. The detail design of the structure would focus on developing a simple, yet elegant, solution through careful detailing of its components, such as the beams along the edges of the structure and the supporting piers.

### *Non-motorised user bridges*

- 4.8.19 One of the scheme objectives is to provide safe local access for NMUs, including pedestrians, cyclists and equestrians. As such, rather than using road crossings, separate NMU bridges are proposed at Swavesey and Bar Hill junctions. Because they would need to span both the A14 and the slip roads, they would be very noticeable major structures which would have the potential to form landmarks.
- 4.8.20 The ambition for the bridge at Swavesey is for it to form a landmark and to create a destination, particularly for potential circular NMU routes, encouraging use by pedestrians and cyclists.

- 4.8.21 The ambition for the bridge at Bar Hill is also to form a landmark to identify the last junction before the Cambridge Northern Bypass, the new Northstowe development and Bar Hill.
- 4.8.22 Truss, arch and cable supported structure options have been amongst the alternatives considered for both bridges. The selection of the proposed structures considered the requirements of pedestrians and other NMUs, and also took into account design aesthetics and effects on land use, views and the landscape. One of the design aims was to form a landmark and create a destination, thus encouraging use by pedestrians and cyclists. The bridge at Swavesey junction is now proposed to be a suspension bridge with a double curve in plan, while the bridge at Bar Hill is proposed to be a cable stayed bridge, with a single curve in plan. Both designs would continue to be developed during detail design.

## 4.9 Borrow pits

- 4.9.1 Earthworks calculations have identified a shortfall of fill material of approximately 5 million m<sup>3</sup>. This section details the different options that were considered to provide this additional material.

### *Imported fill*

- 4.9.2 Other sources of fill may be available at the time of construction, including surplus materials from other construction projects, industrial by-products such as PFA or commercial clay pits or quarries.
- 4.9.3 Depending on the location of such sources, importing fill could increase the traffic movements on the local roads and would involve additional transportation costs compared to sourcing material locally from borrow pits. However, these sources of potential material are uncertain at the preliminary design stage and have not been included in likely worst case for the assessment of the scheme.

### *Disused airfields near the route*

- 4.9.4 Several disused airfields exist near the proposed route, including former RAF Alconbury and RAF Oakington. Cambridgeshire County Council (CCC) has advised that these sites are earmarked for redevelopment in the near future and so the structures and runways would need to be removed. The pavement and sub-layers of the runways could well be suitable as a sustainable source of recycled earthworks fill or capping. The volume available is estimated to be of the order of 0.5 million m<sup>3</sup>. At this stage the use of recycled airfield pavement material is identified as an opportunity, but the preliminary earthworks strategy has been designed not to rely on it for the following reasons:

- whilst near the route, the airfields are still several kilometres offline and so the mass haul arrangements may outweigh the advantage of using the recycled fill source;
- to include one or both airfield sites in the A14 DCO submission would prevent development of the airfield sites independently of the A14 project, which may effectively 'sterilise' the sites for

redevelopment. There is not sufficient certainty over the timings of either project to guarantee they would be aligned; and

- once the A14 contractor is appointed, they may still choose to use the local recycled pavement material if it is available and commercially viable to do so.

#### *Borrow pits adjacent to or near the route*

- 4.9.5 The use of borrow pits to source material locally would provide flexibility in supply, minimise additional traffic on the local road system and keep haulage distance down. The local geology includes a number of strata that could be suitable for use as both embankment fill and capping material.
- 4.9.6 The *Cambridgeshire and Peterborough Minerals and Waste Core Strategy (CPMWCS)* (*Cambridgeshire County Council and Peterborough City Council, July 2011*) identifies a number of mineral safeguarding areas adjacent and near to the route corridor. Several of these have been historically earmarked for the A14 improvement works, and as such any material excavated from them can only be used for the A14 scheme.
- 4.9.7 Early in 2014, a review was carried out for the current scheme to identify potentially suitable areas adjacent to and near the route corridor for borrow pits. This review took the following into consideration so far as practicable:
- the areas already safeguarded for possible minerals extraction in the *CPMWCS*;
  - the nature of material likely to be encountered and its suitability for use in earthworks;
  - areas not included in the *CPMWCS*, but where material with better engineering properties might be present. Use of these materials could enable steeper embankment side slopes resulting in a smaller embankment footprint and a lower quantity of material required;
  - distribution of borrow pits along the route to reduce the haulage distance to keep down cost and haulage time as far as practicable;
  - quantities of fill materials required in the different sections of the route;
  - proximity to water courses and low lying land which could increase drainage and dewatering issues during excavation;
  - suitable and safe means of access for dump trucks to the borrow pits;
  - proximity to housing;
  - environmental constraints such as nature conservation value and effect on the landscape; and
  - presence of significant utility routes.
- 4.9.8 The review identified six main borrow pit locations on the basis that they satisfied the criteria set out above, and in large part have already been assessed as appropriate in the *CPMWCS*. Selection of location was guided

- in particular by the first three items in the list, although all aspects listed were considered in the decision process.
- 4.9.9 The main alternatives considered during and following this process were at borrow pits 3, 4 and 5, and the identification of borrow pit 7, as described below.
- 4.9.10 Following the public consultation in 2014, the positioning of the cells of borrow pit 3 has been reviewed. An alternative location for the southern cell was considered within the Woolpack Farm landholding due to potential benefits in seeking to retain the commercial viability of existing farming units in this area. A technical and environmental appraisal was conducted to consider the relative advantages and disadvantage of the two sites. The alternative location at Woolpack Farm was rejected due to the lack of confidence in the suitability and quantity of available mineral resources and the additional land area required to be excavated to realise the same quantity of minerals. There was little to choose between the two areas in environmental terms as both are currently used for arable agriculture.
- 4.9.11 Borrow pit 4, in the vicinity of Conington, was discounted following consideration of the likely ground conditions from which material would be won.
- 4.9.12 In the case of borrow pit 5 near Boxworth, the original location for this was as identified for A14 Ellington to Fen Ditton scheme, which located this in an area safeguarded in the CPMWCS as a clay and general fill borrow pit for any future improvements of the A14. Its location was amended due to more suitable engineering materials being identified in the new location, and it now falls partially outside of the CPMWCS safeguarded area. Environmental assessment identified amenity and landscape sensitivities at Boxworth, but noted that mature vegetation and small woodland blocks north west of Boxworth would limit landscape and visual impacts. The possibility of nuisance from dust and disruption was considered to be similar to that from the other borrow pits.
- 4.9.13 Comments received on borrow pit 5 during the 2014 public consultation highlighted concerns in relation to potential visual impact and impacts from construction operations. The restoration proposals (see *Appendix 3.3*) have been developed to minimise visual impacts of the restored site, and construction impacts would be mitigated by the measures set out in the Code of Construction Practice (*Appendix 20.2*).
- 4.9.14 Borrow pit 7 (Weybridge Farm, Alconbury) was identified as being required to provide a source of material for this section of the scheme. The location is identified within the Cambridgeshire and Peterborough Minerals and Waste Site Specific Proposals Development Plan (SSP M2E) as an Area of Search for Sand and Gravel Borrow Pit to serve any future improvements of the A14. Environmental assessment considered the proximity of this site to Ellington Brook and to Brampton Meadow SSSI, and the possible presence of badger, otter and great crested newt in the wider area. With appropriate mitigation measures in place, these environmental issues were considered unlikely to be a constraint to the siting of borrow pit 7.

- 4.9.15 Consultation with CCC Minerals and Waste team has agreed in principle the six borrow pit sites proposed for the scheme. With the exception of borrow pit 5, the borrow pits are all located within mineral safeguarding areas under the *CPMWCS*. The proposed locations of the borrow pits (other than borrow pit 5) have been environmentally assessed at a strategic level as part of the Core Strategy.
- 4.9.16 At this time, broad estimates of the quantity and suitability of materials likely to be won have been made. Additional ground investigation is proposed (September to December 2014) to better inform the material quantity and suitability estimates.

#### 4.10 Bibliography

Department for Transport (November 2012). A14 Study: Output 3 Package Testing & Appraisal Report. Available at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/15238/3b-package-testing-and-appraisal-v6-1.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/15238/3b-package-testing-and-appraisal-v6-1.pdf). Accessed 9 September 2014.

Cambridgeshire County Council and Peterborough City Council (July 2011). Cambridgeshire and Peterborough Minerals and Waste Development Plan. Core Strategy Development Plan Document. Available at: <http://www.cambridgeshire.gov.uk/NR/ronlyres/76AE7877-5A20-44E9-97CF-34BCF0017FE2/0/CoreStrategyAdopted19July2011.pdf>. Accessed 20 March 2014.

Cambridgeshire and Peterborough Minerals and Waste Site Specific Proposals Plan (February 2012). Available at: [http://www.cambridgeshire.gov.uk/info/20099/planning\\_and\\_development/49/water\\_minerals\\_and\\_waste/7](http://www.cambridgeshire.gov.uk/info/20099/planning_and_development/49/water_minerals_and_waste/7)

Highways Agency (2009). A14 Improvement Ellington to Fen Ditton Environmental Statement. Available at: [http://iprojects.costain.com/a14\\_public\\_area/Public/DVD1.html](http://iprojects.costain.com/a14_public_area/Public/DVD1.html). Accessed 10 September 2014.

Highways Agency (September 2013). A14 Cambridge to Huntingdon improvement scheme. Technical review of options September 2013. Available at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/243999/a14-technical-review-of-options.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/243999/a14-technical-review-of-options.pdf). Accessed 9 September 2014.