

**A14 Study: Output 2**  
Strategic Outline Case (2D Report)  
Department for Transport

**ATKINS**

May 2012

# Notice

This document and its contents have been prepared and are intended solely for the Department for Transport's information and use in relation to the A14 Study: Output 2.

Atkins Limited assumes no responsibility to any other party in respect of or arising out of or in connection with this document and/or its contents.

## Document history

Job number: 5108300			Document ref: 2D Strategic Outline Case FINAL – no appendices.docx			
Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
Rev 1.0	Internal Draft	LC	NP	GGH	GGH	04/04/12
Rev 2.0	Draft for Project Board	LC/GGH	GGH	AHM	GGH	05/04/12
Rev 3.2	Revised draft Final report	LC	LC	AHM	GGH	16/04/12
Rev 3.3	Amended Table 3	LC	LC	AHM	GGH	17/04/12
Rev 4.0	Final version	LC	LC	AHM	GGH	01/05/12
Rev 4.1	Further amendment to Table .					18/05/12

# Table of contents

	<b>Chapter</b>	<b>Page</b>
<b>1.</b>	<b>Introduction</b>	<b>5</b>
	Purpose of this report	5
	Context and background	5
	Study methodology	6
	Packages for assessment	8
	Assessment methodology	16
<b>2.</b>	<b>Strategic Case</b>	<b>21</b>
	Introduction	21
	Business strategy	21
	Problems and issues / impacts of not changing	22
	Local objectives	25
	Measures for success	25
	Scope	25
	Constraints and interdependencies	26
	Stakeholders	26
	Performance against local objectives	26
	Fit with wider transport and government objectives	31
<b>3.</b>	<b>Economic Case</b>	<b>33</b>
	Approach to assessing value for money	33
	Performance against Economic Case criteria	33
	Value for money statement	41
<b>4.</b>	<b>Commercial and Financial Case</b>	<b>44</b>
	Approach taken to assess affordability and commercial viability	44
	Budgets / funding cover	48
<b>5.</b>	<b>Management Case</b>	<b>51</b>
	Approach taken to assess if proposal is deliverable	51
	Project dependencies	53
	Governance, organisational structure and project reporting	54

## Tables

Table 1.	Public transport packages	8
Table 2.	Freight packages (core components only shown)	12
Table 3.	Relationship between Network Rail schemes and A14 study freight packages	13
Table 4.	Highway packages	14
Table 5.	Challenge matrix	23
Table 6.	Performance against objectives	27
Table 7.	Summary of assessment against Economic Case criteria/indicators	34
Table 8.	Highway package costs	40
Table 9.	Comparison of funding mechanisms	49
Table 10.	Summary of key deliverability issues	52

## Figures

Figure 1.	A14 study process: stages and outputs	7
Figure 2.	Home origin of trips destined for Cambridge – morning peak hour (from select link Bar Hill-Dry Drayton)	10
Figure 3.	Proposed public transport component (indicative locations and routes only)	11
Figure 4.	Locations of freight schemes	14
Figure 5.	Highway packages recommended for further assessment	16
Figure 6.	Forecast daily HGV flow - eastbound	19
Figure 7.	Relative performance of highway packages against Strategic and Economic Cases ('points per £100m')	42
Figure 8.	Relative performance of highway packages against Strategic and Economic Cases	43
Figure 9.	Seeking an optimal package / funding solution	44
Figure 10.	Up-front capital drawdown that can be sustained by different income levels and financing approaches (£s '000s)	50

## Appendices

A	Steering Group and Project Board membership
B	Social and distributional impacts
C	DfT A14 Challenge Survey responses
D	Schematic maps of highway packages
E	Qualitative Strategic and Economic Case indicators
F	Deliverability assessment
G	Package assessment methodology

# 1. Introduction

## Purpose of this report

- 1.1. This is the third and final report from Output 2 of the A14 Study. It presents the Strategic Outline Case for those modal packages which have been shortlisted for further consideration (see report 2C: Options Recommended for Further Assessment, Atkins April 2012). These modal packages will be assessed further in Output 3 of the study and the best-performing packages combined into a recommended multi-modal package.
- 1.2. The Strategic Outline Case is the standard output from Phase 1 of the Department for Transport's 'Transport Business Case Guidance'<sup>1</sup> which is used to help the Department decide whether further work should be done to progress the proposals. This guidance, in line with the Treasury's 5 Cases model<sup>2</sup> recommends sub-division of the Strategic Outline Case into:
  - a Strategic Case;
  - an Economic Case;
  - a Commercial Case;
  - a Financial Case; and
  - a Management Case.
- 1.3. The remainder of this document therefore sets out the performance of the 11 shortlisted modal packages (described later in this Section ) against these five cases. As such, the report structure and headings follow the headings in the guidance. The presentation of the Commercial and Financial Cases has been combined and considers the fundability and affordability of the modal packages based on indicative outturn costs, potential financing mechanisms and funding sources.
- 1.4. This document differs from the 2C Report in that it presents assessment:
  - of performance against all five cases (as opposed to simply the Strategic Case and Economic Case); and
  - only of the shortlisted modal packages (as opposed to all the packages).

## Context and background

- 1.5. The 2010 Comprehensive Spending Review cancelled the planned implementation of the £1.1 billion A14 Ellington – Fen Ditton scheme (EFD scheme) as it was deemed unaffordable. As part of the Spending Review the Government set out the following position on the A14:

*“We recognise that this corridor faces severe congestion, and that mobility along the route is critical for economic success and growth. However, the current scheme is simply unaffordable under any reasonable future funding scenario. The Department has therefore stopped the current scheme.... We will undertake a study to identify cost effective and practical proposals which bring benefits and relieve congestion – looking across modes to ensure we develop sustainable proposals. This approach will also provide an opportunity for the private sector to play its part in developing schemes to tackle existing problems in the corridor...”*
- 1.6. The A14 Study is being undertaken in response to this commitment. The study has been commissioned in three parts. The objectives for each part being as follows:
  - Output 1: seek to reconfirm our understanding of the nature, scale and importance of the problems affecting the A14 in the Huntingdon and Cambridge areas, developing a list of prioritised challenges (transport problems, and their consequences);
  - Output 2: generate and sift potential interventions; and

- Output 3: develop a package of interventions to tackle the prioritised challenges which is affordable, deliverable and value for money.

1.7. The study is concerned with a core study area and a wider study area. The core study area is bounded by Ellington/Alconbury in the west and Fen Ditton in the east on the A14. The wider study area has been identified to consider freight modal shift opportunities benefitting the core study area; this captures movements between the Haven Ports, London and the South East, to the Midlands and the North via the A14 corridor.

### A14 Challenge

1.8. Alongside the A14 Study, the Department for Transport (DfT) initiated the 'A14 Challenge'<sup>1</sup>. To date the A14 Challenge has comprised two components, the first of which was a web-based survey inviting people who "use the A14, live in the area, or can help with delivery" identify what they think would work best in terms of solutions for the corridor<sup>2</sup>. Views were invited on the scope for improvements to both the national and local road networks, to public transport and to road and rail freight facilities.

1.9. The second component, considered alongside the outputs from the web-based survey, was feedback from a series of engagement events led by Cambridgeshire, Suffolk and Northamptonshire County Councils to gather views on the same issues from key local stakeholders.

### Study methodology

1.10. The study is being carried out in 3 stages. The stages reflect the study objectives described above. Figure 1 shows the study stages, and the tasks and outputs for each stage<sup>3</sup>.

1.11. The first stage of the study (Output 1) has already reported<sup>4</sup>. It identified priority transport problems and wider challenges in the study area (and beyond). Detailed information about the problems and challenges can be found in the Output 1 Report. A summary is presented in Section 2 as part of the Strategic Case. The wider challenges informed the identification of core objectives for the option development and assessment work undertaken during Output 2.

1.12. Identification and initial sifting of options was undertaken at the start of Output 2. The outputs from that phase are presented in the Output 2A Report: Option Generation and Initial Sifting, in the form of a series of modal packages (single mode).

1.13. The Output 2C report on Options Recommended for Further Assessment describes the framework and approach used to assess the modal packages, and the process of identifying the best performing ones. The report recommends a sub-set of those packages for further consideration and more detailed assessment in the next part of the study (Output 3).

---

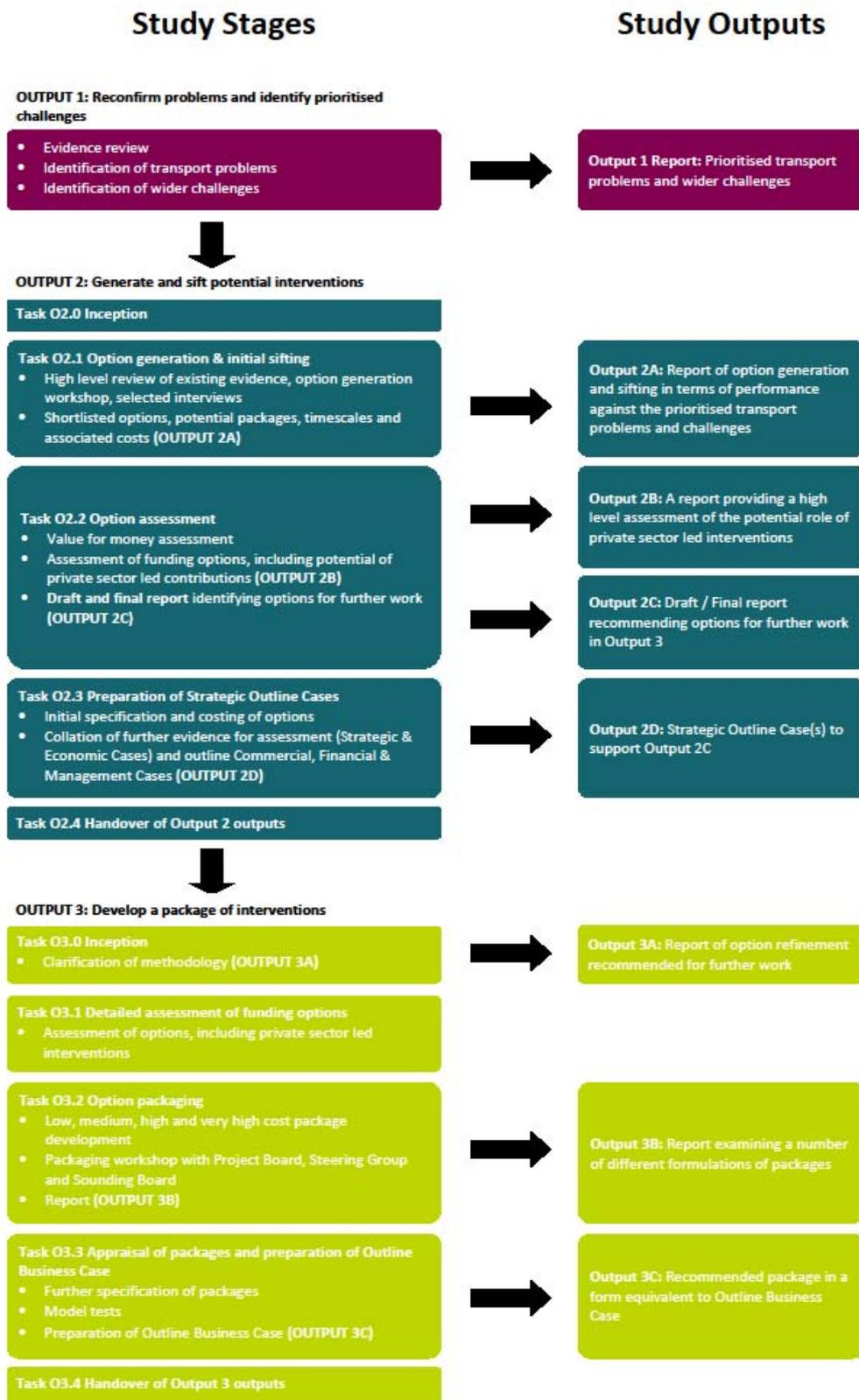
<sup>1</sup> <http://www.dft.gov.uk/consultations/dft-20111212>

<sup>2</sup> The web-based survey closed on 31<sup>st</sup> January 2012

<sup>3</sup> Figure 1 also refers to Output 2B (a report providing a high level assessment of the potential role of private sector led interventions). A standalone Output 2B report will not be prepared. Instead, the findings from the assessment of funding options, including the potential of private sector led interventions, will be presented within Output 2C and Output 2D (Strategic Outline Cases for the recommended packages).

<sup>4</sup> Steer Davies Gleave for DfT (December 2011) A14 Study Output 1 Report

Figure 1. A14 study process: stages and outputs



## Packages for assessment

- 1.14. The Strategic Outline Case is presented for 11 packages:
- three public transport packages;
  - two freight packages; and
  - six highway packages.
- 1.15. The packages are described in the following sections.
- 1.16. The option generation and sifting process is summarised in Section 1 and described in detail in the following reports:
- Output 2A: Option Generation and Initial Sifting; and
  - Output 2C: Options Recommended for Further Assessment.

### Public transport packages

- 1.17. The public transport packages which have been assessed are summarised in Table 1 and Figure 2 below.

**Table 1. Public transport packages**

Package Ref	Description
M(A)	Provision of new Park and Ride site(s) or expansion of existing Park and Ride sites in the corridor, intended to encourage modal shift of people away from car travel for those journeys in scope, particularly in the peak period.
M(B)	Provision of new or enhanced conventional bus or Busway services intended to encourage modal shift of people away from car travel, particularly in the peak period.
M(AB)	Implementation of all reasonable public transport measures intended to encourage modal shift of people away from car travel, particularly in the peak period. Provision of new Park and Ride site(s) or expansion of existing Park and Ride sites in the corridor, and provision of new or enhanced conventional bus or Busway services.

### Primary component M(A) - Additional / expanded Park and Ride provision

- 1.18. The current Park & Ride sites at St. Ives (which will soon be expanded) and Longstanton effectively intercept Cambridge-bound traffic from the Fens as it crosses The Busway alignment; whilst Milton intercepts traffic from the north and north-west. Trumpington is potentially viable for trips from the north/north-west but is less attractive due to the extra car journey distance required.
- 1.19. Therefore there may be potential for an additional Park & Ride site to intercept traffic from the north-east of Cambridge (i.e. from the A14 corridor itself). Anecdotal evidence suggests that the St. Ives and Longstanton sites are located too far from the A14 to be attractive to drivers using the A14. On this assumption, it would be preferable to locate any new site in close proximity to the A14 and where it will:
- minimise bus journey times and operating costs;
  - be close to the start of the worst congestion (to maximise the perceived benefits of using Park & Ride);
  - have the potential to intercept the most Cambridge-bound traffic; and
  - most reduce congestion.

- 1.20. The first three factors suggest a site in the east of the corridor, say adjacent to the A14 at the Swavesey (Jn 28), Longstanton (Jn 29) or Dry Drayton (Jn 30) junctions (although a site at Jn 29 would be relatively close to the existing Longstanton site). A new Park & Ride site in the area between the Swavesey and Dry Drayton junctions would need to be served by at least four buses per hour in each direction during peak periods and would have an estimated journey time to the city centre using the Busway of 26 minutes (the current Longstanton site, being on the Busway spine, is served by up to 10 buses per hour in the peak). A new site would be well signed from the A14.
- 1.21. The fourth factor suggests a site further west would be more attractive (say at Huntingdon racecourse). However, according to the highway model, the number of trips heading for Cambridge at this point on the A14 is very low<sup>5</sup>. A site in the Godmanchester area would be passed by more trips heading for Cambridge, but still a relatively modest number which would be unlikely to make a site viable<sup>6</sup> and would only be likely to attract 30-45 trips in the morning peak hour. Having said this, a site further west is potentially a more optimal location in terms of reducing traffic along a longer section of the A14 and therefore a second new Park & Ride site near Spittals interchange is included in M(A) for further investigation during Output 3.

### **Primary component M(B) - Additional / extended bus / Busway Services**

#### *Serving existing demand*

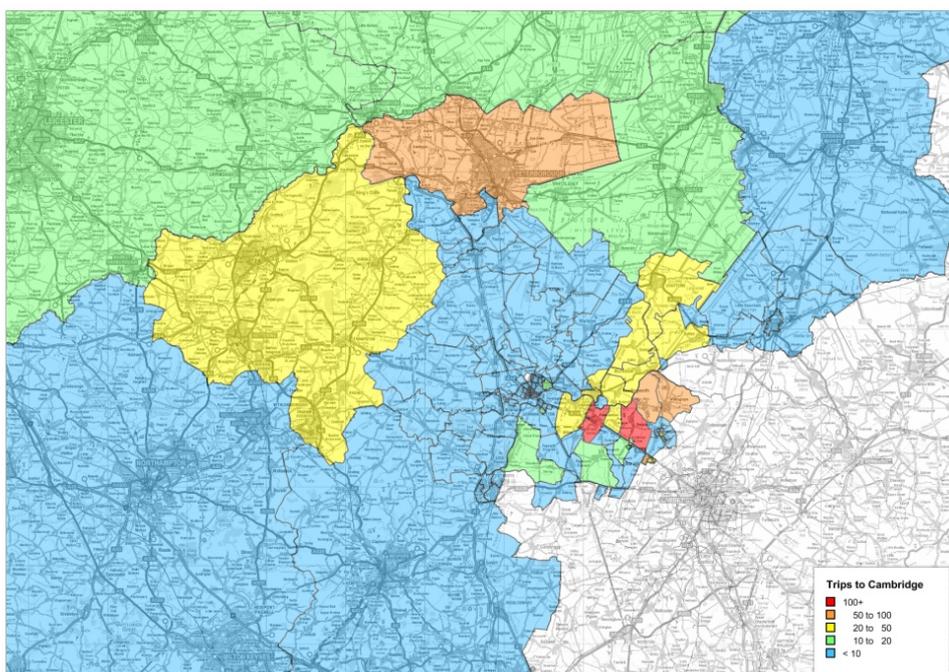
- 1.22. Given that there is already a good service frequency on the Busway spine, and that it is likely to continue to increase to meet demand, this primary component is intended to provide additional connectivity to settlements not directly served by Busway services. Based on an examination of trips destined for Cambridge in the morning peak hour on the A14 between Bar Hill and Dry Drayton (as shown in Figure 2) the settlements with the largest potential demand are:
- Bar Hill (approximately 120 vehicle trips to Cambridge in the morning peak hour);
  - Longstanton (30 trips);
  - Over (85 trips);
  - Willingham (100 trips);
  - Fenstanton / Fen Drayton (150 trips); and
  - Peterborough area (80 trips).

---

<sup>5</sup> Less than 70 in the morning peak hour according to the 2006 base year highway model.

<sup>6</sup> Less than 300 trips in the morning peak hour.

**Figure 2. Home origin of trips destined for Cambridge – morning peak hour (from select link Bar Hill-Dry Drayton)**



Note that some of the zones on the map cover large areas and therefore represent dispersed levels of demand which will be difficult to serve effectively or efficiently by public transport.

Note also that some of the zones with the highest number of trips (e.g. Swavesey) already have direct Busway services – the base year demand shown is prior to opening of the Busway and hence some of this demand will already be using the Busway.

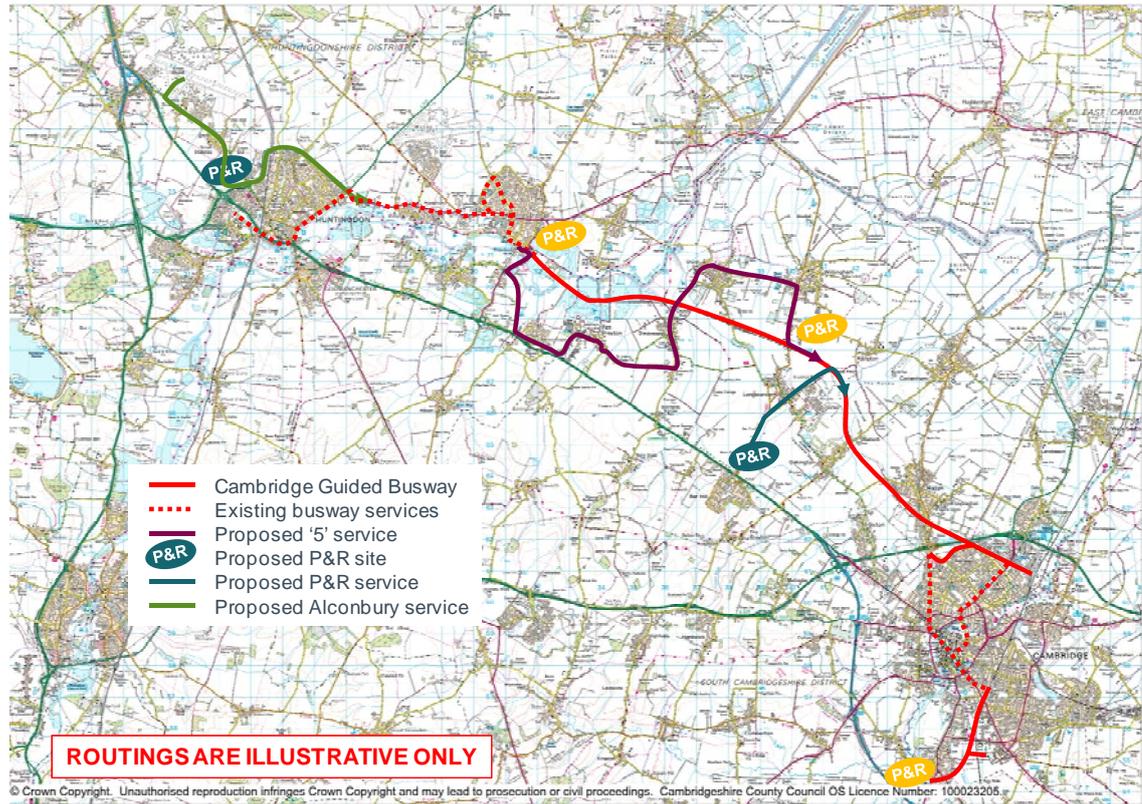
- 1.23. These five local settlements are all currently served by the Citi 5 service. This service operates every 20 minutes between Bar Hill and Cambridge (Emmanuel Street) with an hourly service extending beyond Bar Hill to serve the other settlements and terminating at St. Ives.
- 1.24. Based on this evidence, which it should be noted is based on highway demand prior to opening of the Busway, it is proposed that:
- the Citi 5 service is retained, possibly with an enhanced frequency but running between Cambridge and Bar Hill only all day; and
  - a new service is established using the Citi 5 route between St. Ives and the Busway near Longstanton, either proceeding on the Busway directly to Cambridge or connecting with existing Busway services.
- 1.25. The new service may have a more limited stopping pattern than the current Citi 5 to improve journey times. The proposed service frequency is four buses per hour in the peak, and three buses per hour during the rest of the day.
- 1.26. It is understood that the dominant local bus operator Stagecoach is already considering the potential for an express service between Peterborough and Cambridge, joining the Busway at St. Ives, therefore this has been regarded as being deliverable commercially. This could potentially be combined with the Alconbury Enterprise Zone service at a later date.

#### *Serving future demand*

- 1.27. In time, service changes will be required to serve the new residential development at Northstowe and the Enterprise Zone at Alconbury. Plans to serve the former by a new Busway route through the Northstowe development are already well established and are anticipated to attract a significant modal share. They are not considered further here as it is assumed that they would be delivered as part of the Northstowe development.

1.28. Clearly there will be a significant increase in demand for travel to and from the new Alconbury Enterprise Zone which could accommodate 1,500 jobs by 2015. The Enterprise Zone is not currently directly served by public transport (although the 46 bus service runs along the B1043 on the western edge of the site). There is therefore potential for a new service linking the Enterprise Zone to Huntingdon station, and beyond to Cambridge (possibly via a new Park & Ride site close to Spittals interchange). The Enterprise Zone bid document referred to connections to Cambridge via the Busway network, so it is most likely that such a service would either be an extension of the existing Busway services to Huntingdon or an entirely new (branded) service. It is proposed that, in the longer-term, the Enterprise Zone would be served by a new station on the East Coast Main Line.

**Figure 3. Proposed public transport component (indicative locations and routes only)**



## Freight packages

1.29. Two freight packages have been assessed, as summarised in Table 2.

**Table 2. Freight packages (core components only shown)**

Package Ref	Description
O(ABCD)	Implementation of infrastructure enhancements to provide additional operational capacity for rail freight movements. The improvements will improve the economics of rail freight versus road haulage and will therefore encourage freight to travel by rail rather than by road through the study area plus complementary measures to shift haulage of road freight away from the peak periods. Specifically: <ul style="list-style-type: none"> <li>• Double-tracking of sections of the Felixstowe branch line;</li> <li>• March bi-directional freight loop; and</li> <li>• Strategic Rail Freight Interchanges.</li> </ul>
O(D)	Implementation of new/expanded Strategic Rail Freight Infrastructure to encourage freight to travel by rail rather than by road through the study area plus measures to shift haulage of road freight away from the peak periods.

### Relationship to Felixstowe-Nuneaton Upgrade

1.30. The measures shown in Table 2 are additional to those which are assumed to delivered by Network Rail during Control Period 4 (2009/10-2013/14) or Control Period 5 (2014/15-2018/19, investment levels subject to Statement of Funds Available (SOFA) in July 2012 and High Level Output Statement (HLOS) due Summer 2013).

1.31. Those schemes for which implementation is either complete, underway or imminent are considered to form part of this study's 'do-minimum scenario. These are <sup>7</sup>:

- F2N loading gauge (Increase loading gauge to W10 Felixstowe to Nuneaton to allow high cube containers to be moved by rail) (complete);
- Kennett re-signalling (new signalling, including shorter signal block sections to provide additional capacity between Kennett and Bury St Edmunds) (complete);
- Nuneaton North Chord (to allow freight trains to cross the West Coast Main Line without affecting WCML services, thereby increasing freight capacity and capability);
- Ely Loops (two loops east of Ely station at Ely Dock Junction to facilitate better regulation of trains through the junctions at Ely);
- Ipswich Chord scheme - a new 1 kilometre stretch of track north of Ipswich goods yard, linking the East Suffolk and Great Eastern lines (this scheme had originally formed part of package O(A) as, although funding has been set aside in Control Period 4, it is still being considered by the Infrastructure Planning Commission; however on advice from the Department for Transport this scheme has been moved into our 'do-minimum' scenario);
- clearance to loading gauge W10 between Syston and Stoke-on-Trent to enable container traffic to/from the North West and Scotland to bypass Leicester and the WCML between Nuneaton and Crewe; and
- Ely-Soham doubling (to provide additional freight capacity), for which funding was set-aside in the Autumn statement (National Infrastructure Plan).

1.32. The first five of these seven schemes are comparable to Phase 1 of Network Rail's Felixstowe-Nuneaton Upgrade; the remaining two fall within Phase 2.

1.33. Two further Phase 2 schemes are included in our freight interventions as complementary components:

- Ely North Junction re-modelling (to increase freight capacity and permit longer freight trains) which is being implemented; and

<sup>7</sup> These schemes are comparable to Phase 1 of Network Rail's Felixstowe-Nuneaton Line upgrade.

- remodelling track layout in the Leicester area to provide additional capacity for freight trains between Syston and Wigston North (in combination with planned re-signalling).

1.34. The relationship between the schemes identified by Network Rail and those in this study are summarised in Table 3.

**Table 3. Relationship between Network Rail schemes and A14 study freight packages**

Network Rail scheme	Funding	A14 study freight packages
<b>Phase 1</b>		
F2N loading gauge	CP4	Do-minimum.
Kennett re-signalling	CP4	Do-minimum.
Nuneaton North Chord	CP4	Do-minimum.
Ely Loops	CP4	Do-minimum.
Ipswich Chord	CP4	Do-minimum.
<b>Phase 2 (enabling up to 56 trains per day in each direction by 2030)</b>		
Loading gauge Syston-Stoke	CP4	Do-minimum.
Leicester area remodelling, flyover and re-signalling	Eligible for SFN funding in CP5 <sup>8</sup>	Potentially complementary to other upgrades.
Ely North Junction remodelling <sup>9</sup>	Eligible for SFN funding in CP5	Complementary component.
Ely-Soham double tracking	CP4 into CP5	Do-minimum
<b>Other schemes</b>		
Double-tracking sections of Felixstowe Branch line	HPUK s106	Not currently a Network Rail scheme. A s106 agreement is in place to deliver this scheme. Core Component O(B).
March bi-directional freight loop	Eligible for SFN funding in CP5	Not currently a Network Rail scheme. Core Component O(C).
Strategic Rail Freight Interchanges	Private funding sources	Not currently a Network Rail scheme. Core Component O(D).

1.35. The locations of the schemes in Table 3 are shown in Figure 4.

<sup>8</sup> It is assumed the government will continue to provide Strategic Freight Network funding in CP5 which the industry will direct to the projects of greatest value

<sup>9</sup> Ely North Junction remodelling is not strictly speaking a freight scheme. The need for junction re-modelling may be triggered by increased passenger services from Kings Lynn.

Figure 4. Locations of freight schemes



1.36. The packages do not include improvements to Haughley Junction, which connects the Great Eastern Main Line north of Stowmarket to the 'cross country' route to Ely and Peterborough. It is a single lead junction, meaning that only one train at a time can pass through the junction. Network Rail's view sought during this study is that, given capacity enhancement schemes recently completed or planned for implementation over the next few years, there is no requirement on capacity grounds to double-track the line through the junction (in other words, the enhancement is not required to deliver the capacity required to meet expected future demand). However, in the longer term, there may be benefits on reliability and resilience grounds of double-tracking the junction, as it would better enable network recovery following disruption. It is therefore not viewed as a current priority and it is a scheme to be delivered over the long term.

### Highway packages

1.37. Table 4 summarises the highway packages which have been assessed.

Table 4. Highway packages

Package Ref	Description
<b>LOCAL ACCESS ROADS (LARs) OPTIONS</b>	
DS	Parallel local access roads between Trinity Foot (lane gain/drop to east of junction) and Girton. Full enhancement of Girton interchange as envisaged in EFD scheme. The variant with LARs extending further north west (past Fenstanton) has been dropped.
<b>HUNTINGDON SOUTHERN BYPASS (HSB) PLUS WIDENING/LOCAL ACCESS ROADS** OPTIONS</b>	
GB*CR(d)	Huntingdon Southern Bypass rejoining A14 south east of Fenstanton (e.g. in the proximity of Trinity Foot). A14 then widened to D3AP to Bar Hill then D4AP to Girton (and to improved standards). Scaled-back (compared to the EFD scheme) enhancement of Girton interchange to improve A14-A14 movement. Would probably require enhancements to the western end of the Cambridge Northern Bypass. In the (d) derivative, all strategic traffic uses a D3AP HSB, and the existing A14 is de-trunked/downgraded between the A1(M), Brampton Hut and the junction with the HSB.. The variant of a shorter HSB with online widening extending further north west (past Fenstanton) has been dropped.

Package Ref	Description
GB*CR(r)	As above, but in the (r) derivative, the HSB is for east-west trips only (built as D2AP), north-south trips remaining on the existing A14 through Huntingdon, meaning that a junction with the A1 would not be required.
GDS(r)	Huntingdon Southern Bypass rejoining A14 south east of Fenstanton (e.g. in the proximity of Trinity Foot) and continuing widening to start of local access roads. Parallel local access roads between Trinity Foot (lane gain/drop to east of junction) and Girton. Full enhancement of Girton interchange as envisaged in EFD scheme. The variant with LARs extending further north west (past Fenstanton) has been dropped.  In this r derivative, the HSB is for east-west trips only (built as D2AP), north-south trips remaining on the existing A14 through Huntingdon, meaning that a junction with the A1 would not be required.
<b>NEW ROUTE OPTIONS</b>	
G(part)J(d)	<b>Shortened Huntingdon Southern Bypass</b> from west of Brampton Hut to the A1198 alignment. <b>Upgraded alignment via the A1198 corridor to Caxton Gibbet, then A428 corridor to Girton.</b> New spur road linking M11 (S) and upgraded A428 (W) at Girton. In the (d) derivative, all strategic traffic uses a D3AP HSB/A428, and the existing A14 is de-trunked/downgraded between the A1(M), Brampton Hut and Girton.
G(part)J(r)	As above, but in the (r) derivative, the HSB is for east-west trips only (built as D2AP), north-south trips remaining on the existing A14 through Huntingdon, meaning that a junction with the A1 would not be required.

**Notes to Table:**

A number of the packages including the Huntingdon Southern Bypass have two derivatives where:

The '(d)' derivatives assume that the **A14 is de-trunked/downgraded** between Brampton Hut, the A1(M) and the point at which the Huntingdon Southern Bypass re-joins the existing A14 alignment (in the Trinity Foot area). In this derivative, the Huntingdon Southern Bypass would be D3AP standard to accommodate both north-south and east-west strategic traffic.

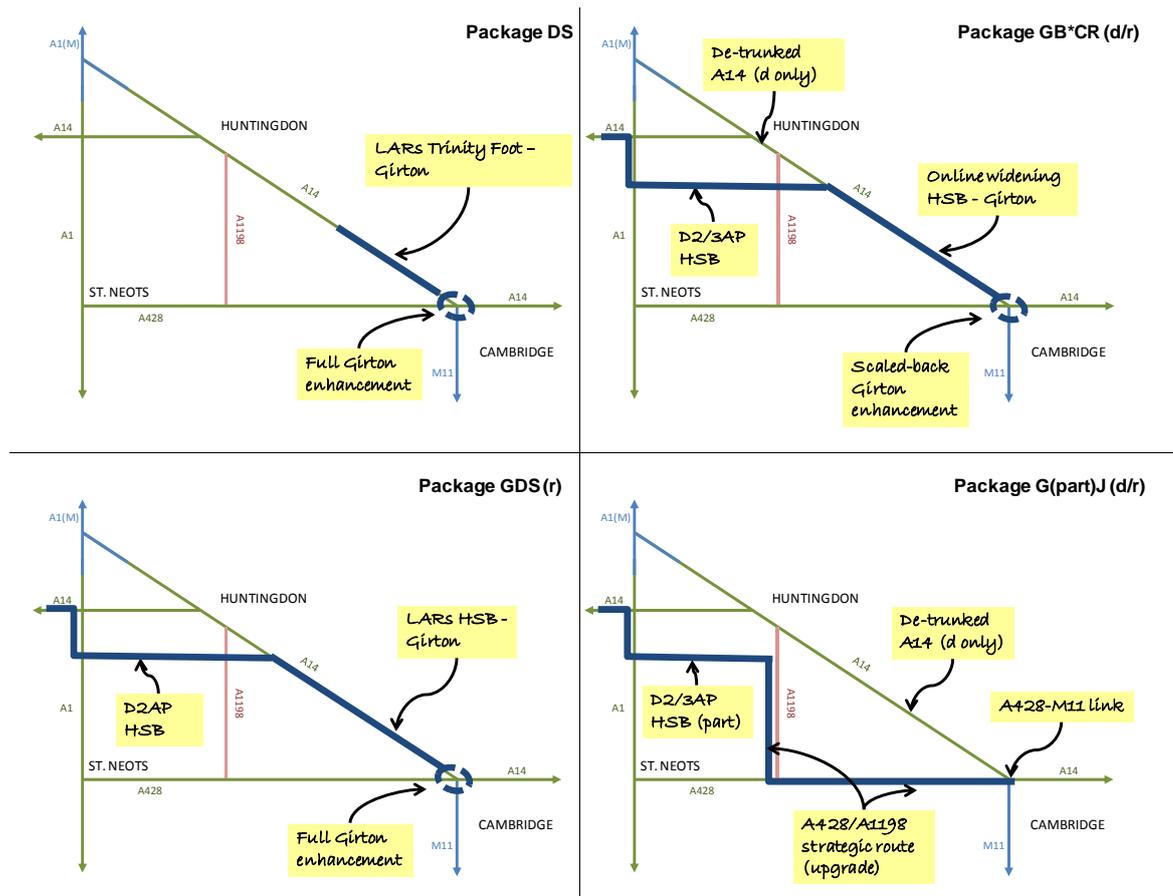
The '(r)' derivatives assume that the A14 is not de-trunked/downgraded but that north-south strategic traffic (and some local traffic) continues to use the existing alignment past Huntingdon whilst strategic east-west (and some local traffic) uses the Huntingdon Southern Bypass. In this derivative, the Huntingdon Southern Bypass would be D2AP standard as it would not need to accommodate as much traffic.

Both derivatives would allow for full free-flow movement for strategic traffic and so perform similarly in economic terms.

The key advantage of the '(d)' derivatives is that they remove strategic north-south traffic from the vicinity of Huntingdon. However, in so doing, they do so at the expense of a longer route for strategic north-south traffic; potential overload on the A1 between Brampton Hut and Alconbury; and underuse of existing assets such as the A1 spur north of Spittals and the (to be repaired) Huntingdon viaduct.

- 1.38. Schematic drawings of these highway packages are shown in Figure 5. Plans showing indicative illustrations of the highway packages are included in Appendix D.

**Figure 5. Highway packages recommended for further assessment**



### Huntingdon railway viaduct

- 1.39. The withdrawal of the A14 Ellington to Fen Ditton scheme from the Highways Agency's programme has required a rethink in the maintenance strategy for the viaduct. The strategy now involves doing what is necessary to keep the structure in service, for the foreseeable future. This is necessary because at this time it is not known what the recommendations of this study will be and if they will affect the usage of the viaduct. Even if they do affect the viaduct, the timescale for their implementation is not known at this time.
- 1.40. As a result, the option identification process has assumed that the repair will extend the life for the foreseeable future. Notwithstanding this, a number of the core components identified would allow the existing A14 alignment through Huntingdon to be de-trunked or downgraded. However, in developing these core components no assumptions have been made about what would happen to the de-trunked or downgraded route and how this would be dealt with for example removing the viaduct structure and providing local road links.
- 1.41. As a result, the cost estimates presented in Section 5 similarly assume no work on the viaduct. Please note however that the cost estimate for core component A does include an allowance for widening/rebuilding the viaduct. During Output 3 of the study, it will be necessary therefore to consider how the highway packages which incorporate a retained or replaced viaduct should be costed.

## Assessment methodology

### Approach to assessment

- 1.42. A detailed description of the approach taken to assessing the performance of the packages against each of the indicators informing the Strategic Case and the Economic Case is presented in Appendix G. This is summarised in the following sections.

- 1.43. The DfT's guidance on proportionality of appraisal has been followed in determining the assessment framework adopted for Output 2. The framework has been developed in line with WebTAG principles, and the level of assessment undertaken is deemed sufficient to inform the decisions being made at this stage. The implication is that, when a particular impact is very unlikely to drive a decision to retain or reject a package at this stage, assessment of this impact will be undertaken during Output 3 rather than Output 2.

### **Assumptions and assessment evidence**

- 1.44. Generally, no new transport model runs (forecasts) have been undertaken at this stage of the study. Instead, the assessment has made best use of existing information, in particular using:
- evidence readily available in reports and datasets, particularly evidence presented for the cancelled A14 EFD business case;
  - existing ("off-the shelf") model outputs (from the A14 ECI DIADEM model and Cambridge Sub-Regional Model) to identify baseline movements, traffic flows, and so on where these were not identified in Output 1; and
  - qualitative feedback from the option generation and sifting stage and from the Project Board.
- 1.45. Where possible, assessment has been made based on quantitative evidence (such as that described above). However, where there are gaps in information, information is no longer considered current, or where quantitative information is not readily available, indicators have been assessed using professional judgement (assumptions are clearly stated).

### **Basis of the assessment for public transport and freight packages**

- 1.46. Reliance on existing information has limited the level of detail and robustness of the assessment of the public transport and freight packages. New runs of the Great Britain Freight Model (GBFM) have been undertaken to provide baseline information on freight flows on the A14 corridor and forecasts of changes in freight movements as a result of the proposed freight packages. However at this stage, the resulting impacts of these changes on the performance of the A14 in general has not been tested.
- 1.47. As a result, the assessment of these packages is in outline only with an emphasis on identifying the relative performance of packages within each mode. Where possible, initial estimates of key outcomes (such as public transport patronage) have been derived and used as the basis for what is a largely qualitative assessment of the packages.

#### *Estimates of impacts of public transport packages*

##### **New Park & Ride site(s) – primary component M(A)**

- 1.48. The 2006 base year highway model estimates that 1,340 vehicles in the morning peak hour on the A14 eastbound between Bar Hill and Dry Drayton are heading for Cambridge. This demand, plus any potential diversion from the Milton Road Park & Ride site, is the maximum potential in-scope market for a new site between junctions 28 and 30. It is likely that some of these trips will now have transferred to the Busway since its opening and others may have, in any event, already been using Park & Ride at Trumpington, although encouraging them to switch to a new site on this section of the A14 would improve traffic conditions on the A14 east of the site. We have assumed that 1,200 of the 1,340 trips are still making this journey.
- 1.49. The existing Cambridge Park & Ride sites are estimated to have an interception rate of approximately 15% of their in-scope market. Assuming a higher figure of 20% (to allow for diversion from the Milton Park & Ride site), the new site could attract 240 vehicles in the morning peak hour and perhaps the same again at other times, meaning a site with up to 500 spaces might be required (Longstanton has 350 spaces).
- 1.50. In the morning peak hour, 240 vehicles represents 5% of total vehicles eastbound between Bar Hill and Dry Drayton. Assuming a nominal trip length of 20 kilometres, the site could remove up to 20,000 vehicle kilometres from the road network each weekday.

- 1.51. Based on travel demand in the base year highway model, the second proposed site near Spittals interchange is currently anticipated to have a significantly lower demand than the site between Bar Hill and Dry Drayton. Potential demand for a site in this location will be examined further in Output 3.

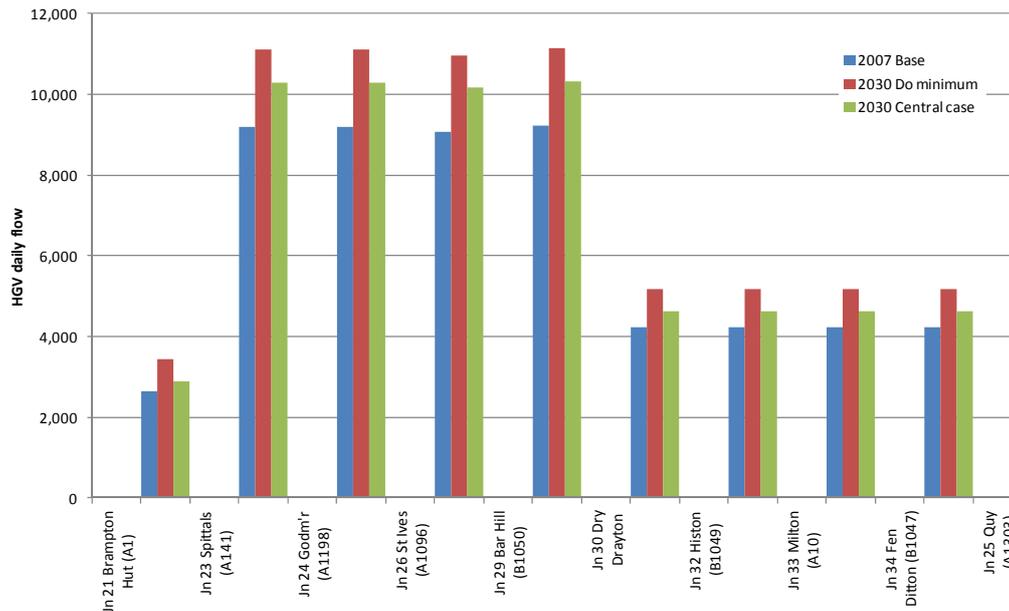
#### New or enhanced bus services - primary component M(B)

- 1.52. There are 480 vehicle trips in the 2006 base year highway model (morning peak hour) travelling from Bar Hill, Longstanton, Over, Willingham, Fenstanton/Fen Drayton to Cambridge via the A14. Assuming that the new or enhanced services result in 25% of these trips switching to public transport, 120 vehicles in the peak hour, and perhaps the same again at other times, would be removed from the A14 (2-3% in the morning peak hour). Based on a nominal average journey distance of 15 kilometres, these services could remove up to 7,200 vehicles kilometres from the road network each weekday.
- 1.53. The model suggests 200 car trips per day on the A14 between Peterborough and Cambridge. Again assuming a 20% shift from car to bus, up to 40 vehicles and 4,000 vehicle kilometres could be removed from the A14 each weekday (assuming an average trip distance of 50 kilometres).

#### Estimates of impacts of freight packages

- 1.54. Initial freight demand forecasts have been prepared for 2030 for four scenarios:
- a 'do-minimum' based on 'central case' assumptions on growth in freight demand (see Technical Note for more details);
  - 3 'do-something' scenarios assuming implementation of package O(ABCD):
    - a central case;
    - a low growth sensitivity test - case (A); and
    - a second low growth sensitivity test - case (B).
- 1.55. **It is important to note that at this stage the forecasts are of changes in road freight demand and not of the impacts of these changes on general traffic conditions on the A14 (this will be examined through highway assignment modelling during Output 3 of the study).**
1. In the **do-minimum** scenario in 2030, the daily flow is forecast to be approximately 11,000 HGVs eastbound and 9,500 westbound on the core section between the A14/M11 junction and Huntingdon (the higher, eastbound, flows are shown in Figure 6). This is an **increase of approximately 20% over the 2007 model base year** for most of the route (and 30% for the Brampton Hut to Spittals section). Note the daily forecast flows from the GB Freight Model are not comparable to the observed Annual Average Daily Traffic (AADT) flows in the baseline which are calculated including weekend flows.
  2. In the 2030 do-something scenario (central case), the model predicts that the HGV flows on the core section will be 650 (eastbound) and 850 (westbound) lower than in the do-minimum. In other words, **package O(ABCD) is expected to reduce HGV flows by around 10% by 2030**. The effect of package O(ABCD) is therefore **equivalent to removing 40% of the growth in HGV traffic** from the 2007 base to 2030 between Huntingdon and Cambridge and approximately 60% of the growth on the Cambridge Northern Bypass.
  3. In the 2030 do-something scenario low growth tests, package O(ABCD) has a slightly larger effect in reducing HGV flows by 12% (Case A) to 14% (Case B) in 2030 compared to the do-minimum.
- 1.56. By delivering additional capacity, the forecasts suggest that package O(ABCD) does indeed improve the competitive position of rail freight, leading to a 'modal shift' from road freight and a reduction in HGV travel. The development of Strategic Rail Freight Interchanges is likely to be a major factor in improving the competitive position of rail freight.

**Figure 6. Forecast daily HGV flow - eastbound**



## Basis of the assessment for highway packages

### Traffic based assessments

- 1.57. Where quantitative information is available, assessment has been undertaken on a link by link basis along the A14 between Brampton Hut and Quy junction. Based on this framework a forecast 2015 Do Minimum case has then been developed using the following data for each link:
- link length;
  - forecast 'do-minimum' Annual Average Daily Traffic (AADT) from the information presented in the Environmental Statement (October 2009) for the A14 EFD scheme. The AADT flow has been disaggregated into:
  - 'local' and 'strategic' movements based on the forecast flows on the offline and local access roads from the proposed ECI scheme; and
  - time periods (morning peak, inter-peak, evening peak and off-peak period);
  - forecast journey times (from the A14 EFD scheme traffic model).
- 1.58. The traffic impacts of each package has been assessed by manually adjusting the forecast flows and speeds on each link on the A14 mainline expectations. For the online improvement options, capacity increases have been reflected in reduced journey times. For those packages where local access roads are proposed, local traffic has been assigned to the local access road while the remaining strategic traffic on the A14 has been assumed to benefit from reduced journey times. For packages with offline improvements, strategic traffic has been assigned to the offline routes while local traffic remains on the existing A14 alignment.
- 1.59. Other links have also been included, representing local access roads, offline sections and the existing A1 and A428. A fixed trip assessment has been maintained by ensuring that in cases where traffic would assign from the existing A14 mainline it is accounted for in the offline sections.
- 1.60. The assessment has been based on a single average day in 2015. The total travel time and distance travelled by time period has been estimated for the 'do minimum case' and each of the highway packages. The benefit of each package is measured in terms of the difference in total travel time and distance between the 'do-minimum' and the highway package.
- 1.61. It should be noted that, for the highway package tests, the process described above has been applied to the 'do-minimum' trip matrix. In other words, the analysis does not reflect variable demand effects (for example induced traffic). The approach is valid at this stage as the scale of

variable demand impacts is considered to be too small to affect the relative performance of the highway packages. However, changes in trip patterns as a result of the packages will occur because those making the trip benefit from the change. Those packages generating the greatest benefit in the fixed trip assessment are therefore likely to cause the largest shifts in travel behaviour, adding further additional benefits.

#### *Assessment using other data*

- 1.62. Assessment of performance against criteria that are not directly traffic related was based on other available data sources (for instance relating to environmental impacts) and professional judgement (with assumptions clearly stated).

#### **Presentation of the results**

- 1.63. A qualitative scoring system has been applied to the presentation of results for each indicators, both those based on quantitative estimates of impacts and those based on a more subjective judgement. The scoring system serves a number of purposes:
- it facilitates comparison;
  - it helps the reviewer assimilate large amounts of data; and
  - it focuses the assessment on the relative performance of the packages, rather than on consideration of absolute values where quantitative estimates exist, which at this stage would be misleading.
- 1.64. A seven point scale has been used ranging from -3 to +3 (large adverse, moderate adverse, slight adverse, neutral and slight positive, moderate positive and large positive). This is consistent with the WebTAG approach.
- 1.65. The assessment focuses on the performance of the core components of each package only. Further assessment of the shortlist of packages in Output 3 will examine the performance of the packages in more detail, including the contribution made by complementary components.

## 2. Strategic Case

### Introduction

- 2.1. The Strategic Case establishes the need for intervention and considers the extent to which a package will meet the specific objectives it is intended to address; and whether it is consistent with, and will contribute to, wider policy aims and objectives in transport and in other areas. The Strategic Case is set out below.

### Business strategy

- 2.2. The Strategic Outline Case has been prepared on behalf of the Department for Transport in partnership with the Highways Agency and Cambridgeshire County Council. As the promoting organisations, their strategic aims and responsibilities are summarised as follows.

#### The DfT's objectives <sup>10</sup>

- 2.3. The DfT's vision is for:

*"a transport system that is an engine for economic growth but one that is also greener and safer and improves quality of life in our communities. By improving the links that help to move goods and people around, and by targeting investment in new projects that promote green growth, we can help to build the balanced, dynamic and low-carbon economy that is essential for our future prosperity."*

- 2.4. The identified strategic priorities to meet this vision are:

- delivering on high speed rail;
- securing railways for the future;
- encouraging sustainable local travel;
- tackling carbon and congestion on roads; and
- promoting sustainable aviation.

#### The Highways Agency's objectives <sup>11</sup>

- 2.5. The Highways Agency Strategic Plan 2010-15 sets a vision for the Agency to be *'The world's leading road operator'*. It sets out five strategic goals to support this vision:

- to provide a service that Highways Agency customers can trust;
- a network that is a dynamic and resilient asset;
- roads that are the safest in the world;
- delivering sustainable solutions; and
- setting the standard for delivery.

#### Cambridgeshire County Council <sup>12</sup>

- 2.6. The County Council's priorities are:

- supporting and protecting people when they need it most;
- helping people to live independent and healthy lives in their communities; and
- developing our local economy for the benefit of all.

---

<sup>10</sup> DfT's Business Plan 2011

<sup>11</sup> Highways Agency Strategic Plan 2010-15

<sup>12</sup> Cambridgeshire County Council Local Transport Plan 2011-2026

- 2.7. These sit within an overall vision of: “*Creating communities where people want to live and work: now and in the future.*” Transport’s contribution to this vision and priorities is set out in LTP3’s five objectives, these being:
- enabling people to thrive, achieve their potential and improve their quality of life;
  - supporting and protecting vulnerable people;
  - managing and delivering the growth and development of sustainable communities;
  - promoting improved skill levels and economic prosperity across the county, helping people into jobs and encouraging enterprise; and
  - meeting the challenges of climate change and enhancing the natural environment.

## Problems and issues / impacts of not changing

- 2.8. The purpose of Output 1 was to reconfirm the understanding of the nature, scale and importance of the problems affecting the A14 in the study area. Both short-term and medium/long-term problems were identified. The short term transport problems are summarised as <sup>13</sup>:
- congestion and delay on the A14, which impacts on strategic long term movements and local traffic;
  - lack of resilience in the A14 corridor, often impacting on local road traffic; and
  - safety on the A14.
- 2.9. All of the problems are anticipated to worsen in the future as traffic growth exacerbates current transport problems.
- 2.10. Medium to long-term transport problems were considered in the context of future drivers of demand. Three primary drivers of demand were identified which it is determined, under a ‘business as usual’ scenario, would exacerbate the problems and therefore the wider challenges. These drivers are:
- the background growth in private car demand that will arise as the national economy grows;
  - future localised growth of employment in Cambridge and Cambridgeshire which in turn will support population growth; and
  - forecast growth in freight and strategic traffic.
- 2.11. Given its dual role of strategic route and local road, the key challenges for the A14 corridor will be to accommodate the increasing freight movements that will come from the expansion of the Haven ports and continued growth of other long-distance travel, whilst providing capacity for local access thus facilitating local employment and population growth. If growth in housing and employment can be accommodated without causing unacceptable negative impacts on the transport network, it will encourage economic development in an area that has high growth potential and the opportunity to contribute significantly to the national economy.
- 2.12. Output 1 also identified a series of wider challenges (or non-transport consequences) associated with these problems. This was based on an understanding of the impacts of the transport problems on policy imperatives and broader economic, social and environmental priorities, defined as <sup>14</sup>:
- economy – the impact of transport on encouraging economic growth; and
  - social and environmental impacts – covering measures of ‘well-being’, including accidents, air quality and health impacts, and access to services and economic ‘welfare’ benefits.

---

<sup>13</sup> A14 Study Output 1 Report, page 68, Steer Davies Gleave for the Department for Transport, plus additional text provided by the Project Board.

<sup>14</sup> A14 Study Output 1 Report, page 68, Steer Davies Gleave for Department for Transport

2.13. The relationships between the transport problems and the wider challenges identified in Output 1 are summarised in the Challenge Matrix shown in Table 5<sup>15</sup>.

**Table 5. Challenge matrix**

Transport problems	Wider challenges						
	Supporting economic growth				Impact on quality of life (Social % Environmental impacts)		
	Lost productive time	Supporting growth in the wider UK economy	Supporting growth of Greater Cambridge	Access to labour markets	Quality of life/welfare	Accidents	Air Quality (Health) & Noise
Peak congestion and delay on A14							
Peak congestion and delay on key local roads							
Lack of resilience							
Safety							

Adapted from Steer Davies Gleave (December 2011) Figure 6.1

2.14. The following text, taken from the Output 1 report, describes each of the wider challenges<sup>16</sup>.

#### Lost productive time

- This relates to congestion and associated delay caused to business and freight traffic, where under normal conditions the economic costs of delay have a direct impact on business productivity. This 'routine' delay occurs in both peak and inter-peak periods, but is worse and more significant in the peaks.
- The impact of delays associated with lack of resilience is two-fold. First, there is the direct productivity cost of unreliable journey times – delay due to incidents (additional time). Second, there can be additional costs of disruption and day to day variability in journey times when this affects the planned timing of deliveries, meetings etc. which in turn can place significant additional costs on businesses.
- The lost productive time and lost productivity will, in the absence of interventions, increase over time as traffic growth exacerbates current transport problems.

#### Supporting growth in the wider UK economy

- Enabling the efficient movement of people and freight, from the Channel ports (as a strategic link for North-South movements) and particularly from the Haven ports (as a strategic link for East-West movements) throughout the country. With throughput in the Haven ports forecast to increase from three million TEUs<sup>17</sup> to eight million TEUs by 2030<sup>18</sup>, the A14 has a major role to play in fostering growth and generating wealth through trade.

#### Supporting growth of the Greater Cambridge area

- The economy in the Cambridge area has high growth potential and is of national and international significance in certain industrial sectors but this will be frustrated by a lack of housing and the ability to move people and goods around freely.
- Enabling additional housing and employment would, other things being equal, contribute positively to the local, regional and national economy due to the high-value work and growth potential that underpin the economy of Greater Cambridge.

<sup>15</sup> Steer Davies Gleave for the Department for Transport (2011) *A14 Study Output 1 Report page 69, Figure 6.1*

<sup>16</sup> This summary is reproduced from Steer Davies Gleave (2011) *ibid page 69*

<sup>17</sup> TEU: twenty-foot equivalent unit

<sup>18</sup> <http://www.portoffelixstowe.co.uk/PUBLICATIONS/JOURNAL/frmfuturedevelopment.aspx>

- However, transport constraints mean there is a trade-off between the economic growth from additional housing and jobs, and the economic costs that the greater congestion which would come from associated traffic growth would impose upon all businesses.
- The nature of this trade-off and challenge, and the potential options that could be considered, will be different in the short- and long-term. In the short-term the key issue is the potential for identified housing development in the vicinity of the A14 to come forward given current transport constraints.
- In the longer-term the issue revolves around the further development of the existing transport and land use strategy with the aim of efficiently delivering the level of housing that would support the growth of the Greater Cambridge economy. The challenge is the extent to which affordable and cost effective interventions can be developed that mitigate the associated economic costs on the transport network while supporting growth. This implies consideration of land use *and* transport issues and options along the A14 corridor, and also across a wider area.

### Access to labour markets

- The success of the Greater Cambridge economy relies on having access to a sufficiently large labour market catchment. In choosing where to work, employees trade-off factors such as job income, house prices, commuting time and quality of life factors. High house prices within Cambridge means that a number of workers have to live some distance away and commute.
- Less attractive commuting (delay and unreliability, increasing cost, plus the adverse impact on quality of life) would, other things being equal, serve to limit Cambridge and Huntingdon's effective labour market catchment and make it a less attractive place for people to work.
- There is a link between labour market access and future housing growth, as the accommodation of additional housing closer to jobs can help increase the labour market catchment while mitigating impacts on the transport network. The significant additional housing planned within Cambridge creates the potential to support a more sustainable pattern of commuting, and also cater for the high demand, particularly among the young, for housing in Cambridge. However, many workers will want and choose to live in more rural locations and disparate commuting patterns (including within households) means that the merely locating new housing near jobs will not necessarily have a marked effect in encouraging more sustainable commuting.

### Welfare impacts

- Welfare impacts reflect the measure of dis-benefit associated with travel time congestion and delay, and the leisure time foregone because of this.
- In addition to the direct time costs, there is strong evidence of the additional welfare dis-benefit (frustration and annoyance) that people feel when driving in congested conditions.
- Welfare impacts can, in the medium term, have economic consequences if the impact of the quality of life from congested commuting conditions discourages people from working in the area (and is related to the labour market issue above).

### Accidents

- Accidents have an economic cost (lost productivity, direct costs to NHS 19. Police) and a social cost (pain and suffering of individuals and families etc.).
- Although the accident rate per vehicle mile on much of the route is not significantly above the average for roads built to a similar design standard, this needs to be seen in the context that the road is below the standard to which a modern road would be designed. There are sections where accident rates are much higher than would be expected for roads of a similar standard. However, because traffic flows on the route

---

<sup>19</sup> National Health Service

are high there are a large number of accidents and disruptive incidents that cause delay on the A14 and have knock-on effects on the surrounding network. There is therefore considerable scope to reduce accident rates and the impact of incidents through improving the standard of the road.

- As the social costs of accidents are significant, we suggest options should consider whether there is the potential to reduce accident risk and accidents in order to minimise accidents to levels below 'average' rates.

### Air quality / health (and noise)

- There are four AQMAs<sup>20</sup> along the A14 corridor within the core study area, where the level of emissions represent a health risk for the surrounding community. The level of emissions (and noise) is related to the volume of traffic, but is also exacerbated when congestion and delay is more acute.
- An additional issue is the localised air quality and noise impacts that can occur when there is significant disruption on the A14, and traffic (including HGV) re-routes to the local network.

2.15. Further detail is available in the Output 1 report.

## Local objectives

2.16. The local objectives for the A14 were derived from the wider challenges defined in Output 1. They are:

- reduce lost productive time;
- support the economic growth of the wider UK economy;
- support the growth of Greater Cambridge;
- improve access to labour markets;
- improve quality of life / welfare;
- reduce the number of accidents on the A14 in the core study area; and
- reduce air quality and noise impacts.

## Measures for success

2.17. Setting out what constitutes successful achievement against the objectives (the 'measures for success') will be identified at the start of Output 3. This will guide further exploration of the performance of the packages. As an example, minimum thresholds might be set for different assessment indicators (e.g. 'X% improvement in average journey times between A and B').

## Scope

2.18. As described in Section 1, the A14 Study consists of three outputs, namely:

- identification and prioritisation of problems (Output 1);
- generation and sifting of potential interventions (Output 2); and
- package Development (Output 3).

2.19. The purpose of the study is to develop a multi-modal package of interventions to tackle the prioritised challenges (identified through Output 1) which is affordable, deliverable, and represents value for money. The study includes a high level assessment of the potential role of private sector led interventions, such as new tolled infrastructure, the market appetite for this, and what the public sector can do to help facilitate these.

---

<sup>20</sup> Air Quality Management Areas

- 2.20. It is intended that the preferred package will comprise short and medium term interventions, including those which can be justified in the longer term, given the challenges which are expected to emerge. This will lead to a longer term economically and environmentally sustainable strategy (to 2030), and ensure that any shorter term measures are consistent with this strategy.
- 2.21. The core study area is defined by the A14 corridor with Ellington/Alconbury in the west and Fen Ditton in the east. A wider study area has been identified for the consideration of freight modal shift opportunities benefitting the core study area, and this is the Haven Ports, London and the South East, to the Midlands and North via the A14 corridor.

## Constraints and interdependencies

- 2.22. To date, the assessment the consideration of constraints and interdependencies has focused on a range of areas which could give rise to deliverability issues. These are presented in Section 5 under the Management Case.
- 2.23. Further consideration will be given to internal and external success factors upon which the successful delivery of the preferred package is dependent, as part of Output 3.

## Stakeholders

- 2.24. A range of consultation activities have been undertaken during the course of the study to date. These are:
- ongoing engagement with key stakeholders through the Study Steering Group and the Project Board (see Appendix A for a list of Steering Group and Project Board members);
  - public consultation through the web-based survey undertaken as part of the A14 Challenge process; and
  - engagement at a county level, by Cambridgeshire, Northamptonshire and Suffolk County Councils, with major A14 stakeholders to brief them on the study process and progress, and seek their views on the problems, potential solutions and options for funding improvement measures.
- 2.25. The Study Steering Group, supported by the Project Board, have ultimate responsibility for ratification of the study process, outputs and recommendations. This will continue as the study progresses, providing input to the development of an Outline Business Case for a preferred package during Output 3.
- 2.26. In addition, the opportunity exists to further engage local stakeholders through the County Councils.

## Performance against local objectives

- 2.27. Table 6 summarises the performance of the packages against the local objectives. The assessment is presented in a matrix format and a colour coded scoring system has been applied to facilitate comparison.
- Following the summary table, commentary is provided on the relative performance of the packages against each indicator. The commentary provides direction to the key findings, highlighting the strongest and weakest performers. The focus is on those areas where there is clear distinction between packages.
- 2.28. The appraisal methodology is summarised in Section 1. Additional information about the approach taken to assessing the performance of the packages against each of the indicators informing the Strategic Case and the Economic Case is presented in Appendix G.

**Table 6. Performance against objectives**

Impact	Assessment criteria	Public Transport			Freight		Highway						
		M(A)	M(B)	M(AB)	C(ABCD)	C(D)	DS	GBCR(d)	GBCR(t)	GDS(t)	C(part)j(d)	C(part)j(t)	
Objectives (assessment against specific objectives derived from wider challenges identified in Output 1).	Reduce lost productive time	1	0	1	2	1	1	3	3	3	2	2	
	Support the economic growth of the wider UK economy	1	0	1	0	0	2	2	3	3	1	2	
	Support the economic growth of Greater Cambridge	Impacts on journey costs	1	0	1	1	0	1	2	3	3	2	2
		Housing development	0	0	1	0	0	1	3	2	2	2	2
		Commercial development	0	0	1	2	2	1	3	2	2	2	2
	Improve access to labour markets	Journey times to key employment sites	1	0	1	0	0	2	3	2	2	2	2
		Impact on commuting journey times	1	0	1	0	0	1	3	3	2	2	2
	Improve quality of life/welfare	1	0	1	0	0	1	3	3	2	2	2	
	Reduce number of accidents on the A14 in the core study area	1	0	1	1	1	0	-2	-1	-1	-2	-1	
	Reduce air quality and noise impacts	Impact on AQMAS	1	1	1	1	1	0	2	1	1	3	1
Noise Impact		1	1	1	1	1	0	-2	-1	-1	-2	-1	
Fit with wider transport & government	Fit within the EU legislative framework governing transport; and with other	1	1	1	2	2	1	3	3	3	2	2	
<b>Strategic case Total score</b>		8	3	9	8	7	8	15	16	14	10	11	

*Notes to table:*

- 1 The scores attributed to each package are intended to illustrate the relative performance by mode against each of the appraisal criteria, based on the assessment undertaken to date. Scores should not be considered as absolute, nor can they be compared across modes i.e. scores attributed to public transport packages should not be compared with scores attributed to the freight or highway packages.
- 2 The total score has been adjusted to remove any undue weighting for the criterion that are informed by more than one indicator. Consequently 'Support the economic growth of Greater Cambridge' is represented in the total as the average of the scores for 'Impacts on journey costs', 'Housing development unlocked' and 'Commercial development unlocked' and 'Improve access to the labour market' is represented as the average of the scores for 'Journey times to key employment sites' and 'Impact on commuting journey times'.

**Objective: reduce lost productive time**

**Public transport packages**

2.29. The ability of packages to reduce lost productive time is a function of the reduction in vehicle kilometres travelled Package M(A) in isolation will reduce traffic by approximately 5%; whilst the effect of package M(B) is estimated at 2-3%.

**Freight packages**

2.30. Although the impacts of the freight packages cannot be fully quantified at this stage (as to do this would require testing the forecast reductions in road freight within the highway model alongside total forecast traffic demand on the A14, the forecasts suggest an average reduction in total daily HGV trips passing through the core study area of between 1,500 and 2,000 (4-5%) compared with a do-nothing option.

### Highway packages

- 2.31. All highway packages achieve a positive score, based on forecast travel time savings across the study area. GBCR(d), GBCR(r) and GDS(r) achieve 'large positive' scores, reflecting the scale of capacity improvements associated with the provision of a Huntingdon Southern Bypass (HSB) and improvements to the existing A14 corridor between the HSB and Girton.
- 2.32. Packages G(part)J (d) and G(part)J (r) achieve a 'moderate positive' score as the time savings associated with the upgraded A428 route are smaller in scale than those associated with additional capacity on the main corridor provided in GBCR(d)/(r) and GDS(r).
- 2.33. The impact of DS is only 'slight positive' as it provides additional capacity on a only relatively short section of the existing A14 corridor, limiting the scale of time savings achieved.

### Objective: support the growth of the wider UK economy

#### Public transport packages

- 2.34. The scoring of packages in terms of their ability to support the growth of the wider UK economy is, at this stage, the same as for the 'reduce lost productive time' criterion as both criteria are a function of the reduction in vehicle kilometres travelled.

#### Freight packages

- 2.35. As with impacts on lost productive time, strategic journey times would be reduced as a result of the transfer of freight from road to rail. However the scale and nature of these effects on HGVs and general traffic can only be assessed through further modelling.

### Highway packages

- 2.36. The highway packages all achieve a positive impact, assessed in terms of effect on travel costs for strategic trips.
- 2.37. GBCR(r) and GDS(r) achieve a 'large positive score' due to the congestion relief from the increased capacity provided on the mainline corridor and the retention of the Huntingdon Viaduct as a dual two-lane all-purpose structure to provide a route for traffic to/from the north (A1(M)).
- 2.38. GBCR(d) achieves a 'moderate positive' score, reflecting the fact that overall travel cost savings are less than GBCR (r) due to the additional journey length for north/south strategic traffic which uses Huntingdon Southern Bypass in this option rather than continuing to use the A14 through Huntingdon.
- 2.39. G(part)J(r) also achieves a 'moderate positive' score as the journey time improvements for east/west strategic traffic associated with the upgraded A428/A1198 route are smaller than those associated with the improved online route provided in the GBCR and GDS options. G(part)J(d) achieves a 'slight positive' score due to the additional journey length for north/south strategic traffic using HSB rather than A14 (as for GBCR(d)).
- 2.40. DS achieves a 'moderate positive' score as the cost savings due to capacity relieve are limited to a relatively small section of the corridor but affect all strategic trips.
- 2.41. In terms of local trips, the 2006 Huntingdon Viaduct Study suggested that removal of the viaduct would result in significant travel cost savings during the peak periods by local traffic. The modelling of traffic in Output 3 will enable examination of the overall travel effects of highway packages with the viaduct retained for strategic trips to/from the A1(M) and with the viaduct removed altogether.

### Objective: support the economic growth of Greater Cambridge

- 2.42. This objective is divided into three assessment indicators; considering impacts on journey costs home based work and business trips, scale of housing developments unlocked and impact on commercial developments.

### Public transport packages

- 2.43. Package M(AB) is likely to have the greatest benefit in supporting the economic growth of Greater Cambridge than the other packages as it will do most to increase public transport accessibility to commercial and residential developments and generate confidence amongst developers to invest locally. All packages will have some effect in reducing congestion in Cambridge, thereby enhancing the productivity of existing business and attracting new investment.

### Freight packages

- 2.44. Journey times for home-based work trips and employer's business trips will fall as a result of the freight packages removing HGV traffic from the road network, but impacts are likely to be relatively small. Similarly, a reduction in general traffic (and therefore congestion) on the highway network will assist in unlocking capacity for residential and commercial development, but the impacts are likely to be negligible other than where these developments are freight-related (as in the case of the strategic rail freight terminals).

### Highway packages

- 2.45. The impacts on journey costs for home based work and employer's business trips closely follow those for the objective 'Support the Growth of the Wider UK Economy' above. The slight differences are explained by the fact that this indicator is assessed on the basis of changes in journey costs for all trips (not just strategic trips) and therefore the distance increase associated with strategic traffic using offline routes has proportionately less impact on total costs, as local trips are not affected.
- 2.46. The second and third sub-objectives relate to the how the packages release new housing development and new commercial development respectively. Based on professional judgement, GBCR(d) achieves 'large positive' scores for both sub-objectives, reflecting the role of the package in providing additional capacity on the existing A14 between Bar Hill and Girton, which in turn would serve the proposed Northstowe development.
- 2.47. Package DS achieves a 'slight positive' score for both sub-objectives, reflecting the fact that the capacity improvement is restricted to a relatively short section of the corridor.
- 2.48. All other packages achieve 'moderate positive' scores for both sub-objectives reflecting the relatively significant improvements in capacity achieved through the provision of a Dual 2 AP Huntingdon Southern Bypass and online capacity improvements for the (r) options or Dual 3 AP HSB and A428/A1198 improvement for G(part)J(d).

## Objective: improve access to labour markets

### Public transport packages

- 2.49. The scoring of packages in terms of their impact on access to labour markets is, at this stage, the same as for the 'reduce lost productive time' criteria as both criteria are a function of the reduction in vehicle kilometres travelled.

### Freight packages

- 2.50. Journey times for home-based work trips will fall as a result of the packages (thereby increasing accessibility to labour markets), but the scale of impact is likely to be small as typically only 15-30% of HGV movements occur in the study area during the morning peak period.

### Highway packages

- 2.51. The criterion is divided into two assessment indicators. The first of these is an assessment of the potential change in travel times to key employment sites. Using professional judgement, all of the packages score positively against this criteria with GBCR(d) achieving a 'large positive' score due to the impacts of the Huntingdon Southern Bypass with a de-trunked A14 through Huntingdon.
- 2.52. All other packages achieve a 'moderate positive' score, reflecting the impacts of the capacity improvements provided.

- 2.53. The second indicator relates to the impact on commuting journeys and is based on a change in journey costs for local trips in the morning peak period. GBCR(d) again achieves a score of 'large positive' as does GBCR(r), reflecting the increase in capacity provided by the HSB and online widening, which increases speeds for local traffic.
- 2.54. DS achieves a 'slight positive' score reflecting the relatively limited extent of the capacity improvement and associated travel cost improvements.
- 2.55. All other packages achieve a 'moderate positive' score, reflecting the net impact on journey costs of the increase in capacity and changes in routing and associated trip lengths as a result of each option.

### **Objective: improve quality of life/welfare**

#### **Public transport and freight packages**

- 2.56. The scoring of public transport packages in terms of their impact on quality of life and welfare is, at this stage, the same as for the 'reduce lost productive time' criteria as both criteria are a function of the reduction in vehicle kilometres travelled.
- 2.57. Similarly the scoring of freight packages is, at this stage, the same as for 'improved access to the labour market'.

#### **Highway packages**

- 2.58. The highway packages all score positively against this indicator as they reduce congestion and delays, which in turn leads to more leisure time and improved quality of life.
- 2.59. GBCR(d) and GBCR(r) achieve 'large positive' scores as they address or bypass the three major congestion hotspots at Brampton Hut, Spittals and Girton interchanges, and provide capacity improvements along most (if not all) of the route.
- 2.60. DS achieves a 'small positive' score as congestion relief is limited to the section of the corridor between Trinity Foot and Girton.
- 2.61. All other packages achieve 'moderate positive' scores, reflecting the congestion relief achieved through the capacity improvements associated with the provision of a Dual 2 AP Huntingdon Southern Bypass and online capacity improvements for the (r) options or Dual 3 AP HSB and A428/A1198 improvement for G(part)J(d).

### **Objective: reduce the number of accidents**

#### **Public transport packages**

- 2.62. The scoring of packages in terms of their impact on accidents is, at this stage, the same as for the 'reduce lost productive time' criteria as both criteria are a function of the reduction in vehicle kilometres travelled.

#### **Freight packages**

- 2.63. Changes in the number and severity of accidents cannot be quantified at this stage as to do this would require testing the reductions in road freight as forecast within the highway model alongside total forecast traffic demand on the A14 (i.e. with future car, bus traffic etc.). However, reduction in HGV traffic, especially at peak times, would be expected to result in a reduction in the number and severity of accidents in both packages.

#### **Highway packages**

- 2.64. The assessment of the impact of highway packages on accidents is driven by the change in vehicle kilometres resulting from the package. Consequently package DS has a neutral impact as it is an online option which does not affect distance travelled.
- 2.65. The offline options have a negative impact due to the increase in travel distance caused because the new routes associated with the Huntingdon Southern Bypass are longer. The (d) alternatives (GBCR(d) and G(part)J(d)) have a 'moderate negative' impact as strategic north/south trips use the HSB and therefore have a longer trip length.

- 2.66. The (r) options (GBCR(r), GDS(r) and G(part)J(r)) have a 'slight negative' impact as strategic north/south journeys continue to use the A14, without any increase in journey length.
- 2.67. The increase in accident numbers for offline options would be mitigated to an extent by the fact that the offline options are likely to have a lower average accident rate per kilometre than the main corridor as they will have fewer junctions and will be built to more modern design standards.

### **Objective: reduce air quality and noise impacts**

#### **Public transport packages**

- 2.68. All three packages would have a negligible effect on the Huntingdon AQMA but would reduce emissions and noise levels along the southern section of the A14 between Longstanton and Cambridge.

#### **Freight packages**

- 2.69. Both packages would reduce HGV traffic levels in the AQMAs along the A14, including through Huntingdon and as a result would have a positive impact on air quality (and noise). Levels cannot be quantified at this stage. Note that it is possible for HGV traffic levels in the vicinity of a local strategic rail freight interchange, such as that proposed at Alconbury, to rise.

#### **Highway packages**

- 2.70. The impact of the packages on air quality is largely determined by the extent to which they change traffic flow in the AQMA areas. The indicator is based on flows through the Huntingdon AQMA and those directly along the A14 corridor as they were judged most likely to vary significantly between packages. The central Cambridge AQMA is therefore not included in the assessment.
- 2.71. G(part)J(d) has a 'large positive' score as it removes the majority of strategic traffic from along the length of the corridor between Girton and Huntingdon.
- 2.72. GBCR(d) has a 'moderate positive' impact, reflecting the volume of strategic traffic removed from the corridor by the D3AP HSB. All other offline options (G(part)J(r), GBCR(r) and GDS(r) ) have a 'slight positive' impact, reflecting the level of traffic removed from the main corridor.
- 2.73. DS has a neutral impact in this assessment as the improvement is online and traffic flows on the corridor do not change. However, if variable demand was taken into account, the increase in traffic due to generated demand and rerouting would lead to negative scores, if not mitigated.
- 2.74. Noise impacts are driven by changes in traffic volumes and, therefore, in this assessment are related to changes in journey distances due to the offline options. GBCR (d) and G(part)J(d) both have a 'moderate negative' impact, reflecting the impacts of the D3AP HSB on journey distance for strategic traffic. The other packages (GBCR (r), G(part)J(r) and GDS(r)) have a smaller impact on traffic levels and therefore noise levels, leading to a 'slight negative' impact. .
- 2.75. Again DS has a neutral impact in this assessment as it is an online option and therefore traffic flows on the corridor do not change. If variable demand was taken into account, the increase in traffic due to generated demand and rerouting would lead to negative scores unless mitigation measures were taken into account. It is likely to be possible to mitigate all noise impacts, although this would add cost to each package.

### **Fit with wider transport and government objectives**

#### **Public transport packages**

- 2.76. All three packages would potentially:
- lead to some decongestion benefits to the A14, a TEN designated route;
  - lead to some increase in active travel through reduced car use and related local air pollution which may bring minor health benefits;
  - have a positive impact on access to health and education facilities depending on extent / scope of improvements.

### **Freight packages**

- 2.77. The packages will promote modal shift to rail which will contribute to objectives to reduce CO<sub>2</sub> emissions.
- 2.78. Further, a more efficient railway sector should generate cost benefits to industry, thereby increasing productivity and supporting economic growth.

### **Highway packages**

- 2.79. All packages score positively against this criterion with three: (GBCR(d), GBCR(r) and GDS(r)) achieving a 'large positive' score. These packages score highly as they would provide enhanced EU connectivity in a Trans European Network corridor, contributing positively to economic growth through removal or bypass of existing bottlenecks and remove traffic from the vicinity of Huntingdon.
- 2.80. G(part)J(r) and G(part)J(d) achieve a 'moderate positive' score and DS achieve a 'slight positive' score, reflecting the relative levels of impact on congestion in the study area achieved in each case.

## 3. Economic Case

### Approach to assessing value for money

- 3.1. The Economic (value for money) Case considers the likely benefits and dis-benefits of each package in terms of economic, environmental and social impacts and the packages' impacts on public accounts<sup>21</sup>.
- 3.2. The appraisal methodology is summarised in Section 1. Additional information about the approach taken to assessing the performance of the packages against each of the indicators informing the Strategic Case and the Economic Case is presented in Appendix G.

### Performance against Economic Case criteria

- 3.3. Table 7 summarises the performance of the packages against each of the Economic Case criteria. The assessment is presented in a matrix format and a colour coded scoring system has been applied to facilitate comparison.
- 3.4. Following the summary table commentary is provided on the relative performance of the packages against each indicator. The commentary provides direction to the key findings, highlighting the strongest and weakest performers. The focus is on those areas where there is clear distinction between packages.

---

<sup>21</sup> As prescribed in the Government's transport appraisal guidance (WebTAG)

**Table 7. Summary of assessment against Economic Case criteria/indicators**

Impact		Assessment criteria	Public Transport			Freight		Highway									
			M(A)	M(B)	M(AB)	C(ABCD)	O(D)	DS	GBCR(d)	GBCR(f)	GDS(f)	C(part)J(d)	C(part)J(f)				
Economy	Connectivity	Do journeys will become shorter, quicker &/or cheaper	<i>Strategic Trip Costs</i>		1	0	1	2	2	2	2	3	3	1	2		
			<i>Local Trip Costs</i>		1	0	1	0	0	1	3	3	3	3	3		
	Reliability	Impact on the number of incidents and the day to day variability in journey times or the average minutes of lateness.	1	0	1	1	1	1	1	3	3	3	3	3	3		
	Regeneration		Not assessed. Assessment only required where an option impacts on a designated regeneration area.														
Wider Impacts	Productivity and welfare changes	1	0	1	1	1	1	1	3	3	3	3	3	3			
Environment	Greenhouse gases	Change in CO <sub>2</sub> emissions.	1	0	1	2	2	0	-2	-1	-1	-2	-1				
	Air quality/ noise	Affects on AQMAs - Impacts on local air quality.	1	1	1	0	0	0	2	1	1	3	1				
		Noise Impact	1	1	1	1	1	0	-2	-1	-1	-2	-1				
	Landscape	Impact on open countryside	Not assessed for public transport/freight packages but no show stoppers identified.					0	-1	-1	-2	-1	-1				
	Townscape	Impact on centres of population						-1	-2	-3	-3	-2	-3				
	Heritage	Impact on designated sites						-1	-1	-1	-1	-1	-1				
	Biodiversity	Impact on designated sites						-2	-3	-3	-3	-3	-3				
Water Environment	Impact on flood plain	-1						-1	-1	-2	-1	-1					
Social	Social and distributional	Impacts on specific demographic groups (e.g. children, older people, disabled people, Black and Minority Ethnic)	1	1	1	0	0	0	0	0	0	0	0	0			
	Physical activity	Impacts on levels of walking and cycling	1	0	2	0	0	0	0	0	0	0	0	0			
	Accidents	Change in number and severity of transport-related accidents.	1	0	1	1	1	0	-2	-1	-1	-2	-1				
	Security		Not assessed in Output 2. Negative impacts would not lead to the elimination of an option/package at this stage.														
	Access to goods, services, people and places	Change in ease of access to key locations (e.g. colleges, hospitals).	1	1	2	0	0	1	2	2	2	2	2	2			
	Affordability	Affordability impacts on vulnerable user groups.	Not assessed in Output 2. Negative impacts would not lead to the elimination of an option/package at this stage.														
	Severance	Effects on hindrance of movement by non-motorised modes.	0	0	0	0	0	0	0	0	0	0	0	0			
Option values	Introduction of new transport options (i.e. new mode or new public transport routes) where these did not exist before.	Not assessed in Output 2. Negative impacts would not lead to the elimination of an option/package at this stage.															
Public accounts	Cost to broad transport budget	Capital cost of the package. (£ million)	<100m	<100m	<100m			501-750	751-1000	751-1000	> 1000	501-750	501-750				
		Potential for on-going revenue	1	0	1	0	0	3	3	1	3	2	1				
	Indirect tax revenues		Not assessed in Output 2. Appropriate data not available														
<b>Total score</b>			11	4	13	7	7	3	2	1	1	1	1				

Notes to table:

- The scores attributed to each package are intended to illustrate the relative performance by mode against each of the appraisal criteria, based on the assessment undertaken to date. Scores should not be considered as absolute, nor can they be compared across modes i.e. scores attributed to public transport packages should not be compared with scores attributed to the freight or highway packages.
- The total score has been adjusted to remove any undue weighting for the criterion that are informed by more than one indicator. Consequently 'Connectivity' is represented in the total as the average of the scores for 'Strategic trip costs' and 'Local trip costs'.

## Connectivity

### Public transport packages

- 3.5. The ability of packages to improve connectivity is largely a function of the reduction in vehicle kilometres travelled and associated congestion on the network. Package M(A) in isolation will reduce traffic by approximately 5%; whilst the effect of package M(B) is estimated at 2-3%.

### Freight packages

- 3.6. Changes in vehicle kilometres travelled, journey times, and costs cannot be quantified from the freight forecast outputs, as forecast HGV demand for the packages (compared with the 'do-minimum' scenario) would need to be considered and modelled alongside total traffic demand on the A14.
- 3.7. However, the forecasts suggest an average reduction in total daily HGV-trips passing through the core study area of between 1,500 and 2,000 (4-5%) compared with a do-nothing option. The forecasts also suggest an average reduction in total daily HGV kilometres (when measuring length of haul of HGVs in the core study area) of between 400,000 and 530,000 compared with a do-nothing option.

### Highway packages

- 3.8. Most of the packages score strongly on connectivity which is assessed on the basis of impacts on total journey costs (distance and time elements). For local trips, the packages with Huntingdon Southern Bypass have 'strong positive' scores (GBCR(r/d) GDS(r) and G(part)J(r/d)), reflecting the improvements in journey time on the main corridor generated by the increases in capacity associated with the packages.
- 3.9. DS has a 'slight positive' score reflecting the fact that capacity improvements are more limited in this package.
- 3.10. Assessment of strategic connectivity follows a broadly similar pattern. However, the impacts of increased journey length for strategic trips associated with the offline options partially offset journey time savings. This is particularly the case for the (d) derivatives for options with the HSB where both east/west and north/south strategic trips are routed away from the de-trunked A14 to the longer HSB route, and for the options using the longest route via the A428/A1198 upgrade (G(part)J(d/r)).
- 3.11. Consequently, whilst GBCR(r) and GDS(r) again have a 'strong positive' impact for strategic connectivity, G(part)J(r) and GBCR(d) only have a 'moderate positive' impact. G(part)J(d) has only a 'slight positive' impact (as it combines the impact of the detrunked A14 and the A428/A1198 route).

## Reliability

### Public transport packages

- 3.12. The scoring of packages in terms of their impact on the number of incidents and the day to day variability in journey times is, at this stage, the same as for the 'connectivity' criteria as both criteria are a function of the reduction in vehicle kilometres travelled.

### Freight packages

- 3.13. Changes in the impact of incidents and the day to day variability in journey times cannot be explicitly forecast at this time. However the high number of HGVs on the A14 means that incidents, when they do occur, tend to be more difficult to resolve, meaning that incidents have a longer impact. Both packages reduce the number of HGV kilometres travelled and hence should improve reliability.

### Highway packages

- 3.14. Reliability is influenced by increases in capacity and availability of additional alternative routes for traffic. Consequently all packages have positive scores and the most positive scores arise for the packages which provide additional offline routes (GBCR(d/r), GDS (r) and G(part)j(d/r)). DS has a 'slight positive' score as it provides online additional capacity for a section of the corridor only.

### Wider impacts

#### Public transport packages

- 3.15. The scoring of packages in terms of their impact on the journey costs is, at this stage, the same as for the 'connectivity' criteria as both criteria are a function of the reduction in vehicle kilometres travelled.

#### Freight packages

- 3.16. As described above, changes in journey costs for general traffic cannot be quantified from the freight forecast outputs without further modelling of impacts on wider traffic. However both packages should result in an improvement in the reliability of journey times even if the impact on average (typical) journey times is less marked.

### Highway packages

- 3.17. The wider economic impacts of highway packages are influenced by reductions in journey costs (time and distance), particularly for local trips. Consequently the scores follow a similar pattern to those for reliability with the 'strong positive' scores for the packages providing the greatest increase in overall capacity (GBCR(d/r), GDS (r) and G(part)j(d/r)).
- 3.18. DS has a 'slight positive' score as it provides online additional capacity for a section of the corridor only.

### Greenhouse gases

#### Public transport packages

- 3.19. The scoring of packages in terms of their impact on CO<sub>2</sub> emissions is, at this stage, the same as for the 'connectivity' criteria as both criteria are a function of the reduction in vehicle kilometres travelled.

#### Freight packages

- 3.20. Changes in CO<sub>2</sub> cannot be accurately quantified for traffic as a whole. However, given a mean reduction in daily HGV travel of 400 to 530,000 HGV kilometres, CO<sub>2</sub> emissions would be expected to fall by between 384 and 515 tonnes per day (using current DEFRA guidelines) before other factors are considered.

### Highway packages

- 3.21. The influence of the packages on CO<sub>2</sub> is assessed on the basis of their impact on change in vehicle kilometres travelled. The offline packages therefore have a negative score due to the increased length of the offline routes. The (d) derivatives (GBCR(d) and G(part)J(d)) have 'moderate negative' scores, reflecting the fact that all strategic trips use the Huntingdon Southern Bypass with an associated increase in journey length. The (r) derivatives have a 'slight negative' impact as the north/south strategic trips remain on the A14, with no increase in journey length.
- 3.22. DS has a neutral impact in this assessment as the improvement is online and traffic flows on the corridor do not change. However, if variable demand was taken into account, the increase in traffic due to generated demand and rerouting would lead to negative scores, if not mitigated
- 3.23. Changes in journey speeds as a result of changes the packages would also impact on CO<sub>2</sub> emissions, although the overall impact would reflect a fine balance between changes in speed across the study area (as the relationship between speed and emissions is not linear and emissions increase with both increases and decreases in speed from a minimum point at about 50kph).

## **Air quality and noise**

### **Public transport packages**

- 3.24. All three packages would have a negligible effect on the Huntingdon AQMA but would reduce emissions and noise levels along the southern section of the A4 between Longstanton and Cambridge.

### **Freight packages**

- 3.25. Both packages would reduce HGV traffic levels in the AQMAs along the A14 including through Huntingdon and as a result would have a positive impact on air quality (and noise) although effects cannot be quantified at this stage. Note that HGV traffic in the vicinity of a local strategic rail freight interchange, such as that proposed at Alconbury, is likely to rise rather than fall.

### **Highway packages**

- 3.26. As described under the Strategic Case above, the offline options (GBCR(r/d), GDS(r) and G(part)J(r/d)) have a positive impact on air quality as they remove traffic from the AQMAs along the main corridor and a negative impact on noise as they increase overall traffic levels.
- 3.27. DS is assessed as having a neutral impact as the improvements are online and therefore do not change traffic flows (in the fixed matrix assessment).

## **Landscape / townscape / heritage / biodiversity / water environment**

### **Public transport packages**

- 3.28. A detailed assessment of the impacts of the public transport packages against the individual environmental criteria has not been completed at this stage in the assessment. However, as none of the packages include significant infrastructure, it is anticipated that this will mean that all will have limited impacts on landscape, townscape, biodiversity or the water environment. The largest adverse impacts are likely to be caused by the proposed park & ride site(s).

### **Freight packages**

- 3.29. Similarly a detailed assessment of the impacts of the freight packages against the individual environmental criteria has not been completed at this stage in the assessment. Therefore, there is currently insufficient information to comment on these criteria for the freight packages.

### **Highway packages**

#### *Landscape*

- 3.30. The measures associated with package DS fall within in the existing transport corridor and therefore the package has been scored with a neutral impact on landscape:
- 3.31. All other packages include sections in open countryside and therefore receive a negative score against this criterion. GDS(r) has the longest section in open countryside and therefore has a 'moderate negative' score. GBCR(r/d) and G(part)J(r/d) all have a 'slight negative' score.

#### *Townscape*

- 3.32. The assessment reflects the potential impacts on centres of population. All packages were judged to have an adverse impact and therefore all received a negative score against this criterion. Packages which would have a large adverse impact on the Huntingdon (as the largest centre of population) scored 'large negative'.
- 3.33. The cumulative impacts of packages including a Huntingdon Southern Bypass, in conjunction with online widening or local access roads, leads to those packages (namely GBCR(r), GDS(r) and G(part)J(r)) being attributed a 'large negative' score.
- 3.34. In the (d) derivatives of these packages (namely GBCR(d) and G(part)J(d)), the benefits associated with the relief for Huntingdon (provided by the detrunking of the existing A14) were off-set against the overall adverse effects and were reflected with a 'moderate negative' score.

- 3.35. DS received a 'slight negative' score as it comprises of a shorter section of local access roads only.

#### *Heritage*

- 3.36. Assessment against this criterion was based upon the number of designated heritage sites within one kilometre of the approximate alignment of each package. All packages were attributed a 'slight negative' score on this basis.

#### *Biodiversity*

- 3.37. Scores against this criterion were based on the proximity of packages to designated sites. The worst-scoring packages were those which pass directly through a designated site. GBCR(d/r), GDS(r) and G(part)J(d/r) all have a 'large negative' score as they pass directly through a designated site.

- 3.38. DS has a 'moderate negative' score as it passes within one kilometre of one or more designated sites.

#### *Water Environment*

- 3.39. Scores against this criterion were based on the length of new or widened highway within Flood Zone 3. On this basis GDS(r) was attributed a 'moderate negative' score and all other packages were attributed a 'slight negative' score.

### **Social and distributional impacts**

#### **Public transport packages**

- 3.40. Packages enhancing levels of public transport accessibility would be expected to positively impact those people without access to a car and people on low incomes.

#### **Freight packages**

- 3.41. The freight packages are not considered to have any particular social or distributional impacts.

#### **Highway packages**

- 3.42. Overall, the packages have very little impact on any of the vulnerable user groups. The full assessment of Social and Distributional Impacts of the highway packages is presented in Appendix B.

- 3.43. The areas within one kilometre of packages G(part)J(r) and G(part)J(d) contain a slightly higher concentration of people claiming the Disability Living Allowance when compared to the Cambridgeshire average, while all of the other packages have lower levels of people claiming Disability Living Allowance when compared with the Cambridgeshire average.

### **Physical activity**

#### **Public transport packages**

- 3.44. All three packages will increase levels of physical activity through shifting the balance between the relative attractiveness of travel by car and public transport.

#### **Freight packages**

- 3.45. No impacts on physical activity are expected.

#### **Highway packages**

- 3.46. All packages were judged to have a neutral effect on physical activity as they would not have a significant impact on the volumes and lengths of walking and cycling trips. The main impact of the packages is on longer distance highway trips in the corridor and potential issues of severance can be mitigated (as discussed below).

## Accidents

### Public transport packages

- 3.47. The scoring of packages is, at this stage, the same as for the 'connectivity' criteria as both criteria are a function of the reduction in vehicle kilometres travelled.

### Freight packages

- 3.48. Changes in the number and severity of accidents cannot be quantified at this stage because, as described above, changes in traffic levels cannot be quantified from the freight forecast outputs without further modelling of impacts on wider traffic. However, reduction in HGV traffic, especially at peak times, would be expected to result in a reduction in the number and severity of accidents in both packages.

### Highway packages

- 3.49. The packages with offline elements increase journey distance and therefore accident numbers with the (d) derivatives for all packages with the Huntingdon Southern Bypass (GBCR(d), GDS(d) and G(part)J(d)) having a 'moderate negative' impact and the (r) alternatives having a 'slight negative' impact.
- 3.50. The increase in accident numbers for offline options would be mitigated to an extent by the fact that the offline options are likely to have a lower average accident rate per kilometre than the main corridor as they will have fewer junctions and will be built to more modern design standards.

## Access to goods, services, people and places

### Public transport packages

- 3.51. Package M(AB) offers the greatest increase in public transport accessibility to key locations such as colleges and hospitals.

### Freight packages

- 3.52. Negligible impacts are expected, other than that a reduction in the overall levels of HGV traffic will improve general traffic conditions and therefore car-based access.

### Highway packages

- 3.53. All the packages score positively as increased highway capacity tends to improve access for car drivers. All the packages with offline components (GBCR(r/d), G(part)J(r/d) and GDS(r)) achieve a 'moderate positive' score whilst DS has a 'slight positive' score as it is a smaller scheme with more limited additional capacity and potential to reduce journey times.

## Severance

### Public transport packages

- 3.54. The packages are not anticipated to have any severance impacts.

### Freight packages

- 3.55. Impacts of measures have not yet been assessed.

### Highway packages

- 3.56. All the packages were judged to have a neutral impact on severance as it would be possible to include measures to mitigate any potential issues, such as disruptions to rights of way, as part of scheme design in each case.

## Cost to transport budget

### Public transport packages

- 3.57. All three packages have relatively low capital costs compared to the highway options. All three packages have ongoing operational costs although component M(A) would generate revenue from the park and ride service to offset against these costs.

### Freight packages

- 3.58. Identified costs to the public sector (through Network Rail) during Control Period 5 is approximately £82 million. Costs were derived from a range of public documents (including the CHUMMS final report, Network Rail's Freight and London and South East Route Utilisation Strategies and the DfT's Strategic Rail Freight Network: The Longer Term Vision) and through stakeholder meetings with Network Rail and Hutchison Ports UK.
- 3.59. All the components of the two packages have the potential to generate revenue through track or other access charges although the revenue generated cannot be captured locally. Increased profitability of rail freight operating companies and clients remains in the private sector.

### Highway packages

- 3.60. An estimate of outturn construction costs has been generated for each of the six highway packages. These are presented in broad bands in Table 8. The way in which these costs were derived is set out in Chapter 4. For clarity,:
- the costs for packages DS and GDS(d) assume D2 local access roads between Girton and Trinity Foot;
  - the costs for packages GBCR(d/r) assume a 20 kilometre Huntingdon Southern Bypass (therefore rejoining the current alignment in the vicinity of Trinity Foot); and
  - the costs for packages GBCR(d/r), GDS(r) and G(part)J(d/r) do not assume any improvements east of Girton.

**Table 8. Highway package costs**

Package	Cost Range
DS	£500m - £750m
GBCR(r)	£750m - £1bn
GBCR(d)	£750m - £1bn
GDS(r)	>£1bn
G(part)J(d)	£500m - £750m
G(part)J(r)	£500m - £750m

### Potential for revenue generation

- 3.61. An illustrative assessment was made of the potential of the packages to generate toll revenue. The approach adopted was based on estimated flows on improved sections of the A14.
- 3.62. Packages DS, GBCR(d), and GDS(r) have 'large positive' scores as they could potentially intercept the largest amount of strategic traffic (which has been determined in part by an assessment of diversion of long-distance trips to alternatives to one or more sections of the route).
- 3.63. G(part)J(d) achieves a 'moderate positive' score and GBCR(r) and G(part)J(r) have more limited scope for revenue generation and therefore achieve only 'slight positive'.
- 3.64. At this stage, the assessment has not considered the practicality or acceptability of tolling relatively short sections of improved alignment. In practice, it may be difficult or inappropriate to do so, such as in package DS. The potential for packages to generate toll revenue, including matters of practicality and diversionary effects, will be examined in much more detail in Output 3. A fuller explanation of the approach is provided at §4.17-4.19.

## Value for money statement

- 3.65. The value for money assessment of the packages is based on their overall performance against the Strategic Case and the Economic Case indicators as described in Sections 2 and 3.

### Public transport packages

- 3.66. The level of analysis to date means that a robust assessment against the criteria is not yet possible. At this stage, all three packages have either a neutral or positive score against all criteria in the Strategic and Economic Cases. The exception is the environmental impact criteria where it is possible that infrastructure measures (notably the park & ride sites or additional busway) could have localised negative impacts.
- 3.67. The impacts of the public transport packages have not yet been examined in detail. However initial illustrative forecasts suggest that package M(A) could reduce the number of cars southbound on the A14 approaching Cambridge in the morning peak by approximately 5% (or 240 vehicles). Similarly illustrative analysis suggests that package M(B) could reduce the number of vehicles in the peak hour by 2-3%.
- 3.68. As a result, package M(A) tends to perform better than package M(B) whilst M(AB), which combines the components of the two packages, performs best.

### Freight packages

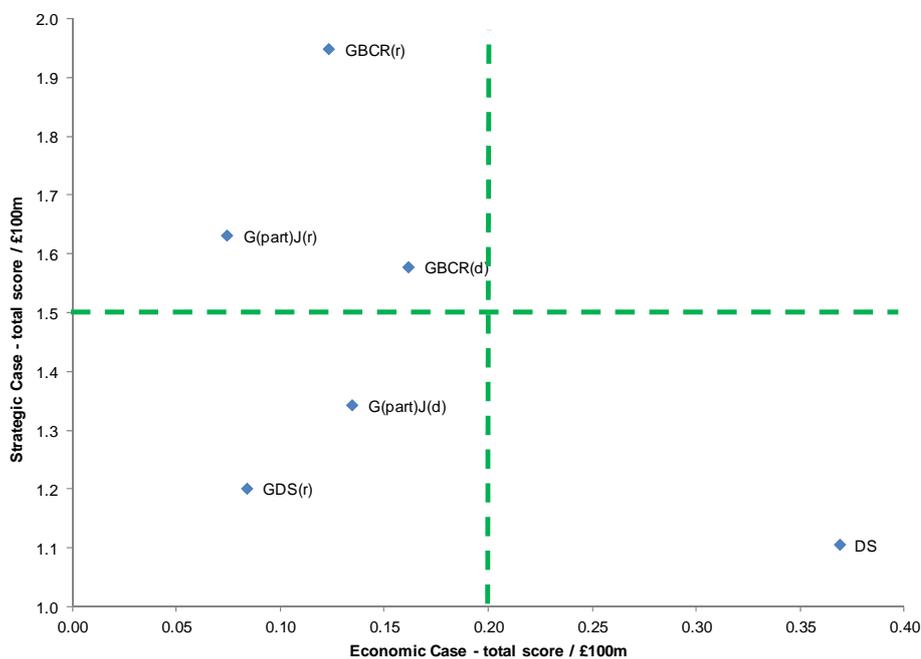
- 3.69. The (central case) forecasts of changes in road freight demand suggest that package O(ABCD) could reduce HGV flows by around 10% by 2030 compared to the do minimum. This is equivalent to removing 40% of the growth in HGV traffic from the 2007 base to 2030 between Huntingdon and Cambridge. Package O(D) has not been tested in isolation, although the development of Strategic Rail Freight Interchanges is likely to be a major factor in improving the competitive position of rail freight.
- 3.70. The effect of these reductions on overall traffic conditions has not yet been tested, although it is worth noting that HGVs account for approximately 15-17% of all vehicles on this section of the A14 (or 35% of Passenger Car Units).
- 3.71. The freight packages have a neutral or positive score against the Strategic Case and Economic Case indicators. In the Strategic Case they perform particularly well in relation to reducing lost productive time, supporting commercial development and fit with government priorities; whilst in the Economic Case they perform particularly well against criteria relating to reducing vehicle kilometres travelled, journey time saved and, as a consequence, reducing CO<sub>2</sub> emissions.
- 3.72. The environmental and social impacts of the freight package components have not yet been assessed in detail.
- 3.73. The capital costs of the packages borne by the public purse are anticipated to be modest compared to the highway packages recommended for further assessment, and may in any case be funded through the Control Period 5 SoFA/HLOS process.

### Highway packages

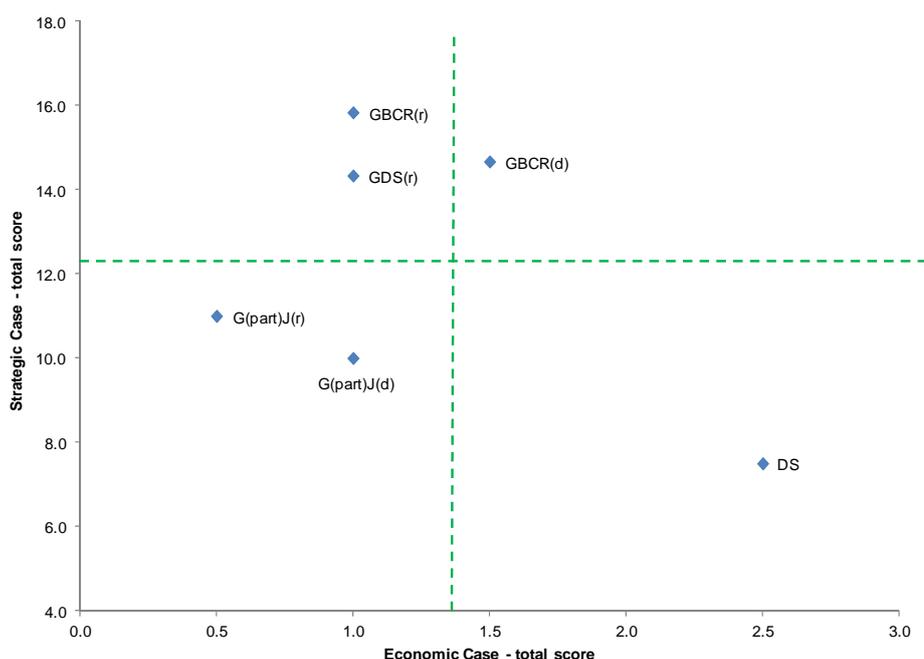
- 3.74. Figure 7 shows the relative performance of the highway packages against the Strategic and Economic Cases, presented in terms of points scored per £100 million estimated capital cost. The average is indicated by the green dashed line. Figure 8 shows the relative performance in terms of total points scored.
- 3.75. Performance against the Economic Case includes an assessment of potential social and environmental impacts. For the social criteria assessed at this stage, only limited impacts have been identified. The most significant impact relates to the potential increase in accidents for packages with an off-line component. This results from the increase in journey distance and therefore accident numbers, with the (d) derivatives having a greater impact when all of the strategic traffic (both north-south and east-west) is assumed to use the Huntingdon Southern Bypass.

- 3.76. The increase in accident numbers for offline options would be mitigated to an extent by the fact that the offline options are likely to have a lower average accident rate per kilometre than the main corridor as they will have fewer junctions and will be built to more modern design standards.
- 3.77. At this stage, the assessment of the impacts of the packages containing an off-line component (i.e. a Huntingdon Southern Bypass) on the environmental criteria, are largely negative. In some instances this is as a result of the increased journey length and the associated increase in vehicle kilometres which affects the assessment against both the green house gas indicator and the accident indicator. For other criteria it is a result of the fact that the off-line sections are creating a new transport corridor in open countryside and will potentially have adverse impacts on landscape, biodiversity and the water environment. It should be noted that this is off-set to some extent by the positive effects of removing traffic from the existing AQMAs in the A14 corridor, and the potential relief to Huntingdon which could arise if the existing A14 is de-trunked.
- 3.78. In general DS performs better against the environmental criteria as it does not increase journey lengths and follows the line of an existing transport corridor.

**Figure 7. Relative performance of highway packages against Strategic and Economic Cases ('points per £100m')**



**Figure 8. Relative performance of highway packages against Strategic and Economic Cases**



3.79. In terms of overall performance, the charts suggest that:

- Package DS performs strongly against the Economic Case in both value for money terms (Figure 7) and in absolute terms (Figure 8). Despite scoring relatively poorly against the economic indicators in the Economic Case, it performs well against the environmental indicators. In part this reflects the balance between the number of indicators relating to economy and environment. However, package DS performs relatively badly against the Strategic Case as it does not address a number of the known problems and challenges.
- All of the other packages perform more weakly against the Economic Case but more strongly against the Strategic Case. All of the other packages include the Huntingdon Southern Bypass, at least in part, meaning that they will score more poorly against the environmental indicators in the Economic Case but tend to address more of the known challenges, hence scoring better in the Strategic Case.
- Package GBCR tends to perform better than package GDS, suggesting that online widening is better than local access roads when delivered in combination with the Huntingdon Southern Bypass.
- The packages with a full Huntingdon Bypass appear to perform better than package G(part)J both in the Economic and Strategic Cases. However the scores are relatively close and are within the margins of error of this level of assessment. This relative performance mirrors the conclusions of the Cambridge to Huntingdon Multi-Modal Study (CHUMMS) and the preparatory work on cancelled A14 scheme, which concluded that routes to the south involving the A428 corridor were less effective at serving strategic A14 movements than packages similar to GBC(d/r).
- The performance of the 'r' and 'd' derivatives of the packages including the Huntingdon Southern Bypass are relatively similar and within the margins of error of this level of assessment.
- The 'r' package derivatives tend to perform better than the 'd' derivatives against the Strategic Case

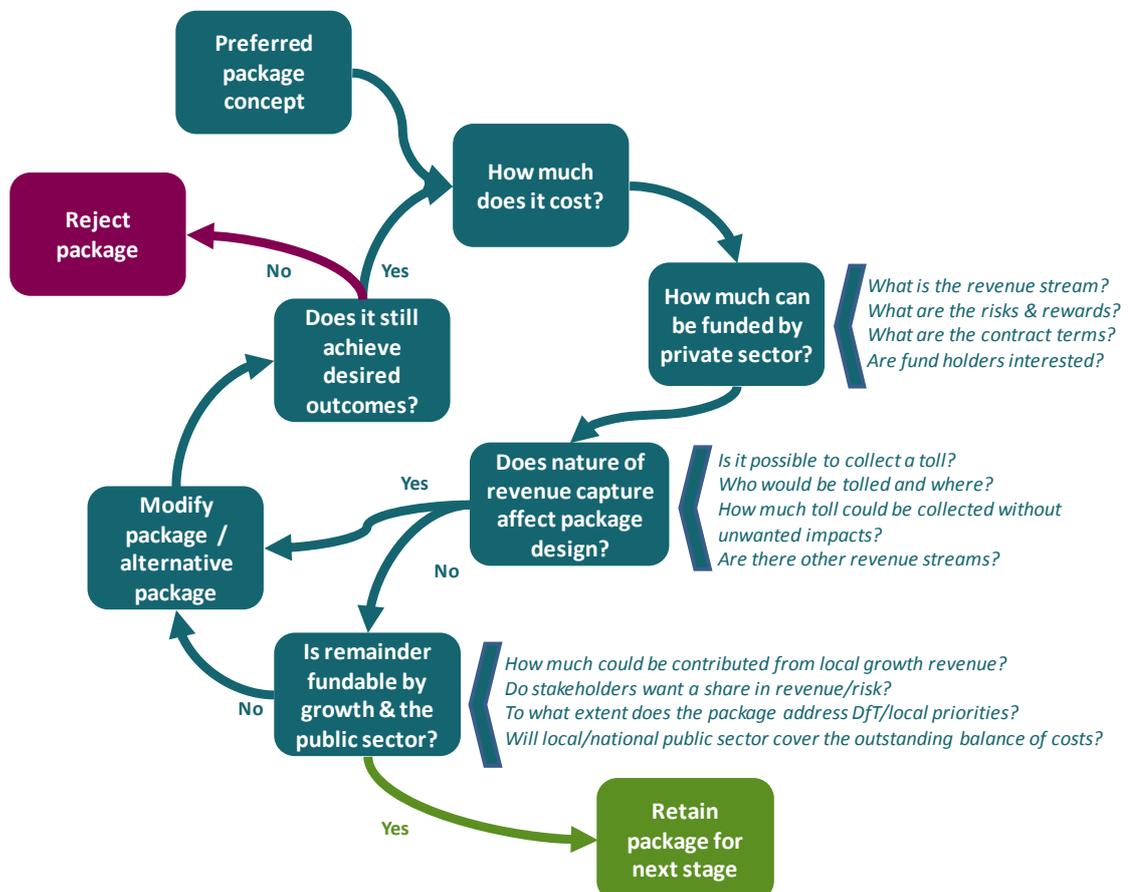
## 4. Commercial and Financial Case

### Approach taken to assess affordability and commercial viability

#### Introduction

- 4.1. Understanding the affordability and commercial viability of each of the packages recommended for further assessment, and in particular the opportunity for private sector investment, is complex as it requires consideration of a range of factors such as:
- the cost of the package (capital and borrowing costs);
  - the ability for the package to generate revenue;
  - the impacts of revenue capture mechanisms on the nature, cost and impact of the package; and
  - the attractiveness of the package in terms of risk and reward to lenders (both private and public sector).
- 4.2. In addition, the attractiveness of the package to the private (and public) sector will be influenced by factors such as duration of involvement (long or short term), certainty of financial return over period of involvement, level of flexibility / control, and scale of investment required. Furthermore, different types of private and public sector funders (including contractors, corporate banks, and pension fund managers) will be prepared to accept different levels of risk.
- 4.3. As shown in Figure 9, these factors are inter-linked. Understanding the most likely funding solution (or determining that no such solution exists) for each package will therefore require an iterative approach.

**Figure 9. Seeking an optimal package / funding solution**



- 4.4. This section describes the approach taken to assess the affordability and commercial viability of the packages recommended for further assessment, during Output 2. In particular, it sets out the approaches taken to:
- estimate capital costs;
  - estimate potential revenue generation;
  - assess potential funding sources and the role of private sector investment; and
  - assess overall affordability.
- 4.5. Please note that a more detailed assessment of funding options and possible private-public sector funding models will be undertaken as part of Output 3.

#### **Estimation of capital costs**

- 4.6. Outline capital costs assumed for each package are shown in the previous chapter. For the purposes of the comparative assessment of packages, construction costs only have been estimated. Whole life costs of delivering the package over a period of time with associated maintenance and operational costs will be considered during Output 3.

#### **Public transport packages**

- 4.7. As the exact nature of the public transport packages has yet to be determined, their associated costs have not been estimated. It is however noteworthy that all the public transport packages will have relatively low capital costs when compared to the highway options but will have ongoing operational costs. The financial sustainability of these services (in terms of operating costs and potential revenue) will be examined in Output 3.

#### **Freight packages**

- 4.8. The costs of components O(A), O(B), and O(C) (i.e. enhancements to the Felixstowe to Nuneaton line) have been derived from a range of public documents (including the CHUMMS final report, Network Rail's Freight and London and South East Route Utilisation Strategies and the DfT's Strategic Rail Freight Network: The Longer Term Vision) and through stakeholder meetings with Network Rail and Hutchison Ports UK. The total cost to the public sector (probably through Network Rail) of these schemes is approximately £82 million.
- 4.9. No costs to the public purse have been assumed in relation to component O(D), strategic rail freight interchanges, as it has been assumed that these will be delivered and funded by the private sector.

#### **Highway packages**

- 4.10. Outturn construction cost estimates were derived for each package based on the constituent core components and those complementary components identified as "mandatory" (see Appendix E of the Option Generation and Initial Sifting Report). At this stage, costs are indicative. They are presented in broad ranges to illustrate the likely order of magnitude for a particular package (see Table 8).
- 4.11. Basic construction costs have been derived using unit rates. In addition to basic construction costs, allowance has been included for costs associated with:
- preliminaries;
  - utilities;
  - land;
  - environmental mitigation; and
  - risk.
- 4.12. Costs shown are outturn estimates:
- based on 2006 prices;
  - assuming a five year construction programme commencing in 2013/2014;

- assuming an opening year of 2017/18 (later delivery would increase outturn costs); and
- reflecting broad assumptions regarding inflation in line with those applied to the cancelled A14 EFD scheme.

- 4.13. An allowance for optimism bias has been made at 44% in line with DfT appraisal guidance.
- 4.14. Although the costing process did not use a Highways Agency cost model, the costs contain all component which the Highways Agency itself would include in its own cost estimates.
- 4.15. Cost estimates will change as packages are refined and components are specified in more detail. As a scheme progresses it is expected that greater certainty about base construction costs will be reflected in the application of lower levels of optimism bias.
- 4.16. All of these factors mean that the package costs are not directly comparable with the A14 EFD scheme costs. The A14 EFD scheme was assumed to have an earlier opening year of 2015/16 (affecting the level of inflation) and would have included a much lower level of optimism bias reflecting the advanced stage of development when the scheme was cancelled.
- 4.17. Maintenance and operational costs (including toll collection costs) have not been considered at this stage, but will be as the financial case for the preferred highway package(s) is finalised in Output 3.

### Estimation of potential revenue generation

#### Public transport and freight packages

- 4.18. The potential revenue generation from public transport (fares) and freight improvements (for example through track access charges) has not been considered at this stage. It is noteworthy that revenue from additional public transport services may be lower than additional capital costs, meaning that they may require ongoing subsidy. In terms of freight packages, whilst all the components of the two packages have the potential to generate revenue through track or other access charges, the revenue generated cannot be captured locally; whilst increased profitability of rail freight operating companies and clients resulting from improved rail freight capacity and/or reliability remains in the private sector.

#### Highway packages

- 4.19. A preliminary assessment of the potential revenue generation from the tolling of new road sections within the highway packages has been made. For ease of modelling, the assessment has assumed that:
- tolling is only possible where a viable no-tolled alternative for local traffic is available;
  - when a toll is levied only strategic traffic would use the new sections and hence incur a charge (the proportion of traffic classed as strategic has been taken from inspection of the A14 Do Minimum highway assignments);
  - the charge would be levied in peak periods only (three hours in morning peak and three hours in the evening peak);
  - the charge is made for each passage of the route; and
  - freight vehicles are charged at a toll twice that of private cars (the assessment has been undertaken based on a toll of £3/£1.50 respectively).
- 4.20. It is anticipated that a proportion of strategic traffic could divert onto non-tolled alternative routes, this could be in the range of 20 to 30% of strategic traffic based on experience elsewhere. However, the specific position of the Cambridge to Huntingdon corridor needs to be taken into account and may lead to different assumptions being made. Further work is required to assess the scale and effects of re-assignment due to the toll and also whether further traffic engineering or regulatory measures might assist in controlling the level of reassignment.

- 4.21. On this basis, the packages which could generate the most toll revenue are those which could potentially intercept the largest amount of strategic traffic (which has been determined in part by an assessment of long-distance alternatives to one or more sections of the route). At this stage, the assessment has not considered the practicality of tolling relatively short sections of improved alignment. In practice, it may be difficult or inappropriate to do so, such as in package DS. The potential for packages to generate toll revenue, including matters of practicality and diversionary effects, will be examined in much more detail in Output 3.

### **Assessment of potential funding sources and the role of private sector investment**

- 4.22. As described at the start of this chapter, the assessment of the potential contribution of different funding sources to the costs of the packages is complex. Indeed, in the current financial climate, the eventual mechanism by which the package is financed and funded is likely to be equally complex. A deliberately simplistic approach has been adopted at this stage to understand in broad terms the potential affordability of different packages. This approach is based on a finance model based on three primary sources of funding<sup>22</sup>:
- tolls / user payments;
  - locally generated 'growth' revenue; and
  - 'grant' funding from local and central government (i.e. from the taxpayer).

#### **Tolls / user payments**

- 4.23. Initial estimation of potential toll revenue (both by Atkins and third parties) suggests that revenues could range from between £5 million and £30 million per annum (depending on package and a wide range of assumptions including hours of tolling and toll levels). Significant further refinement of this analysis will be required early in Output 3. For the time-being, this analysis is sufficient to inform decisions on affordability.
- 4.24. At this stage, no analysis has been undertaken on potential revenue streams (or ongoing operating subsidy) for public transport or freight options.

#### **Locally generated 'growth' revenue**

- 4.25. There are various emerging mechanisms which will generate new revenue streams for local planning authorities and Local Enterprise Partnerships. These new revenue streams could be used to make contributions to the capital and/or ongoing costs of the preferred package (potentially in the form of an up-front payment during construction plus smaller annual ongoing payments). These mechanisms could include, but are not limited to:
- business rates from the Alconbury Enterprise Zone (retained and redistributed by the Local Enterprise Partnership);
  - using a proportion of locally retained business rates along the A14 corridor from Suffolk through to Northamptonshire;
  - New Homes Bonus (although this is relatively short-term); and
  - a proportion of Community Infrastructure Levy / Section 106 (developer) contributions along the A14 corridor from Suffolk through to Northamptonshire.
- 4.26. Informal, without prejudice, discussions with Cambridgeshire County Council suggest that these mechanisms, in combination, could generate in the order of £150 million over a 25 year period (i.e. approximately £6 million per annum).

---

<sup>22</sup> It is likely that other funding sources will also be included in the final financing model, for example European funding.

## Budgets / funding cover

### Introduction

- 4.27. An analysis has been undertaken to provide an illustration of the potential up-front capital drawdown which could be sustained by a private sector 'DBFO'-type consortium on the basis of the potential income described above.
- 4.28. The analysis is a simplistic representation of the amount of funding that may be available for the range of incomes and based on the information understood at this stage. Each of the three options will require much more detailed analysis and development alongside a clear understanding of the risk positions before a robust funding position is reached.
- 4.29. This analysis has made a number of assumptions, the key ones being:
- an acceptable risk transfer level is agreed, subject to the financial delivery mechanism;
  - the income outlined above is available at the same amount each year over the period considered for each of the funding models (the available payment to the private sector for delivering the project over the life of the model);
  - the income / payment will need to cover the repayment of construction costs, financing charges and the operational and maintenance costs (no operational and maintenance costs have been included but will need to be included as further definition takes place); and
  - an indicative interest rate for borrowing for each of the models based upon current market knowledge.
- 4.30. For simplicity, the analysis assumes three different total annual incomes of £10 million (low), £20 million (medium) and £30 million (high).
- 4.31. The analysis also examines how the level of drawdown may vary depending on the financing approach (a number of which are described below). Three financing approaches have been considered:
- traditional project finance;
  - bond finance; and
  - a hybrid approach combining the two above.
- 4.32. Further details of the assumptions made in this illustrative analysis are available upon request.
- 4.33. The three finance options are described below.

### Project finance

- 4.34. The "traditional" route for PFI and PPP schemes in UK and overseas. A Special Purpose Vehicle (SPV) is created that raises a combination of equity and debt funding to finance the project (although in our illustrative examples, no equity investment is assumed so no dividends are paid). The SPV appoints providers to carry out the design, construction, operation and ongoing maintenance of the project. The SPV is paid once the project is available by annual service payments for the duration of the contract term. This is used to pay the dividends associated with the equity payments as well as financing the debt.
- 4.35. Whilst the option has been widely used in the UK there are issues that have been brought about by the financial crisis that relate to the availability of long term debt borrowing. Wider syndication to lessen risk and shorter term deals have become more prevalent. There are still projects of this type ongoing in Europe. The involvement of the European Investment Bank and other central funders is giving comfort to other lenders.
- 4.36. Typical projects are for a 25 year period with range of deal sizes. This approach funds a DBFO model with a combination of capital and operating costs.

---

<sup>23</sup> These could be as large (in totality) as the upfront capital requirements.

- 4.37. The market has a good understanding of the design, construction operation and maintenance risks. However, the traffic / toll revenue risk is tending to mean that the public sector takes more of the risk than in earlier projects. Payments are typically linked to availability of the asset and/or shadow tolling.

#### Bond finance

- 4.38. Used more commonly overseas with longer term deals of 30 to 40 or even 50 years and cheaper rates than project finance. Generally suited to the maintenance and operation phases of already constructed assets rather than used to fund the construction phase. Typically a coupon is paid to service the bond over the life of the deal, with a repayment of the bond at the end of the term to the holder of the bond. The funds associated with a bond investment may be provided by a variety of investors including, but not limited to, pension funds, banks and/or sovereign wealth funds.
- 4.39. Borrowing is based upon the credit rating of the client and has not been used widely in the UK.

#### Hybrid solution

- 4.40. Separation of 'design and build' from 'operation and maintenance' by using short term project finance for the initial 'design and build' phase and longer term bond/pension funding for the 'operation and maintenance' phase. A balloon payment at the end of phase 1 would be needed to pay off the short term borrowing. This approach could better reflect, and separate, the different risk profiles of the two phases, thereby in theory reducing borrowing costs compared to a simple project financed solution (but not a bond solution).

#### Pension funds

- 4.41. Pension funds are typically longer term than Project Finance, suited to longer term investment around operation and maintenance phases. The use of UK pension funds is not yet clear although the Budget 2012 announcement of a Pension funding platform demonstrates that the potential of pension funds (for example in the bond market) is growing. As mentioned above, Pension Funds could also be investors in Bond finance vehicles.
- 4.42. The relative strengths and weaknesses of each financing approach are summarised in Table 9.

**Table 9. Comparison of funding mechanisms**

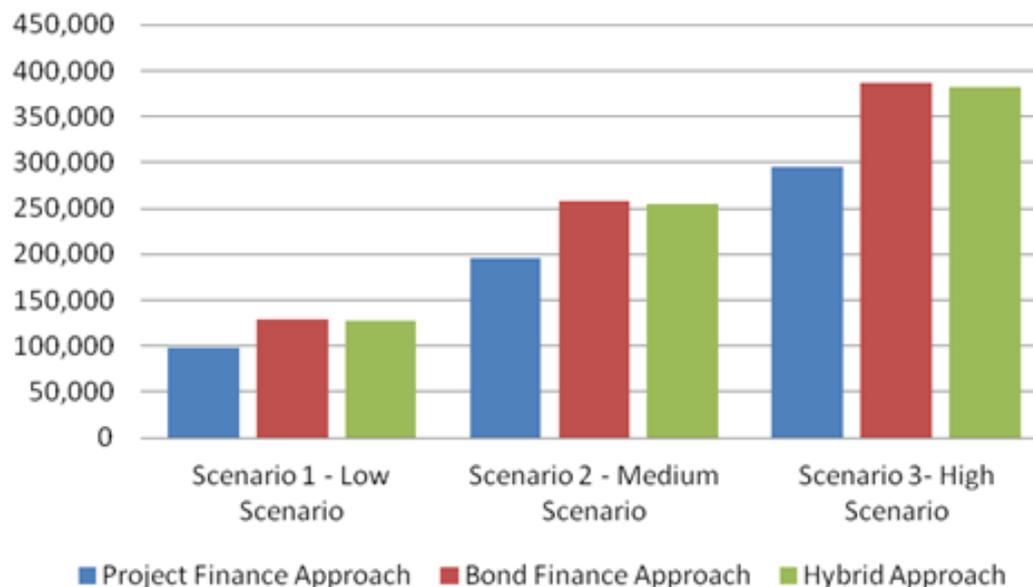
Approach	Project Finance	Bonds	Hybrid
<b>Investment period assumed</b>	25 years	40 years	5 years construction followed by 35 years operation
<b>Key risk summary</b>	Based on DBFO approach with transfer of major design, construction, funding risks with traffic risk shared at an acceptable level.	Would be a new approach for UK highway provision. Bond funding in the UK currently limited to operation of existing assets not provision of new. Experience overseas. Assumes similar risk transfer to project finance.	Shorter initial borrowing through project finance route is refinanced by long term bond funding when construction phase is complete
<b>Advantages</b>	Has been used in the UK and internationally and is understood. Syndicated approach to funding is becoming more acceptable.	Provides longer term facility and therefore more affordable access to funding. Significant potential access to funds.	Potentially combines the best of first two approaches. Different funding routes linked to risk profile of different phases of scheme.

<b>Disadvantages</b>	Access to funding at affordable cost is difficult. Length of lending available has become limited.	Would need to resolve use of approach in construction of new assets – possibly through government guarantees. Longer term would require more funding input for operational phase as more renewal and expansion of asset is required.	As Bonds, plus questions around procurement of providers and funders. Potential for complex dialogue around risk allocation.
----------------------	---	---	--

### Results of illustrative analysis and interim conclusions

- 4.43. The illustrative analysis described above suggests that given a variety of assumptions the bond finance and hybrid approaches would enable higher up front capital draw downs, primarily as the overall costs of borrowing are lower (see Figure 10). As would be expected, the hybrid approach falls between the other two.
- 4.44. The analysis also suggests that an annual income of £10 million would allow an up-front draw down of £100 to £130 million; with the up-front draw down rising to £200 to £250 million (£20 million per annum income) and £300 to £370 million (£30 million per annum income). In other words, based on the assumptions made, toll revenue and growth-related income could cover up to £370 million of capital and/or operating and maintenance costs. This amount would clearly be higher should a larger annual income be assumed. It should be noted however that in these scenarios none of the annual income have been used to fund operation and maintenance costs of a project and therefore alternative funding sources would need to be found to fund these.

**Figure 10. Up-front capital drawdown that can be sustained by different income levels and financing approaches (£s '000s)**



## 5. Management Case

### Approach taken to assess if proposal is deliverable

- 5.1. At this stage of the assessment consideration has been given, at a strategic level, to a range of deliverability issues for each of the packages:
- environmental constraints;
  - engineering constraints;
  - acceptability (public/political);
  - permissions / planning / orders; and
  - timescales / phasing.
- 5.2. Information on the highway packages was gathered at a workshop with attendees representing the Highways Agency and Cambridgeshire County Council as well as Atkins specialists.
- 5.3. As part of the deliverability discussion, consideration was given to the identification of relationships with other schemes / projects; and land-use planning dependencies.
- 5.4. A summary of the issues identified for each of the packages is presented below.

#### Public transport packages

- 5.5. The public transport packages include proposals for one or more new park and ride sites along with additional and enhanced bus services.
- 5.6. At this stage issues associated with specific locations for park and ride sites have not been examined. This will be undertaken as part of Output 3. Depending on the location, environmental constraints may be identified, although it is likely that these could be mitigated. Specific locations could also give rise to public acceptability issues. At this stage is considered unlikely that there would be any significant engineering constraints or issues relating to planning permissions.
- 5.7. The extension of existing bus services or increased service frequencies raises questions about the commercial viability of such improvements. This will be examined further during Output 3. It is considered unlikely that that there would be any other deliverability issues associated with these packages.

#### Freight packages

- 5.8. The freight packages contain proposals for new rail infrastructure along with new Strategic Rail Freight Interchange facilities. Infrastructure within the existing railway boundary could be delivered by Network Rail under permitted development rights. Infrastructure improvements outside the railway boundary will require consent under the Transport and Works Act, or, from the Major Infrastructure Planning Unit. The Felixstowe Branch line partial double-tracking is, for example, subject to planning permission. Similarly Strategic Rail Freight Interchanges above 60ha in size will also require consent from the Major Infrastructure Planning Unit. Strategic Rail Freight Interchanges below 60ha would, in the first instance, seek planning consent from the relevant local authority.
- 5.9. No further assessment of deliverability issues associated with the freight packages has been made at this time. This will be assessed further during Output 3.

## Highway packages

- 5.10. Table 10 summarises the key deliverability issues associated with each of the highway packages. These deliverability issues are reflected in the initial assessment of the highway packages in so far as their impacts on the alignments are known and understood. The key issues are summarised in Table 11. Further information is provided in Appendix F. It is important to note that the highway packages represent strategic route options, rather than alternative alignments of different route options (the latter being subject to assessment at a later stage).

**Table 10. Summary of key deliverability issues**

Package	Summary of deliverability issues.
DS	Limited impact on environmental designations between Trinity Foot and Girton. Potential for greater impact than on-line widening as footprint of scheme likely to be bigger. Large number of structures at Girton interchange. Perception that local access roads may be more contentious than on-line widening.
GB*CR	New river and rail crossings required on Huntingdon Southern Bypass section. Large number of structures at Girton interchange (but less intrusive than packages containing component S). On-line widening presents more issues during construction relative to packages containing local access roads.
GDS	New river and rail crossings required on Huntingdon Southern Bypass section. Large number of structures at Girton interchange. Perception that local access roads may be more contentious than packages containing on-line widening.
G(part)J	Limited impact on environmental designations. New river and rail crossings required on Huntingdon Southern Bypass section. Scope for less complicated junction arrangements depending on d/r derivative. Limited engineering constraints envisaged for section adjacent to A1198, but some constraints on A428 at Cambourne. Proximity to settlement areas, potential impacts on Papworth/Cambourne, but route follows line of existing transport corridor.

*Note: derivatives of packages with online improvements extending north west of Fenstanton have been dropped. The deliverability issues associated with online improvements in this area are therefore not reported in the table.*

### Planning / Permissions / Orders

- 5.11. The scale of all of the highway packages, and the impact on the A14 as a trunk road, is such that it is considered highly likely that, under current legislation, development consent would need to be sought from the Major Infrastructure Planning Unit (within the Planning Inspectorate). Whilst there could be scope for packages which only contain local access road elements to seek planning consent from the local planning bodies, it is considered unlikely that, given the related impact on the A14, these would be treated as local schemes.
- 5.12. All of the packages are likely to require Compulsory Purchase Orders.

### Timing / Phasing

- 5.13. Given the planning and approvals processes which will need to be followed, most packages are likely to take approximately five years from any decision to proceed to the start of construction.
- 5.14. A preliminary assessment has considered the potential to construct and open different elements of a package in a phased way. As a consequence, we have taken the view that components which release additional capacity at the current 'bottlenecks', i.e. Brampton Hut, Spittals and Girton interchanges, should be delivered and opened last in order to avoid moving the problems or creating new ones before other improvements are in place.
- 5.15. Similarly where packages contain component G (Huntingdon Southern Bypass) in combination with either on-line widening or with local access roads, the bypass should be delivered and opened last releasing capacity at the western end of the corridor.
- 5.16. For those packages which are wholly off-line, a phased construction profile could be developed, however in respect of the traffic impacts, the whole package would need to be released at the same time.

- 5.17. Where packages contain local access roads and associated improvements at Girton interchange, phasing would be inappropriate in terms of the traffic impacts.
- 5.18. Further consideration would need to be given to the ability and practicality of progressing separate elements of a package through the planning and approvals processes.

## Project dependencies

### Public transport packages

- 5.19. At this stage, the public transport package components are at a conceptual stage only and therefore dependencies to their achievement (in terms of decisions or deliverables) have not been examined in depth. However, in outline the following dependencies are likely.
- 5.20. The proposed park and ride site(s) will require planning permission from relevant district planning authorities. In addition, supporting infrastructure including possible links to The Busway and signage from the A14 could require further planning consents and agreement from the Highways Agency and Cambridgeshire County Council. The existing park & ride sites currently receive operating subsidy from the County Council and it is anticipated that this would also be the case for any additional sites.
- 5.21. The proposed bus services could operate via the CGB without further infrastructure, but additional guideway could increase reliability of the bus services to the proposed new park & ride sites. The commercial viability of the bus services themselves has yet to be established (with the exception of the proposed Stagecoach services to/from Peterborough) but it is likely that they will require ongoing operational subsidy from the County Council.

### Freight packages

- 5.22. The additional rail network capacity and reliability improvements which result in the forecast modal shift from road to rail will only be achieved should all the schemes in the 'do minimum' and 'do something' scenarios be delivered as a package. Use of this extra capacity by the private sector logistics operators will depend on whether rail is able to offer financial and operational benefits over road transport and the necessary freight paths being made available.
- 5.23. It has been assumed that the schemes to improve capacity and reliability of the Felixstowe to Nuneaton line which are included in the 'do-minimum' scenario would be delivered in full as funding is committed from the various parties (such as Network Rail and Hutchison Ports UK) and planning consent (where required) has been granted.
- 5.24. Based on trends over the last 15-20 years, on average around one million m<sup>2</sup> of new warehouse floor space is built in Great Britain per year. However, much of this is replacing existing 'stock' which is life expired. On that basis, the assumed 'market response' is that there is a continual need for new warehousing and, consequently, a continual demand from the logistics market for new warehouse floor space. New warehousing is normally built by commercial property developers and then leased to retailers, their suppliers or contracted logistics specialists.
- 5.25. The most recent national rail freight demand forecasts which assume an additional 7.2 million m<sup>2</sup> of warehousing will be developed on rail-linked sites (or approximately 35% of the warehousing likely to be built in Great Britain over the next 20 years).
- 5.26. For the core components of the 'do something' freight packages, the key dependencies are described below.

### Planning Consent

- 5.27. Under permitted development rights, Network Rail does not require planning consent for schemes within the Network Rail boundary fence. Therefore it is anticipated that the March bi-directional freight loop (core component O(C)) does not require any planning consents.

- 5.28. The other core components are thought to lie, at least in part, outside the Network Rail fence, and, as a result, will require planning consent. For major infrastructure schemes such as new railway alignments (such as partial double-tracking of the Felixstowe branch line) and Strategic Rail Freight Interchanges above 60 hectares, planning applications will be dealt with by the new Major Infrastructure Planning Unit of the Planning Inspectorate. Smaller schemes could be submitted to the local planning authority in the first instance but would be likely be determined by the Secretary of State for Communities. In both cases therefore, the responsibility for major infrastructure planning decisions will lie with government ministers.

### **Funding**

- 5.29. Funding for core components O(A), O(B) and O(C) are likely to be channelled to Network Rail to be included within the High Level Output Statement (HLOS) and Statement of Funds Available (SoFA). Therefore, the critical decisions required to secure funding of these components are:
- inclusion by the Government in the HLOS of the relevant strategic outputs for the line; and
  - determination by the Office of Rail Regulation that these core components are required to achieve these strategic outputs in the most efficient way and within the funds available.
- 5.30. Alternatively, funding could be sought through specific grants, including from DfT, provided to Network Rail to deliver specific schemes (many of the schemes recently delivered were funded through the Strategic Freight Network budget for example).
- 5.31. Strategic Rail Freight Interchanges are private sector funded, and are their timing, location and form is determined by market forces. Much therefore depends on the general state of the economy and the willingness of investors to lend capital. Similarly, the partial double-tracking of the Felixstowe branch line is dependent on Phase 2 of the Felixstowe South reconfiguration which, as before, is dependent on the general state of the economy driving growth through the Haven ports.

### **Highway packages**

- 5.32. At this stage in the assessment there are no known interdependencies between the potential highway packages and any other projects or scheme delivery processes. However, there are shared considerations relating to land-use planning aspirations and the desire to unlock key development sites within Cambridgeshire. This is particularly pertinent for Northstowe about which there is a general assumption that some improvement would be required on the A14 between Bar Hill and Girton. Whilst a formal planning permission for the full scale of the development has not yet been submitted, the Highways Agency requirement is likely to be one of nil-detriment in the short term. Therefore consideration should be given to phasing and likely build-out rates as part of the planning approvals process.
- 5.33. At this stage it is unclear as to the level of transport infrastructure improvements that development of the Alconbury Enterprise Zone may require and the likely timescales for these.
- 5.34. Although the former Ministry of Defence site at Waterbeach currently has no planning status, any future development is likely to impact on the Cambridge Northern Bypass section of the A14 and further consideration should be given to the treatment of this within the analysis undertaken during Output 3.

### **Governance, organisational structure and project reporting**

- 5.35. The preferred package of measures designed to resolve the issues on the A14 is anticipated to comprise of physical infrastructure and service improvements to the highway, freight and public transport networks. These measures will be likely to be delivered by a range of agencies, predominantly the Highways Agency, Network Rail and Cambridgeshire County Council, within the usual regulatory and legal processes.

- 5.36. At this stage however, there is currently considerable uncertainty over future investment in the national networks, in part due to the pending Government response to the Cook Review on the future form and function of the Highways Agency, the pending National Policy Statement on National Networks and the fact that the SoFA and HLOS for Control Period 5 will not be published until July 2012.
- 5.37. However, what is clear is that delivery of the package as a whole will be critical. Therefore, and in order to avoid the partial package delivery associated with the Multi Modal Studies of the 1990s, cross-modal governance and oversight of planning delivery is recommended. Given the current uncertainties, it would be inappropriate to recommend structural and organisational details at this time; other than to stress the importance of ensuring that that governance is accompanied by appropriate decision-making powers and funding.
- 5.38. Governance and wider delivery arrangements will be examined further during Output 3 when a clearer picture of the strategic planning environment has emerged.

**Greg Hartshorn**

Atkins Ltd  
The Axis  
10 Holliday Street  
Birmingham B1 1TF  
England

**Email: [greg.hartshorn@atkinsglobal.com](mailto:greg.hartshorn@atkinsglobal.com)**

**Tel: +44 (0) 121 483 5000**

**Fax: +44 (0) 121 483 5252**