

## **TRANSPORT AND WORKS ACT 1992**

### **Transport and Works (Applications and Objections Procedure) (England and Wales) Rules 2006**

## **THE NETWORK RAIL (EAST WEST RAIL WESTERN SECTION PHASE 2) ORDER**

### **DRAFT ENVIRONMENTAL STATEMENT**

#### ***CHAPTER 14: TRAFFIC AND TRANSPORT***

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## 14. TRAFFIC AND TRANSPORT

### **Summary**

A traffic and transport assessment has been undertaken, which covers the short term effects during construction and long term effects arising from the operation of the Project.

The assessment of the traffic benefit from predicted modal shift from private vehicle to rail will be presented in the final version of this ES.

### **Baseline Studies**

A baseline study in the form of a Transport Assessment (TA) has been undertaken. Information relating to baseline conditions can be found in this Draft Transport Assessment Appended to this Draft ES.

### **Effects (not complete)**

Construction – There is high impact at 6 junctions as a result of construction related traffic. Temporary road closures during the construction phase of the scheme will have a temporary impact upon various road users.

Operation – The percentage change of all station use during AM peak hours will range between: 0.51% to 22.90%. The percentage change of all station use during PM peak hours ranges between: 0.35% to 15.42%. Closure of level crossings and replacement with road bridges, will have a positive effect on the identified receptors. There will generally be a medium to low delay impact on the use of public highway level crossings that are due to remain open.

### **Mitigation**

Construction- All construction phase mitigation measures will be undertaken under construction traffic management plans through the Code of Construction Practice (CoCP). Each construction compound will be the subject of a site-specific traffic management plan.

Impacts during construction phase on rail passenger services will be mitigated through the provision of “Disruption Access Planning” carried out through negotiation between the Alliance and Train Operating Companies (TOCs).

Operation – No operational mitigation proposed.

### **Residual Effects**

No residual effects are predicted.

## **14.1 Introduction**

14.1.1 This chapter of the Draft ES identifies and assesses the effect of the Project on traffic and transport during the construction and operation phases.

14.1.2 This chapter has been informed by the Draft Transport Assessment (TA) (Appendix 14.1).

14.1.3 The assessment of the traffic and transportation effects of the Project covers the short term effects during construction and the longer term effects arising from the operation of the Project. The scope of assessment undertaken is summarised as follows:

- Construction related impacts:
  - Construction vehicular traffic affecting all road users. Construction traffic includes both HGV traffic and trips generated by staff travelling to and from construction compounds; and
  - Construction works on roads and public rights of way whereby temporary closures and diversions may be in operation.
- Operational impacts:
  - Local impacts due to increased trips to and from stations;
  - Closure, diversion and alterations to public rights of way;
  - Changes to the highway due to new bridge crossings; and
  - Level crossings - effects of change in barrier down-time.

14.1.4 The assessment of the impact upon access to private land has been assessed in the Chapter 6 (Land Use and Agriculture).

14.1.5 The final ES will additionally cover the traffic benefit from predicted modal shift from private vehicle to rail.

## **14.2 Limitations and Assumptions**

14.2.1 The constructing party or 'contractor' for the Project is already appointed (EWR Alliance). This has made available more detailed traffic and transport information relating to construction than would be usual at this stage of the design. This knowledge has informed our assessment.

However, during the preparation of an ES, there is some information not available, and in order to assess the environmental effects of the Project on traffic and transport a number of general assumptions have been made.

- 14.2.2 For the purpose of the assessment the following assumptions and limitations for the construction and operational phase of the assessments are shown in Table 14.1 and Table 14.2. These are in addition to those detailed in Section 4.11 in Chapter 4 (EIA Methodology).
- 14.2.3 Section 4.11 in Chapter 4 (EIA Methodology) also sets out those aspects of this assessment that are not included in this Draft ES, but will be included in the final ES.
- 14.2.4 The Traffic Assessment has generated a magnitude of traffic impact during construction and operation and these have been included in this draft chapter. However, the sensitivity of receptors has not been established and therefore the significance of effects have not been assessed for this draft ES; this will be completed for the final ES. The methodology for assessing effects on the use of PRow has been set out in this chapter; however, the assessment of effects is not complete and not included in this Draft ES, but will be completed in the final ES. The operational benefit of modal shift, as set out in Chapter 1 (Introduction), has not been completed for this Draft ES, but will be fully assessed in the final ES.

**Table 14.1 Limitations and Assumptions – Construction Phase of Assessment**

Limitations	Assumptions
<ul style="list-style-type: none"> <li>• Phasing of construction compound usage provides estimates of annual use and does not account for peak / monthly variations at each compound.</li> <li>• HGV arrival and departure times are spread evenly throughout the day and therefore the assessment does not account for hourly peaks within the day. HGVs are likely to arrive over a 10 hour window on a typical weekday. For assessment purposes it is assumed that the arrival time is over a 7 hour window to account for potential hourly variations in HGV arrivals.</li> <li>• Information regarding staff / operative travel patterns does not take account inter-peak trips. The Draft ES and TA assess the AM and PM peak hour trips when the impact of the scheme will be greatest.</li> <li>• Construction staff and worker vehicle occupancy provided by the Alliance is based on previous experience of similar projects. This limitation is due to no survey on similar schemes.</li> <li>• Data is not available for the location of staff and operative lodgings as the workforce is yet to be commissioned. An estimate has been provided by the Alliance based on population centres within the vicinity of the Project to identify the likely lodging locations.</li> <li>• Traffic survey data is not available at a number of locations due to the on-going development of the construction methodology. This will be revisited in the final ES and TA.</li> <li>• Percentage impact assessments have been undertaken at junctions and links where survey data is available. The final ES and TA will provide detailed junction capacity assessments.</li> </ul>	<ul style="list-style-type: none"> <li>• Deliveries of 'railway' material (sleepers, rail and ballast) will be made by rail;</li> <li>• All HGV access will be via the primary construction routes;</li> <li>• All HGV's will arrive and depart the construction compound on the same day;</li> <li>• Construction phasing proportions assumptions provided by the Alliance (see Table 14-7);</li> <li>• Construction compounds will be in operation 12 months of the year and work will be spread evenly over the 12 months with no seasonal variations;</li> <li>• There will be an average of 20 weekdays per month;</li> <li>• HGV's will arrive / depart over 7 hours per day;</li> <li>• Maximum of 350 operatives working from any one construction compound at any one time (excluding sections 2c and 2d);</li> <li>• Maximum of 150 staff working from any one construction compound at any one time (excluding sections 2c and 2d);</li> <li>• 100% of operatives will arrive before 07:00 with 50% departing between 17:00-18:00 and 50% departing between 18:00 – 19:00;</li> <li>• Operative vehicle occupancy rate assumed as 2 operatives per vehicle;</li> <li>• Staff vehicle occupancy rate assumed to be 1 for staff working out of the strategic construction compounds and 2 for staff working out of the satellite compounds;</li> <li>• 95% of operatives and 80% of staff working out of the satellite compounds will access the Project via one of the strategic construction compounds and travel via the internal haul road. The remaining operatives / staff will travel direct to the compound;</li> <li>• The trip distribution of operatives and staff has been provided by the Alliance; and</li> <li>• Traffic growth assumed to follow National Trip End Model (NTEM) and National Road Traffic forecasts (NRTF).</li> </ul>

**Table 14.2 Limitations and Assumptions – Operational Phase of Assessment**

Limitations	Assumptions
<ul style="list-style-type: none"> <li>• The East West Rail (EWR) Business Case<sup>347</sup> has been used to derive the future passenger demand increases at each of the stopping stations. The base year of 2011 was used in the EWR Business Case and therefore the figures are based on growth projections from 2011.</li> <li>• The EWR Business Case provided annual demand figures and did not provide a breakdown into daily and hourly demand. Accordingly a number of assumptions have been made.</li> <li>• The EWR Business Case provided a future year of 2031 whereas the Draft ES and TA assesses up to 2035.</li> <li>• There is no data available for the modal split of passengers arriving and departing the stopping stations along the route. Mode share surveys are planned to be undertaken at the stopping stations in spring 2018. These will be used to inform the final assessment reported in the final ES and TA.</li> <li>• This Draft ES assesses the percentage increase in trips at the station access and assumes new trips will use a distribution based on existing traffic flows. The mode share surveys will capture postcode data which will be used to calculate the distribution of new passenger trips to and from the stations in order to undertake junction capacity assessments.</li> <li>• The PRoW assessments have been undertaken without the use of any survey data to establish current usage.</li> </ul>	<ul style="list-style-type: none"> <li>• The Draft ES and TA assume no passenger growth will occur between 2031 and 2035.</li> <li>• To split the annual increase in passenger demand into typical weekday values an annualisation of 300 has been applied.</li> <li>• The passenger arrival and departure profiles have been derived using MOIRA data. It is assumed that the existing and future profiles will follow the MOIRA profiles.</li> <li>• A 70% car share has been assumed for passengers arriving and departing the stations. This assumption has been applied to the percentage impact assessments across all stations. This assumption gives a robust estimate of the increase in car trips. This will be revised in the final ES and TA once mode share surveys have completed.</li> <li>• The PRoW assessments have assumed that PRoW that are within 500 m of a school will have a high sensitivity, PRoW that are over 500 m from a school but 400 m from an urban area will have a medium sensitivity and PRoW which are further than 500 m from a school and 400m from an urban area will have a low sensitivity.</li> <li>• The Level Crossing Future Barrier down time has been taken from the East West Rail Phase 2 – Level Crossing Barrier Down Time Report<sup>348</sup>.</li> </ul>

<sup>347</sup> East West Rail Western Section Updated Business Case, Atkins, 2015

<sup>348</sup> East West Rail Phase 2 – Level Crossing Barrier Downtime Assessment, Network Rail, 2015



14.2.5 Winslow Station, though part of East West Rail Phase 2 (EWR2), is not covered in the Draft TA or this Draft ES. The local planning authority considered these impacts as part of their consideration of a separate planning application for the station: 13/02112/AOP.

14.2.6 No reporting has been included for the Wycombe District Council sub-section. Changes brought about by the Project in this sub-section are limited to a platform extension at Princes Risborough Station. It is therefore considered that there are no impacts to assess or report for this sub-section and it is not considered further within this Chapter of the Draft ES.

### **14.3 Legislation, Policy and Guidance**

14.3.1 There is no legislation directly applicable to the assessment of traffic and transport impacts. The assessment has been undertaken in line with policy and guidance detailed below.

14.3.2 National, regional and local traffic and transportation policy and guidance relevant to the Project have been considered in this assessment. The policies and guidance which have been reviewed are detailed below:

- The Future of Transport: A Network for 2030;
- National Policy Statement for National Networks;
- 2010 to 2015 Government Policy: Rail Network;
- National Planning Policy Framework;
- National Planning Policy Guidance;
- Railways Act 2005 Statement;
- A Better Railway for a Better Britain;
- Strategic Business Plan for England and Wales for CP5 - 2014-19;
- Bedford Borough Local Plan;
- Buckinghamshire County Council Strategic Plan;
- Central Bedfordshire County Council Local Plan;
- Milton Keynes Council Core Strategy;
- Vale of Aylesbury Local Plan;
- Wycombe District Council Adopted Strategy;

- Bedford Borough Council Local Transport Plan 3;
- Buckingham County Council Local Transport Plan 3;
- Central Bedfordshire Council Local Transport Plan 3;
- Milton Keynes Council Local Transport Plan 3; and
- Oxfordshire County Council Local Transport Plan 3.

14.3.3 National, regional and local traffic and transportation policy and guidance relevant to the Project have been considered in this assessment. The policies and guidance which have been reviewed are detailed below:

14.3.4 Full details of the above guidance can be found in the Draft TA (Appendix 14.1).

#### **14.4 Approach and Methodology**

14.4.1 This Draft ES has assessed the construction and operational phases of the Project.

##### Consultation

14.4.2 A number of stakeholders have been consulted during the EIA. A series of meetings were held with Local Highways Authorities (LHAs) to discuss and agree the scope of assessments. These consultations were informed by a series of technical notes (these notes will be appended to the final ES). Stakeholders consulted include:

- Highways England (HE);
- BCC;
- BBC;
- OCC;
- CBC; and
- MKC.

14.4.3 Further details regarding consultation can be found in Section 4.3 of the Draft TA (Appendix 14.1).

### Baseline Conditions

14.4.4 The baseline describes existing transport provision at construction compounds and rail stations along the railway. The following is considered:

- Station/construction compound location and access;
- Local highway network including flows, speeds and level crossings;
- Construction routes and haul road crossings;
- Road safety and vulnerable users;
- Public transport accessibility; and
- Walking and cycling networks.

14.4.5 The assessment approach is described in the following sections.

#### *Data Collection and Identification of Baseline Conditions*

14.4.6 A range of data sources have been used to provide existing information on baseline conditions. These were as follows:

- Level crossing audits;
- Road traffic flow data;
- BCC and OCC strategic modelling outputs;
- Personal injury accident records;
- Traffic signal timing data;
- Bus and rail timetable information;
- National Cycle Network datasets;
- Outputs from the EWR Business Case; and
- MOIRA Data.

14.4.7 Where no data was available, additional surveys were undertaken by an independent survey company in September and October 2016. This included turning count data at junctions, Automatic Traffic Counters (ATC), queue surveys and level crossing surveys.

#### *Spatial study area*

14.4.8 The study area for this Draft ES and the Draft Transport Assessment comprises:

- All construction compound sites and construction access routes (see figures 2.1A to 2.1J in Volume 4.);
- Level crossings with increased barrier down time (see figures 1-H1 to 1-H5 in Volume 4);
- The following stopping stations:
  - Aylesbury;
  - Aylesbury Vale Parkway;
  - Bedford;
  - Bicester;
  - Bletchley;
  - Ridgmont;
  - Woburn Sands; and
- Public Rights of Way which cross the Project Area.

14.4.9 A plan showing the study area for this assessment will be included in the final ES.

14.4.10 The final ES chapter and Transport Assessment will also consider the impacts on the road network, as a result of the Project where there:

- is likely to be an hourly increase of 30 or more vehicular trips or,
- an hourly increase of 5% in vehicular trips on either arm of a junction.

14.4.11 This has not been completed for this Draft ES. The study area will be refined in the final ES chapter and TA.

Temporal scope

14.4.12 The following assessment scenarios were considered within the subsequent assessments;

- Base Year (2016), when the traffic surveys were undertaken;
- The Peak Year of Construction at each construction compound, which will vary by compound. Details are provided later in the chapter;
- Cumulative peak year construction across all construction compounds (2019-2024);
- Project Opening (2024); and
- Future year of operation assessment (2035).

## Methods

### *Construction Phase Assessment*

- 14.4.13 The construction assessment approach and methodology can be found in the supporting Draft TA (Appendix 14.1).
- 14.4.14 The final TA will provide an assessment of the cumulative impact of the Project and the construction traffic associated with HS2. This will include the following:
- A review of HS2 constructions routes will be undertaken and routes which overlap the Project will be identified;
  - A review of the staff/operatives vehicle trip generation will be undertaken and links which overlap the Project staff /operatives will be identified;
  - The traffic deriving from HS2 as outlined above will be added on to the traffic generated by the construction phase of the Project for each year which the two schemes overlap. Percentage impact assessments and junction capacity modelling will be undertaken on appropriate links/junctions. The appropriate type of assessment will be discussed with the LHAs and reported on in the final TA;
  - A review of HS2 temporary road closures will be undertaken to ensure there is no overlap with the Project HGV routing; and
  - Based on the assessments stated above, suitable mitigation strategies will be discussed with the LHAs.

### Operational Phase Assessment

#### *Passenger Demand Increases: Trip Generation*

- 14.4.15 To derive the increase in passenger numbers as a result of the Project, forecasts from the modelling work undertaken for the EWR Business Case<sup>349</sup> have been used.

#### *Modal Split and Trip Distribution*

- 14.4.16 As previously stated, the Project will encourage modal shift from private vehicle to rail. However, the increase in passengers will lead to an increase in localised vehicle trips to and from each station as passengers may drive and leave their car or be dropped off. Therefore the Draft ES

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<sup>349</sup> East West Rail Western Section Updated Business Case, Atkins, 2015

considers the potential impact of the increase in passengers accessing the station by car. The following stations have been considered:

- Aylesbury;
- Aylesbury Vale Parkway;
- Bedford;
- Bicester;
- Bletchley;
- Ridgmont; and
- Woburn Sands.

14.4.17 Although part of EWR2, Winslow Station is not covered in the Draft TA or this Draft ES as it has already been assessed as part of a previous planning application: 13/02112/AOP.

14.4.18 As stated in the limitations and assumptions section of this chapter, there is no current information available regarding mode share for the stations which will be assessed within this Draft ES. To inform the final ES data is to be collected. The mode share surveys will capture the following:

- Existing passengers' mode of travel to and from each of the considered stations;
- The location they usually park if driving; and
- Their home post code.

14.4.19 For the purpose of providing an initial assessment of the change in journeys to and from each station by rail passengers it has been assumed 70% of any increase will make occur through use of a private car.

14.4.20 This Draft ES chapter reports on the predicted percentage increase of traffic at each of the station access junctions based upon the 70% car mode share for new passengers. The following station access junctions have been considered in the assessment:

- Aylesbury;
- Aylesbury Vale Parkway;
- Bedford;
- Bicester;

- Bletchley;
- Ridgmont; and
- Woburn Sands.

14.4.21 Further junction assessments will be considered once mode share surveys have been undertaken and the distribution of additional trips has been calculated. This approach is being discussed with the local highway authorities.

*Level Crossing Assessment Approach*

14.4.22 A number of Level crossings along the Bletchley to Bedford section of the Project will not be closed. During operation of the Project there is a predicted increase in rail services and therefore the level crossing barriers are predicted to be down for a longer period of time. The impact of the Project on the operation of level crossings has been assessed using LinSig<sup>350</sup> design and modelling software. The software allows for the modelling of signalised junctions and highway level crossings. The full details of the approach are contained in the Draft TA (Appendix 14.1).

*Public Rights of Way Assessment*

14.4.23 To understand the impact of the replacements and diversions on existing users, an assessment has been undertaken using methodology adapted from IEMA and DMRB guidelines.

14.4.24 The assessment included a desktop review to establish the baseline conditions along the existing railway. The baseline conditions have been compared against the replacements and diversions for each PRoW.

14.4.25 The following four user groups (referred to as 'users' or 'receptors') of each PRoW where applicable have been considered:

- Pedestrians;
- Cyclists;
- Equestrians; and
- Vulnerable Users (includes elderly users, users with disabilities, and children).

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<sup>350</sup> LinSig design and modelling software, produced by JCT consultancy.

*Sensitivity of PRow*

14.4.26 To quantify the sensitivity of the PRow to change, an assessment framework has been adopted from a review of DMRB criteria, based on the users predicted to be using the PRow. This is detailed in Table 14.3.

Table 14.3 Sensitivity of PRow

Receptor or PRow Type	Receptor Sensitivity
<p>One or more of the following criteria are met:</p> <ul style="list-style-type: none"> <li>• Users take direct access to residential, commercial or farmland property via an existing PRow level crossing;</li> <li>• Users for whom a PRow is essential because they do not have any other alternative route available for their journey; or</li> <li>• Vulnerable users require access to key facilities via PRow.</li> </ul>	High
<p>Users of the local transport network who use the affected routes frequently for essential journeys such as education and commuting but also have an existing choice of alternative routes.</p>	Medium
<p>Users of the local transport network who use the affected routes frequently or non-essential journeys such as leisure and recreational purposes and those who use the routes less frequently for essential journeys.</p>	Low

14.4.27 The sensitivity of the PRow has been determined based on the PRow proximity to existing urban areas and schools and, therefore, the likely users of the PRow. These distances are as follows:

- **High** – PRow is within 500 m of an existing school (these PRow are assumed to have a high proportion of vulnerable users);
- **Medium** – PRow is over 500 m from existing school but within 400 m of an existing urban area (for the purpose of the assessment urban areas are defined as a cluster of developments such as housing and businesses. They do not include single farm holdings or single isolated units); and
- **Low** – PRow is over 500 m from existing schools and over 400 m from an existing urban area.



14.4.28 The above criteria have been adopted to estimate the number of distances and are as follows (adopted from Table 3.2 of the CIHT's document 'Providing for Journeys on Foot'<sup>351</sup>):

*Magnitude of Impact*

14.4.29 The assessment for assigning a magnitude to the impacts has been taken from guidelines in DMRB Volume 11 and the IEMA<sup>352</sup> guidelines. This has enabled a number of thresholds to be derived which will be used to assess the magnitude of the impacts on each receptor type. These are shown in Table 14.4

**Table 14.4 Magnitude of Impact**

<b>Magnitude of Impact</b>	<b>Negligible</b>	<b>Low</b>	<b>Medium</b>	<b>High</b>
<b>Severance</b>	Change in journey distance of less than 30%	Change in journey distance of 30%-60%	Change in journey distance of 60%-90%	No Access
<b>Cyclist /Equestrians Journey Time</b>	Change in journey distance of less than 60%	Change in journey distance of 60%-75%	Change in journey distance of 75%-100%	Change in journey distance of greater than 100%
<b>Pedestrian Journey Time</b>	Change in journey distance of less than 30%	Change in journey distance of 30%-60%	Change in journey distance of 60%-100%	Change in journey distance of greater than 100%
<b>Vulnerable Users Journey Time</b>	Change in journey distance of less than 15%	Change in journey distance of 15%-30%	Change in journey distance of 30%-50%	Change in journey distance of greater than 50%

*Significance of Effect*

14.4.30 The significance of effect has been assessed against the sensitivity of the receptor and the magnitude of the impact. The following terms have been used to define the significance of the effects identified based on the

<sup>351</sup> Chartered Institute of Highways and Transportation, *Providing for Journeys on Foot*, 2000

<sup>352</sup> Institute of Environmental Assessment, *Guidelines for Environmental Assessment of Road Traffic*, 2006

receptor sensitivity and the magnitude of effect due to the intervention at each PRow:

- **Major effect** – where the Project could be expected to have a significant effect (either positive or negative) on the user;
- **Moderate effect** – where the Project could be expected to have a noticeable effect (either positive or negative) on the user;
- **Minor effect** – where the Project could be expected to result in a small, barely noticeable effect (either positive or negative) on the user; and
- **Negligible effect** – where no discernible effect is expected as a result of the Project on the user.

14.4.31 Table 14.5 shows the matrix which has been used for determining the significance of effect.

Table 14.5 Significance of Effects

		Sensitivity of Receptor		
		High	Major	Low
Magnitude of Change / Effect	High	Major	Moderate to Major	Minor to Moderate
	Medium	Moderate to Major	Moderate	Minor
	Low	Minor to Moderate	Minor	Negligible to Minor
	Negligible	Negligible	Negligible	Negligible

## 14.5 Baseline

14.5.1 Information relating to baseline conditions can be found in the Draft TA (Appendix 14.1).

## 14.6 Effects

### Construction Phase Assessment

14.6.1 The construction compounds which have been considered in this Draft ES chapter are set out in Table 14.6. Since construction information was provided for this Draft ES, the number of compounds and location has altered slightly, and the final ES will reflect this change.

Table 14.6 Summary of Construction Compound Type and Duration of Use

Construction Compound Number	Construction Compound Name	Construction Compound Type	Duration of Use (Years)
A1	Bicester	Strategic	4
A2	Launton	Satellite	4
A3	Marsh Gibbon	Satellite	4
A4	Claydon Junction	Strategic	5
B1	Steeple Claydon	Satellite	5
B2	Verney Junction	Satellite	5
B3	Furze Lane	Satellite	4
B4	Little Horwood	Strategic	5
B5	Newton Longville	Strategic	4
B6	Bletchley	Strategic	5
C1	Wellington Place	Satellite	3
C2	Bletchley Flyover	Satellite	3
D1	M1 Junction 13	Satellite	4
D2	Kempton Hardwick	Satellite	4
E3	Waddesdon	Satellite	2
E4	Ackerman Street	Strategic	4
E5	Aylesbury Vale Parkway	Satellite	4

*Years of Construction and Phasing*

- 14.6.2 Construction is planned to take place from 2019 to 2024 with various degrees of intensity of works at each construction compound over the build out process.
- 14.6.3 The estimated build out rate per construction compound has been provided by the Alliance and is set out in Table 14.7.

Table 14.7 Construction Compound Build Out Rates

Construction Compound Name	2018	2019	2020	2021	2022	2023	Total
A1 - Bicester	20%	30%	30%	20%			100%
A2 - Launton	30%	30%	20%	20%			100%
A3 - Marsh Gibbon	20%	20%	30%	30%			100%
A4 - Claydon Junction	10%	15%	20%	25%	20%	10%	100%
B1 - Steeple Claydon		15%	20%	20%	20%	15%	100%
B2 - Verney Junction		15%	20%	20%	20%	15%	100%
B3 - Furze Lane		20%	25%	30%	25%		100%
B4 - Little Horwood		20%	25%	25%	20%	10%	100%
B5 - Newton Longville		25%	25%	25%	25%		100%
B6 - Bletchley		15%	20%	20%	20%	15%	100%
C1 - Wellington Place		30%	40%	30%			100%
C2 - Bletchley Flyover		30%	40%	30%			100%
D1 - M1 Junction 13			25%	25%	25%	25%	100%
D2 - Kempton Hardwick			25%	25%	25%	25%	100%
E3 - **Waddesdon			50%	50%			100%
E4 - Ackerman Street			20%	25%	30%	25%	100%
E5 - Aylesbury Vale Parkway			20%	30%	40%	10%	100%

#### Construction Trip Types

14.6.4 The following construction trip types are considered in this Draft ES chapter:

- **HGV Trips** – Trips from heavy goods vehicles. These will travel via the fixed construction routes;
- **Staff Trips** - Office based support and admin staff trips; and
- **Operatives** - Construction / site based personnel trips.

*Routes for Construction Traffic*

14.6.5 The Alliance has identified highway routes to and from each construction compound. These routes have been subject of consultation with the LHA. Each construction compound will have a primary access route which will be used for all access and deliveries to the construction compound. This draft assessment assumes all access by HGVs will be via the primary routes.

*HGV Trip Generation*

14.6.6 The estimated daily two-way HGV movements to each construction compound are set out in Table 14.8.

**Table 14.8 Two-way Estimated Daily HGV Trips by Construction Compound**

<b>Construction Compound Name</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
<b>A1 - Bicester</b>	4	6	6	4	-	-
<b>A2 - Launton</b>	6	6	4	4	-	-
<b>A3 - Marsh Gibbon</b>	4	4	6	6	-	-
<b>A4 - Claydon Junction</b>	2	4	4	6	4	2
<b>B1 - Steeple Claydon</b>	-	2	2	2	2	2
<b>B2 - Verney Junction</b>	-	2	4	4	4	2
<b>B3 - Furze Lane</b>	-	6	6	8	6	-
<b>B4 - Little Horwood</b>	-	6	8	8	6	4
<b>B5 – Newton Longville</b>	-	6	6	6	6	-
<b>B6 - Bletchley</b>	-	-	2	2	2	-
<b>C1 - Wellington Place</b>	-	4	6	4	-	-
<b>C2 - Bletchley Flyover</b>	-	-	2	-	-	-

Construction Compound Name	2018	2019	2020	2021	2022	2023
D1 - M1 Junction 13	-	-	6	6	6	6
D2 - Kempton Hardwick	-	-	10	10	10	10
E3 - Waddesdon	-	-	10	10	-	-
E4 - Ackerman Street	-	-	6	6	8	6
E5 - Aylesbury Vale Parkway	-	-	6	10	12	4

14.6.7 A table showing the HGV movements to each construction compound contained in the Draft TA (Table 4.5, Appendix 14.1).

*Staff/Operatives Trip Generation*

14.6.8 The staff and operative trips have been based on information provided by the Alliance. The assumptions underpinning the numbers are based on an experience of another rail improvement project recently completed by the Alliance (Staffordshire Area Improvement Project, SAIP). SAIP involved the construction of 14 km of new rail infrastructure through a rural environment with 11 new structures and considerable earthworks. This is considered as a suitable proxy to use for the Project, as the scope of work undertaken is similar.

14.6.9 During the peak for construction activity, the SAIP had 350 operatives and 150 staff deployed on the construction of the railway. SAIP is comparable in scope to each section of the Project and these resource levels have therefore been used. It has been confirmed that on a weekday a maximum of 350 operatives and 150 staff will be working on any one section of the Project at any one time. It should be noted these are peak construction numbers and it is likely that the actual level of resource over the period of construction will be lower than this.

14.6.10 The Alliance construction strategy divides the Project into 6 geographical sections 2A-F. Resources will be allocated to a number of construction compounds on each section as set out in Table 14.9. these are as follows:

- 2A - Bicester to Claydon Junction;
- 2B - Claydon Junction to Bletchley;
- 2C - Bletchley;
- 2D - Bletchley to Bedford;
- 2E - Claydon Junction to Aylesbury; and
- 2F - Aylesbury to Princes Risborough.

14.6.11 Sections 2C, 2D and 2E will have a smaller workforce than the other sections as a result of the more modest construction activity along those sections.

**Table 14.9 Percentage and Number of Operatives / Staff per Construction Compound**

Compound	Compound Type	% Operatives at per Compound	% Staff at each Compound	Number of operatives per compound	Number of Staff per compound	Total number of workers per compound
<b>Section 2A – Bicester to Claydon Junction</b>						
<b>A1 - Bicester</b>	Strategic	45%	80%	158	120	278
<b>A2 - Launton</b>	Satellite	5%	5%	18	8	26
<b>A-3 Marsh Gibbon</b>	Satellite	5%	5%	18	8	26
<b>A4 - Claydon Junction</b>	Strategic	45%	10%	158	15	173
<b>Total</b>	-	100%	100%	350	150	500
<b>Section 2B – Claydon Junction to Bletchley</b>						
<b>B1 - Steeple Claydon</b>	Satellite	5%	5%	18	8	26
<b>B2 - Verney Junction</b>	Satellite	5%	5%	18	8	26
<b>B3 - Furze Lane</b>	Satellite	5%	5%	18	8	26
<b>B4 - Little Horwood</b>	Strategic	40%	20%	140	30	170
<b>B5 – Newton Longville</b>	Satellite	5%	5%	18	8	26
<b>B6 - Bletchley</b>	Strategic	40%	60%	140	90	230

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Compound	Compound Type	% Operatives at per Compound	% Staff at each Compound	Number of operatives per compound	Number of Staff per compound	Total number of workers per compound
<b>Total</b>	-	100%	100%	350	150	500
<b>Section 2C – Bletchley to Milton Keynes</b>						
<b>C1 - Wellington Place</b>	Satellite	10%	5%	35	8	43
<b>C2 - Bletchley Flyover</b>	Satellite	45%	50%	158	75	233
<b>Total</b>	-	55%**	55%**	193	83	276
<b>Section 2D – Bletchley to Bedford</b>						
<b>D1 - M1 Junction 13</b>	Strategic	10%	10%	35	15	50
<b>D2 - Kempton Hardwick</b>	Satellite	5%	40%	18	60	78
<b>Total</b>	-	15%**	50%**	53	75	128
<b>Section 2E – Claydon Junction to Aylesbury</b>						
<b>E3 - Waddesdon</b>	5	5%	20%	140	8	148
<b>E4 - Ackerman Street</b>	2	90%	50%	18	8	26
<b>E5 - Aylesbury Vale Parkway</b>	5	5%	30%	140	60	200
<b>Total</b>	-	100%	100%	298	75	373

- Arithmetic errors due to rounding

\*\* - Sections 2C and 2D have a reduced scope compared to 2A, B and E where the full complement of resource will be required therefore the percentage is lower than the standard requirement.

14.6.12 There may be some limited construction work taking place on a Saturday; however this will be at a significantly reduced rate compared to weekday working, with a maximum of 25% of staff/operatives being on site. The Draft ES will consider the weekday figures as this is when the traffic from the construction compounds will be highest.



*Staff and Operatives Trip Distribution*

14.6.13 Details of the staff and operatives trip distribution is contained in the Draft TA (Appendix 14.1)

14.6.14 The vehicle occupancy rate for staff and operatives is shown in Table 14.10. This is an average occupancy that takes into account that a number of staff and operatives will:

- Car share;
- Use public transport;
- Walk;
- Cycle; and
- Use of workforce shuttle buses.

**Table 14.10 Percentage of staff / operatives by construction compound type and estimated vehicle occupancy rates**

Construction Compound Type	Staff		Operatives	
	Percentage	Vehicle Occupancy	Percentage	Vehicle Occupancy
Strategic	80%	1	95%	2
Satellite	20%	2	5%	2

14.6.15 Access to the satellite construction compounds will generally be via the nearest strategic construction compound; however where operations restrict access along the haul road there may be times when access from the next nearest available strategic construction compound may be required. The proportions of access through each construction compound are shown in Table 14.11.

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Table 14.11 Proportion of Trips accessed via each construction compound

Construction Compound		Bicester	Launton	Marsh Gibbons	Clayton Junction	Steeple Claydon	Verney Junction	Furze Lane	Little Horwood	Swanbourne	Bletchley	Wellington Place	Bletchley Flyover	M1 Junction 13	Kempton Hardwick	Waddesdon	Ackerman Street	Aylesbury Vale Parkway	Total
Proportion of Trips accessed via each construction compound																			
Construction Compound of Work	Bicester	1.00																	1.00
	Launton	0.76	0.05	0.19															1.00
	Marsh Gibbons	0.48		0.05	0.48														1.00
	Clayton Junction				1.00														1.00
	Steeple Claydon	0.10			0.81	0.05			0.05										1.00
	Verney Junction	0.10			0.76		0.05		0.10										1.00
	Furze Lane				0.48			0.05	0.48										1.00
	Little Horwood								1.00										1.00
	Swanbourne								0.90	0.05	0.05								1.00

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Construction Compound		Bicester	Launton	Marsh Gibbons	Clayton Junction	Steeple Claydon	Verney Junction	Furze Lane	Little Horwood	Swanbourne	Bletchley	Wellington Place	Bletchley Flyover	M1 Junction 13	Kempton Hardwick	Waddesdon	Ackerman Street	Aylesbury Vale Parkway	Total
Construction Compound of Work	Bletchley										1.00								1.00
	Wellington Place										0.95	0.05							1.00
	Bletchley Flyover										0.95		0.05						1.00
	M1 Junction 13													1.00					1.00
	Kempton Hardwick													0.95	0.05				1.00
	Waddesdon															0.05	0.95		1.00
	Akeman Street																1.00		1.00
	Aylesbury Vale Parkway																0.95	0.05	1.00

14.6.16 The assumptions for the proportional split of arrivals and departures for operatives and staff are shown in Table 14.12 and Table 14.13. The figures are based on previous experience of SAIP.

Table 14.12 Operatives / Staff Arrival and Departure Profiles (Non-Winter Months)

	Arrivals			Departures		
	06:00 – 07:00	07:00 – 08:00	08:00 – 09:00	16:00 – 17:00	17:00 – 18:00	18:00 – 19:00
<b>Operatives*</b>	100%	0%	0%	0%	10%	90%
<b>Staff</b>	0%	85%	15%	10%	80%	10%

Table 14.13 Operatives / Staff Arrival and Departure Profiles (Winter Months)

	Arrivals			Departures		
	06:00 – 07:00	07:00 – 08:00	08:00 – 09:00	16:00 – 17:00	17:00 – 18:00	18:00 – 19:00
<b>Operatives</b>	100%	0%	0%	0%	50%	50%
<b>Staff</b>	0%	85%	15%	10%	80%	10%

14.6.17 The resultant trip generation and distribution for staff and operatives are contained in the Draft TA (Appendix 14.1).

#### Construction Phase Assessment

##### *Percentage Impact Assessment*

14.6.18 The following criteria have been used to categorise the magnitude of impact (change) in traffic flows as a result of the construction related traffic (HGVs, and operative and staff trips).

- **Negligible** - Below 30%;
- **Low** - 30% to 60%;
- **Medium** - 60% to 90%; and
- **High** - Above 90%.

14.6.19 Table 14.14 provides a summary of the results for each junction where baseline data is available. Further details are contained in the Draft TA

(Appendix 14.1). Traffic data has been collected at a number of junctions which were considered to certainly form part of the construction routes. Additional junctions have recently been identified along construction routes, these will be surveyed, traffic data collected and analysis undertaken and presented in the final ES and TA.

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Table 14.14 Summary of Percentage Impact Assessment

Junction	Total Vehicles	Total LGV / Car	HGV	PCU <sup>353</sup>
Junction: M40 / A41 / A34	High	High	Low	High
Junction: B4100 / A4421 / A41 / Gravenhill Road North	High	High	High	High
Junction: A1 Compound / Bicester Road / A4421	Negligible	Negligible	High	Negligible
Junction: A4421 / Launton Road Impact	Negligible	Negligible	Low	Negligible
Junction: A4421 / Buckingham Road / A4095	Negligible	Negligible	High	Negligible
Junction: Bicester Road / Station Road / Blackthorn Road / W End	High	High	Negligible	High
Junction: Embleton Way / A421 / Gawcott Road	High	High	High	High
Junction: Coddimore Lane / A421 / Whaddon Road	High	High	High	High
Junction: A421 Standing Way / Whaddon Road / A421	Negligible	High	Negligible	High
Junction: A421 / B4304 / Snelshall Street	Negligible	High	Negligible	High
Junction: Whaddon Road / B5 Compound	High	High	High	High
Junction: Bletchley Road / Stoke Road / Drayton Road / Whaddon Road	Negligible	High	Negligible	High
Junction: Newton Road / B6 Compound / Bletchley Road	Negligible	High	Negligible	High
Junction: B4304 / Newton Road / Shenley Road	Negligible	Negligible	Negligible	Negligible
Junction: Verney Road / B2 Compound	Low	Low	Low	High
Junction: Manor Road / D2 Compound	Negligible	High	Negligible	High
Junction: Water Eaton Road / C2 Compound / C1 Compound	Negligible	High	Negligible	High

<sup>353</sup> Passenger Car Unit

*Impact of Temporary Road Closures*

- 14.6.20 During the construction phase of the project there will be a number of temporary road closures required. A schedule of the temporary road closures has been provided by the Alliance. These are summarised in Table 14.15.
- 14.6.21 These closures will have a temporary impact upon various road users. Accordingly, a desktop review has been undertaken to identify if there will be any negative impact on bus services, pedestrians, cyclists and road vehicles as a results of these closures. Bus route plans have been used to assess which services may be impacted.

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Table 14.15 Assessment of Temporary Road Closures

Name	Management /Mitigation	Duration (weeks)	Bus Impact	Pedestrian Impact	Cycle Impact	Vehicle Impact
Station Road, Launton	Lane closures under Traffic Management (TM) for 'tie-ins'	10	Potential increase to bus journey times during 10 weeks of single lane span. Night closures to have potentially no effect.	Potential removal of a footway during TM which may cause pedestrians to cross the road during 10 weeks of single lane span. Night closures to have potentially no effect.	The potential TM may cause delays during the additional waiting times during 10 weeks of single lane span. Night closures to have potentially no effect.	The potential TM may cause delays during the additional waiting times during 10 weeks of single lane span. Night closures to have potentially no effect.
Charndon OB	Full closure for deck install (With TM / lane closures in the lead up / following install)	1 night	Potential increase/decrease to bus journey times / change to bus route.	The area is very rural with limited pull factors for pedestrians. The diversion is unlikely to affect pedestrians.	Diversion may cause increase/decrease in journey times depending on the diversion route.	Diversion may cause increase/decrease in journey times depending on the diversion route.
A413 Buckingham Rd	Lane closure (single direction traffic under deck)	13	Potential increase to bus journey times	Potential disruption to desire lines if footway closes	Potential increase to journey times	Potential increase to journey times
Horwood Road	Lane closure (single direction traffic under deck)	13	Potential increase to bus journey times	No dedicated pedestrian facilities at this UB. Potentially no effect for pedestrians.	Potential increase to journey times	Potential increase to journey times



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Name	Management /Mitigation	Duration (weeks)	Bus Impact	Pedestrian Impact	Cycle Impact	Vehicle Impact
<b>Horwood Road</b>	Off line new structure, potential TM (lane closures) for final tie in	n/a	Potential increase to bus journey times	Remote area which is unlikely to have pedestrians, therefore potentially no effect.	Potential increase to journey times	Potential increase to journey times
<b>Newton Road</b>	Lane closure (single direction traffic over deck)	5	Potential increase to bus journey times	Remote area with limited footways, which is unlikely to have pedestrian movement, therefore potentially no effect.	Potential increase to journey times	Potential increase to journey times
<b>Berry Lane</b>	Permanent Closure and new access track	n/a	Potential increase to bus journey times with diversion routes	Limited facilities in the immediate area. Pedestrian activity is unlikely; however delays may be expected with level crossing closure.	Potential increase to journey times	Potential increase to journey times
<b>Akeman Street</b>	Night closures	7	Potential journey delays for the 2 day closure. No delays expected for the night closures.	Limited facilities west of the UB suitable for pedestrian to walk to. Potentially no impact on pedestrians	Potential journey delays for the 2 day closure. Potentially delays expected for the night closures.	Potential journey delays for the 2 day closure. No delays expected for the night closures.
	Weekend (2 day closure)	1				

Operational Phase Assessment

*Stations*

14.6.22 Table 14.16 and Table 14.17 provide a summary of the results during the AM and PM peak periods.

**Table 14.16 Summary of AM Peak Hour Percentage Impact Assessments**

Station Access Junction	Time Period	2016 Observed Traffic Flow	2016 Observed Traffic Flow + Increased Car trips	Net Change	Percentage Change
Aylesbury Vale Parkway	07:00-08:00	1,719	1,728	+9	0.51%
Bedford	07:00-08:00	1,402	1,496	+94	6.70%
Bicester	07:00-08:00	684	786	+102	14.97%
Bletchley	07:00-08:00	732	900	+168	22.90%
Ridgmont	08:00-09:00	56	61	+5	9.48%
Woburn Sands	08:00-09:00	1,001	1,045	+44	4.40%

**Table 14.17 Summary of PM Peak Hour Percentage Impact Assessments**

Station Access Junction	Time Period	2016 Observed Traffic Flow	2016 Observed Traffic Flow + Increased Car trips	Net Change	Percentage Change
Aylesbury Vale Parkway	18:00-19:00	1,427	1,432	+5	0.35%
Bedford	18:00-19:00	1,088	1,167	+79	7.22%
Bicester	18:00-19:00	708	817	+109	15.42%
Bletchley	18:00-19:00	1,090	1,207	+117	10.78%
Ridgmont	17:00-18:00	59	65	+6	9.55%
Woburn Sands	17:00-18:00	1,109	1,152	+43	3.90%

*Level Crossing Qualitative Assessment*

14.6.23 The following public highway level crossings will be closed and replaced by road bridges, shown on figure 1.H in Volume 4.

- Charbridge Lane;
- Station Road, Launton;
- Queen Catherine Road
- Verney Junction
- Marston; and
- Kempston Hardwick.

14.6.24 A qualitative assessment of the impact of these closures has been undertaken and the results summarised in Table 14.18. Further details are contained in the Draft TA (Appendix 14.1).

**Table 14.18 Qualitative Assessment of Level Crossing Closure and Replacements**

Receptor	Qualitative Impact
Vehicles	<b>Positive impact</b> due to the removal of delay caused by the existing level crossing. Safety improvement due to the removal of the existing level crossing.
Pedestrians	<b>Positive impact</b> due to improved safety due to the removal of the existing level crossing.
Cyclists	<b>Positive impact</b> due to improved safety due to the removal of the existing level crossing.
Public Transport Users	<b>Positive impact</b> due to the removal of delay caused by the existing level crossing.

*Level Crossing - Assessment of Delay*

14.6.25 The following public highway level crossings have been assessed using LinSig modelling software and will not be closed:

- Fenny Stratford;
- Bow Brickhill;
- Woburn Sands;
- Aspley Guise;
- Ridgmont;

- Lidlington;
- Millbrook; and
- Wootton Broadmead.

14.6.26 The location of the public highway level crossings which are remaining open are contained in Figure 1.H in Volume 4.

14.6.27 The following criteria, based on professional judgement and experience of similar schemes, have been used to determine whether there will be a significant change in waiting times at these level crossings:

- **Low** – delay below 10 seconds;
- **Medium** – delay between 10 – 120 seconds; and
- **Large** – delay above 120 seconds.

14.6.28 Table 14.19 provides a summary of the results for the level crossings which are remaining open. Further details are contained in the Draft TA (Appendix 14.1).

**Table 14.19 Summary of Delay at Level Crossings**

Level Crossing	AM Peak Hour		PM Peak Hour	
	2024	2035	2024	2035
Fenny Stratford	Low	Low	Low	Low
Bow Brickhill	Medium	Medium	Medium	Medium
Woburn Sands	Medium	Medium	Medium	Medium
Aspley Guise	Medium	Medium	Medium	Medium
Ridgmont Level	Low	Low	Low	Low
Lidlington Level	Medium	Medium	Medium	Medium
Millbrook	Medium	Medium	Medium	Medium
Wootton Broadmead	Medium	Medium	Medium	Medium

## 14.7 Mitigation

14.7.1 All construction phase mitigation measures will be undertaken under construction traffic management plans, through the Code of Construction

Practice (CoCP) and Construction Environmental Management Plan. A draft CoCP is appended to the Draft ES.

- 14.7.2 Each construction compound will be the subject of a site-specific traffic management plan. This document will address the requirements for traffic management measures such as: traffic route signage, the signing and guarding of compound access and egress, co-ordination of road closures, the need for diversions, as well as any route, timing, or volume restrictions.
- 14.7.3 A Green Travel Plan will be produced by the Alliance to encourage the reduction of the use of single occupancy private vehicles to travel to the worksite or compound offices. The plan will include measures that will be taken to encourage the use of public transport, cycling, walking and car sharing, for example, a shuttle bus from the nearest train station to the strategic compounds.
- 14.7.4 There is a potential for impacts on rail passenger services to arise during the construction phase of the Project as a result of temporary station closure or a service reduction. In order to minimise disruption to rail service users these impacts will be mitigated through the provision of “Disruption Access Planning” carried out through negotiation between the Alliance and Train Operating Companies (TOCs).
- 14.7.5 Further mitigation work may be proposed once the full assessments have been undertaken.