

UNITED
BY OUR
DIFFERENCE



SOUTH WOKINGHAM HIGHWAY STUDY

Options Appraisal Report

27/05/2014

Confidentiality: Confidential

Quality Management

Issue/revision	Issue 1	Revision 1	Revision 2	Revision 3
Remarks	DRAFT	WBC Comments	Further WBC Comments	
Date	November 2013	March 2014	May 2014	
Prepared by	Laura Bazley Vicky Noble Nadia Lyubimova Martin Petley Stephen Reed	Laura Bazley Vicky Noble Nadia Lyubimova Martin Petley Stephen Reed	Laura Bazley Vicky Noble Nadia Lyubimova Martin Petley Stephen Reed	
Signature				
Checked by	Laura Bazley	Laura Bazley	Laura Bazley	
Signature				
Authorised by	Stephen Reed	Stephen Reed	Stephen Reed	
Signature				
Project number	10395859	10395859	10395859	
Report number				
File reference	N:\10395859 - South Wokingham Highway Study\C Documents\Reports\Options Appraisal Report\140527 South Wokingham Highway Study - Option Appraisal Report.docx			

South Wokingham Highway Study
Options Appraisal Report

27/05/2014

Client

Wokingham Borough Council

Consultant

WSP UK
Mountbatten House
Basing View
Basingstoke
RG21 4HJ
UK

Tel: +44 (0)12 5631 8800
Fax: +44 1256 318 700

www.wspgroup.co.uk

Registered Address

WSP UK Limited
01383511
WSP House, 70 Chancery Lane, London, WC2A 1AF

WSP Contacts

Stephen Reed
Vicky Noble
Martin Petley
Nadia Lyubimova
Laura Bazley

Table of Contents

Executive Summary.....	5
1 Introduction	7
2 Summary of Environmental Constraints Review	11
3 Flood Risk Review	40
4 Summary of Engineering Review	47
5 Model Outcomes	65
6 Recommendations	81
 Appendices.....	 83
Appendix A: Environmental Figures.....	84
Appendix B: Landscape and Visual Constraints	101
Appendix C: Noise and Vibration	118
Appendix D: Water Environment	146
Appendix E: Archaeology and Cultural Heritage	154
Appendix F: Air Quality	167
Appendix G: Ecology and Nature Conservation	190
Appendix H: Ground Conditions.....	211
Appendix I: Flood Risk Review Figures	236
Appendix J: Engineering Review Figures.....	240
Appendix K: Model Outcomes and Figures.....	251
Appendix L: Paramics Study Local Model Validation and Future Options Testing Report.....	358

Executive Summary

A considerable evidence base and investigation has been undertaken to examine the provision of the South Wokingham Distributor Road (SWDR), the potential impacts of various route options and a number of sensitivity tests focusing on junction layouts at the A321 Finchampstead Road. There is a significant body of evidence and consultant comment within the reports and appendices. Where possible, summaries are provided.

The approach undertaken by the team has **not** included any assessment of the costs of interventions but the team appreciates that there are potential hurdles with delivery of certain aspects of the SWDR and there will be key challenges for the Council and Developers to overcome. These are focused most critically on:

- The bridge over the railway between the SW SDL and Montague Park;
- Crossing the flood plain close to Tesco's;
- Highway connection between SWDR and A321 Finchampstead Road;
- Bridge improvements on the A321 Finchampstead Road; and
- Provision of footway / cycle crossing of the railway linking the new Strategic Development Location (SDL) with existing residential areas, town centre and local facilities and schools.

The sensitivity testing undertaken in the Council's traffic model (WSTM) would indicate that there is a benefit in providing the above pieces of infrastructure and thus providing a continuous highway route to access the SDL and also to provide an alternative link between the A329 (Coppid Beech) to the A321 Finchampstead Road and Molly Millars area.

General route options (A, B and C) were examined and, given the limited space between the railway line (Reading – London Waterloo) and the southern boundary of the SDL, the evidence collected and summarised in this report would indicate that there is very little to choose between the main route alignments in terms of traffic impact.

However, there are enough small differences between the three (mainly on engineering and environment grounds) to identify that the SPD (Option B) alignment would be more appropriate. Option B, the general SDL SPD alignment, can provide a better balance of impact on the local area, if small changes in the alignment were made to reduce impacts on items such as the flood plain.

The provision of Option B will still require detailed assessment and investigation for the likely provision of mitigation measures to offset potential impacts on items such as noise, visual intrusion and flood plain for instance, but these can be incorporated in to the overall development area, as part of the SDL scheme.

Detailed traffic modelling of the A321 Finchampstead Road / Tesco's / Molly Millars area has indicated that there could be increased delays and congestion with and without the highway scheme and SDL development. WSP acknowledge that it is not possible to produce a "nil-detriment" highway layout at this location, given the land and flood constraints and the additional traffic movements that are expected, and as such we would anticipate there to be an increase in queuing and delay in this section of the highway. However, we would outline that this needs to be balanced with the overall improvement in traffic conditions elsewhere; in and around the town and on routes leading from the SDL area northwards (through Rances Lane, Priest Avenue and Waterloo Road for example).

The traffic modelling undertaken would indicate that there is little “traffic benefit” in providing a dual two lane link between the two roundabouts on Finchampstead Road. There would be greater impacts on local residents immediately in the vicinity of the dual link compared to a single link. However, the team recognise that there could be advantages of providing dual link for future operational maintenance.

To achieve a highway improvement (at A321 Finchampstead Road / Molly Millars) it is anticipated that the Southern Railway Bridge would need to be improved to allow full height HGV access to and from the industrial and commercial areas in Molly Millars Lane. The form of this bridge and highway layout will need some further refinement from those options presented by Network Rail (NwR) and consideration will be needed on the impacts of temporary works closures and construction approaches. The width of any bridge opening will need to be given careful consideration as to the potential to achieve longer term benefits in terms of highways operation and future maintenance if provided with a dual link (as outlined above).

Improvement of the Northern rail bridge is not necessarily needed as part of the traffic solution on the A321. However, the team consider that access to the town centre would be greatly improved by a wider bridge opening which could provide wider footways and provide options for improving the public realm. We would suggest that further work by WBC / NwR is undertaken to consider if an alternative to full bridge widening is needed and whether a separate subway approach might be more cost effective, through the existing western (Majestic Wine) embankments).

1 Introduction

1.1 Background

- 1.1.1 WSP has a term commission with Wokingham Borough Council (WBC). As part of its continued services to WBC, WSP was asked to undertake the South Wokingham Highway Study to examine the potential route options of a link road to manage the impact of development in South Wokingham. The study and reviews cover:
- Environmental issues and constraints
 - Issues related to local flood impacts
 - Initial engineering alignment approaches
 - Traffic modelling and traffic engineering
- 1.1.2 The Wokingham Borough Council Local Plan (Core Strategy) was adopted in 2010. This identified a number of Strategic Development Locations (SDLs) across the Borough to meet the housing needs set out in the then, South East Regional Plan. Subsequently, the Council has maintained this level of housing delivery in its Local Plan.
- 1.1.3 As part of the Local Plan Core Strategy a number of key strategic transport improvements had been highlighted including
- North Wokingham Distributor Road
 - Station Link Road
 - Winnersh Relief Road
 - Arborfield Cross Relief Road
 - Shinfield Eastern Relief Road
 - Coppid Beach Park and Ride
 - MereOak Park and Ride
 - South Wokingham Distributor Road
- 1.1.4 Figure 1.2 shows the highway route options against which the various WSP discipline teams have undertaken desktop and other reviews as well as local walk over surveys. All routes will connect into the proposed route through Montague Park, which will provide a connection to the A329 London Road.

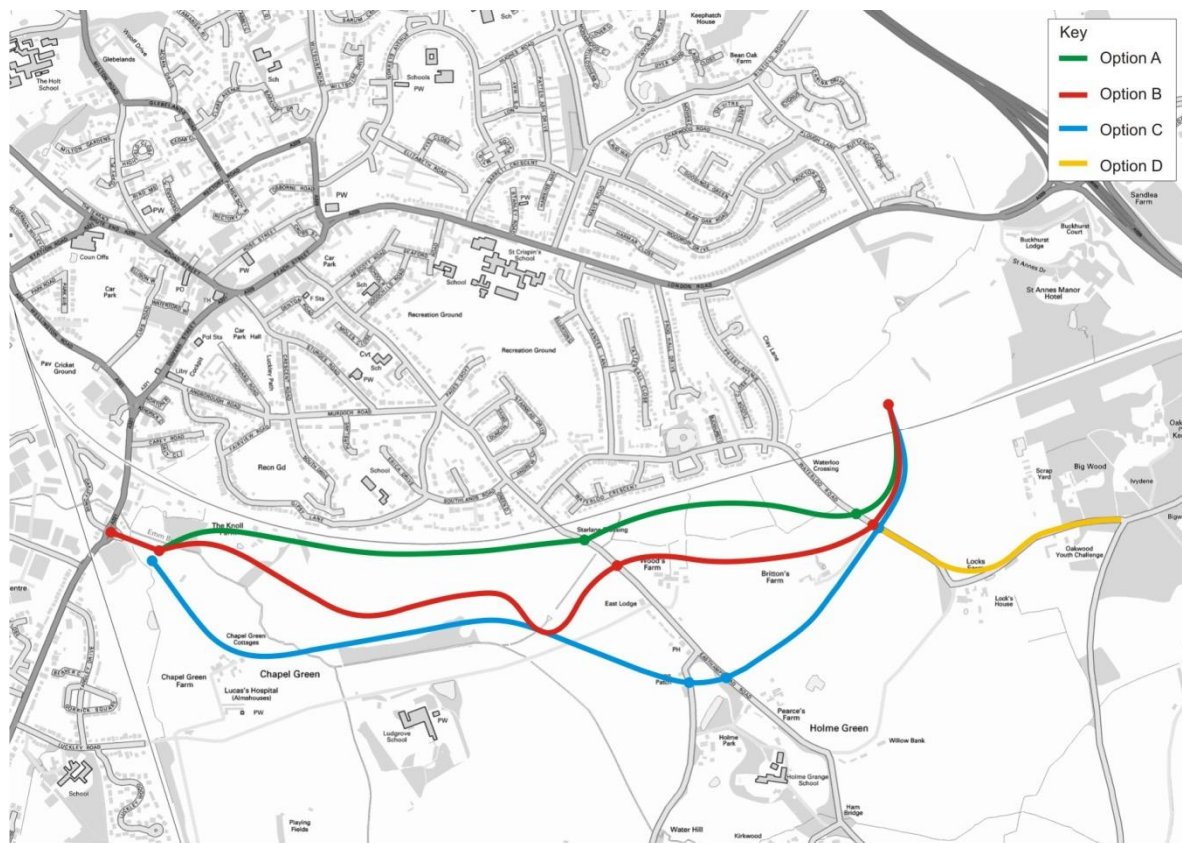


Figure 1.1 Proposed Options

1.1.5 As well as these basic route options some sensitivity tests on these alignments have been examined. The route options and their alternative alignments are described in detail below.

- **Route Option A** – Route Option A starts at the A321 Finchampstead Road at the junction with Oakley Drive. It runs approximately west to east, immediately south of the railway and ends just North of the railway line, approximately 300m east of the crossing of Waterloo Road. The proposed route will cross Emm Brook, Public Rights of Way 9 and 10, Easthampstead Road and Waterloo Road.
- **Route Option B** – Route Option B begins in the same location as Route Option A, on the A321 Finchampstead Road at the junction with Oakley Drive, and runs broadly east, diverting south round the existing surface water detention pond. The route also ends in the same location as Route Option A, just north of the railway line, and crosses the Emm Brook, Public Rights of Way 9 and 10, Easthampstead Road and Waterloo Road.
- **Route Option C** – This route runs broadly west to east, south of Route Options A and B. It also begins in the same location, on the A321 Finchampstead Road at the junction with Oakley Drive. Route Option C ends north of the railway, in the same location as Route Options A, B and the alternatives. Route Option C crosses the Emm Brook east of Chapel Green, Public Rights of Way 9 and 10, Ludgrove School private access, Heathlands Road, Easthampstead Road and Waterloo Road.

1.1.6 Alternative alignments (see Figure A.1b in Appendix A) in relation to the above are as follows:

- Route Option A Alternative Link 1 – A link between Route Option B and Route Option A at Knoll Farm. This link provides an alternative route for Route Option A which does not require land from Knoll Farm.
- Route Option A Alternative Link 2 - Link between Route Option A and Route Option B to the west of the existing detention pond. This link provides an alternative route for Route Option A to the south of the detention pond which enables the Easthampstead Road junction to be located further south at the proposed Route Option B Easthampstead Road crossing.
- Route Option A Alternative Link 3 - Link between Route Option A and Route Option B. This link provides an alternative route from Route Option A passing through the existing detention pond to the proposed Route Option B Easthampstead Road crossing.
- Route Option B Alternative Link B1 –This link provides an alternative more southern and straight alignment for Route Option B east of Tesco which does not require land acquisition from Knoll Farm.
- Route Option C Alternative Link C1- Link between Route Option C to the south of the existing detention pond to Easthampstead Road, traveling down Easthampstead Road to re-join Route Option C. This link provides an alternative route for Route Option C to access Easthampstead Road which avoids the Ludgrove School private access and Heathlands Road crossings.

Local Study Areas:

1.1.7 Six local study areas (A to F) (see Figure A.1b in Appendix A) have also been considered within this note.

1.1.8 For the purpose of this assessment:

- Local Study Area A is centred over the A321 Finchampstead Road, over the roundabout intersection with Oakley Drive, and is approximately 140m long. This is an area identified for new highway junctions and footway improvements.
- Local Study Area B is centred at the Knoll Farm private level crossing, to the south of Gipsy Lane, and is approximately 60m long.
- Local Study Area C is centred at an existing footbridge over the railway line, to the south of Gipsy Lane, to the east of Local Study Area B, and is approximately 60m long.
- Local Study Area D is centred on the Easthampstead Road Level Crossing, and is approximately 70m in length.
- Local Study Area E is centred over the Waterloo Road Level Crossing, and is approximately 80m in length.
- Local Study Area F is approximately 340m in length, at the point of the South Wokingham Distributor Road roadbridge over the railway line, from below to a point approximately 150m north of the railway line.

Route D – Waterloo Road to Peacock Lane Improvements:

- 1.1.9 The proposed improvements commence on the corner of Waterloo Road (See paragraph 4.5.95 – 4.5.99), just north of the woodland parcel to the west, and continues east along Waterloo Road and Peacock Lane until its cessation approximately 300m east of Easthampstead Park. All works are expected to be completed within the highway boundary with the exception of the junction between Waterloo Road, Old Wokingham Road and Peacock Lane, where some additional land could be needed to the south west. However, land checks will be required.

1.2 Technical Review Summaries

- 1.2.1 Summaries of the findings of this work are presented as follows within this report, with fuller technical notes provided as Appendices.
- Chapter 2: Environmental Constraints Summary;
 - Chapter 3: Flood Risk Review
 - Chapter 4: Engineering Review Summary;
 - Chapter 5: Model Outcomes;
 - Chapter 6: Recommendations

2 Summary of Environmental Constraints Review

2.1 Introduction

- 2.1.1 This section presents a summary of potential environmental constraints and recommendations in relation to three aspects of the proposed South Wokingham Distributor Road scheme. A suite of technical notes has been produced which appraise the scheme and accompany this summary. The three aspects of the scheme include:
- Three proposed route options for the Proposed South Wokingham Distributor Road: Route Option A (including Route Option A Alternative Links A1, A2 and A3), Route Option B (including Route Option B Alternative Link B1) and Route Option C (including Route Option C Alternative Link C1);
 - Six Local Study Areas where improved access across the railway is proposed; and
 - Proposed improvements to Waterloo Road / Peacock Lane leading to Jennetts Park and Southern Industrial Estate.
- 2.1.2 Figures A1a 'Overall Study Area and Environmental Constraints Plan' and A1b 'Aerial Photography View' in Appendix A present the 3 aspects of the scheme in relation to environmental designations and general context in relation to the surrounding area. Figure A5 'Waterloo Road / Peacock Lane Improvements Environmental Constraints Plan' in Appendix A specifically relates to the study area of the Waterloo Road / Peacock Lane improvements.
- 2.1.3 These 3 aspects to the scheme are described in further detail in section 1 and shown on Figure A1b in Appendix A.

Definitions

- 2.1.4 Given the relative proximity of the proposed distributor road routes, six local study areas and improvements to Waterloo Road / Peacock Lane, which share some of the same existing baseline, they are herein collectively termed '**the overall study area**'. Where there are differences, they will be referred to as Route Option A, Route Option A Alternative Link A1, A2, or A3, Route Option B, Route Option B Alternative Link B1, Route Option C, Route Option C Alternative Link C1, Local Study Area (A – F) or Waterloo Road / Peacock Lane improvements respectively.
- 2.1.5 In relation to the three route options where they share the same existing baseline, they will herein be referred to as '**the Site**'.
- 2.1.6 The term '**Local Study Areas**' will be used to refer to the six areas where work is proposed to improve access across the railway.
- 2.1.7 The advice presented within the summary of constraints at the end of this technical note must be considered both generic and preliminary at this stage and will need updating when more information becomes available regarding the likely infrastructure scenarios. For ease of reading, the constraints identified within this technical note are colour coded in relation to a traffic light system according to their significance on the scheme. Below identifies the colour coding:
- **Red** – Constraint to Development.
 - **Amber** – Constraint to Planning/Major Cost Implication
 - **Green** – Manageable constraint through scheme adaptation/mitigation measures/surveys (some cost implications).

-
- 2.1.8 Text left in black is not considered to represent any form of constraint and provides background information and/or recommendations to further avoid environmental impacts and/or to enhance the existing environment.

2.2 Methodology

- 2.2.1 The methodology used to appraise the three aspects of the scheme is outlined within each technical note included by topic area in Appendices A to I. A desk based review of existing information in the public domain was undertaken to identify existing potentially sensitive receptors within or adjacent to the Overall Study Area. The desk based review included a review of existing information, aerial photographs and ordnance survey maps. For specific methodology and source details, please refer to the individual technical notes.

Limitations

- 2.2.2 In relation to ecology and ground conditions, the search area for the data collected and Envirocheck Report is based on the route options under consideration at the time of the data requests [February 2013], this includes a full search radius of 2km from the route options considered, and a minimum of a 1km search radius around some areas of the road improvements. The minor reduction in search radius is not considered to reduce confidence in the conclusions reached within this summary note or respective technical notes.
- 2.2.3 Neither the Noise or Air Quality technical notes appraised the alternative links for Route Options A, B or C due to the number of route variations that these produce. The assessment of traffic data for the main routes was deemed an appropriate proxy for the level of study required at this stage of the scheme.
- 2.2.4 **Please note that the findings of the environmental assessment do not consider the effect of the route options on future residents within Wokingham and only assess effects in relation to existing sensitive receptors. It is anticipated that effects on future residents will be considered, and mitigation measures incorporated, as part of separate environmental studies for individual developments.** However, it should be noted that the eastern end of all of the proposed route options considered in this assessment terminate east of Waterloo Road just north of the railway line and from here, the route will continue through the future Montague Park development to join London Road (A329) which has already been granted planning permission. It is understood that the Montague Park section of the route was part of the original WBC Strategic Development Locations (SDLs) and therefore the South Wokingham Distributor Road running through Montague Park was taken into account during the planning application. It is expected that the route section through Montague Park will be in place by the time the South Wokingham Distributor Road becomes operational.

2.3 Summary of Environmental Constraints and Recommendations

Summary of Landscape and Visual Constraints

- 2.3.1 The landscape and visual constraints study appraises the route options in relation to the existing conditions within the Overall Study Area. Therefore, it does not take into account any constraints or effects on future development proposed on or surrounding the Overall Study Area. The team recognise that the SDL development itself will impact the area and the new roads would be part of this development.

General Constraints relating to All Route Options

- 2.3.2 The following constraints are applicable to all three Route Options (Route Options A, Route Option A Alternative Link A1/ A2/ A3, Route Option B, Route Option B Alternative Link B1, Route Option C and Route Option C Alternative Link C1) for full details please refer to Appendix B:

- Potential adverse effect on local landscape character (including tranquillity and lighting) through a change in land use from one of a more tranquil, rural, agricultural nature with trees and hedgerows to one of noisy, active, built form. Encroachment of built form beyond the southern fringe of Wokingham, currently contained by the railway line;
- Potential alteration in local topography if the road is built on embankment or in cutting at any point;
- All route options and their alternatives pass close to, or within the setting of listed buildings, including the Grade II* Lock's House on Waterloo Road and Grade I Henry Lucas Hospital at Chapel Green. The Site currently provides an agricultural and largely rural setting for the listed buildings which is also likely to provide some intervisibility due to proximity (within 500m). All the Options therefore have the potential to adversely affect the setting of some listed buildings;
- Potential change in visual amenity for travellers along Easthampstead Road; Waterloo Road; Finchampstead Road; and Oakley Drive;
- Potential loss of visual amenity for residents along/ off Easthampstead Road; Waterloo Road; Finchampstead Road; and Oakley Drive;
- Potential loss of visual amenity for users of the immediate public rights of way network, in particular footpaths 5, 10, 24 and 25. The footpaths will have to be diverted over/ under/ across or round the proposed road alignment;
- Potential loss of visual amenity for users of the wider public rights of way network, including footpaths 20 and 23 and Byways 26, 28 and 30;
- There will be a loss of some mature trees and sections of hedgerow, including trees protected by TPOs. The routes may potentially impinge upon the character and quality of Big Wood ancient woodland; and
- Potential adverse effect on the landscape characteristics and quality of the Wokingham N1 landscape character area.

Route Specific Constraints

Option A and Route Option A Alternative Link 1

- Potential change in the setting of 15 listed buildings, including the Grade I Henry Lucas Hospital and Grade II* Lock's House and Outbuildings At Lucas Hospital;
- Potential change in character, number and quality of the six area or individual TPOs within the route corridor;
- Potential change in visual amenity for travellers along Gypsy Lane;
- Potential change in visual amenity for residents along/ off Gypsy Lane
- Potential change in visual amenity for residents and visitors to the Knoll Farm;
- Potential change in visual amenity for users of footpath 21; and
- Potential change in visual amenity for users of and workers on the mainline railway line.

Option A Alternative Link 2 and 3 and Option B and Route Option B Alternative Link 1

- Potential change in the setting of 15 listed buildings including the Grade I Henry Lucas Hospital and Grade II* Lock's House and Outbuildings At Lucas Hospital;
- Potential change in character, number and quality of the seven area or individual TPOs within the route corridor;
- Potential change in visual amenity for travellers along Chapel Green;
- Potential change in visual amenity for residents along/ off Chapel Green; and
- Potential change in visual amenity for residents, workers and visitors to the Knoll Farm.

Option C and Route Option C Alternative Link 1

- Potential change in the setting of 15 listed buildings including the Grade I Henry Lucas Hospital and Grade II* Lock's House and Outbuildings At Lucas Hospital;
- Potential change in character, number and quality of up to 12 area or individual TPOs within the route corridor;
- Potential change in visual amenity for travellers along Heathlands Road, Ludgrove, and Chapel Green;
- Potential change in visual amenity for residents along/ off Heathlands Road; Ludgrove; and Chapel Green;
- Potential change in visual amenity for residents, workers and visitors to Lucas's Hospital; Wood's Farm; Britton's Farm Peace's Farm; and Locks Farm listed buildings;
- Potential change in visual amenity for residents, workers and visitors to Chapel Green Cottages; White Horse pub (Easthampstead Road) and residents within Chapel green and north of Long Patch;
- Potential change in visual amenity for travellers along Chapel Green and north of Long Patch; and
- Potential change in visual amenity for staff, pupils, workers and visitors to Ludgrove School.

Local Study Areas

Local Study Area A

- Potential change in character, number and quality of the two TPO areas within the location of the proposed works;
- Potential change in the character and quality of existing mature vegetation, including trees;
- Potential change in route/ access of Public Right of Way (footpath number 5) located to the east of Local Study Area A;
- Potential change in visual amenity for residents and travellers along/ off Finchampstead Road to the south and north;
- Potential change in visual amenity for workers and visitors to Wokingham Industrial Estate to the west;
- Potential change in visual amenity for workers and visitors to Tesco supermarket to the east;
- Potential change in visual amenity for residents and travellers along/ off Oakley Drive to the north-west; and
- Potential change in visual amenity for users of footpath 5 to the east.

Local Study Area B

- Potential change in the character and quality of existing mature vegetation, including trees;
- Potential change in visual amenity for users of and workers on the mainline railway;
- Potential change in visual amenity for residents and travellers along/ off Gypsy Lane to the north; and
- Potential change in visual amenity for residents, workers and visitors to properties around Knoll Farm

Local Study Area C

- Potential change in character, number and quality of the TPO on the south-east section of the Local Study Area;
- Potential change in the character and quality of existing mature vegetation, including trees;
- Potential change in visual amenity for users of and workers on the mainline railway;
- Potential change in visual amenity for residents and travellers along/ off Gypsy Lane to the north;
- Potential change in visual amenity for residents, workers and visitors to properties around Knoll Farm; and
- Potential change in visual amenity for users of footpath 10 to the east.

Local Study Area D

- Potential change in character, number and quality of the TPOs on the southern section of the Local Study Area;
- Potential change in the character and quality of existing mature vegetation, including trees (not covered by TPOs);
- Potential change in visual amenity for users of and workers on the mainline railway;
- Potential change in visual amenity for residents and travellers along / off Easthampstead Road; and
- Potential change in visual amenity for residents off Waterloo Crescent.

Local Study Area E

- Potential change in character, number and quality of TPOs on the south-western section of the Local Study Area;
- Potential change in route/ access of Public Right of Way (byway number 26) located to the north of Local Study Area E;
- Potential change in the character and quality of existing mature vegetation, including trees (not covered by TPOs);
- Potential change in visual amenity for users of and workers on the mainline railway;
- Potential change in visual amenity for residents and travellers along/ off Waterloo Road; and
- Potential change in visual amenity for users of byway 26 to the north.

Local Study Area F

- Potential change in character, number and quality of the two TPO areas on the western section and northern section of the Local Study Area;
- Potential change in the character and quality of existing mature vegetation, including trees (not covered by TPOs); and
- Potential change in visual amenity for users of and workers on the mainline railway;

Waterloo Road / Peacock Lane Improvements

- Potential change in character, number and quality of the TPO areas to the western section of the study area along Waterloo Road/ Holme Green junction and one individual TPO located to the west of Oakwood Youth Challenge Centre along Waterloo Road;
- Potential change in the setting of two listed buildings to the south (Lock's House and Locks Farm);
- Potential change in route/ access of Public Right of Way (byway number 30) located to the west of the of the Study Area;
- Potential change in the character and quality of existing mature vegetation, including hedgerows and trees (not covered by TPOs);
- Potential change in the character, quality or setting of Big Wood Ancient Woodland;
- Potential change in visual amenity for residents and travellers along/ off Waterloo Road;

- Potential change in visual amenity for users of byway 30 to the west;
- Potential change in visual amenity for residents and visitors to Big Wood Lodge and Big Wood House;
- Potential change in visual amenity for staff, workers and visitors to the Oakwood Youth Challenge Centre; and
- Potential change in visual amenity for residents, workers and visitors to Lock's Farm and Lock's House listed buildings.

Construction

- 2.3.3 The loss or change in visual amenity and local landscape character for the receptors identified above are likely to be greater during the construction phase than the operational phase for all options due to the presence of construction traffic, plant, materials and temporary signage and lighting and the need for works such as vegetation clearance and earthworks. Control of lighting through a CEMP, minimising artificial lighting during construction, completion of the works in as short a timescale as possible, retaining trees and hedgerows where possible and completion of the works in summer when trees are in leaf and daylight working reduces the need for artificial lighting would all help to reduce adverse landscape and visual effects.

Operation

- 2.3.4 If the operational roads are lit, potential adverse changes in the night time lit environment may be experienced, although these would be minimised by the implementation of an appropriate and sensitive lighting strategy. Increased traffic may also be discernible for surrounding visual receptors, particularly where the proposed route is more distant (and hence more distinct) from existing highways.

Recommendations

- 2.3.5 The key constraints relate to the loss of open/ agricultural countryside; the loss of trees, particularly those covered by TPOs; infringement of existing PROW; and location in the context of the setting of listed buildings.
- 2.3.6 It should also be noted that a number of issues such as lighting, noise and the loss and replacement of vegetation are applicable to a number of technical areas and therefore consideration of these interrelationships should be considered going forward, particularly in relation to potential mitigation measures.
- 2.3.7 The following recommendations are therefore provided for consideration which may help to reduce the magnitude of any adverse effects on landscape and visual receptors.

Mitigation relating to All Route Options

- Retention of mature trees with review of road alignment to avoid high value trees. A tree survey to BS5837: 2012 standard is recommended to determine the location and value of the tree resource. At the planning stage, an arboricultural implications assessment and methodology statement should be provided to outline the protection and mitigation measures for the trees during construction;

- Permission from the Local Planning Authority (LPA) is required for any works to TPOs. Early consultation with the LPA is recommended undertaken to determine potential mitigation or compensation measures for potential loss of trees;
- Survey of hedgerows to determine whether any fall within the Hedgerow Regulations specification;
- For all the options considered, mitigation planting, including replacement of trees lost, will help to reduce adverse effects on local landscape character and visual amenity;
- Footpath diversion orders would be required for alterations to footpaths (either temporary or permanent) and options for mitigation determined, such as new routes or suitable crossings. These designs should be discussed and agreed with the LPA;
- Reducing the amount of artificial lighting, retaining trees, and replacement and additional tree planting would help to reduce adverse effects on the setting of nearby listed buildings;
- The final agreed road alignment or options should be accompanied by a landscape design plan to indicate proposed planting. This should include native trees and shrubs to help mitigate any trees or hedgerow lost as a result of the proposed works; and
- Lighting should be in keeping with the existing road network or preferably remain un-lit to limit adverse effects on local landscape character and setting.

- 2.3.8 The proximity of the Site to nearby residences will allow some clear views of all the options from these receptors.
- 2.3.9 As the wider landscape is generally gently undulating with good tree cover, the Site is not likely to be very visible from the wider countryside, being generally well screened with hedgerows and trees.
- 2.3.10 If tree planting and hedgerows are incorporated along all route options together with a sensitive lighting design, it is anticipated that the impact upon the setting of identified listed buildings can generally be mitigated.
- 2.3.11 Any development on Site is likely to change the existing Site vegetation and character, although there may be opportunity to integrate tree planting and/or hedgerow to contribute to the landscape fabric of the Site.
- 2.3.12 The existing public rights of way running through the Site offer the potential to be enhanced and to further contribute to the Wokingham non-vehicular network.

Mitigation relating to Local Study Areas and Waterloo Road / Peacock Lane Improvements

- Retention of mature trees adjacent to the proposed works. A tree survey to BS5837: 2012 standard is recommended to determine the location and value of the tree resource. At the planning stage, an arboricultural implications assessment and methodology statement should be provided to outline the protection and mitigation measures for retained/ adjacent trees during construction;
- Permission from the Local Planning Authority (LPA) is required for any works to TPOs. Early consultation with the LPA is recommended undertaken to determine potential mitigation or compensation measures for potential loss of trees;
- Survey of hedgerows (primarily for Local Study Area F) to determine whether any fall within the Hedgerow Regulations specification; and

- Reducing the amount of artificial lighting, retaining trees and replacement tree planting where possible, particularly of any high-value trees lost (with mature trees replaced with specimen trees) would help to reduce adverse effects on local landscape character and visual amenity in relation to Local Study Areas B to E. Larger areas of trees lost should be replaced by new tree planting in greater numbers than those lost;
- Consideration of suitable hoardings, minimising the visual clutter associated with construction and undertaking the construction works in summer when surrounding trees are in leaf would all help to reduce adverse visual effects of construction works. Mitigation during construction would be particularly important due to the visibility of the works by adjacent residential receptors;
- In relation to Local Study Areas B to E, construction of any tall or large access ramps or built form should be assessed for visual effects once detailed designs are known; and
- Consideration of the use of local artists to enliven built structures that are not able to be screened or the use of materials in muted colours to reduce the visual intrusion of the structures proposed at Local Study Areas B to E would potentially reduce adverse visual effects.

2.3.13 The proximity of the Site to nearby residences will allow some clear views of all the options from these receptors, particularly as the works are likely to be elevated over the railway. However, as the wider landscape is generally gently undulating with good tree cover, the Local Study Areas and Waterloo Road / Peacock Lane Improvements are not likely to be very visible from the wider countryside, being generally well screened with hedgerows and trees.

Summary of Noise and Vibration Constraints

- 2.3.14 The likely constraints along each route alignment have been considered qualitatively in relation to noise and based on the number and proximity of noise sensitive receptors to the proposed line. For more details, please refer to Appendix C.
- 2.3.15 Please note that the findings of the assessment do not consider the effect of the route options on future residents within Wokingham and only assess effects in relation to existing sensitive receptors. It is anticipated that effects on future residents will be considered, and mitigation measures incorporated, as part of separate environmental studies for individual developments. However, it should be noted that the eastern end of all of the proposed route options considered in this assessment terminate east of Waterloo Road just north of the railway line and from here, the route will continue through the future Montague Park development to join London Road (A329) which has already been granted planning permission. It is understood that the Montague Park section of the route was part of the original WBC Strategic Development Locations (SDLs) and therefore the South Wokingham Distributor Road running through Montague Park was taken into account during the planning application. It is expected that the route section through Montague Park will be in place by the time the South Wokingham Distributor Road becomes operational.
- 2.3.16 A brief qualitative review of the potential noise and vibration constraints during the construction phase of the route options has been undertaken. Noise effects in relation to the proposed routes during operation have, where feasible, been predicted and appraised following the Calculation of Road Traffic Noise (CRTN) methodology presented within Annex 2 of Appendix C. At this stage the focus is on determining whether a change in road traffic noise of more than 1 dB in the short term is expected as a result of the Distributor Road options in line with the guidance for a scoping assessment contained within The Design Manual for Roads and Bridges (DMRB) guidance HD 213/11. HD 213/11 notes that *“if sufficient traffic flow information is available then it is acceptable to use this to determine whether there is likely to be a change of 1 dB LA10,18h in the short term.....which will result from a combination of traffic flow, speed and composition...”*

-
- 2.3.17 Route Option A (the most northerly route) is not favoured because of its proximity to the southern fringes of Wokingham where some 125 dwellings would fall within the 100m buffer zone. Whilst the vast majority of these dwellings would lie in excess of 50m from the route alignment (with the railway in between) the sporadic nature of the train movements and the number of properties potentially affected means this is not a favoured option.
- 2.3.18 Route Option C (the most southerly route) is also not favoured. Despite there being far fewer properties within 100m of this route option compared to Route Option A (12 against 125), a number of these lie close to the route alignment. Chapel Green House and nos. 1-2 Chapel Green Cottages all lie within 25m of the route alignment, as does Long Patch in Holme Green, immediately west of Heathlands Road.
- 2.3.19 Route Option B (the central alignment) is favoured, since there are only three individual properties – Knoll Farm, Woods Farm and Brittons Farm – located within 100m. None of these dwellings lie closer than 60m to the route alignment and Woods Farm would be well screened by existing farm buildings and commercial units.
- 2.3.20 It should be noted that all three route options have the potential to affect properties in the vicinity of Tesco roundabout at the western termination point; two properties nos. 76A and 76B Finchampstead Road are particularly vulnerable to noise as both lie close the proposed line of the Distributor Road on its approach to the Tesco roundabout.
- 2.3.21 Along the wider road network, a quantitative assessment has been undertaken based on the likely difference in the Basic Noise Level for the three route options, which has been calculated on a link-by-link basis using supplied traffic data. Overall, the noise differences identified can be considered inconsequential and should not be taken as a significant differentiator between the three route options.
- 2.3.22 In addition to the assessment of the Distributor Road route options, the constraints affecting two other aspects associated with the proposals have been considered – the works associated with the construction of railway bridges at six Local Study Areas and the improvements of Peacock Lane and Waterloo Road (Route D).
- 2.3.23 In each case there are no details of the works that would be required, the plant that would be utilised, nor the time or duration of such work. Therefore, the constraints in the vicinity of the works have been considered qualitatively based on the number and proximity of noise sensitive receptors at each location. In particular, the number of properties within 100m of the works has been identified, as it is these receptors that are likely to be most adversely affected during the proposed works, although this does not preclude the possibility that significant adverse effects might arise at more distant locations.
- 2.3.24 Local Study Area Zone A has by far the largest number of dwellings (in excess of 70) located within 100m, however, many of these residential receptors are also subject to the highest ambient noise levels primarily arising from road traffic on the A321, but also from the Crowthorne to Wokingham railway and commercial uses in the area.
- 2.3.25 Between 20 and 30 dwellings lie within 100m of Zones B, C and D. These receptors would be subject to relatively low ambient noise levels from local road traffic and sporadic train movements. As a result of its more remote location on the very edge of Wokingham, fewer properties lie within 100m of Zone E, whilst no residential receptors at all lie within 100m of Zone F. The nearest properties to Zone F are to be found on the east side of Priest Avenue more than 220m away.
- 2.3.26 Only a handful of sensitive receptors have been positively identified as lying within 100m of the proposed scheme to improve Peacock Lane/Waterloo Road.

- 2.3.27 Where properties are adversely affected by any of the proposals, consideration should be given to the use of mitigation measures as described in the preceding section.

Opportunities to Avoid or Minimise Effects

Construction

- 2.3.28 Noise effects arising during construction can be mitigated to an extent through contractual means. Contract conditions can be used to limit noise from a construction site, to control working hours (especially for potentially disruptive operations), to prevent access to sensitive areas and to restrict construction traffic to suitable haul routes etc. It is important that contractual working restraints are discussed in advance with the local authority Environmental Health Officer. Monitoring of noise and vibration may be required during construction.

Operation

- 2.3.29 A number of techniques are available that can be applied either in isolation or in combination, to mitigate the adverse effects of road traffic noise during the operational stage. Some scheme-related measures are set out below.
- *Horizontal alignment* – moving a route away from sensitive receptors;
 - *Vertical alignment* – keeping a route low within the natural topography can exploit natural screening;
 - *Environmental barriers* – in the form of earth mounding or acoustic fencing of various types, or a combination of the two;
 - *Low noise road surface* – effective for noise generated by tyres of vehicles travelling at speeds in excess of 75 kph (c47 mph) (however may not be relevant depending on proposed speed of alignment); and
 - *Restriction on vehicle speed and numbers* – above about 40 kph, noise level increases with the speed of the vehicle; the volume and composition of traffic also have a direct effect on noise level.
- 2.3.30 The measures set out in the first two bullet points above should be the primary objective when determining the alignment of the Distributor Road. However, it is acknowledged that it may not always be possible to apply some of these techniques to the proposed road as there will be competing constraints. For example, there may be good engineering, environmental or safety considerations why the route cannot be aligned further away from the nearest dwellings or positioned so as to maximise screening.
- 2.3.31 The potential benefit of applicable mitigation measures can vary widely according to local circumstances.

Recommendations

- 2.3.32 At the appropriate time the proposed scheme will require consideration in terms of an Environmental Impact Assessment (EIA) and also in a regulatory sense, through the obligations under the Noise Insulation Regulations (NIR) 1975, as amended. Further thoughts on EIA, the consideration of significance and the NIR are provided in the Noise and Vibration Technical Note included in Appendix C, whilst factors that influence levels of road traffic noise are described in Annex 2 and Annex 3 of the Technical Note.
- 2.3.33 As a new road is proposed, the requirement to undertake an assessment that is compliant with the methodology set out in DMRB advice note HD 213/11 will need to be determined in discussion with the Local Planning Authority.

Summary of Water Environment Constraints

- 2.3.34 General constraints relating to the Site (including all routes, Local Study Areas and Waterloo Road / Peacock Lane improvements) in relation to the water environment include the potential effects to drainage, local flood risk and the potential for contamination of surface and ground waters. Key water environment features are shown on Figure A3. For more detail, please refer to Appendix D.
- 2.3.35 Emm Brook represents more of a constraint to route Option B, however all route options meet the Brook. Route Option A crosses the Brook close to the A321 Finchampstead Road roundabout. In addition, the risk of flooding is of greatest relevance to route Option C, where a proportion (approximately one third) of the route is located in an area classified as having a 1 in 75 year (1.3%) risk of flooding. Local Study Area A also falls within this flood zone.

Construction

- 2.3.36 Potential environmental effects during the construction phase of any route option would require assessment of the following:

Applicable to All Route Options, Local Study Areas and Waterloo Road / Peacock Lane Improvements

- The potential for contamination (including heavy metals, hydrocarbons, suspended solids and construction materials) of surface or groundwater during construction activities and associated effects on sensitive receptors (e.g. adjacent to Emm Brook or nearby ditches etc.). Sources of pollution could be associated with the mobilisation of any historical on site contamination within the Site, general construction activities, siting and operation of site construction compound(s) and the operation of construction vehicles.
- The alteration of drainage patterns and creation of extensive areas of impermeable surface that have the potential to alter the level and rate of surface water run-off and flood risk on and off site. This could result from soil compaction from the operation of construction vehicles and machinery.

Applicable Only to Route Options

- The Environment Agency 'General policy regarding culverts' states that no watercourse should be culverted unless there is an overriding need to do so. For all route options, it is likely that the Emm Brook may need to be crossed. This should be done either by bridge or by diverting the watercourse. Culverting can change and reduce the ecological status of water bodies, as well as increasing the risk of blockage.

Operation

- 2.3.37 Potential environmental effects during the operation phase of any route option would require assessment of the following:

Applicable to All Route Options, Local Study Areas and Waterloo Road / Peacock Lane Improvements

- The potential for contamination of surface or groundwater during operation activities and associated effects on sensitive receptors (e.g. adjacent to Emm Brook and nearby ditches etc.). This potential could result from oil residues and sediments from vehicles, hazardous loads transported by road and any road traffic accidents, which lead to the release of hazardous loads and/or hydrocarbons into the water environment.
- The alteration of drainage patterns and creation of extensive areas of impermeable surfaces that have the potential to alter the level and rate of surface water run-off. This could occur through new areas of hardstanding associated with any of the options or works.

Recommendations

- Culverting of watercourses is not advised. The route option with the least amount of interaction with the Emm Brook, Route Option A or Route Option B, would be preferable although it is noted that all the route options would meet up with the Brook.
- It is recommended that an assessment of the road drainage and water environment should be undertaken as part of further environmental studies prior to submission of a planning application for the proposed routes, Local Study Areas and proposed improvements of Waterloo Road / Peacock Lane.
- Should Route Option A Alternative Link A3, with the intent of removing the balancing pond, be chosen it is recommended that suitable land is identified close by which can provide the equivalent amount of surface water attenuation and minimise the risk of flooding.
- Further consultation should be undertaken with the Environment Agency relating to the design of the chosen route option, works undertaken at Local Study Areas and improvements of Waterloo Road / Peacock Lane, specifically in relation to drainage requirements, the Emm Brook and the replacement of the balancing pond (should it be removed).
- Use of sustainable urban drainage systems is recommended along route Options B and C to minimise the risk of flooding and to increase road drainage.

Summary of Historic Environment Constraints

- 2.3.38 A summary of the potential historic environment constraints related to the three aspects of the proposed South Wokingham Distributor scheme are summarised below and further details are provided in Appendix E.

General Constraints relating to All Route Options

2.3.39 The following constraints are applicable to all three Route Options (A, B and C):

- All three Route Options pass close to, or within the setting of 10 listed buildings, including the grade I listed Lucas Hospital and grade II* Lock's House on Waterloo Road. The Site currently provides an agricultural and largely rural setting for the listed buildings which is also likely to provide some inter-visibility due to proximity (within 500m). The Options therefore have the potential to adversely affect the setting of the listed buildings;
- The study area for the proposed routes lie immediately adjacent to the Local Plan area of high archaeological potential Site 59 and 57. In addition, Development Plan area of high archaeological potential 82 falls within the north eastern extent of the Site (these sites are designated under policy MDDLTP TB25: and
- Potential for adverse effects to presently unknown buried archaeological assets.

Route Specific Constraints

Option A, A1, A2 and A3

- Potential change in the setting of an additional four grade II listed buildings (14 in total);
- Potential change in historic landscape character and loss of historic open space.
- Potential adverse effects to unknown buried archaeological features

Option B and B1

- Potential change in the setting of an additional five grade II listed buildings (15 in total);
- Potential change in historic landscape character and loss of historic open space.
- Potential adverse effects to unknown buried archaeological features

Option C and C1

- Potential change in the setting of an additional five grade II listed buildings (15 in total) and one grade I and one grade II* listed building;
- Potential change in historic landscape character and loss of historic open space;
- Potential adverse effects on Local Plan areas of high archaeological potential Site 82 (through which Option C passes) and Site 57 (close to which Options C and C1 pass); and
- Potential adverse effects to unknown buried archaeological features

Local Study Areas

Local Study Area A-F

- Potential change in historic landscape character and loss of historic open space.
- Potential adverse effects to presently unknown buried archaeological features

Waterloo Road / Peacock Lane Improvements

- Potential change in the setting of two listed buildings to the south (Lock's House and Locks Farm);
- Potential change in historic landscape character and loss of historic open space.
- Potential adverse effects to unknown buried archaeological features

Construction Phase

- 2.3.40 The construction activities involved as part of the proposed route options have the potential to disturb buried soil horizons within which archaeological assets might survive. Based on the results of the review of baseline evidence, the typical sources of effects (in the absence of mitigation) upon the main classes of archaeological assets can be characterised as follows in Table 6.

Table 6: Archaeological Effects Summary

Asset Type	Location/Scale	Main Period	Main Impacting Construction Process
Surface/Near surface remains	undetermined/localised	Potential for Prehistoric onwards, focus on Medieval and Post Medieval.	All construction activities.
Buried remains.	undetermined/localised	Potential for Prehistoric onwards, focus on Medieval and Post Medieval.	All construction activities.
Artefacts/ecofacts.	undetermined/localised	Potential for Prehistoric onwards, focus on Medieval and Post Medieval.	All construction activities.

- 2.3.41 During construction, potential effects on above ground heritage assets are likely to comprise negative temporary impacts on the settings of assets. The impacts on the setting of heritage assets are likely to be partly ameliorated by the shielding effect of the current street trees, vegetation and parks within the immediate environs.

2.3.42 The period and scale of these effects are outlined in Table 7.

Table 7: Built Heritage: Period and Scale of Effect

Potential Receptor	Option	Key Sensitivity	Variation of contribution	Outcome
68 Finchampstead Road	Route Option A, B and C	Change of setting	Introduction of changes to junction layout	Reduction of setting horizon from current
Wood Farm	Route Option B and B1	Change of setting	Introduction of changes to junction layout	Reduction of setting horizon from current
Lucas Hospital	Route Option C	Change to setting	Introduction of changes to junction layout	Reduction of setting horizon from current
Outbuildings at Lucas Hospital	Route Option C	Change to setting	Introduction of changes to junction layout	Reduction of setting horizon from current
Garden wall at Lucas Hospital	Route Option C	Change to setting	Introduction of changes to junction layout	Reduction of setting horizon from current
Britton's Farm	Route Option B and B1	Change to setting	Introduction of changes to junction layout	Reduction of setting horizon from current
Barn at Britton's Farm	Route Option B and B1	Change to setting	Introduction of changes to junction layout	Reduction of setting horizon from current

- 2.3.43 With respect to buried archaeological deposits, it is considered that the proposed route options have limited potential to result in the impact and loss of archaeological assets due to the extent of development of infrastructure within the near vicinity of the proposed routes
- 2.3.44 These are not considered, at present, to be of over-riding importance to result in the need to substantially alter the principle of constructing the changes to the proposed routes.
- 2.3.45 A suitable programme of investigation and mitigation (as defined by the NPPF) is considered sufficient to allow the works to proceed in relation to areas of archaeological potential and unknown buried assets.
- 2.3.46 The built heritage assets are not considered to be in locations whereby the existing setting would be permanently harmed by construction processes. Typically, construction can proceed through measured and proportionate controls on traffic routes.

Operational Phase

- 2.3.47 It is anticipated that the proposed new routes will improve the traffic management system in the wider Wokingham area and this will subsequently have beneficial effects on the built heritage assets within the area. However, in future the roads within Wokingham are likely to see an increase in traffic generated by future proposed developments in the area.

2.3.48 Operational effects:

- Sections of road improvements may result in change to the setting of nearby assets; and
- Existing road sections may experience an increase in traffic in the future.

2.3.49 It is considered that the settings of Listed Buildings which would be subject to change in relation to the works could be mitigated against through the replanting of lost vegetation or trees and therefore would not be influenced by the predicted increase in future traffic within the Wokingham area.

2.4 Summary

2.4.1 These initial environmental assessments, based on desktop information and local site observations have highlighted a number of constraints and potential impacts, the majority of which could be mitigated through slight alterations to alignment or through planting and landscaping. However, route options A and C have some serious potential impacts which would be difficult to mitigate, especially noise and vibration impacts.

Summary of Air Quality Constraints

2.4.2 The potential air quality constraints related to the proposed works are summarised below. For more details, please refer to Appendix F.

2.4.3 Please note that the findings of the assessment do not consider the effect of the route options on future residents within Wokingham and only assess effects in relation to existing sensitive receptors. It is anticipated that effects on future residents will be considered, and mitigation measures incorporated, as part of separate environmental studies for individual developments. However, it should be noted that the eastern end of all of the proposed route options considered in this assessment terminate east of Waterloo Road just north of the railway line and from here, the route will continue through the future Montague Park development to join London Road (A329) which has already been granted planning permission. It is understood that the Montague Park section of the route was part of the original WBC Strategic Development Locations (SDLs) and therefore the South Wokingham Distributor Road running through Montague Park was taken into account during the planning application. It is expected that the route section through Montague Park will be in place by the time the South Wokingham Distributor Road becomes operational.

Construction

2.4.4 The potential construction impacts identified below could apply to all the proposed works (including the three route options, Local Study Areas and Waterloo Road / Peacock Lane improvements) and could affect receptors identified earlier in the 'Sensitive Locations' section.

Increase in Dust and PM₁₀ Generated by Site Activities

2.4.5 During the site preparation and construction phase, activities undertaken on the Site may cause dust and particulate matter to be emitted to the atmosphere. If transported beyond the Site boundary, dust and particulate matter can have an adverse impact on local air quality at nearby sensitive receptors unless suitable mitigation and control measures are applied at source.

-
- 2.4.6 Due to its relatively large particle size (typically 1-75µm), dust is only resident in the atmosphere for short periods of time after its initial release and falls out of suspension relatively quickly and in proximity to the source of emission. Dust is therefore unlikely to cause long-term or widespread changes to local air quality; however, if it is transported beyond the Site boundary, dust deposition on property and cars can cause 'soiling' and discolouration. This may result in complaints of nuisance through amenity loss or perceived damage caused.
- 2.4.7 As PM₁₀ is much smaller (typically less than 10µm in aerodynamic diameter) in size than dust, it remains suspended in the atmosphere for a longer period and can be transported by wind over a wider area. It is small enough to be drawn into the lungs during breathing, which can cause an adverse reaction particularly in sensitive members of the public.
- 2.4.8 Dust and PM₁₀ emissions can also have an adverse effect on sensitive ecological habitats. For example dust deposition may reduce a plant's efficiency in photosynthesising and there could be indirect impacts on fauna (e.g. foraging habitats).
- 2.4.9 The surrounding ecological receptors for all of the options would be considered to be of medium sensitivity at most. However, due to the proximity of Route Option C to the Woodland near Ludgrove School LWS (the proposed route borders the northern edge of the woodland) it is likely that this route option would have the greatest potential impact on ecological receptors due to construction dust and PM₁₀.
- 2.4.10 The areas surrounding the three route options are considered to be of comparable sensitivity (medium) for human receptors during the construction phase, with less than 10 dwellings within 20m of any of the route options. .
- 2.4.11 Overall, Route Options A or B are therefore considered to be the preferred options in relation to potential impacts from increases in construction dust and PM₁₀.
- 2.4.12 The above construction phase effects will be of a temporary nature (i.e. for the duration of the construction phases) and, provided appropriate mitigation measures are applied, all three route options are unlikely to result in a significant impact on ecological or human receptors and are not likely to be a constraint to any of the proposed works.

Increase in Pollutant Concentrations (namely NO₂ and PM₁₀) as a Result of Exhaust Emissions Arising from Construction Traffic and Plant

- 2.4.13 Traffic associated with site preparation and construction activities of the proposed works will contribute to traffic levels on the surrounding road network. Exhaust emissions from construction vehicles could have an impact on local air quality both on-site and adjacent to the routes used by these vehicles to access the Site. In addition, exhaust emissions from on-site plant operating during this phase will contribute to local pollutant concentrations in the vicinity of the equipment/plant. The numbers of construction vehicles involved are unknown at this stage; however, the increase in pollutant concentrations is likely to be insignificant.
- 2.4.14 However, with appropriate mitigation measures this is not considered to pose a constraint to the proposals given that any effects will be temporary and will only last for the duration of the works.

Operation

Increase in pollutant concentrations (namely NO₂ and PM₁₀) as a result of exhaust emissions arising from operational traffic

Route Options

- 2.4.15 The proposed route options will cause a change in the distribution, composition and speed of existing traffic on the local road network. It would be expected that changes in vehicles flows on the existing road network would be greatest around the junctions with the proposed South Wokingham Distributor Road. The main pollutants of concern for road traffic are typically considered to be NO₂, PM₁₀, carbon monoxide (CO) and benzene (C₆H₆). Of these pollutants, emissions of NO₂ and PM₁₀ are most likely to result in exceedences of the statutory air quality limit values and objectives. There is the potential for adverse effects on local air quality to occur at sensitive receptors located close to the alignment of the proposed route options and/or alongside roads where traffic flows are predicted to increase as a result of the operation of the proposed route options. However, some roads may experience a reduction in traffic flows, which will have a beneficial impact on air quality at sensitive receptors that are located alongside them.
- 2.4.16 Local monitoring data and the DEFRA background concentration estimates suggest that the AQS objectives are not currently being exceeded at the majority of sensitive receptors identified. However, data for some of the local monitoring locations along London Road (A329) and in the centre of Wokingham has been close to or exceeding the annual NO₂ AQS objective in recent years and therefore any increase in traffic flows in this area could lead to further exceedences of the objective. The South Wokingham Distributor Road is however likely to redistribute traffic that would otherwise have used London Road (A329) and therefore has the potential to reduce overall traffic flows on London Road. Detailed modelling will need to be undertaken once a preferred route option has been selected but it is considered unlikely that air quality will be a constraint once the South Wokingham Distributor Road is operational.
- 2.4.17 Option A has the greatest number of receptors with the highest concentrations for both NO_x and PM₁₀ and Option B has the least number of receptors with the highest concentrations for both NO_x and PM₁₀.
- 2.4.18 The NO_x and PM₁₀ modelling results for the receptors near to the junctions where the route options would join the existing road networks generally show less difference in concentrations between the different route options. For example, the difference in concentrations of NO_x adjacent to the junctions (Receptors 15 to 19 adjacent to Finchampstead Road and Receptors 29 to 33 adjacent to London Road, see Figure A15) are 0.4µg/m³ and below which infers that there is unlikely to be a significant difference between the scheme options on local air quality on the immediate surrounding road network.
- 2.4.19 There is generally a greater difference in the concentrations for the route options at receptors located closest to the proposed route options themselves. For example, the highest range in NO_x concentrations (5.3µg/m³) is predicted at Receptor 14 (The Knoll Farm). Receptor 14 is located close to Route Option A and therefore will experience higher concentrations of NO_x with Route Option A in place rather than Route Options B and C.
- 2.4.20 Route Option A also has a higher number of receptors located close to the proposed route (including a residential estate located north of the proposed route) than Route Option B and Route Option C.
- 2.4.21 Based upon the results presented above it is expected that the difference in operational air quality impacts between the route options would be greatest at receptors located closest to the proposed routes themselves rather than at receptors located on the wider road network.

-
- 2.4.22 The results suggest that out of the three modelled scenarios Route Option B would have the least impact on air quality at existing receptors once operational.

Local Study Areas

- 2.4.23 Once operational the proposed footbridges across the railway are proposed at each Local Study Area will provide pedestrian and cyclist access only. It is assumed that the implementation of these crossings will not affect traffic and there will therefore be no additional emissions or impacts to air quality. Therefore, no air quality constraints are anticipated with the operational phase within the Local Study Areas.

Waterloo Road / Peacock Lane Improvements

- 2.4.24 The Waterloo Road / Peacock Lane improvements will not directly generate any additional operational traffic but may increase the potential capacity of the road and improve the free flow of traffic. This could result in an increase in the volume of road traffic using this route. In addition, the improvements could increase the proximity of nearby sensitive receptors to traffic emissions. However there are a limited number of receptors within 200m of the proposed improvements (less than 10 residential properties within 20m and no statutory designated ecological sites) and the majority of the improvements will be completed within the existing highway boundary. Therefore it is considered unlikely that air quality will be a constraint once road improvements is complete and the road is operational.

Recommendations

- 2.4.25 It is recommended that once a route option has been confirmed and further details are available in relation to all the works, a further air quality assessment should be undertaken to determine the potential effect on human and ecological receptors, the scope of which will need to be agreed with the relevant Environmental Health Officer at WBC.

Summary of Ecology and Nature Conservation Environmental Constraints

- 2.4.26 The following potential constraints have been identified in relation to ecology and nature conservation and are identified on Figures A6-A11. In addition, recommendations have been made on the assumption that an extended Phase 1 habitat survey will proceed before final recommendations can be made on the three aspects of the scheme. Full details are provided in Appendix G.

Potential Constraints / Recommendations relating to the Route Options and Improvements of Waterloo Road / Peacock Lane

Habitats

Statutory Designated Sites

- European designated sites are afforded a high level of protection under European and UK legislation as well as further protection through the planning system. Given the distance between the proposed route options, and the designated sites it is considered unlikely that there would be a direct effect upon these sites, providing standard pollution control measures are implemented. It is anticipated that measures to control noise, air quality and visual disturbance will be implemented to protect sensitive receptors including, but not specifically, statutory designated sites.
- The nearest European designated site is the Thames Basin Heaths Special Protection Area (SPA), although all route options, fall within the 5km mitigation zone for the site, this (and the other mitigation zones) primarily relates to mitigation required if residential development is proposed (to mitigate potential effects in relation to increased recreational pressures).
- Whether the proposed development would have an effect on European designated sites, or closer UK designated sites should be fully considered irrespective of which route option is selected, and consultation with the local authority may be required. In the first instance, once outline plans have been prepared, it is recommended that a screening note is prepared to identify whether there are any mechanisms by which statutory sites could be affected; this should be provided to the local authority for agreement, and only if any mechanisms are identified would further work be required. Preliminary consideration of Route Options A-C (including Alternative Links) indicates that the proposals are unlikely to affect the SPA.
- Given the localised nature of the works, it is not considered likely that suggestions to improve Waterloo Road / Peacock Lane would affect the Thames Basin Heaths SPA.

Non-Statutory Designated Sites

- These sites receive no statutory protection but require consideration in the context of the National Planning Policy Framework (NPPF) policies, and local planning strategies.
- Due to the distance between Route Options A, and B, and the Alternative Links for these, and the nearest non-statutory designated site, they would likely be able to proceed, assuming standard noise and pollution control mitigation measures were implemented.
- Route Option C would require the loss of a portion of the Woodland near Ludgrove School Local Wildlife Site (LWS). It is therefore highly likely that, should this option, proceed substantial measures would be needed to mitigate effects upon retained sections of habitat, and compensate for habitat loss to satisfy planning policy relevant to non-statutory designated sites. The objective of compensation would be to avoid net loss in habitat area or quality, and avoid, or mitigate where avoidance is not possible, the effects upon species using these habitats.
- The suggested improvements of Waterloo Road / Peacock Lane would potentially affect Big Wood Proposed LWS due to the proximity of the Proposed LWS to the works area. The extent of encroachment is dependent on the exact boundaries of both the Proposed LWS and the works, but based on the information available it is considered likely that working methods could be developed to incorporate avoidance / mitigation measures to satisfy relevant planning policy. Where direct effects cannot be avoided, provision of compensatory habitat nearby should be provided (see also recommendations in relation to ancient woodland).

Ancient Woodland

- Although ancient woodland receives no specific statutory protection the NPPF clearly states that loss and deterioration of irreplaceable habitat, including ancient woodland, should be avoided unless *'the need for, and benefits of, the development in that location clearly outweigh the loss'*. In the first instance options which avoid effects upon, or loss of ancient woodland should be explored.
- In this case, it is considered likely that any of the route options would be able to proceed with minimal disturbance to ancient woodland, given the distance between the options and the nearest parcel of ancient woodland.
- The suggested improvements of Waterloo Road / Peacock Lane would however, potentially affect Big Wood ancient woodland parcel due to the proximity of the woodland parcel to the works area. The exact extent of encroachment is dependent on the exact boundaries of both the woodland parcel and the works. Providing that designs avoid direct loss of habitat (i.e. land take to permit improvements is primarily south of the existing road) it may be possible to satisfy relevant planning policy through implementation of mitigation measures, and where direct effects cannot be avoided, provision of compensatory habitat nearby. In such instances where avoidance cannot be achieved, and mitigation measures are deemed necessary, the creation of larger areas of new woodland to replace this resource in the longer term may be required; the specification of such mitigation and compensation measures would need to be agreed with the local authority.

Hedgerows

- Under the Hedgerow Regulations (1997) it is an offence to remove an 'important hedgerow' (as defined within the Hedgerow Regulations) without applying to the local planning authority for permission. Therefore it may be necessary to identify whether 'important' hedgerows are present on any of the route options (surveys should be undertaken between May to September (May and June optimal)).
- Hedgerows are also listed as a Habitat of Principal Importance (HPI) under Section 41 of the NERC Act 2006. Under Section 40 of the NERC Act local planning authorities should have regard for the conservation of these habitats when carrying out their duties, including determining planning applications. During the extended Phase 1 habitat survey the extent of HPI should be considered, including hedgerow connectivity, the size of gaps (breaks in wildlife corridors). Where possible hedgerow habitat should be retained, where effects cannot be avoided, compensatory planting and measures to allow wildlife crossing may be necessary to avoid a net loss of hedgerow habitat.

Biodiversity Action Plan (BAP) Habitat

- The majority of UKBAP habitats are also HPI under the NERC Act 2006, under Section 40 of this Act local authorities have a duty to have regard to the conservation of biodiversity, with specific attention to HPI.
- During the extended Phase 1 habitat survey it is recommended that consideration is given to the likely presence or absence of UKBAP and local BAP habitats, and the effect the proposed works may have upon these habitats. UKBAP and local BAP habitat types are broad ranging, therefore it is unlikely that all effects will be avoidable, for example all route options may require the loss of hedgerows which are likely to qualify as UKBAP habitat / HPI (see above). In addition all options will transect other habitats identified as BAP, as provided within the data supplied by TVERC.

- Based on the information available all route options (except Route Option A Alternative Link A2 if undertaken on its own) would directly affect HPI habitat, mainly either grassland or lowland deciduous woodland, with river also affected which may also satisfy the relevant criteria. No one particular route option affects considerably more or less HPI habitat than the others; but Route Option C affects more lowland deciduous woodland, and less grassland, with Route Options A and B affecting more grassland than woodland in comparison to Route Option C. It should be noted that due to the proximity of Route Option A to the existing conurbation of Wokingham, this option is likely to lead to the least habitat fragmentation, with Route Option C likely to lead to the greatest.
- The suggested improvements of Waterloo Road / Peacock Lane will also likely affect parcels of HPI habitat, although none of the parcels would be bisected in the same way as for the main route options. As previously, the exact extent of encroachment is dependent on the exact boundaries of both the habitat parcels and the works, but it is considered likely that mitigation measures may be considered appropriate in this instance (see also recommendations in relation to ancient woodland).
- Once extended Phase 1 habitat survey data is available it is recommended that proposals are adjusted to retain habitat of greater value where possible (taking into account other species issues too). However, where avoidance is not possible habitat loss should be calculated and proposals should be designed to compensate for loss through the creation of new habitats where possible.

Species

Badgers (Potential for badger to be present within the area)

- Badgers (and their setts) are afforded protection under the Protection of Badgers Act 1992.
- In parallel to the extended Phase 1 habitat survey, a badger survey is recommended to establish the presence or absence of badgers from each route option and their immediate vicinity. Badger surveys can be completed throughout the year, however the winter period is generally considered optimal, as during the summer months vegetation may obscure setts or other evidence of activity.
- If badger setts will be affected by the proposed works it may be necessary to relocate setts (where effects cannot be avoided). This may only occur legally under licence from Natural England), and generally to avoid unnecessary disturbance during breeding, closure may only occur between August – November once suitable alternative sett provision has been supplied (artificial replacement sett or alternative).
- Given the linear nature of the proposed works, it is also recommended that suitable crossing points be provided for badger to avoid fragmentation of badger habitat. Depending on the results of the surveys, it may be appropriate to install multiple badger tunnels to avoid the loss of current pathways between setts and foraging habitat (specifications should follow those in the Design Manual for Roads and Bridges, DMRB).

Bats (Potential for roosting bats to be present in trees within the area / foraging over the area)

- All UK bat species are protected under the Conservation of Habitat and Species Regulations 2010 (as amended) with additional protection afforded in relation to disturbance under the Wildlife & Countryside Act 1981 (as amended). This affords protection to individual bats and their roost sites.

- All route options would likely affect foraging habitat likely to be used by bats and in the absence of mitigation, could lead to fragmentation of habitat available to this species group. Furthermore, aerial photography shows potentially suitable roosting opportunities in mature trees / woodland located along each route option. The proposed works could lead to loss of the roosts, should they be present here.
- In addition, the suggested improvements of Waterloo Road / Peacock Lane have the potential to affect trees which support roosting bats.
- Given the high level of protection afforded to this species group, preliminary recommendations are as follows:
 - A ground level inspection should be completed to confirm whether trees present have the potential to support roosting bats (November-February inclusive), noting further emergence / return surveys may be required to confirm presence or likely absence of roost should potential be identified (May-August).
 - If the presence of bat roosts is confirmed then removal of trees to facilitate the road development would be subject to licensing by Natural England, and removal of trees should be avoided.
 - Bat activity surveys should be completed to confirm whether linear features or habitats present currently provide foraging habitat for bats (April-September inclusive).
- Efforts should be made to retain linear features or habitats shown to support bats. Compartmentalisation of suitable habitat should ideally be avoided, this may require the design and construction of suitable crossing features, culverts / bridges (specification and location to be determined by survey data).

Birds (Potential for nesting birds to be present within the area in trees and hedgerows. There may also be ground nesting birds within the arable fields)

- Suitable habitat occurs within the search area for nesting birds; all nesting birds, their nests and eggs are protected under the Wildlife & Countryside Act 1981 (as amended).
- During the extended Phase 1 habitat survey the extent of suitable bird nesting habitat should be considered, and the potential for Schedule 1 species to be present also assessed. Consideration to the presence of habitat with potential to support wintering birds will also be given during the extended Phase 1 habitat survey. Irrespective of the route option selected, or whether improvements of Waterloo Road / Peacock Lane proceeds, mitigation to minimise the risk of an offence with regard to nesting birds will be required (for example seasonal timing of works during August to February inclusive to avoid the main bird nesting period), and landscaping should be designed to avoid a net loss in available nesting habitat.

Dormouse (Potential for dormice to be present within hedgerows or trees within the area)

- The dormouse is protected under the Conservation of Habitat and Species Regulations 2010 (as amended) with additional protection afforded under the Wildlife & Countryside Act 1981, Schedule 5. They are also a Species of Principal Importance (SPI) under Section 41 of the NERC Act 2006, and a UKBAP species.
- During the extended Phase 1 habitat survey the extent of suitable dormouse habitat should be considered and following this, a specific survey is likely to be required to confirm presence / likely absence. Dormouse surveys entail the deployment of artificial nest tubes which are then checked on multiple occasions during the summer period when this species is active (May-October).

- In the event that dormice are confirmed to be present in the area, avoidance and mitigation measures would be required to minimise the risk of disturbance, killing and injury due to the high level of protection afforded to this species. If works require the removal of habitat occupied by this species (generally hedgerows, scrub and woodland) this would require a licence from Natural England and like for like habitat replacement would be expected (which may need to be planted a number of years prior to removal of habitat to enable establishment).

Great Crested Newts (Potential for great crested newts to be present in ponds within 500m of the area, and using suitable terrestrial habitat within the area)

- Great crested newts are protected under the Conservation of Habitat and Species Regulations 2010 (as amended) with additional protection afforded in relation to disturbance under the Wildlife & Countryside Act 1981.
- All route options and Waterloo Road / Peacock Lane improvements lie within 500m of water bodies that may support great crested newts and therefore this species may be present in association with suitable terrestrial habitat along all routes.
- It is recommended that the habitats present within the respective Study Areas are assessed for their suitability as great crested newt terrestrial habitat, and ponds within 500m are assessed for their suitability as great crested newt breeding ponds (against the Habitat Suitability Index (HSI)). This survey may be undertaken at any time of year, although aquatic vegetation is more prevalent during the summer months (if completed over winter a precautionary approach may be applied). The need for a specific survey to confirm presence / likely absence should then be considered; if required this would involve multiple visits between late March and early June to search for the presence of great crested newts in suitable breeding ponds.
- If great crested newts are found in ponds within 500m of the route options, a mitigation strategy would be required to minimise the risk of killing and injuring great crested newts during construction and to ensure no net loss of suitable habitat in the local area, and to include measures to avoid fragmentation of suitable habitat (such as culverts / tunnels which newts could move through beneath the road). Mitigation of this type would be licenced by Natural England and would need to be implemented during the period that newts are active (i.e. broadly between March-September).

Invertebrates (Potential for invertebrate species of conservation concern to be present within the area)

- It is recommended that an inspection of the Study Area is carried out to determine if there is any potential habitat present for invertebrate species of conservation concern on either of the route options. This survey could be completed during the extended Phase 1 habitat survey during the summer months, if a targeted invertebrate survey is required, this is generally completed between April-August although should be focussed towards the species/habitat in question.

Otter (Potential for Otter to be present in ditches within the area)

- Otters are protected under the Conservation of Habitat and Species Regulations 2010 (as amended) with additional protection afforded in relation to disturbance under the Wildlife & Countryside Act 1981.
- It is recommended that an otter survey is completed to identify whether this species is present in the relevant Study Areas for the route Options and hence whether this may constrain proposals for the proposed route. Otter survey is not seasonally constrained, however may be limited by dense vegetation during the summer months.

Plants

- During consideration of potential effects upon habitats associated with the respective route options, the effects upon specific plant species of conservation concern should also be considered.
- If the presence of rare or legally protected plant species is suspected (due to the presence of suitable habitat) targeted survey may be required. The timing of such a subsequent survey would be seasonally constrained to between May – July, and further constrained dependent on the habitat type in question.

Reptiles (Likely presence of widespread reptiles in suitable habitat within the area)

- Reptiles are protected by the Wildlife & Countryside Act 1981 as amended, all native species are also SPI.
- It is recommended that during the extended Phase 1 habitat survey the extent of suitable reptile habitat is recorded, and following this, a specific survey is completed to confirm presence / likely absence of reptiles. Based on aerial photography specific survey is likely to be required irrespective of which route option is preferred. Reptile survey involves the deployment of artificial refugia which are then checked on multiple occasions during the survey season (late-March to September inclusive).
- If reptiles are confirmed to be present it may be necessary to instigate a programme of trapping and translocation in advance of works to prevent the risk of killing and, or injury during construction. Translocations are not completed under licence, but do require the approach to be set out clearly in a method statement to be agreed with the local authority. Receptor habitat of suitable size and quality must be identified, and animals trapped and moved during a sufficient period of time (up to 90 days, or more if a large population is present) prior to construction. Translocation of this type may only proceed when reptiles are active, March-September inclusive.

Water Voles (Potential for other species of conservation concern to be present, protected under planning policy)

- Water voles are fully protected under the Wildlife & Countryside Act 1981 as amended.
- As for otter, it is recommended that a water vole survey is completed to confirm whether water vole is present in association with the Emm Brook and associated ditch network. Water vole survey entails two visits to the survey area to search for signs of activity during the period March-October inclusive.

UKBAP / Berkshire BAP Species (Potential for other species of conservation concern to be present, protected under planning policy)

- During the extended Phase 1 habitat survey, it is recommended that consideration is given to the likely presence or absence of UKBAP species, for example common toad *Bufo bufo* and West European hedgehog *Erinaceus europaeus* for which records were returned within the desk study. Appropriate recommendations for UK and Berkshire BAP species will be made, if appropriate, following the outcome of the extended Phase 1 Habitat survey.

Summary of Ground Conditions Constraints

2.4.27 For full details please refer to Appendix H.

Route Options

Option A / A1 / A2 / A3

2.4.28 Having evaluated the information gathered during the desk based study, as described in the previous sections; the following potential contamination risks should be given further consideration as part of the proposed Route Option A (including A1 / A2 / A3):

- Railway line;
- Knoll Farm;
- Historical landfill and gravel pit; and
- Petrol filling station.

2.4.29 The alignment of Route Option A (including A1 / A2 / A3) crosses several geological strata and other potential geotechnical constraints. It is considered that the key geotechnical constraints may include:

- Soft and variable superficial Alluvium and Head Deposits.
- Determination of suitable material and parameters for re-use in any areas of the road to be constructed in cut or on an embankment;
- Areas of variable Made Ground associated with the above environmental constraints and potential migration of ground gas/leachate from the historical landfill and gravel pit;
- Potential shallow groundwater within the Alluvium, Head Deposits, River Terrace Deposits and the Bagshot Beds;
- Potential measures required to mitigate the risk of flooding and possible need for flood compensation works; and
- Soft drift deposits associated with the Emm Brook crossing.

Option B / B1

2.4.30 Having evaluated the information gathered during the desk based study as described in the previous sections; the following potential contamination risks should be given further consideration as part of the proposed Route Option B and B1:

- Various farms;
- Railway Line;
- Gravel pit; and,
- Petrol filling station.

2.4.31 The alignment of Route Option B (including B1) crosses several geological strata and other potential geotechnical constraints. It is considered that the key geotechnical constraints may include:

- Soft and variable superficial Alluvium and Head Deposits.
- Determination of suitable material and parameters for re-use in any areas of the road to be constructed in cut or on an embankment;

- Areas of variable Made Ground associated with the above environmental constraints and potential migration of ground gas/leachate from the historical landfill and gravel pit;
- Potential shallow groundwater within the Alluvium, Head Deposits, River Terrace Deposits and the Bagshot Beds;
- Potential measures required to mitigate the risk of flooding and possible need for flood compensation works; and
- Soft drift deposits associated with the Emm Brook crossing.

Option C / C1

2.4.32 Having evaluated the information gathered during this desk based study as described in the previous sections, the following potential contamination risks should be given further consideration as part of the proposed Route Option C / C1:

- Railway Line;
- Chapel Green Farm and Woods Farm; and
- Petrol filling station.

2.4.33 The alignment of Route Option C (including C1) crosses several geological strata and other potential geotechnical constraints. It is considered that the key geotechnical constraints may include:

- Soft and variable superficial deposits including Alluvium, River Terrace Deposits and Head Deposits;
- Determination of suitable material and parameters for re-use in any areas of the road to be constructed in cut or on an embankment;
- Areas of variable Made Ground associated with the above environmental constraints;
- Potential shallow groundwater within superficial deposits and Bagshot Beds;
- Potential measures required to mitigate the risk of flooding and possible need for flood compensation works; and
- Soft drift deposits associated with the Emm Brook crossing.

Local Study Areas

2.4.34 The following potential contamination risks should be given further consideration as part of the proposed works within the Local Study Areas:

- Railway Line;
- Petrol filling station;
- Various farms; and,
- Various roads.

2.4.35 The Local Study Areas cross several geological strata and other potential geotechnical constraints. It is considered that the key geotechnical constraints may include:

- Soft and variable superficial deposits including Alluvium, and Head Deposits;
- Determination of suitable material and parameters for re-use in any areas of the works to be constructed in cut or on an embankment;

- Areas of variable Made Ground associated with the above environmental constraints; and
- Potential shallow groundwater within superficial deposits and Bagshot Beds.

Waterloo Road / Peacock Lane Improvements (Route D)

2.4.36 The following potential contamination risks should be given further consideration as part of the proposed improvements of Waterloo Road / Peacock Lane:

- Locks Farm.

2.4.37 It is considered that the key geotechnical constraints may include:

- Determination of suitable material and parameters for re-use in any areas of the improvements to be constructed in cut or on an embankment (if applicable);
- Areas of variable Made Ground associated with the above environmental constraints; and
- Potential shallow groundwater within superficial deposits and Made Ground.

Recommendations

2.4.38 The following recommendations pertain to all three aspects of the scheme.

2.4.39 It is recommended that a Preliminary Sources Study Report (PSSR) is completed for the chosen option. It is considered that the PSSR will help inform the further recommended ground investigation for geotechnical purposes as well as flood considerations.

2.4.40 Following completion of the PSSR it is recommended that an intrusive site investigation is scoped to satisfy any planning and design requirements. The investigation should be designed to establish any potential geotechnical and environmental constraints with respect to ground, ground gas and groundwater conditions, which may represent potential constraints to the proposed road. In addition to the above, an assessment of any potential geotechnical considerations should be made that may affect or impact the proposed works.

3 Flood Risk Review

3.1 Introduction

- 3.1.1 This review considers the likely effects of the proposals for the South Wokingham Distributor Road with respect to flood risk. Using the desk study information provided by Wokingham Borough Council, the Environment Agency (EA) and freely available aerial photography, WSP have identified potential issues in relation to the flood risk constraints along the alignment of the three proposed options.
- 3.1.2 The area encompassing the full extent of the proposed options is hereafter referred to as the 'Study Area'. The approach to the desk study process is set out below.

3.2 Methodology

- 3.2.1 To consider potential constraints, initially the route/alignment of the proposed Distributor Road was reviewed using OS mapping and aerial photography.
- 3.2.2 Following this, GIS data provided by both Wokingham Borough Council and the EA was reviewed to provide information on the existing flood risk, its extent and source.
- 3.2.3 Data along the routes of the proposed Distributor Road was considered as well as potential impacts in the vicinity. The datasets, provided by Wokingham Borough Council, used in the production of this Technical Note are listed below:
- Flood Map showing Flood Zones
 - Flood Map for Surface Water (FMfSW)
- 3.2.4 As well as datasets the following documents were reviewed to provide an overview of flood risk information within this area:
- Strategic Flood Risk Assessment (SFRA) February 2012 – Wokingham Borough Council
 - Preliminary Flood Risk Assessment (PFRA) June 2011 – Wokingham Borough Council

3.3 Relevant Legislation and Planning Policy

Legislation:

- Flood and Water Management Act (2010)
- Water Resources Act (1991)
- Land Drainage Act (1991)

Planning Policy:

- National Planning Policy Framework (NPPF) March 2012 – Department of Communities and Local Government (DCLG)
- Wokingham Borough Core Strategy (Adopted 29 January 2010)

3.4 Baseline Conditions (Preliminary Assessment)

- 3.4.1 The proposed route options for the South Wokingham Distributor Road extend over approximately 2.5km, starting from the existing Tesco Roundabout on the A321 (Finchampstead Road), taking alternate routes through an area designated as a strategic development area. The options for the route alignment converge to a site located north of the existing Wokingham to London railway line. Refer to Figure 3.1 below:

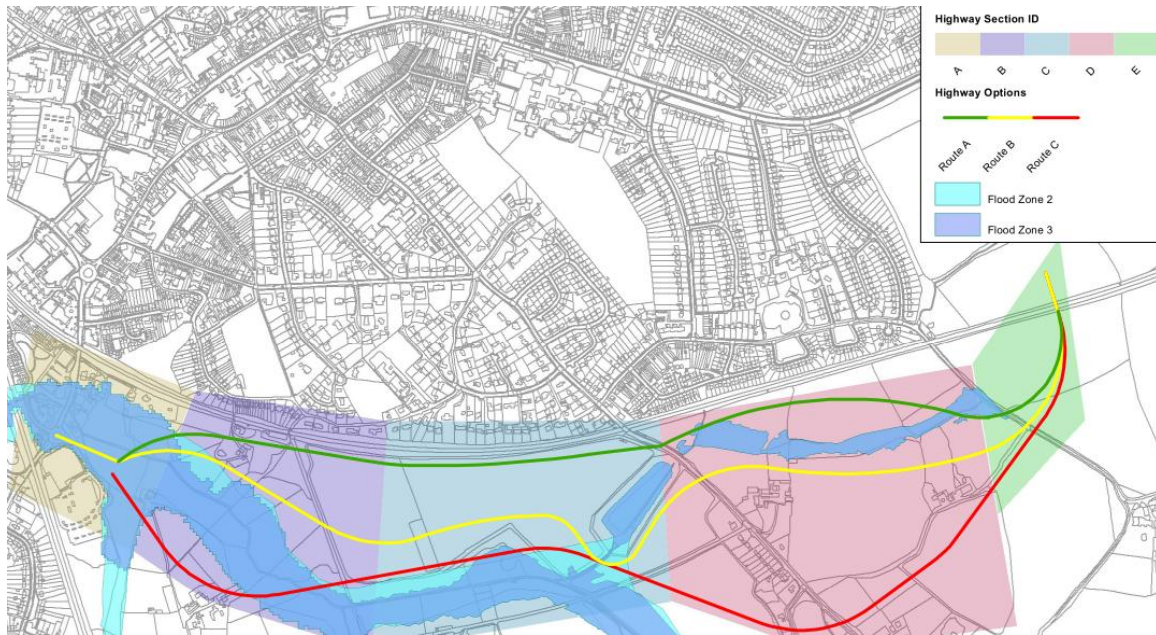


Figure 3.1: Proposed Distributor Road Alignment

- 3.4.2 The proposed Distributor Road alignments have been split into different sections to enable a more accurate assessment of the flood risk. The sections are indicated on the extract above and are labelled in the Figures provided in Appendix I. The following sections discuss the generic flooding characteristics for the key Sections A and B in relation to the three route options A, B, and C. Information on the remainder of the sections follows later in the report.

Section A

- 3.4.3 Initial inspection of the EA Flood Maps for the alignment of the proposed Distributor Road Options indicates that there is a risk of fluvial flooding associated with the Emm Brook. The existing Tesco Roundabout on the A321 is illustrated to lie within an area classified as Flood Zone 3, which is an area of land assessed as having an annual probability of fluvial flooding of greater than 1% (1 in 100 year Storm Event).
- 3.4.4 The proposed Distributor Road route, from the Tesco Roundabout, will be affected by the flood plain. The EA undertook an ESTRY model for the Lower Loddon Study in 2007, which includes the flood levels for various return periods associated with the Emm Brook.

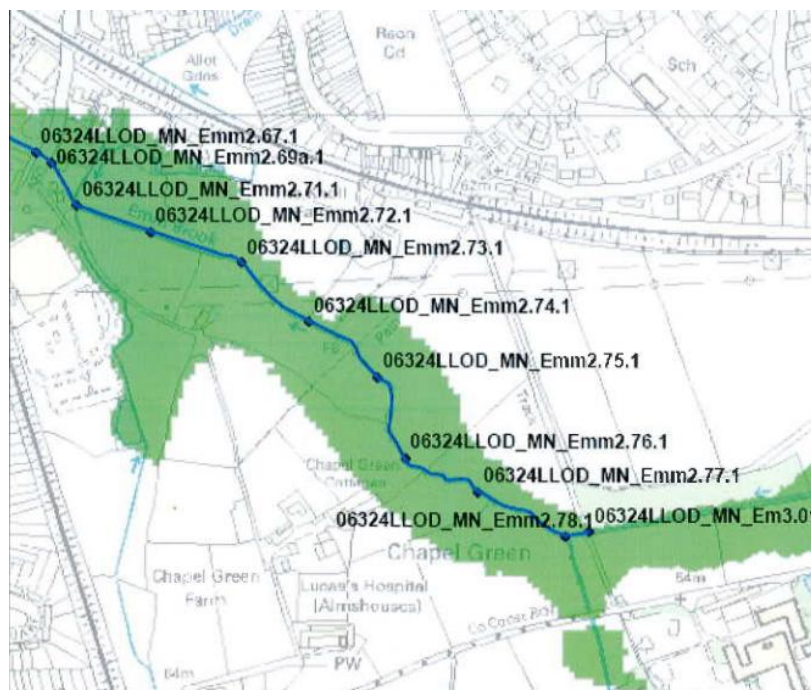


Figure 3.2: EA Node Points from the Lower Loddon Study (2007)

Table 1: EA Modelled Flood Levels

Node Label (EA Reference)	EA Modelled Floods Levels for Various Return Periods (m AOD)			
	5yr	20yr	100yr	100yr+20%
06324LLOD_MN_2.71.1	49.71	49.93	50.32	50.57
06324LLOD_MN_2.72.1	49.76	49.97	50.35	50.59
06324LLOD_MN_2.73.1	49.82	50.01	50.36	50.60
06324LLOD_MN_2.74.1	50.16	50.38	50.64	50.79
06324LLOD_MN_2.75.1	50.26	50.44	50.67	50.82
06324LLOD_MN_2.76.1	50.36	50.50	50.71	50.85

- 3.4.5 Two options (A and B) cross the river Emm Brook in this Section. The road will need to be constructed to a level 600mm above the 1 in 100 year plus 20% flood level where it crosses the watercourse and through this section it will be required to be constructed to a level above the 1 in 100 plus 20% flood level.
- 3.4.6 It is likely that there will be significant earthworks associated with achieving these levels and this will have an impact on this critical area of flood storage. Flood Plain Compensation (FPC) will be required for any loss of floodplain up to the 1 in 100 year event. River modelling will be required to understand the effects of the new road on the flood plain and ensure that any necessary FPC areas are effective. An initial assessment of the first 500m length of the proposed Distributor Road indicates that providing a level for level FPC may prove challenging due to the limited availability of land.

Implications of the Emm Brook Flood Alleviation Scheme

- 3.4.7 A Flood Alleviation Scheme (FAS) was investigated for the area adjacent to the Tesco superstore on Finchampstead Road, which is primarily used for agriculture. This online flood storage area would comprise a compacted earth bund with an outlet control structure to ensure downstream flows are restricted. Additional training bunds or flood walls would be constructed downstream of the control structure to provide additional protection to those properties which would still be at risk of flooding. The Maximum Water Storage Volume for the scheme is approximately 160,000m³, attenuating up to a 1 in 20 year design event flood.
- 3.4.8 Recent de-culverting work undertaken downstream on Molly Millars Lane may mean this FAS is no longer required, although no modelling has been undertaken at this time to confirm this. Regardless of whether the FAS progresses the proposed road would need to be located on an embankment through the area to ensure it is situated above the predicted flood levels. This embankment could be designed to act as the flood defence bund itself. The three proposed options all follow the same path through this area and therefore the implications for each route option are the same. The feasibility of the approach would need to be further investigated and would likely require amendments to the proposed alignment of the bund and remodelling of the FAS. The impact of any embankment works would need to be assessed on wider planning grounds such as noise, landscape and visual impact.
- 3.4.9 The viability of utilising the proposed crossing points for Options A and B over the Emm Brook to restrict flows and provide more upstream storage could also be investigated. This may mean that the structures and floodplain compensation areas could be reduced in size, although further modelling and feasibility assessments would be required to assess this fully.

Flood Maps

- 3.4.10 The Flood Maps for Surface Water (FMfSW) are currently the primary national source of information on the risk of surface water flooding as they contain a more realistic representation of the conditions that lead to surface water flooding. However, the maps provided by the EA are indicative, and should not be used as the sole evidence for assessing risk or for any specific planning decision without further supporting studies or evidence, e.g. historic surface water flooding.
- 3.4.11 The route proposed for Option A and B through Section A is shown to be at risk from Surface Water Flooding. The FMfSW indicate that the Surface Water flood extent at this location is very similar to the Fluvial Flood Maps, which is expected, as the flood plain areas associated with the watercourse are naturally a low spot within the river valley. There have been a number of local flooding events affecting areas downstream of Tesco's along Finchampstead Road. Flooding events here are likely to be caused by a combination of high river levels impeding surface water discharge. This causes flooding to occur along the road and roundabout.

Section B

- 3.4.12 To the east of Section B the river Emm Brook becomes an ordinary watercourse and has an associated flood plain spanning approximately 50m on either side of the river channel. Options A and B do not encroach into the existing flood plain extent associated with the watercourse at this location; therefore, a flood compensation scheme will not be required for this particular section of the road for these Options.

-
- 3.4.13 Prior to the Emm Brook becoming an ordinary watercourse in this section, Option C crosses the river and its Flood Plain, nearly perpendicular to the directions of flow. Modelling will be required to determine the design of this crossing which spans over 100m of floodplain. It is likely that the road will need to be on an embankment and a single span bridge will be required to cross the watercourse with a series of flood arches.

Option A

- 3.4.14 Option A is the northernmost of the three options, beginning at Oakley Drive, to the east of the roundabout intersection with the A321, Finchamstead Road. The road runs west to east parallel with the railway line to the north for most of its length, ending just north of the railway line, approximately 300m east of the crossing of Waterloo Road. The option A alignment crosses the Emm Brook, Easthampstead Road, a tributary of the Emm Brook, twice, and Waterloo Road.
- 3.4.15 The flood risk for option A is concentrated at the beginning and end of the route. In terms of fluvial flood risk approximately 135m of the route located within Section A is within Flood Zone 3 and 5m is located in Flood Zone 2, meaning these extents have a greater than 1% chance of fluvial flooding in any one year (Flood Zone 3) and between a 1 and <0.1% chance of fluvial flooding in any one year (Flood Zone 2). In Sections D and E approximately 150m of the route is located in Flood Zone 3. The remainder of the route not located in Flood Zones 2 or 3 is situated in Flood Zone 1, meaning it has a less than 0.1% chance of fluvial flooding in any one year.
- 3.4.16 The surface water flood extent is similar to the fluvial flood extent, partly due to the modelling for both being based on rainfall and topographical data. Again, the flood risk for surface water is concentrated in the beginning and end sections of the route. For the 1 in 30 year event areas of the route in section A are susceptible to both shallow (>0.1m) and deep (>0.3m) surface water flooding, whilst parts of the route in sections D and E are susceptible to shallow (>0.1m) surface water flooding. For the 1 in 200 year event, areas of the route in section A, D and E are susceptible to both shallow (>0.1m) and deep (>0.3m) surface water flooding. The remaining sections of the route are not at risk of surface water flooding for either the 1 in 30 or 1 in 200 year event.
- 3.4.17 Option A crosses the Emm Brook in section A. Consent from the Environment Agency will have to be sought to cross this main river and an assessment of the impacts of the crossing on water quality and geomorphology will need to be undertaken.
- 3.4.18 The route will cross one of the tributaries feeding into the Emm Brook twice; in section D and E. Consent will have to be sought from the local authority (Wokingham Borough Council) to construct these crossings.

Option B

- 3.4.19 Located between options A and C, option B begins in the same location as option A, on Oakley Drive, east of the A321 Finchamstead Road. The route then runs broadly east, bending at the approximate centre point to skirt round a balancing pond. Option B ends just north of the railway line, and as with option A, crosses the Emm Brook, Easthampstead Road and Waterloo Road.
- 3.4.20 Section A of option B (approximately 270m) is fully situated within Flood Zone 3, meaning this section of the route has a greater than 1% chance of fluvial flooding in any one year. 105m of section B is also situated in Flood Zones 2 and 3 and parts of section C are in Flood Zone 2 where the road crosses the outlet from a large balancing pond. Areas covered by Flood Zone 2 have between a 1 and <0.1% chance of fluvial flooding in any one year. The remainder of the route not located in Flood Zones 2 or 3 is situated in Flood Zone 1, meaning it has a less than 0.1% chance of fluvial flooding in any one year.

- 3.4.21 The flood risk for surface water is concentrated at the beginning and end of option B, as well as a risk for the 1 in 200 year event where the route crosses the ordinary watercourse in section C. For the 1 in 30 year event areas of the route in section A are susceptible to both shallow (>0.1m) and deep (>0.3m) surface water flooding, whilst parts of the route in section E are susceptible to shallow (>0.1m) surface water flooding. For the 1 in 200 year event, areas of the route in section A, C and E are susceptible to both shallow (>0.1m) and deep (>0.3m) surface water flooding. The remaining sections of the route are not at risk of surface water flooding for either the 1 in 30 or 1 in 200 year event.
- 3.4.22 Option B crosses the Emm Brook in section A. Consent from the Environment Agency will have to be sought to cross this main river and an assessment of the impacts of the crossing on water quality and geomorphology will need to be undertaken.
- 3.4.23 The route will cross one of the tributaries feeding into the Emm Brook; in section C. Consent will have to be sought from the local authority (Wokingham Borough Council) to construct these crossing.

Option C

- 3.4.24 Option C is the southernmost option. The route starts in the same location as options A and B, on Oakley Drive, to the east of the A321 Finchamstead Road. Option C runs west to east and ends in the same location as option B, north of the railway line. Option C also crosses the Emm Brook, Easthampstead Road and Waterloo Road.
- 3.4.25 Section A of option C (approximately 115m) is fully situated within Flood Zone 3, meaning this section of the route has a greater than 1% chance of fluvial flooding in any one year. 480m of section B and C are situated in Flood Zones 2 and 3. Areas covered by Flood Zone 2 have between a 1 and <0.1% chance of flooding in any one year. The remainder of the route not located in Flood Zones 2 or 3 is situated in Flood Zone 1, meaning it has a less than 0.1% chance of fluvial flooding in any one year.
- 3.4.26 Almost all sections of option C have parts of the road located within an area at risk from surface water flooding. For the 1 in 30 year event areas of the route in section B are susceptible to both shallow (>0.1m) and deep (>0.3m) surface water flooding, whilst parts of the route in section A, C and E are susceptible to shallow (>0.1m) surface water flooding. For the 1 in 200 year event, areas of the route in section A, B and C are susceptible to both shallow (>0.1m) and deep (>0.3m) surface water flooding, whilst parts of the route in section D and E are susceptible to shallow (>0.1m) surface water flooding. The remaining sections of the route are not at risk of surface water flooding for either the 1 in 30 or 1 in 200 year event.
- 3.4.27 Option C crosses the Emm Brook in section B. Consent from the Environment Agency will have to be sought to cross this main river and an assessment of the impacts of the crossing on water quality and geomorphology will need to be undertaken.
- 3.4.28 The route will cross one of the tributaries feeding into the Emm Brook in section C. Consent will have to be sought from the local authority (Wokingham Borough Council) to construct these crossings.

Flood Zone Implications

- 3.4.29 Table 2 indicates the approximate length of distributor road situated within flood zone 2 and 3. Where the proposed options pass through these zones it is likely that the EA will require the road to be raised to a level above the predicted 1 in 100 year flood level and possibly the 1 in 1000 year flood level, thus ensuring safe access and egress is provided to any new strategic development sites. Where the road is raised within Flood Zone 3, flood plain compensation areas will be required to compensate for the subsequent loss of flood storage.

Table 2: Extent of the Proposed Options Located within Flood Zone 2 and 3

	Extent of the proposed Options within Flood Zone 3 (m)					
	Section A	Section B	Section C	Section D	Section E	Total
Option A	135	-	-	116	35	286
Option B	265	21	7	-	-	293
Option C	116	161	104	-	-	381
	Extent of the proposed Options within Flood Zone 2 (m)					
	Section A	Section B	Section C	Section D	Section E	Total
Option A	4	9	-	-	-	13
Option B	-	80	111	-	-	191
Option C	-	36	177	-	-	213

3.5 Summary

- 3.5.1 Information used in this initial assessment of potential flood impacts of the route options is likely to need significant update due to de-culverting in the Emm Brook along Molly Millars Lane. There will be a requirement for flood plain compensation for all options to a varying degree depending on the actual route selected and further testing.
- 3.5.2 However, an alignment that reduces the impact as far as possible on the Emm Brook area would be favoured and it is suggested that alterations to option B (in section A) to make use of part of route A in this section would be most favourable.

4 Summary of Engineering Review

4.1 Introduction

4.1.1 The objective of the engineering assessment was to carry out an appraisal to determine suitable alignments and junction proposals for the South Wokingham Distributor Road. The distributor road is to provide access to proposed residential development, an alternative route to the town centre and to provide HGV access to the Molly Millars Lane business district. The assessments are based on the three initial route options shown in Figure J1 in Appendix J and outlined below:

- Option A: Link road adjacent to Railway (northern)
- Option B: Link road through middle of the assessment site (central)
- Option C: Link road at south boundary of the site (southern)

4.1.2 A further objective of the study is to carry out an engineering appraisal to upgrade Waterloo Road (Route D) and pedestrian and cyclist facilities to provide an improved strategic link between Wokingham, Jennetts Park and Bracknell Southern Industrial area. Route D is shown in Figure J1.

4.2 General Alignment Design Philosophy

4.2.1 The initial design criteria from TD 9/93 'Highway Link Design' from the Design Manual for Roads and Bridges applicable to a 30mph single carriageway road have been adopted as this provides appropriate design standards for such a link road using desirable minimum radii of 255m and desirable minimum stopping sight distance of 90m. However as it is the intention to closely manage the driver perception of the route the design criteria may be reduced to one step below desirable minimum radii of 180m with a stopping sight distance of 70m.

4.2.2 An alternative design strategy based on the requirements of 'Manual for Streets' has also been assessed as it is considered most likely that this standard will be adopted at masterplan stage. It is anticipated that the final route would be subject to a 30mph speed limit with the Waterloo Road to Peacock Farm remaining at a speed limit of 40mph. Further consideration of these alternative design strategies will be developed for the alignment options. A minimum radius of 90m has generally been adopted which provides 60m forward visibility within a 3m verge on either side of the carriageway which is consistent with the base cross section strategy but may require some minor verge widening on the footway side of the road at specific locations.

- 4.2.3 The exact criteria for link design is very much dependant on the potential development access points, frontage properties and features along the route. The type and locations of pedestrian crossing points, boulevard trees and road side features will be key to developing the characteristics of the route and to provide a 30mph driving environment. For the purpose of this assessment it has been assumed that T junctions augmented with dedicated right turn lanes at heavily trafficked junctions will be provided to serve the developments and roundabouts will be provided at the major junctions at Finchampstead Road, Easthampstead Road, Waterloo Road and the Tesco superstore access. Since this is a feasibility assessment it is not possible to fully develop the route characteristics as the details of the adjacent residential development is not yet known. However a number of key features to improve driver perception and safety based on the Montague Park design philosophy have been assumed. These include pedestrian and cyclist crossing traffic calming features and the boulevard cross section (that stem from the council's adopted policy and guidance). It is envisaged that the detailed alignment of the route, details of access roads, right turn lanes, frontage property accesses etc. will be developed as part of the planning applications associated with each development area. This design strategy is to ensure that each development maintains the overall link design approach to ensure that driver and non-motorised users (NMUs) perception matches the 30mph maximum speed limit of the road.

4.3 Cross Sections

- 4.3.1 Two carriageway widths were considered for the distributor road. These were 6.1m and 7.3m. The 7.3 m width is the normal width standard for a distributor road which is to cater for buses, general commercial and HGV vehicle use. As it is anticipated that this road will become the preferred route for HGVs to access Molly Millars Lane business district the 7.3m width has been adopted for this study. This proposed 7.3m width can be reviewed at the Master planning stage for each development along the route but it is unlikely that the review would affect the strategy since the whole length of the distributor road will attract HGVs regardless of the phasing of the developments.
- 4.3.2 The Montague Park Development, which has recently received Planning Consent, forms the eastern part of the proposed distributor road. It has a carriageway width generally of 7.3m which is consistent with the width proposed for the remainder of the route. However, while maintaining two way HGV access, there are discrete lengths where the carriageway has been reduced in width to 6.1m as part of the overall traffic calming strategy. The traffic modelling for this study has been carried out at a high level to determine the strategic implications of the SWDR on the Wokingham traffic model only. As the scheme develops further traffic modelling will be required to determine the local impacts and to determine whether the carriageway may require additional widening at junctions throughout the route. The extent and locations of the widening has not been assessed at this stage.
- 4.3.3 For the purpose of this assessment it has been assumed that roundabouts with pedestrian and cycle crossings will be provided at all major junctions and changes of alignment along the route. This strategy will be reviewed when the detailed design of the scheme elements are carried out.
- 4.3.4 For the purpose of this assessment and to ensure that the character of the road accords with the 30mph speed limit it is proposed that major pedestrian crossing points to service the existing footpath network and the designated school site are designed with lozenge shaped islands as shown in Figure J5.

4.3.5 Five overall highway cross sections have been considered for the initial route alignment. For this preliminary options appraisal report CS01 has generally been adopted throughout. The cross sections are shown in Figure J6 and outlined below ;

- CS01 'Boulevard' Overall width 19.3m comprising 3.0m shared footway/cycleway, 3.0m grass verge (tree lined where sight lines permit) 7.3m carriageway (including central 1.3m hatched strip with coloured surfacing), 3.0m verge (tree lined where sight lines permit) and 3m shared footway/cyclepath. This section is generally proposed south of the rail overbridge throughout the route except where there are significant environment or land constraints.
- CS02 Boulevard' Overall width 19.3m comprising 3.0m shared footway/cyclepath, 3.0m grass verge (tree lined where sight lines permit) 7.3m carriageway(including central 1.3m hatched strip with coloured surfacing), 2.0m verge (tree lined where sight lines permit) and 4.0m segregated footway/cyclepath. This section is the same as CS01 but provides an alternative pedestrian and cyclist provision. This alternative section could generally be adopted south of the rail overbridge throughout the route except where there are significant environment or land constraints. It is considered that CS01 provides an appropriate and flexible solution for pedestrian and cyclists.
- CS03 Boulevard' Overall width 19.5m comprising 2.0m footway, 3.0m grass verge (tree lined where sight lines permit) 1.5m on carriageway cycle lane, 6.1m lined carriageway, 1.5m on carriageway cycle lane 3.0m verge (tree lined where sight lines permit) and 2.0m footway. This section is 0.2m wider than CS01. It has the potential advantage to provide additional tree planting adjacent to the carriageway. This is because the 1.5m cycleway may be included with the 3.0m verge to increase forward visibility and so extend the length of tree planting on the inside of curves. It is considered that CS01 is the preferred section due to the potential safety disadvantage of on- road cycleway lanes and the costs associated with additional 3.0m carriageway widening. This section could generally be adopted south of the rail overbridge throughout the route except where there are significant environment or land constraints.
- CS04 Constrained Cross Section Overall width 12.3m comprising 3.0m unsegregated footway/cyclepath, 7.3m carriageway and 2.0m footway. This section would only be adopted where there are significant environment or land constraints.
- CS05 Traffic Calmed ' Boulevard' Overall width 18.1m comprising 3.0m shared footway/cycleway, 3.0m grass verge (tree lined where sight lines permit) 6.1m carriageway, 3.0m verge (tree lined where sight lines permit) and 3m shared footway/cyclepath. This section is to be adopted as part of the detailed development to assist as a traffic calming/ speed control measure at selected locations to south of the rail overbridge throughout the route except where there are significant environment or land constraints.

4.3.6 Further discussion on the merits of CS02 and CS03 is required as it is considered that they may provide a more appropriate cross section which provides greater flexibility for cyclists. An estimation of anticipated cycle usage is required to ensure that the correct strategy is adopted for the whole route. Since the overall cross section width for all three sections varies by less than 0.2m the actual final cross section adopted will not affect this route assessment study and so the decision is not required at this time. The cross section requires further consideration to ensure that the correct strategy is adopted for the whole route. Once the review has been completed for each section of the route the preferred cross section strategy should be included in future Masterplanning.

- 4.3.7 The 7.3 m carriageway cross section may on the straighter sections, lead to driver perception of higher speeds and so features to maintain speeds to 30mph have been considered. The first is that a central strip delineated by colour should be included. Options considered are: hatched carriageway markings with 3.0m lanes; coloured surfacing with 3.0m lanes and block paving with 3.0m lanes widths but widened at low radius bends to minimise HGV overrun. However, due to the potential number of HGVs (circa 50 one way in the peak hour) and the inevitable overrun onto the block paving areas it is not considered that this would provide a robust long term solution as regular maintenance would be required. The recommended option is to provide a 1.3m wide central hatched strip with coloured surfacing material, albeit this would still require a maintenance regime. Careful consideration of highways materials and maintenance regimes that inform future maintenance commuted sum payments will be needed and agreed with the SDL developers. The second is that the CS05 cross section with reduced 6.1m carriageway width may be appropriate at some locations throughout the route. It is anticipated that the locations for these traffic calming solutions would be determined during the masterplan phase for each development.

4.4 Key constraints

- 4.4.1 Preliminary consideration of the route has identified a number of key constraints which are outlined below.
- Finchampstead Road junction
 - Tesco Access
 - Tree belt adjacent to arable land north of Ludgrove School
 - Balancing Pond to west of Easthampstead Road
 - Montague Park development and location of Railway overbridge
 - Overhead High Voltage Electrical power lines
 - The Emm Brook and Emm Brook flood plain.
 - Drainage attenuation measures. Although no allowance has been included in this study for flood compensation and drainage attenuation measures at this stage it has been assumed that the Environment Agency will require that additional flow as a consequence of the highway improvements are fully attenuated and that there is no resultant net discharge flow into the Emm Brook catchment. Therefore, the additional land required to accommodate drainage attenuation measures such as balancing ponds, swales and underground oversized pipe/ culvert drainage storage will need to be determined. This will result in additional land requirements above what would normally be expected in a less flood sensitive area.
- 4.4.2 Discussions to determine the best approach to deal with these issues are outlined within the relevant sections of the report. It is anticipated that SWDR will be constructed as a number of discrete development phases of the SDL in a medium term timeframe of approximately 10 years. It is therefore important that a strategic approach to address these constraints is prepared in advance of the first SDL phase development. This will ensure that the effects of the constraints are minimised and addressed as the phased developments proceed.
- 4.4.3 The route alignment options have taken into account the current outline SDL development parcels. The SDL includes housing development areas, a site for a Primary school, SANGs (suitable alternative natural greenspace) and areas for outdoor sports facilities. At this stage the principle is that the access to the development sites will be from the SWDR but details of the access arrangements are not known at this time.

Land Constraints

- 4.4.4 It has been assumed that land within the control of the SDL developers would be provided to construct the SWDR. As a consequence the commentary for the alternative routes outlined in section 4.5 only highlights potential land acquisition associated with land which is either outside the control of the SDL developers or Wokingham Borough Council highway land.
- 4.4.5 A Land Registry search to identify all land owners has not been carried out for the SWDR alternative routes. It is recommended that, once the SWDR route has been finalised, a search is carried out to identify all land owners and that they are advised of the route proposals.

4.5 Description of Southern Distributor Options

- 4.5.1 This section reports the findings of the alignment constraints review for the three distributor road options from Finchampstead Road to the Montague Park development. Generally Option A routes to the north of the study area, Option B passes through the centre and Option C is to the south. They are shown in Figure J1.
- 4.5.2 Each option comprises of the following summary elements;
- Improved junction at Finchampstead Road/ Molly Millars Lane
 - Improved junction at Finchampstead Road/ Tesco Access
 - New link from Finchampstead Road to Tesco Superstore
 - New link from Tesco Superstore to Easthampstead Road
 - New link from Easthampstead Road to Waterloo Road
 - New link from Waterloo Road to Railway Bridge
 - New Railway Bridge and tie in to Montague Park Development
- 4.5.3 A number of further sub options have been identified which provide alternative alignment links for various elements of the main route options. These options are shown on Figure J1 and an initial description of the alignments and key constraints is detailed in the paragraphs immediately following each main option assessment. These alternative alignments have been assessed in accordance with the environmental and land constraints and in consultation with WBC will be used to determine the preferred SWDR route.
- 4.5.4 This alignment assessment has been carried out following a site walk over survey and the Environmental Constraints Surveys. The alignments of the Options do not affect the existing trees or hedges significantly. However they do affect individual or small groups of trees where the routes cross existing field boundaries.
- 4.5.5 There are two overhead High Voltage electrical power lines which run parallel to the railway and which will be affected either by the route options or the future development. For the purpose of this assessment it has been assumed that the overhead cables will be rerouted underground as part of the development works and so the potential impacts on the route options has been ignored. However there would be significant cost associated with the diversion of the cables and so if this assumption is incorrect then the choice of route may be affected.

-
- 4.5.6 There is likely to be significant statutory undertaker (SU) apparatus between Molly Millars Lane and Tesco which will be affected by the rail bridge reconstruction and the roundabout improvements. It is recommended that once the Network Rail Assessment Report is fully available that a combined Statutory Utility study is carried out to determine the preferred Value Engineering option for the overall improvement in this area.
- 4.5.7 Access to Knoll Farm for pedestrians and vehicles is from Gypsy Lane by means of a private at grade crossing of the Waterloo railway line. This is considered an unsatisfactory access arrangement. It is therefore important that whichever route option is adopted for the SWDR that a suitable alternative access is provided to Knoll Farm. This will enable the crossing to be closed. The process for arranging this is outside the scope of this report. However it is recommended that once the preferred route is finalised that early negotiations are commenced with Network Rail and the owner of Knoll Farm to ensure that the revised Farm access is included as part of the phased development of the SWDR.

Finchampstead Road

A321 Finchampstead Road/ Molly Millars Lane Roundabout (Location A) and realignment of Finchampstead Road to Tesco Roundabout (Location A to B) (Appendix J Figures J7, J8 and J9)

- 4.5.8 The existing junction between the A321 Finchampstead Road and Molly Millars Lane is a three arm mini roundabout. The A321 is generally 6m wide with 1.5m footways on each side. Molly Millars Lane is 6.0m wide with 2.0m footways on each side and has a high proportion (6%) of HGV vehicles since it serves the local industrial estates.
- 4.5.9 The key constraints to improving the capacity of the junction are the limited availability of highway land and the existing substandard Finchampstead Road railway bridge. The bridge has a 5.5m wide carriageway with a 1.5m footway on the east side only. It also has limited headroom (4.5m).

Finchampstead Road Guildford line Railway Bridge-Network Rail Options

- 4.5.10 Options to replace the Railway Bridge have been developed by Network Rail and the results of their preliminary assessment are outlined below. All options provide an online dual carriageway replacement of the existing substandard bridge, which was the original brief from the Council to Network Rail.
- 4.5.11 Bridge Option 1 is for a twin 11.5m portal frame construction comprising of 3.5m cycleway, 7.3m two lane carriageway and a 0.7m central verge in each portal with an overall width of 24.6m.. The proposed road alignment would be 0.7m below existing carriageway level. This reduction in carriageway level is likely to require the removal and relocation of the existing statutory undertaker services. The portals would have compliant headroom to enable all vehicles to have unrestricted use of the structure. The existing bridge would require a minimum three month closure to enable the advance bridgeworks to be carried out prior to the installation of the main bridge deck. The bridge deck would be installed during a temporary closure of the railway line using the Network Rail major track possession procedure. These major track possessions are limited by Network Rail to occur only during the Christmas and Easter holiday periods and need to be booked two years in advance of the work. As well as the three month closure of the Finchampstead Road during the bridge reconstruction it is likely that further closures would be required to enable the statutory undertaker's plant to be relocated. It is therefore likely that Finchampstead Road will require closure for between four and five months to enable this option to be constructed.

- 4.5.12 Bridge Option 2 is to replace the existing bridge with a 23.4m single span box girder deck structure comprising of two 3.5m cycleways, two 7.3m two lane carriageways and a 1.8m central reserve.. The proposed road alignment would be 0.5m below existing carriageway level. This reduction in carriageway level is likely to require the removal and relocation of the existing statutory undertaker services. The structure would have compliant headroom to enable all vehicles to have unrestricted use of the structure. The existing bridge would require a minimum two month closure to enable the advance abutment bridgeworks to be carried out prior to the installation of the main bridge deck. The bridge deck would be installed during major track possessions as Bridge Option 1. As well as the two month closure of the Finchampstead Road during the bridge reconstruction it is likely that further closures, to enable the statutory undertakers plant to be relocated, would also be required. It is therefore likely that Finchampstead Road will require closure for between three and four months to enable this option to be constructed. An alternative but more expensive variant of Bridge Option 2, with a fixed rather than ballasted rail track has also been identified by Network Rail which would significantly reduce the depth of construction from track level to bridge soffit level. The key advantage of this option is that the existing road level in Finchampstead would not require lowering but would be maintained at its current level. It is therefore likely that existing statutory undertakers apparatus would be unaffected by this option apart from the need to protect them during the bridgeworks. It is considered that this option would require the closure of Finchampstead Road for a maximum of three months. However before this option is finalised Network Rail will carry out additional localised assessment to ensure that it is a viable option for construction at this location. It is understood that the results will be included in the Network Rail Final Assessment report.

Finchampstead Road Guildford line Railway Bridge - WSP Options

- 4.5.13 Through the traffic modelling and micro simulation assessment (see Section 5.2) a single carriageway with junction flares was found to be the more appropriate traffic solution. WSP have examined the Network Rail information and suggest the following alternative options for further consideration.
- 4.5.14 Bridge Option 3 is a reduced cross section of Option 2, to replace the existing bridge with a 21m single span box girder deck structure comprising of two 3.5m cycleways and a 14.0m two way carriageway. The proposed road alignment would be 0.5m below existing carriageway level. This option would provide similar benefits to Option 2 but would cost less. The indicative bridge cross section span of 21.0m is shown on Figure J7.
- 4.5.15 Bridge Option 4, a reduced cross section similar to Option 3, is to replace the existing bridge with a 20m single span box girder deck structure comprising of two 3.5m cycleways and a 13.0m two way carriageway. The indicative bridge cross section span is shown on Figure J9. The proposed road alignment would be offset to the west of the existing bridge in order to minimise disruption to traffic during construction. Further work, outside the scope of this report, would be required to determine the exact affect, but it is anticipated that closures would be limited to a few weeks at most. However this proposal has very significant issues as it would require the acquisition of land by the CPO procedure and demolition of four properties on the west side of Finchampstead Road in Landen Court. It should be noted that the existing properties are located within the flood plain and so an alternative option to obtain the properties by agreement may require further consideration. It is recommended that Network Rail is requested to include this alternative highway alignment option within their Assessment Study.

Finchampstead Road/ Molly Millars Lane Junction

- 4.5.16 For the purpose of this highway assessment two options have been considered to improve the junction to cater for the predicted flows, although a detailed design assessment has not been carried out. The first ties in to the online widened Railway Bridge Network Rail options 1 or 2 and WSP Bridge option 3 described in paragraph 4.5.10 to 4.5.15. The second, shown in Figure J9 proposes an offline widened Railway Bridge Option 4, described in paragraph 4.5.15, constructed to the west of the current bridge. Both options require land from Wokingham Motors, and it is assumed that this will be available. From WBC land ownership records it would appear that land has been reserved for future improvement works at the frontages of 81 and 83 Finchampstead Road. Both options make use of this additional highway land. This needs confirming by WBC through land registry or property legal teams.
- 4.5.17 The preliminary layout for the Molly Millars Lane roundabout Option 1 is shown on Figures J7 and J8. An alternative signalised junction has also been considered and a traffic modelling assessment has been carried out, see Chapter 5.2. The main advantage of a roundabout is that there is additional spare road capacity available for any future traffic requirements within the proposed railway bridge and Network Rail preliminary assessment demonstrates that this is a viable option. A key disadvantage is that the A321 will require closure throughout the bridge replacement works. It is anticipated that this may take a minimum of between three and five months (depending on which Network rail bridge option is adopted) and is likely to cause significant temporary disruption to traffic.
- 4.5.18 The second option, shown in Figure J9 is to enlarge the roundabout in a similar way to Option 1 but to tie in to the A321 Finchampstead Road by means of an offline railway bridge constructed to the west of the existing bridge. The key advantage of this alignment is that the effect on Finchampstead Road during construction would be minimised as the existing bridge would be available to maintain traffic flow while the new bridge is constructed. However see paragraph 4.5.15 which outlines the disadvantages and the recommended action for this option.
- 4.5.19 All options would affect the present levels of amenity since the improvements are in close proximity to residential properties. As such there is a potential for Wokingham Borough Council to attract claims under the Land Compensation Act 1973.

A321 Finchampstead Road Roundabout (Location B) (Appendix J Figure J7, J8 and J9)

- 4.5.20 The existing junction is a small four arm roundabout on the A321 Finchampstead Road. The road is generally 6m wide with 1.5m footways on each side. The roundabout provides access to the Tesco Superstore to the east by means of a 7.3m wide private road with a 2m footway on the south side. The roundabout also provides, to the west, access to the residential properties in Landen Court.
- 4.5.21 The key constraint to improving the capacity of the junction is the limited availability of highway land. The current roundabout has, historically, been liable to flooding with an annual probability greater than 1% (1 in 100yr storm) and so any improvements to the roundabout are likely to require flood compensation investigations. It is considered that there are no improvements to the roundabout which can be accommodated within the existing highway boundary.
- 4.5.22 Two options have been considered to improve the junction to cater for the predicted through the micro simulation modelling. A detailed horizontal and vertical alignment design would be required, depending on which Network Rail bridge option is chosen. The first shown in Figure J7 is improving the roundabout to the east and which requires land on the eastern side of the current alignment. It is recognised that the land acquisition for this Option may be difficult to achieve by negotiation. It is suggested that early discussions are carried out with the landowner to determine the viability of this option.

-
- 4.5.23 The second option shown in Figure J8 widens the roundabout to the west which would require land acquisition from the western side of the current alignment. This is considered to be a significant issue as land would be required from the residential frontage properties.
- 4.5.24 The proposal would affect the present levels of amenity since the improvements are in close proximity to residential properties. As such there is a potential for Wokingham Borough Council to attract claims under the Land Compensation Act 1973.

Option A

A321 Finchampstead Road to Tesco Access (Location B to C) (Appendix J Figure J1)

- 4.5.25 The existing road is 7.3m wide and forms the access to the Tesco Superstore only. There is an existing footway on the south side of the road which is located adjacent to the store and at a higher level than the road. To the north of the access road there is a public footpath No 25 and access track serving Nos 76A and 76B Finchampstead Road, stables and arable land to the north. The Emm Brook is situated adjacent to the access track. A recycling facility is located on the north side of the access road. A surface water detention pond is located at the east end of the superstore site. This forms part of the drainage mitigation works for the existing superstore development.
- 4.5.26 The proposal is for a 7.3m wide carriageway with a three arm roundabout located on the distributor road to serve the superstore. A detailed horizontal and vertical alignment design would be required, to determine the impact on No 76B Finchampstead Road since the alignment passes close to this property. It is proposed that the Footpath No 25 would be diverted onto the north footway between Finchampstead Road and the revised Tesco access. The existing recycling facilities would require relocation within the store site or at a suitable replacement facility constructed close by. Currently it is noted that at peak times vehicles exiting the superstore queue in the current access road. The exact location and size of the roundabout will require agreement with the landowner/Tesco and may require reconfiguration of the internal car park layout.
- 4.5.27 There is insufficient land available to adopt the proposed boulevard cross section in this area. Due to the limited land availability the cross section CS04 (Figure J6) is restricted to a 2m footway on the north side of a 7.3m carriageway and a 3m wide shared footway cycleway adjacent to the store. The footway on the north side of the carriageway ties into the existing access road and footpath No 25. The cycle route ties into the existing road network at the west end of the SWDR and the proposed cycle facilities on Finchampstead Road to Molly Millars Lane.
- 4.5.28 The route is within the Emm brook flood plain which is currently arable land, and so adequate flood compensation would be required. Land for the flood compensation has not been determined at this stage but is seen as a significant issue since there are no alternative options which would avoid highway construction within the flood plain. Land acquisition for the highway and the flood compensation area would be required by means of negotiation or CPO processes. An updated flood study in this area is recommended.

New link from Tesco Superstore to Easthampstead Road (Location C to D) (Appendix J Figure J1)

- 4.5.29 The existing topography at the west of this area is bounded on the north by the Waterloo line and the Tesco Store to the south. The ground slopes gently from the railway line southwards and a significant part of the area (the western 500m) is within the Emm Brook flood plain. Knoll Farm is located adjacent to the railway and is accessed by means of a private level crossing to Gypsy Lane. There are two Footpaths (Nos 9 and 10) which pass through the site and which join to cross the railway by means of a footbridge with step access only. To the east of Knoll Farm the land slopes gently between the railway to the north and the existing copse of trees and balancing pond to the south.
- 4.5.30 The route of the SWDR up to the west side of Knoll Farm is wholly within the Emm Brook flood plain and then is routed to the north of the flood plain to a new junction at Easthampstead road. The route, which would be elevated above flood plain, will require a bridge and associated flood relief arches where it crosses the Emm Brook. The implications of the full width boulevard through the flood plain would require further consideration with the EA to finalise the cross section details. Apart from the flood compensation issues there are no other significant issues associated with this part of the alignment.
- 4.5.31 The west part of the route is within the Emm brook flood plain and so adequate flood compensation would be required. The Emm Brook bridge crossing and flood compensation are considered to be very significant issues which require early resolution to determine the viability of the whole SWDR and its connection to the Finchampstead Road. If this option is preferred it is recommended that early dialogue with the EA is carried out to determine an acceptable flood compensation proposal to address the flooding issues. Refer to paragraphs 3.4.14 to 3.4.18 for a more detailed analysis of the flood issues in this area.
- 4.5.32 This Option then passes through Knoll Farm in order to further reduce the impact of the alignment on the flood plain. However this would require the acquisition of land from Knoll Farm by means of negotiation or CPO processes.
- 4.5.33 From Knoll Farm to Easthampstead Road the alignment runs parallel with the Waterloo line. It would be located close to the railway in order to minimise land severance. Proposals to screen the railway from the land to the south could be considered at the next stage but is outside the scope of this study. Footpaths No 9 and 10 would require suitable locations to cross the SWDR and minor diversions of their routes may be required. There are not considered to be any significant issues associated with the alignment along this length of the route.

Foot / Cycle Bridge Replacement

- 4.5.34 To the east of Knoll Farm it is proposed to replace the existing railway footbridge with a new bridge with steps and 1 in 20 ramps to provide a safe crossing route for all pedestrian and cyclist users. This new bridge would provide access from the future developments to Gypsy Lane and the Town Centre. A layout illustrating the proposals is shown in Figure J2. There are a number of issues associated with this proposal. These are;
- There is insufficient land within the existing highway boundary on the north side of the railway to accommodate the bridge. The acquisition of land from the frontage properties would be required by means of negotiation or CPO process.
 - There are a number of mature trees adjacent to the route which may require removal.
 - The north ramp may be visually intrusive to the adjacent houses as it would be located in part at a similar level to the first floor property windows.

- 4.5.35 To address these issues a proposal to provide lifts instead of the 1 in 20 ramps has been considered. However it was rejected due to the remote location, potential for vandalism and the perception that it would not be considered 'safe' for users. Lifts are normally only provided at stations or in urban locations as an integral part of Shopping Centres in a controlled environment where usage is high.
- 4.5.36 **Given the constraints of ownership, visual impact and engineering difficulties, it is recommended that a review of the legislation surrounding Disability Discrimination Act is undertaken by WBC Legal Services before further engineering study is commissioned. The scope of the study should address the key issues (land acquisition, visual intrusion, tree loss, implications of step only access at some locations and costs) to provide a cost effective and viable footbridge strategy.**

Easthampstead Road junction (Location D) (Appendix J Figure J1)

- 4.5.37 Easthampstead Road is a 6m carriageway with minimal width footways on each side on the southbound approach to the level crossing. On the north bound approach there is a 1.5m footway and a layby for large vehicles to park before obtaining permission to use the level crossing.
- 4.5.38 **The preferred proposal is for a signal controlled four arm junction located to the south of the existing railway level crossing. The traffic signals would need to be connected to and controlled by the level crossing operation. This would operate in a similar way to the Station Link Road junction to the east of Wokingham station. This is likely to lead to delays for traffic on the SWDR as well as the current delays encountered by traffic on Easthampstead Road when the level crossing is closed. This is considered a significant disadvantage of the route as the delays to traffic on the SWDR would be difficult to design out due to the proximity to the level crossing.**
- 4.5.39 Locating the junction further south was considered to provide greater capacity for northbound queuing traffic when the crossing is closed, but it would result in Option A being located too far south (ie close to the alignment of Option B) and remote from the railway before any benefits are achieved and so was rejected.
- 4.5.40 An alternative four arm roundabout was also considered but was rejected. This was because it would be difficult to control traffic flows when the level crossing is closed which may result in additional traffic queuing and congestion on the SWDR

Easthampstead Road Foot / Cycle Bridge

- 4.5.41 Cyclists and pedestrians currently cross the level crossing at grade. Consideration was given to the provision of a footbridge with steps and 1 in 20 ramps to provide an alternative safe crossing route for all pedestrians and cyclists. A number of locations were considered but all require the acquisition of land from properties north of the railway. A layout illustrating the proposals is shown in Figure J3
- 4.5.42 The issues associated with this footbridge are similar to the ones for the footbridge east of Knoll Farm with primarily land acquisition and visual intrusion issues. It is recommended that they are addressed by the strategy study proposed in paragraph 4.5.36.

New link from Easthampstead Road to Waterloo Road (Location D to E) (Appendix J Figure J1)

- 4.5.43 Between Easthampstead Road and Waterloo Road the land gently slopes from the railway line to the south. The alignment passes to the north of one of the tributaries feeding the Emm Brook for the majority of its length and WSP would recommend crossing the tributary by means of a bridge close to Waterloo Road.
- 4.5.44 There are not considered to be any significant issues associated with this element of the route and adequate flood compensation would be provided adjacent to the highway where required by the EA.

Waterloo Road Junction (Location E) (Appendix J Figure J1)

- 4.5.45 The traffic modelling has demonstrated that there are benefits in closing this level crossing once the full SWDR has been implemented. (See Table 5.2) On that basis it is proposed to provide a three arm roundabout located 100m south of the railway to connect the SWDR to Waterloo Road (south).
- 4.5.46 It is proposed that vertical alignment of the roundabout is approximately 0.5m above the existing road to minimise impact on existing services.
- 4.5.47 There are not considered to be any significant issues associated with this proposal, subject to a detailed investigation for utility services and land ownership checks.

Waterloo Road Foot / Cycle Bridge

- 4.5.48 Cyclists and pedestrians currently cross the level crossing at grade. Once the full SWDR has been implemented and the railway bridge at Montague Park is operational the level crossing may be closed. If the level crossing is closed then a footbridge with steps and 1 in 20 ramps will be required to maintain NMU access to the north of the railway. A number of locations were considered but all require the acquisition of land from properties north of the railway. A layout illustrating the proposals is shown in Figure J4. It is proposed that the length of Waterloo Road between the roundabout and the level crossing would become a 4.0m segregated footway/ cyclepath.
- 4.5.49 The issues associated with this footbridge are similar to the ones for the footbridge east of Knoll Farm with primarily land acquisition and visual intrusion issues. It is recommended that they are addressed by the strategy study proposed in paragraph 4.5.36.

New Link from Waterloo Road to Railway Bridge and Montague Park Development. (Location E to F) (Appendix J Figure J1)

- 4.5.50 The land between Waterloo Road and the proposed Railway Bridge is gently sloping arable land
- 4.5.51 This is a critical section of the alignment since the location of the railway crossing has been fixed as part of the Montague Park Planning Consent. A preliminary design of this section based on the LIDAR survey information, which although not as accurate as a full topographical survey, has been carried out.
- 4.5.52 The proposed route has been designed in accordance with the requirements of TD9/93 and meets the design criteria for a 30mph carriageway. However the horizontal radius of 180m, which is a 1 step below desirable minimum horizontal radius, has been adopted in order to tie in with Waterloo Road to the north of the access to Brittons Farm and footpath No.5. It has been designed with a maximum longitudinal gradient on the approach to the bridge of 5% which is compliant with TD9/93 (and less than the desirable maximum of 6% for an all-purpose single carriageway.)
- 4.5.53 The forward visibility over the crest at the rail bridge is 90m which is the desirable minimum for a 30mph road. The clearance from the track rail is 7.1m (required clearance from the top of rail to soffit of bridge is 5.1m) leaving 2m for deck and surfacing.
- 4.5.54 The proposed road is 7.3m wide with 3m shared footway/cycleways on both sides. The embankment side slopes are 1 in 4. This has been adopted to minimise the earthworks and footprint of the embankment but could be widened to provide the full CS01 'boulevard' cross section if required for environmental reasons.
- 4.5.55 To the north of the proposed rail bridge design checks have been carried to ensure that the SWDR proposals are aligned and tie into Montague Park Development.

- 4.5.56 The Montague Park development spine road forms the north link of the SWDR to the A329 London Road. It is recommended that a further assessment is carried out of the Montague Park proposals to ensure that there is sufficient land north of the railway to construct both the tie in works including the embankment and bridge construction before the adjacent site boundary is finalised.

Option A Alternative Links (Locations G to H, I to J and K to D1) (Appendix J Figure J1)

- 4.5.57 Location G to H. This is a 255m radius curve link between Option B and Option A. This link provides an alternative route for Option A which does not require land acquisition from Knoll Farm. It would require the acquisition of the arable land to the south of Knoll Farm by means of negotiation or CPO processes. There are no significant environmental issues associated with this alternative and so although further from the railway is the preferred alignment for Option A.
- 4.5.58 Location I to J. This is a 180m radius curve link between Option A and Option B to the west of the existing detention pond. This link provides an alternative route for Option A to the south of the detention pond. As a consequence the Easthampstead Road junction to be located further south which significantly reduces the adverse effect on its operation by the level crossing. Note the junction is sufficiently remote from the crossing for a roundabout to be the preferred solution. There are no significant environmental issues associated with this alternative.
- 4.5.59 Location K to D1. This is a 520m radius curve route between Option A and Option B. This link provides an alternative route from Option A passing through the existing detention pond to the proposed Option B roundabout at Easthampstead Road. It would require replacement attenuation and compensatory storage for that lost in the detention pond. It has the advantage that it enables the Easthampstead Road junction to be located further south to significantly reduce the impact on the level crossing on the operation of the junction. Note the junction is sufficiently remote from the crossing for a roundabout to be the preferred solution.

Option B

A321 Finchampstead Road/ Molly Millars Roundabout to Tesco Access (Location A to C) (Appendix J Figure J1)

- 4.5.60 The Option B route is the same as Option A up to the Tesco Store Access roundabout as discussed in paragraphs 4.5.24 to 4.5.28.

New link from Tesco Superstore to Easthampstead Road (Location C to D1) (Appendix J Figure J1)

- 4.5.61 The existing topography at the west of this area is bounded on the north by the Waterloo line and the Tesco Store and arable land to the south. The ground slopes gently from the railway line southwards and considerable part of the area (the western 250m) is within the Emm Brook flood plain. Knoll Farm is located adjacent to the railway and is accessed by means of a private level crossing to Gypsy Lane. There are two Footpaths (Nos 9 and 10) which pass through the site and which join to cross the railway by means of a footbridge with step access only. To the east of Knoll Farm the land slopes gently between the railway to the north and the existing copse of trees and balancing pond to the south.

-
- 4.5.62 The route of the SWDR from the Tesco access passes through the flood plain for approximately 200m and then along the south boundary of Knoll Farm and passes through the arable land to the south. This would require the acquisition of the arable land to the south of Knoll Farm by means of negotiation or CPO processes. The route will require a bridge and associated flood arches where it crosses the Emm Brook. It is then routed to the north of the flood plain, through arable land, generally 150 m to the south of the railway.
- 4.5.63 The alignment curves around the south of the existing detention pond with a 60m radius curve. An alternative option to provide a 90m radius curve which would pass through the south end of the detention pond, but avoids the 1 in 200 year flood plain, could be considered at the next stage. The detention pond is in the ownership of WBC and this alternative may provide a more cost effective alignment at this location.
- 4.5.64 The route then crosses the outfall from the detention pond and part of the Emm Brook 1 in 200 year flood plain by means of a series of low radius curves to a new junction at Easthampstead Road approximately 200m south of the existing railway crossing. The route will require a bridge/culvert where it crosses the outfall from the existing detention pond. It is recommended that early dialogue with the EA is carried out if this is the preferred route to determine the extent of compensatory flood plain. There are no other significant issues associated with this alignment. The design of the road in the low radius curve section will require careful consideration at detailed design to ensure that adequate visibility is provided.
- 4.5.65 Land for the flood compensation has not been identified at this stage but is seen as a significant issue since there are no alternative options which would avoid construction within the flood plain.
- 4.5.66 The replacement railway footbridge proposals and the minor diversion issues associated with Footpaths No 9 and 10 are the same for Option B as for Option A as discussed in paragraph 4.5.34.

Easthampstead Road junction (Location D1) (Appendix J Figure J1)

- 4.5.67 Easthampstead Road is a 6m carriageway with a verges and a footway on the east side. The highway boundary is tree and hedge lined. It is noted that in the evening peak hour when the level crossing is closed that there are significant traffic queues on the northbound approach.
- 4.5.68 The preferred proposal is for a four arm roundabout located 200m south of the existing railway level crossing. However further traffic modelling analysis is required to ensure that the roundabout is the optimum junction choice and size (ICD) and is able to function during the evening peak when northbound traffic is delayed by the level crossing operation.
- 4.5.69 It is proposed for Option B to provide a pedestrian and cyclist bridge across the railway at the Easthampstead Road level crossing. The proposals are the same as Option A as discussed in paragraph 4.5.36
- 4.5.70 There are not considered to be any significant issues associated with this proposal, subject to a detailed investigation for utility services.

New link from Easthampstead Road to Waterloo Road (Location D1 to E1) (Appendix J Figure J1)

- 4.5.71 Between Easthampstead Road and Waterloo Road the land gently slopes from the railway line to the south. The alignment crosses arable land to the south side of one of the tributaries feeding the Emm Brook.
- 4.5.72 There are not considered to any significant engineering issues associated with this element of the route.

Waterloo Road Junction (Location E1) (Appendix J Figure J1)

- 4.5.73 The Waterloo Road junction proposal is the same as for Option A but is further south and closer to the access to Brittons Farm. Details of this are provided in paragraphs 4.5.45 – 4.5.47.
- 4.5.74 There are not considered to be any significant engineering issues associated with this location, subject to a detailed investigation for utility services and land ownership checks.

New Link from Waterloo Road to Railway Bridge and Montague Park Development. (Location E1 to F) (Appendix J Figure J1)

- 4.5.75 Option B adopts a similar alignment but with a slightly increased radius (255m) as Option A from Waterloo Road to the tie in with the Montague Park development. See paragraphs 4.5.50 – 4.5.54 for further comments.

Option B Alternative Link (Location C1 to L) (Appendix J Figure J1)

- 4.5.76 **Location C1 to L. This link provides an alternative more southern and straight alignment for Option B which does not require land from Knoll Farm and passes through the Emm Brook Flood plain for 400m. However it is considered that if this is the preferred option that early dialogue with the EA is carried out as the issues associated with providing adequate flood compensation are likely to be challenging, and a review of flood modelling is updated. See Section 3.4.**

Option C

A321 Finchampstead Road/Molly Millars Roundabout to A321 Tesco Access (Location A to C1) (Appendix J Figure J1)

- 4.5.77 The Option C route is the same as Option A up to the Tesco Store Access roundabout, as discussed in paragraph 4.5.25 to 4.5.28.

New link from Tesco Superstore to Easthampstead Road (Location C1 to D3) (Appendix J Figure J1)

- 4.5.78 The route of the SWDR is routed southeast from the Tesco roundabout and passes north of the Chapel Green Cottages and close to the Grade ~~2~~¹ Listed Elizabethan Building (~~formerly~~ Lucas Hospital) before proceeding within the Emm Brook flood plain close to the mature tree copse which screens the carriageway from Ludgrove School. It then continues through the flood plain adjacent to the Ludgrove private school access road. It also crosses Footpaths 9 and 10. The route will require three bridge crossings over the Emm Brook, and comment is contained in paragraphs 3.4.24 to 3.4.28. This route would require the acquisition of the arable land to the north of Chapel Green Cottages by means of negotiation or CPO processes.
- 4.5.79 **The route then crosses the Ludgrove private access road at location D4. It is proposed that the private road should access the SWDR by means of a T junction. However further traffic modelling will be required to determine if this is an appropriate junction for the predicted traffic flows. An alternative roundabout option may require consideration. It is considered that the existing private access track should be stopped up to the east side of the SWDR. It is recommended that it would not have direct access onto the SWDR but would continue with its current access arrangement onto Easthampstead Road. There are significant procedural issues associated with this approach as it is considered that both CPO and Side Roads Orders will be required to enable the revised access arrangements to be provided.**

- 4.5.80 The route then proceeds south easterly across arable land and crosses Heathlands Road at location D5. It is proposed that a three arm roundabout is provided to the SWDR for Heathlands Road (south). It is considered that the north 100m section of Heathlands Road between the SWDR and Easthampstead Road should be stopped to the north of the SWDR. It is proposed that this short length of highway would continue with its current access arrangements onto Easthampstead Road. There are significant issues associated with this approach as it is considered that both CPO and Side Roads Orders will be required to enable the revised access arrangements to be provided. A number of mature trees would also require removal for this section of the SWDR.
- 4.5.81 The proposal may affect the present levels of amenity since the improvements are close to the rear gardens of the residential properties in Easthampstead Road. As such there is a potential for Wokingham Borough Council to attract claims under the Land Compensation Act 1973 for depreciation in value of property and the impacts of increased traffic noise.
- 4.5.82 The route then crosses tree screened land before reaching Easthampstead Road. Land would be required from the frontage properties.
- 4.5.83 The majority of this alignment is within, or very close to, the Emm Brook flood plain and so it would be very difficult to provide adequate flood compensation land to mitigate the loss of the Emm Brook flood plain caused by this route. It is considered that the issues associated with the flood plain for Option C are significantly greater than for Options A or B. There are also highway alignment and procedural issues due to the number of existing roads which the route crosses. There are also significant adverse environmental issues associated with the route. In particular the adverse effect and possible loss of the mature tree screen at Ludgrove School, the close proximity of the alignment to the Grade 2ⁱ Listed Building (~~formerly~~ Lucas Hospital) and the adverse impacts and loss of trees in the vicinity of Heathlands Road and Easthampstead Road. It is considered that the highway and environmental issues for Option C are very significantly greater than for Options A or B.
- 4.5.84 The replacement railway footbridge proposals and the minor diversion issues associated with Footpaths No 9 and 10 are similar for Option C as for Option A, see paragraphs 4.5.29 – 4.5.34.

Easthampstead Road junction (Location D3) (Appendix J Figure J1)

- 4.5.85 The Option C proposal is to provide a four arm roundabout at Easthampstead Road. As this junction is 80m further from the railway than Option B it is considered that the queuing issues identified in Option B would be significantly less and unlikely to impact on the operation of the roundabout.
- 4.5.86 There are not considered to be any alternative junction options at this location that would be suitable.
- 4.5.87 Land will be required from the frontage properties by means of negotiation or CPO process. This is considered to be a significant issue associated with this proposal.
- 4.5.88 The proposed roundabout would also require a detailed investigation for utility services.
- 4.5.89 It is proposed that Option C provides a pedestrian and cyclist bridge across the railway at the Easthampstead Road level crossing. The issues are the same as Option A, see paragraph 4.5.34.

New link from Easthampstead Road to Waterloo Road (Location D3 to E2) (Appendix J Figure J1)

- 4.5.90 The route then proceeds north easterly through arable land adjacent to Pearce's Farm and to the south of Brittons Farm and footpath No. 5 to Waterloo Road.

- 4.5.91 There are not considered to any significant engineering issues associated with this element of the route.

New Link from Waterloo Road to Railway Bridge and Montague Park Development. (Location E2 to F) (Appendix J Figure J1)

- 4.5.92 Option C provides an alignment south of Brittons Farm access but in all other respects is the same alignment as Option A from Waterloo Road to the tie in with the Montague Park development, see paragraphs 4.5.50 – 4.5.56 for comments.

Route Option C Alternative Links

- 4.5.93 Link between Option C to the south of the existing detention pond to Easthampstead Road at location D2. This link provides an alternative route for Option C to access Easthampstead Road which avoids the significant adverse impacts associated with the Ludgrove School private access and Heathlands Road crossings. Link between Option C Alternative junction (location D2) and Option C (location D3). This proposal is to upgrade Easthampstead Road between new SWDR Junctions (Location D2 to D3).
- 4.5.94 This section of Easthampstead Road is 6m wide with housing and the White Horse Public House on the west side and footways and highway drainage ditches. It is not considered that the carriageway may be widened to 7.3m with the associated footways and cycleways without acquiring land from the frontage properties. The preferred proposal if this alternative is adopted is to develop a reduced cross section which can be accommodated within the existing highway boundary.

Route D Waterloo Road to Peacock Lane (including Old Wokingham Road Junction) (Location E to G) (Appendix J Figure J10)

- 4.5.95 Waterloo Road south of the SWDR is a single 6.0m single carriageway road with grass verges and ditches on either side. There is a T junction where it joins Peacock Lane/Old Wokingham Road There is a short length of shared footway/cyclepath on the north side of the carriageway adjacent to the Old Wokingham Road junction. The road generally has good visibility but there is an existing 60m radius bend towards to east end of the road which has a widened verge to provide 90m visibility. There are some frontage properties and the majority of the route is hedge and tree lined.
- 4.5.96 A number of improvement works have been considered to supplement the SWDR proposals. The first is to widen the road and improve the horizontal alignment and visibility. This has currently been rejected since there would not appear to be a safety or traffic capacity issue to justify the improvement.
- 4.5.97 The second is to improve the radius of the 60m radius bend highlighted above. It is recommended that a separate study of accident details is carried out to determine whether there is a safety case for this proposal.

- 4.5.98 The third is to provide a 3m shared footway/cyclepath on the north side of the road. This would require the removal of the existing mature boundary hedge on the north side and the piping of the existing ditch. The existing width between the carriageway and the existing boundary hedge is generally up to 2.0m wide. Therefore to provide the proposed footway cyclepath land acquisition would be required. Due to these issues it is recommended that further assessment to determine the viability of this proposal is carried out. It is recommended, subject to agreement with Bracknell Forest Council, that the facility is extended to Peacock Farm (and potential further connection to the Bracknell Western Industrial Area cycle network). This is considered to be an option to include in the overall SWDR route strategy.
- 4.5.99 The fourth option is to improve the Old Wokingham Road T junction and provide a three arm roundabout. Land would be required and a number of mature trees would be lost. It is recommended subject to agreement with Bracknell Forest Council that this improvement should be assessed in more detail and included in the Development Transport Assessment to determine a value engineering safety case for its inclusion as part of the overall SWDR route strategy.

4.6 Summary

- 4.6.1 In general, the road alignment options are dictated by the existing constraints whether these are local ecology, existing housing or potential impacts on river or flood plains. The study has highlighted where there may be key issues and concerns. In general an alignment based around option B with potentially some small localised adjustments satisfies, from the engineering review, the most appropriate alignment. The key elements of the preferred route are summarised as follows;
- A321 Molly Millars Lane to Finchampstead Road Roundabout layout shown on Appendix J Figure J8
 - Option A A321 Finchampstead Road Roundabout to Tesco Access (Location B to C) (Appendix J Figure J1)
 - Option B New link from Tesco Superstore to Easthampstead Road (Location C to D1) (Appendix J Figure J1)
 - Option B New link from Easthampstead Road to Waterloo Road (Location D1 to E1) (Appendix J Figure J1)
 - Option B New Link from Waterloo Road to Railway Bridge and Montague Park Development. (Location E1 to F) (Appendix J Figure J1)
- 4.6.2 Provision of replacement or new foot or cycleway bridges with ramps will be challenging and require additional land, mostly from private residents.
- 4.6.3 Traffic modelling assessment of the dual carriageway option for Finchampstead Road at the Waterloo line railway bridge showed negligible benefits when compared to a single carriageway. The single carriageway link for Finchampstead Road is considered the preferred option.
- 4.6.4 The provision of a footway cyclepath on the north side of Waterloo Road between the SWDR and Peacock Lane is subject to further consideration and the potential for the route to be extended to join to Bracknell Western Industrial Area cycle network.
- 4.6.5 The proposed Waterloo Road/ Old Wokingham Road/ Peacock lane roundabout should be assessed in more detail and included in the Development Transport Assessment.
- 4.6.6 When the SWDR route has been finalised, a search is carried out to identify all land owners and that they are advised of the route proposals.

5 Model Outcomes

5.1 Strategic Model

Introduction

- 5.1.1 This chapter provides background information on the current and forecast traffic flows, summarises model outputs for each of the SWDR options tested and discusses the relative differences between them in terms of the predicted traffic flows and Volume over Capacity (VoC) statistics. In general, a VoC value of 85% and below indicates spare capacity. A VoC value of between 85% and 100% means that a junction or a turning movement operates within, but approaching, capacity with signs of queuing and delays whereas a VoC value of 100% and above indicates that the junction operates at or above capacity, resulting in queues and delays.
- 5.1.2 All scenarios have been tested using the WSTM3 model and the AM and PM peak hour 2026 Scenario C models (January 2013) were used as the basis for the assessment. The WSTM3 forecast model development is described in detail in the “WSTM3. Forecasting Report. Forecasting Methodology and Results”, 26/03/2013.

Base year model validation

- 5.1.3 The development, calibration and validation of the WSTM3 to 2010 conditions are fully reported in the “WSTM3 Local Model Validation Report (LMVR), January 2013”. The area around the SWDR was validated against a set of Automatic Traffic Counts (ATC) and junction Manual Classified Turning Counts (MCTC). Most of the link validation sites have a GEH of less than five indicating that WSTM3 has been validated well for the South Wokingham area.
- 5.1.4 Junction turning count data was collected at the Finchampstead Road/Molly Millar's Lane junction. The turning flows at this junction are reasonably well validated both in the AM and PM peak models with the GEH for the majority of the movements being less than 5.0. In the AM peak the Finchampstead Road south – north movement has a GEH value of 5.9 with the modelled flows being 158 vehicles higher than observed flows. In the PM peak model a number of movements show GEH values greater than 5.0. These are Finchampstead Road north – south and south - north movements and the Molly Millar's Lane – Finchampstead Road North movement. The discrepancies between the observed and modelled junction turning movements have been taken into account when a local area assessment of the western end of the SWDR was undertaken using the Paramics micro-simulation model (Section 5.2).

Option A, B and C results

- 5.1.5 As part of the study three main options for the SWDR have been considered, which are schematically shown in Figure 5.1. A detailed modelling assessment has been completed and is contained in Appendix K.

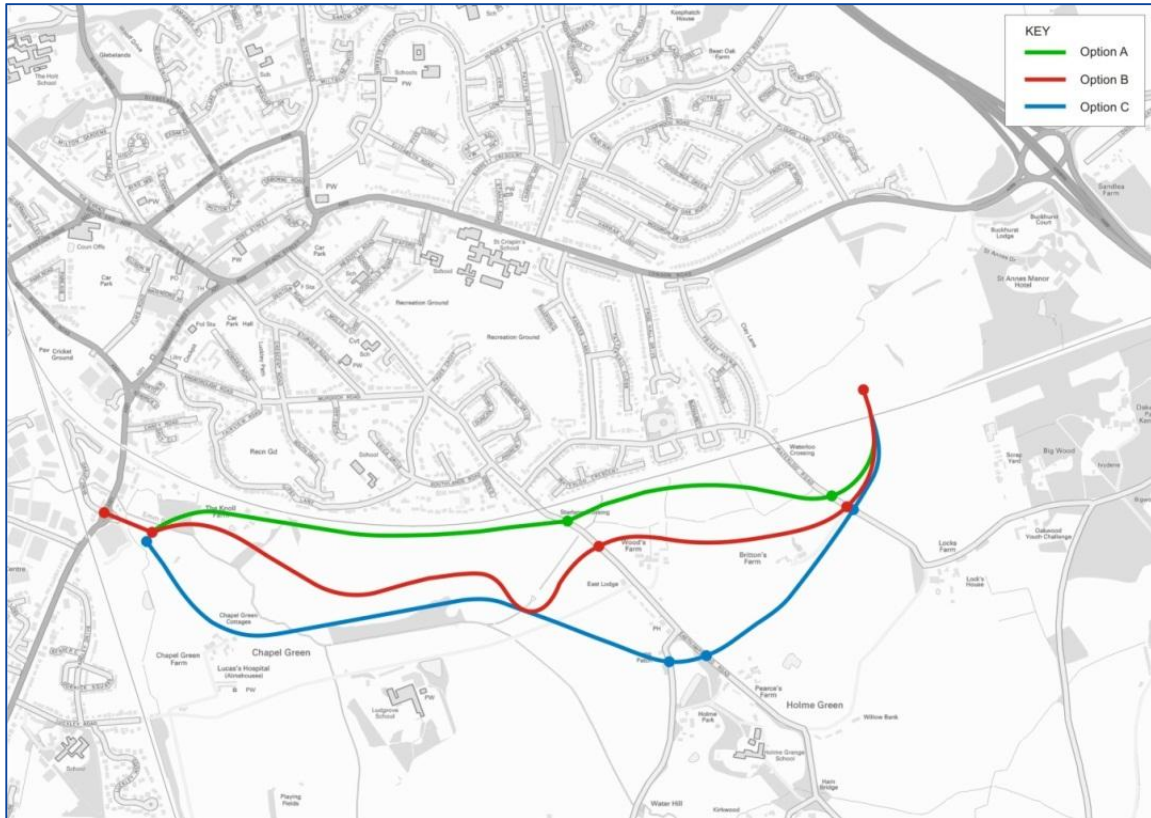


Figure 5.1: South Wokingham Distributor Road. Schematic representation of options A, B and C

- 5.1.6 All options assume that the SWDR is a single lane carriageway with a speed limit of 30 mph. The SWDR runs through the proposed South Wokingham SDL and provides a through route between the A329 London Road in the north and the A321 Finchampstead Road in the west. Waterloo Road is assumed closed at the level crossing, south of Priest Avenue. The western end of the SWDR is assumed to be connected to the A321 Finchampstead Road via a roundabout. The A321 Finchampstead Road/Molly Millar's Lane junction also remains a roundabout. The section of Finchampstead Road between the SWDR and Molly Millar's Lane has a single carriageway capacity (as in the base), but with improved junction approach flares and improved footways.
- 5.1.7 Option B is described first in this section as it approximates to the SWDR alignment shown in the South Wokingham SDL Supplementary Planning Document adopted in October 2011. Schematic presentation of the option B alignment and test assumptions are shown in Figure 5.2.

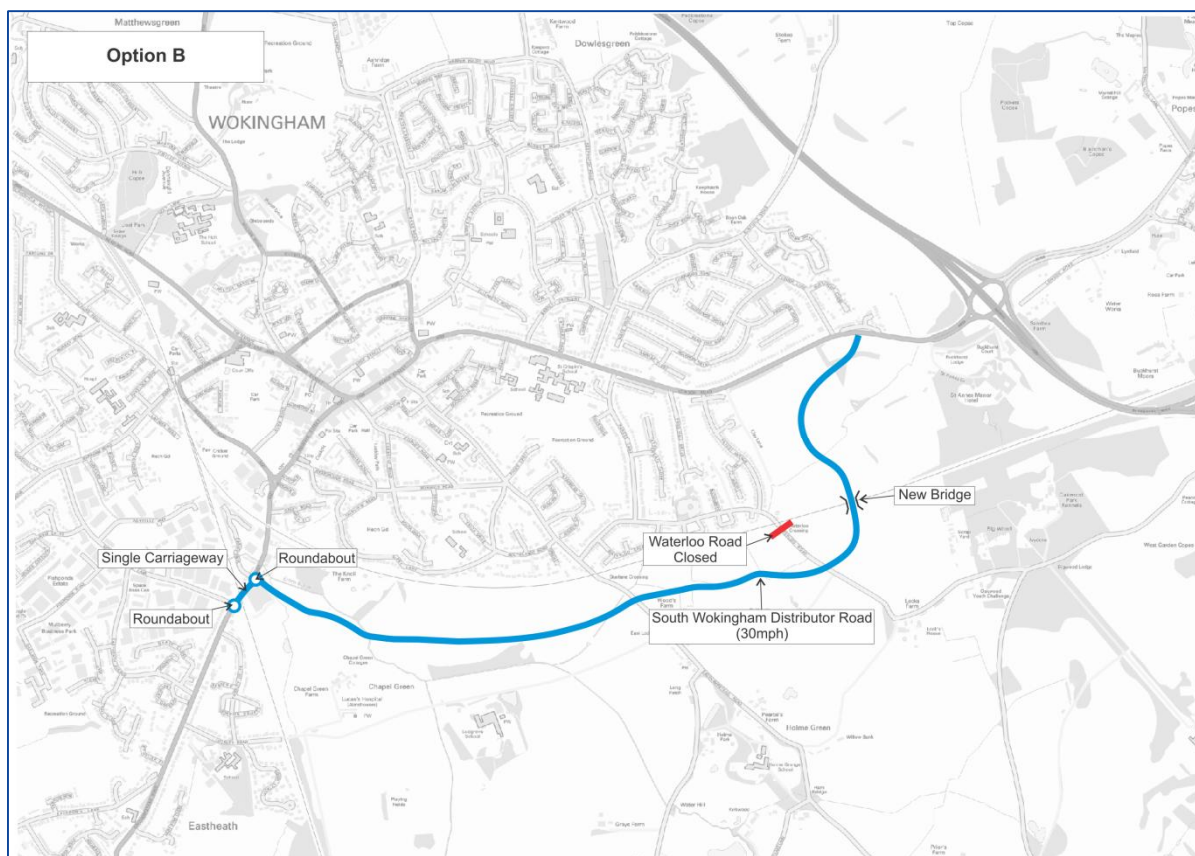
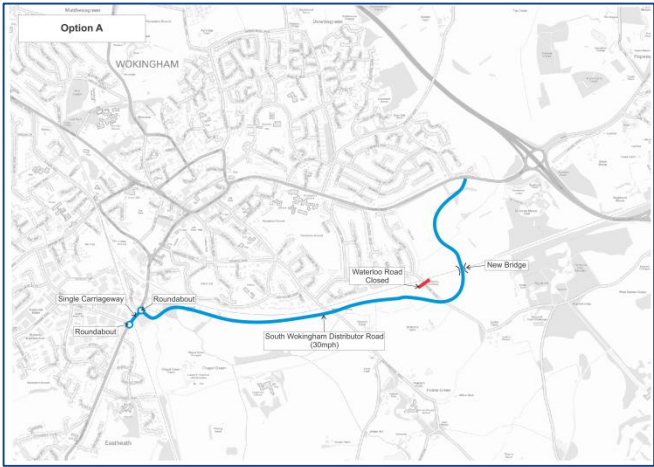
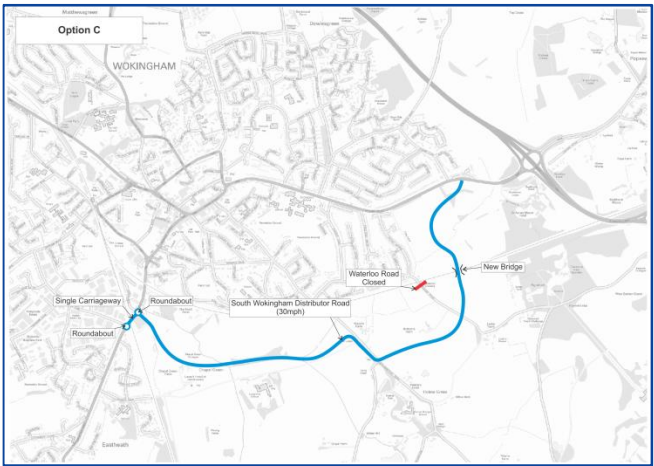


Figure 5.2: Option B assumptions

- 5.1.8 In Option B the SWDR is predicted to attract in the AM peak approximately 556-989 pcu in the eastbound direction and approximately 509-769 pcu in the westbound direction. In the PM peak the SWDR is forecast to carry approximately 423-647 pcu in the eastbound direction and approximately 426-811 pcu in the westbound direction.
- 5.1.9 Both the western and the northern ends of the SWDR are predicted to be a source of congestion in 2026 with the VoC values at these locations approaching or exceeding 100% both in the AM and PM peaks, indicating a need for considered junction designs.
- 5.1.10 Compared to the base year the volume of traffic going through the area along Finchampstead Road between the Molly Millar's roundabout and the Wellington Road/Denmark Street junction is forecast to increase by approximately 1,348 pcu in the AM peak and by approximately 1,563 pcu in the PM peak, which is equivalent to approximately a 38% and 47% increase in each of the peaks.
- 5.1.11 In Option B the main movements through the two roundabouts on the western end of the SWDR are between Finchampstead Road and Wellington Road and SWDR and Molly Millar's Lane (both directions). The SWDR - Molly Millar's Lane movement shows a significant increase in traffic in Option B compared to the base resulting in increases in delays on the Finchampstead Road and Molly Millar's Lane approaches. This indicates that any mitigation in this area should consider this interaction.

- 5.1.12 Option A is very similar to Option B but assumes that the SWDR runs closer to the railway line thus providing a slightly shorter route.
- 5.1.13 The SWDR in Option C carries the same assumptions as in Option B but runs further away from the railway line thus providing a slightly longer route.
- 5.1.14 The traffic impacts of Option A and C have been compared to Option B with the results summarised in Table 5.1.

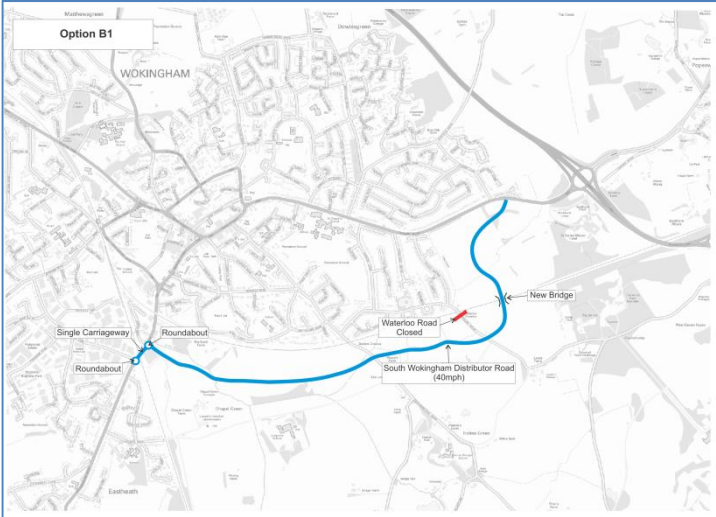
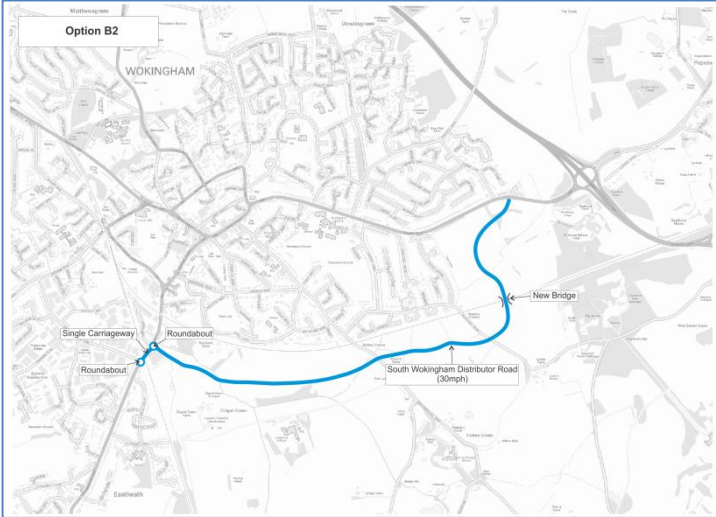
Table 5.1: Option A and C summary results

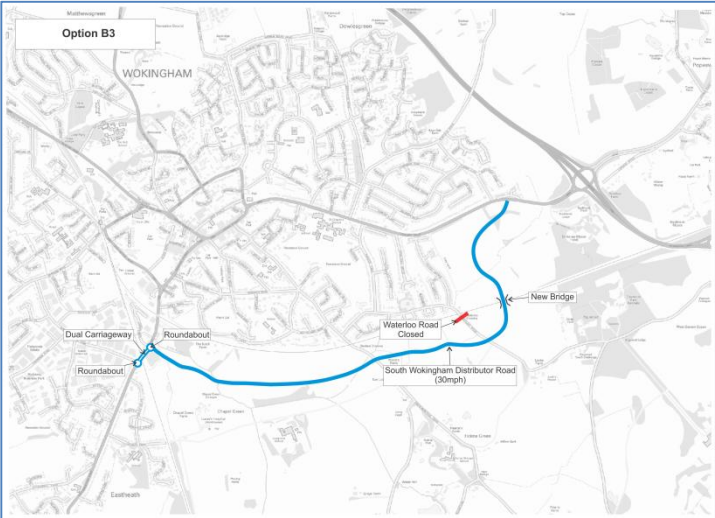
Option	Description	Traffic Effect
A		<ul style="list-style-type: none"> ■ The shorter northern route in Option A is forecast to attract up to approximately 179 more pcu in the AM peak and up to approximately 89 additional pcu in the PM peak than in Option B thus further reducing the traffic levels in Wokingham ■ Similar to Option B in Option A the western and the northern ends of the SWDR are predicted to be a source of congestion in 2026 with the VoC values approaching or exceeding 100% both in the AM and PM peaks
C		<ul style="list-style-type: none"> ■ In comparison with Option B the longer southern route is predicted to attract up to approximately 357 less two-way pcu in the AM peak and up to approximately 260 less pcu in the PM peak resulting in slightly higher volumes of traffic in Wokingham especially on the A329 London Road ■ Similar to Option B in Option C the western and the northern ends of the SWDR are predicted to be a source of congestion in 2026 with the VoC values approaching or exceeding 100% both in the AM and PM peaks

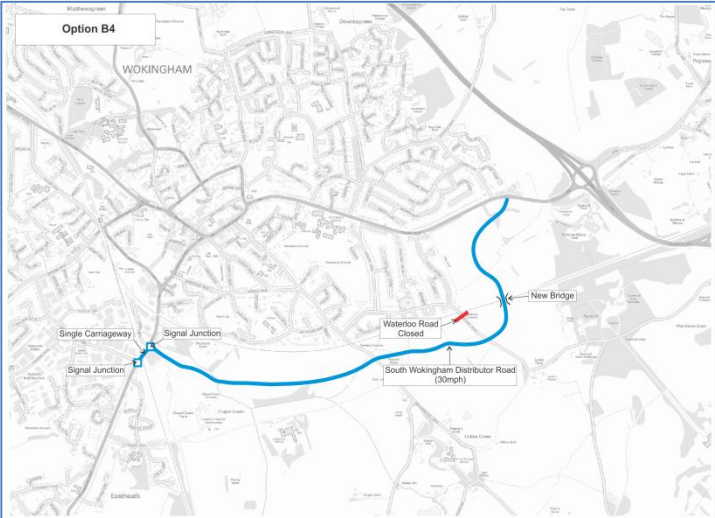
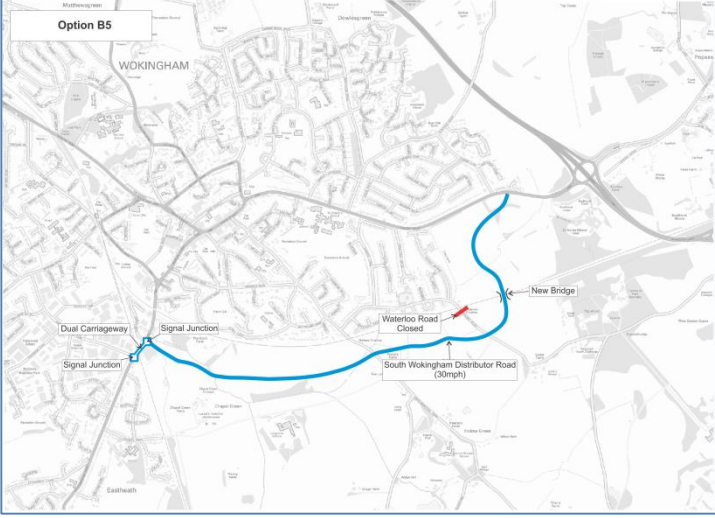
Option test results

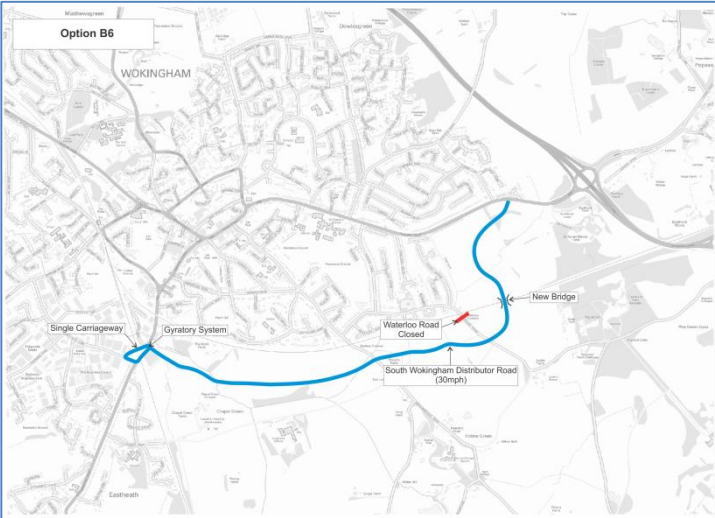
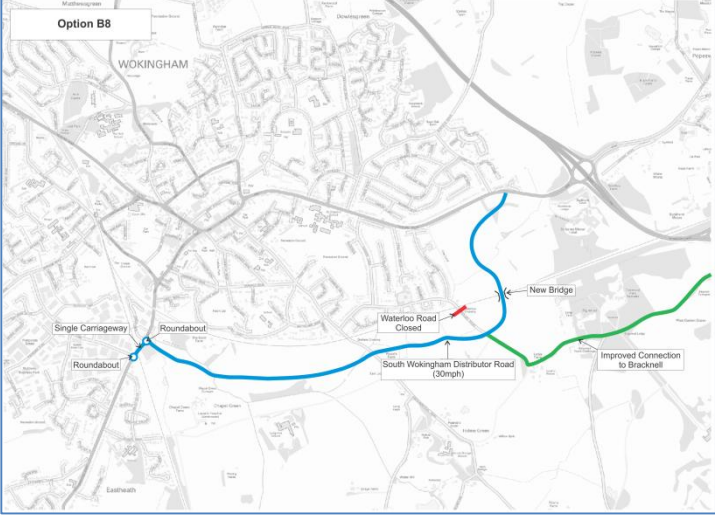
5.1.16 Fourteen variations of Option B have been considered and the impact of each of them is summarised in Table 5.2.

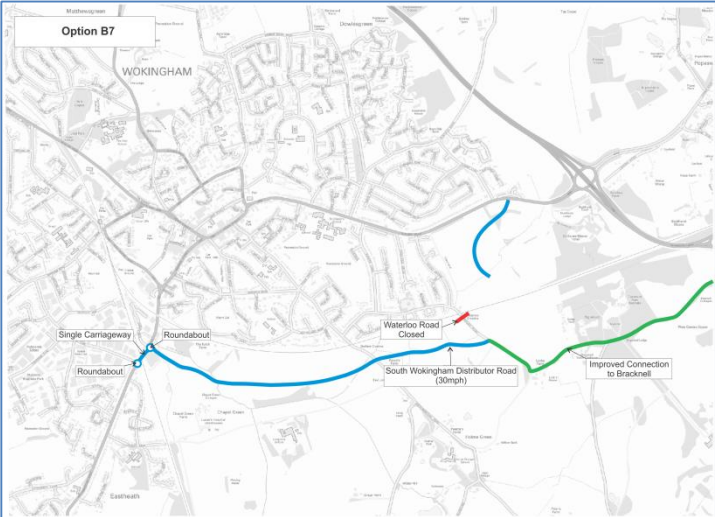
Table 5.2: Option tests summary results

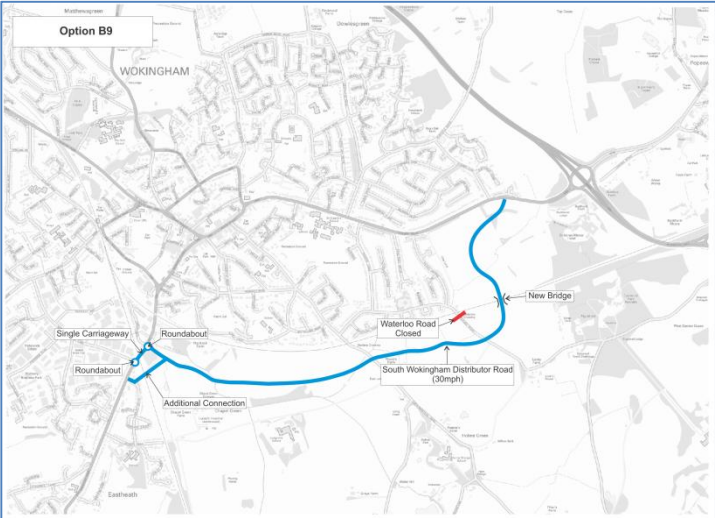
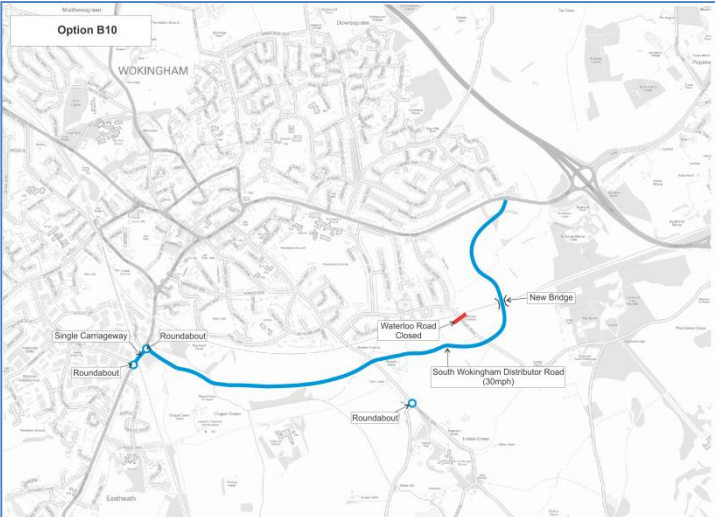
Option	Description	Traffic Effect
B1	 <p>Option B1 is based on Option B but assumes that the SWDR is a single lane carriageway with a higher than in Option B speed limit of 40 mph.</p>	<ul style="list-style-type: none"> Option B1 has been compared against Option B The higher speed limit in Option B1 is likely to make the SWDR a more attractive route resulting in approximately an additional 300-450 two-way pcu in the AM peak and approximately 150-450 two-way pcu in the PM peak. This in turn would provide an additional relief to WTC including the A329 London Road, Rances Lane, Wellington Road, Rectory Road, Peach Street, Denmark Street, Elms Field Link Road and Gypsy Lane Similar to Option B both the western and the northern ends of the SWDR are predicted to be a source of congestion in 2026 with the VoC values approaching or exceeding 100% both in the AM and PM peaks
B2	 <p>Option B2 is based on Option B but assumes that Waterloo Road is open south of Priest Avenue.</p>	<ul style="list-style-type: none"> To understand the impact of closing Waterloo Road level crossing Option B has been compared against Option B2 The Waterloo Road level crossing closure in Option B results in a reduction of traffic on Priest Avenue of around approximately 136-156 two-way pcu in the AM and approximately 232-339 two-way pcu in the PM. This traffic finds alternative routes via Rances Lane, Easthampstead Road and the SWDR (the section east of the Waterloo Road/SWDR junction) The closure of Waterloo Road level crossing makes little change to the operation of the SWDR junctions with both the western and the northern ends of the SWDR likely to be a source of congestion in 2026 with the VoC values approaching or exceeding 100% both in the AM and PM peaks

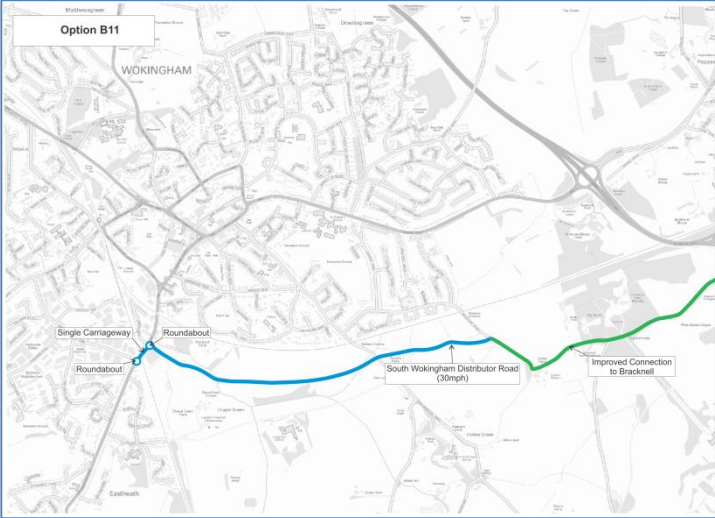
Option	Description	Traffic Effect
B3	 <p>Option B3 tests a dual two lane carriageway between the Tesco and Molly Millar's Lane roundabouts on Finchampstead Road using Option B test as the basis.</p>	<ul style="list-style-type: none"> ■ Option B3 has been compared against Option B ■ In the AM peak the increased capacity on Finchampstead Road between the Tesco and Molly Millar's Lane roundabouts results in some reassignment of traffic from the A329 London Road to the SWDR with around 100 additional two-way pcu on the SWDR and around 100 two-way pcu less on the A329 London Road. ■ In the PM peak in Option B3 the resultant traffic on the SWDR is up to approximately 115 pcu higher than in Option B. In the PM peak the additional traffic is attracted from a number of routes and not one or two distinct ones as in the AM peak. ■ Dualling of Finchampstead Road between the Tesco and Molly Millar's Lane roundabouts results in a substantial reduction in VoC values (to less than 54% in the AM and less than 62% in the PM) on the section of Finchampstead Road between the two roundabouts, which is likely to eliminate the blocking back effect as predicted by the Option B model. ■ At the same time the VoC values to the north and to the south of this section of Finchampstead Road increase slightly as the traffic on Finchampstead Road approaching from the north and south gives priority to the Molly Millar's Lane - Finchampstead Road – SWDR movement at Tesco and Molly Millar's Lane roundabouts. ■ This area was examined in more detail as part of the micro-simulation modelling.

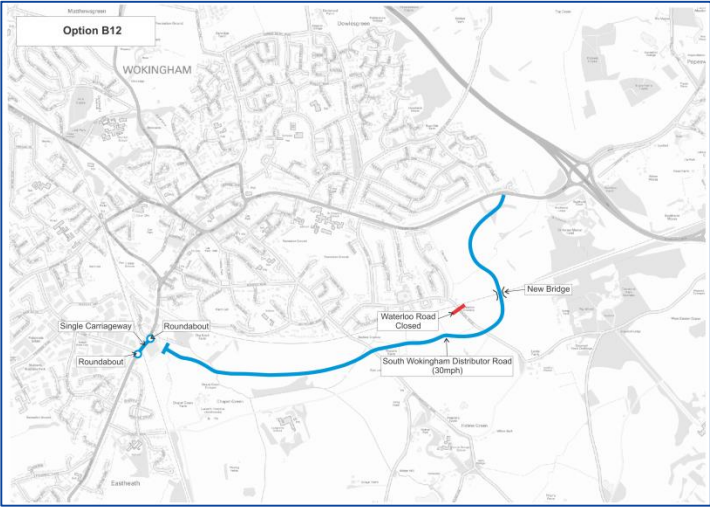
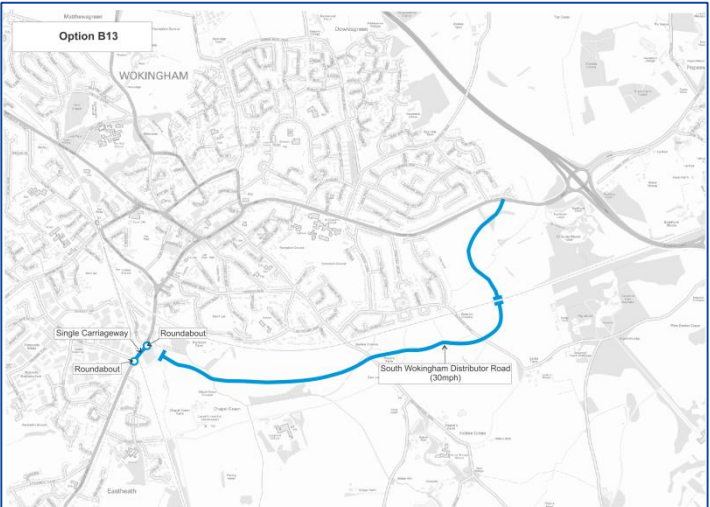
Option	Description	Traffic Effect
B4	 <p>Option B4 tests signal controlled junctions instead of the Tesco and Molly Millar's Lane roundabouts on Finchampstead Road using Option B test as the basis.</p>	<ul style="list-style-type: none"> ■ Option B4 has been compared against Option B ■ The introduction of signals at the Tesco and Molly Millar's Lane junctions results in a wider network reassignment ■ The main changes include: a reduction in traffic volumes approaching the junctions from the south and north on Finchampstead Road and an increase in traffic on the Molly Millar's Lane approach to the Finchampstead Road/ Molly Millar's Lane junction ■ The changes in traffic flows on the SWDR are negligible ■ Signalising of the Tesco and Molly Millar's Lane junctions in Option B4 does not bring a congestion relief to the western end of the SWDR with the VoC values remaining high at around 100%. However, compared to a roundabout arrangement signals would allow a better control of traffic flows at this location. ■ This area was examined in more detail as part of the micro-simulation modelling.
B5	 <p>Option B5 tests a dual two lane carriageway between the Tesco and Molly Millar's Lane roundabouts on Finchampstead Road using Option B4 test as the basis (i.e. signals rather than roundabout control)</p>	<ul style="list-style-type: none"> ■ Option B5 has been compared against Option B4 ■ The increased capacity on Finchampstead Road between the Tesco and Molly Millar's Lane signals results in negligible reassignment of traffic across the network. ■ Changes in the VoC values are also negligible with the exception of the section of Finchampstead Road between the Tesco and Molly Millar's Lane junctions. In the AM peak the VoC drops down from 98% in option B4 to 90% in Option B5 in the northbound direction and from 89% to 75% in the southbound direction. In the PM peak the changes in VoC values are negligible. ■ This area was examined in more detail as part of the micro-simulation modelling.

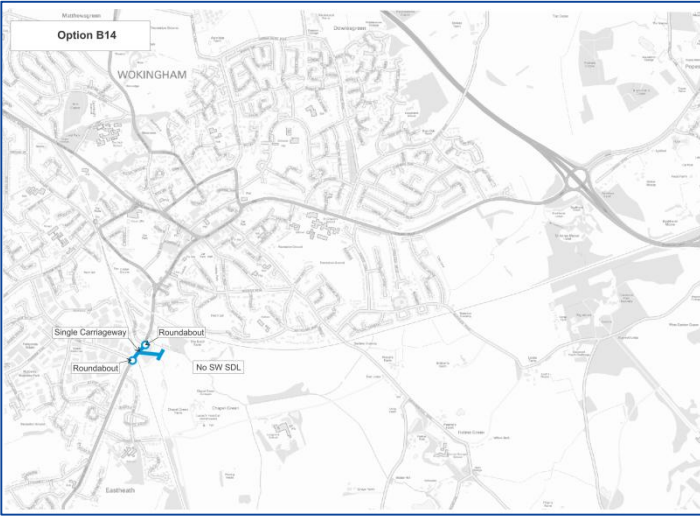
Option	Description	Traffic Effect
B6	 <p>Option B6 assumes a large roundabout at the Finchampstead Road/SWDR intersection.</p>	<ul style="list-style-type: none"> ■ Option B6 has been compared against Option B ■ The alternative layout provides a lot more capacity than the two roundabouts in Option B, which attracts substantial volumes of additional traffic from across the network into the Finchampstead Road and the SWDR - Molly Millar's Lane corridors. ■ In the AM and PM peaks the flow on Finchampstead Road increases by up to around 500 pcu in both directions. The increase in traffic flow on Molly Millar's Lane is of a similar magnitude. ■ The impact on the VoC in the area of interest is mixed with the SWDR-Molly Millar's Lane movement likely to experience less congestion than in Option B. ■ There is little change to the travel conditions on Finchampstead Road with VoC values still being high which may be due to additional traffic attracted to the corridor.
B8	 <p>Option B8 tests an improved connection to Bracknell via Waterloo Road and Peacock Lane.</p> <p>It should be noted that Option B8 is reported before Option B7 to show the incremental impact of changes associated with improved connection to Bracknell.</p>	<ul style="list-style-type: none"> ■ Option B8 has been compared against Option B ■ An improved connection to Bracknell is forecast to attract travellers that would otherwise use the A329M and A329 Berkshire Way to get to and from Bracknell and further to the M3. ■ In the AM the flow on a section of Berkshire Way between Coppid Beech and Vigar Way reduces by approximately 148 pcu in the eastbound direction and approximately 167 pcu in the westbound direction. In the PM the impact is less material with a reduction of approximately 51 pcu in the eastbound direction and no change in flow in the westbound direction. ■ The improved section of Waterloo Road also makes the north-south route through Old Wokingham route more attractive to traffic that used A321 Finchampstead Road, A3095 Mill Lane or A322 Bagshot Road in Option B attracting up to approximately 258 and approximately 240 additional pcu in the AM and PM respectively,

Option	Description	Traffic Effect
		<p>predominantly in the southbound direction.</p> <ul style="list-style-type: none"> ■ The change of the Old Wokingham/Peacock Lane/Waterloo Road junction type from a priority to a roundabout results in a reassignment of traffic from Easthampstead Road – Old Wokingham Road route (around 142 pcu in the AM and approximately 325 pcu in the PM) to a more logical shorter route via Waterloo Road. ■ In comparison with Option B the improved connection to Bracknell provides little change to congestion at the northern and western ends of the SWDR.
B7	 <p>Unlike Option B, Option B7 assumes that the bridge that would allow a through route between the A329 London Road in the north and the A321 Finchampstead Road in the west is not provided but the connection to Bracknell via Peacock Lane is improved.</p>	<ul style="list-style-type: none"> ■ To understand the incremental impact of not providing the bridge, Option B7 flows have been compared against Option B8 flows ■ If the bridge is not provided traffic that used SWDR as a through route or to access the South Wokingham SDL development or other areas of Wokingham will be finding alternative routes to reach their destinations. ■ The increases in traffic are likely to affect A329 London Road, A321 Finchampstead Road, Easthampstead Road, Priest Avenue, Rances Lane and others both in the AM and PM peaks. ■ The non-provision of the bridge makes little change to the operation of the SWDR junctions with the western end of the SWDR likely to be a source of congestion in 2026 both in the AM and PM peaks. As far as the northern end of the SWDR is concerned the congestion is likely to occur in the PM but not in the AM.

Option	Description	Traffic Effect
<p>B9</p>	 <p>Option B9 is based on Option B but assumes that an additional connection is provided between the SWDR and Finchampstead Road south of Molly Millar's Lane. The additional link is connected to the A321 Finchampstead Road via a roundabout.</p>	<ul style="list-style-type: none"> ■ Option B9 has been compared against Option B ■ In the AM peak the additional link between the SWDR and Finchampstead Road is forecast to attract around 515 pcu in the eastbound direction and approximately 271 pcu in the westbound direction thus relieving a section of Finchampstead Road by up to approximately 283 pcu in both directions. ■ In the PM peak the additional connection is predicted to carry around 306 pcu in the eastbound direction and approximately 528 pcu in the westbound direction with a proportion of this traffic reassigning from Finchampstead Road. ■ An introduction of a new connection, which provides additional capacity in the area around the two existing congested roundabouts, also results in a reassignment of traffic with traffic increases forecast on Finchampstead Road, Molly Millar's Lane and SWDR. ■ Though in comparison with Option B the western end of the SWDR shows an improvement in the operation of existing roundabout, it is forecast to remain congested in Option B9, which is mainly a result of the additional traffic attracted to the corridor.
<p>B10</p>	 <p>Option B10 is based on Option B but assumes that the</p>	<ul style="list-style-type: none"> ■ Option B10 has been compared against Option B ■ In the AM peak an easier access from Heathlands Road to Easthampstead Road results in a reassignment of traffic to Heathlands Road (up to approximately 196 northbound and up to approximately 36 southbound pcu) from alternative parallel routes including Finchampstead Road and Easthampstead Road. ■ A change in traffic flows between Option B10 and Option B in the PM peak test is negligible. ■ The modelling results are slightly different to an expectation that

Option	Description	Traffic Effect
	existing priority junction at the Heathlands Road/Easthampstead Road intersection is a roundabout with a two-lane approach on each arm.	an improvement at this junction would encourage a greater transfer of traffic from Finchampstead Road to Easthampstead Road. The Select Link (SL) analysis undertaken on the A321 Sandhurst Road using the AM peak Option B scenario shows that there is a potential to transfer 200-300 pcu in each direction. However, the journey times achievable through Easthampstead Road may not be attractive enough due to delays along Nine Mile Ride and on the approach to Peach Street and due to capacity constraints caused by on-street parking and school access on Easthampstead Road.
B11	 <p>This option is similar to Option B7 but assumes that Waterloo Road remains open south of Priest Avenue, no bridge connection to/from the A329 London Road</p>	<ul style="list-style-type: none"> ■ To understand the impact of closing Waterloo Road level crossing, Option B11 has been compared against Option B7 ■ The Waterloo Road level crossing closure results in a reduction of around 477 pcu in the AM and approximately 684 pcu in the PM driving through Priest Avenue in both directions. This traffic finds alternative routes via Rances Lane, Easthampstead Road, the SWDR and Wokingham Town Centre. ■ The closure of the Waterloo Road level crossing makes little change to the operation of the SWDR junctions with the western end of the SWDR likely to be a source of congestion in 2026 with the VoC values approaching or exceeding 100% both in the AM and PM peaks.

Option	Description	Traffic Effect
B12	 <p>This option is based on Option B but assumes that the connection from Tesco to the A321 Finchampstead Road is not provided.</p>	<ul style="list-style-type: none"> ■ To understand the impact of not providing the connection from Tesco to the A321, Option B12 has been compared against Option B ■ Under Option B12 the through traffic is predicted to route via the Wokingham Town Centre instead of the SWDR using the A329 London Road, Peach Street, Denmark Street and Finchampstead Road north of Oakey Drive. ■ The traffic reassignment has a wider effect with increases in traffic flows predicted along the NWDR. ■ The western end of the SWDR remains congested in Option B12 with the VoC values approaching or exceeding 100% both in the AM and PM peaks.
B13	 <p>Option B13 is based on Option B but assumes that the connection between the Tesco's roundabout and the A321 Finchampstead Road is removed and the bridge on the eastern section of the SWDR is not delivered (the Waterloo Road level crossing remains operational).</p>	<ul style="list-style-type: none"> ■ Option B13 has been compared against Option B ■ In Option B13 traffic re-routes via the A329 London Road, Peach Street, Denmark Street and Finchampstead Road north of Oakey Drive. ■ The traffic reassignment has a wider effect with increases in traffic flows also predicted along the NWDR. ■ The western end of the SWDR remains to be congested in Option B13 with the VoC values approaching or exceeding 100% both in the AM and PM peaks.

Option	Description	Traffic Effect
B14	 <p>Based on Option B but assumes that South Wokingham SDL including the associated on-site infrastructure and the SWDR are not delivered.</p>	<ul style="list-style-type: none"> ■ Option B14 has been compared against Option B ■ Under Option B14 (South Wokingham SDL is not delivered and the SWDR is not provided) there is an increased impact on the Wokingham town centre routes, which is not a direct impact of the additional South Wokingham trips but traffic coming from somewhere else. ■ The strategic nature of the SWDR is highlighted. ■ Under Option B14 the A321 Finchampstead Road north of the Molly Millar's is predicted to be congested with the VoC values approaching or exceeding 100% both in the AM and PM peaks.

5.2 Finchampstead Road Microsimulation Modelling

- 5.2.1 Microsimulation modelling was undertaken to appraise different layout options (four scenarios listed below) for the junctions of A321 Finchampstead Road / Molly Millar's Lane and A321 Finchampstead Road / Tesco Access (Proposed Southern Distributor Road). A Local Model Validation and Future Options Testing Report is included in Appendix L and a summary of the results are presented below.
- 5.2.2 Numerous layouts were conceived and tested to the 2026 predicted year within the WSTM prior to microsimulation modelling. Most either drew too much traffic to the area or created too much delay. Four feasible layouts were settled on for further testing within the microsimulation software:
- **Do Nothing:** Leave existing network unchanged.
 - **Scenario 1:** A larger roundabout at the junction with Molly Millar's Lane, similar sized to that at Tesco and an altered alignment under a new bridge, retaining the current two way single lane arrangement.
 - **Scenario 2:** The same as scenario 1, but with a two way dual lane arrangement under the railway.
 - **Scenario 3:** Conversion of the two current roundabouts into signalised junctions, retaining the current two way single lane arrangement.
 - **Scenario 4:** The same as scenario 3, but with a two way dual lane arrangement under the railway which would require a larger bridge to be constructed.
- 5.2.3 The results of the modelling - in Table 5.3 below - showed that a larger roundabout at Molly Millar's Lane with single lanes between (Scenario 1) had the least delay. It had marginally less delay (1 min) than the Do Nothing scenario, whereas all the other scenarios created more delay.

Table 5.3: Sum of the Average delay (per vehicle) on all approaches

Scenario	Sum of average delay per vehicle on all approaches. (Seconds)			Sum of average delay per vehicle on all approaches. (Minutes)			Total Vehicles In Entire Network	
	AM	PM	Total	AM	PM	Total	AM	PM
1 – Roundabout - Single Lane	872	665	1537	15	11	26	4144	4434
2 – Roundabouts – Dual Lane	1134	1180	2314	19	20	39	4312	4641
3 – Signals – Single Lane	1237	1818	3055	21	30	51	3811	4148
4 – Signals – Dual Lane	1364	1354	2719	23	23	45	4129	4196
Do Nothing	898	724	1622	15	12	27	4144	4434

- 5.2.4 Table 5.3 shows that depending on the layout, the total number of vehicles in the network changes. This is due to the differing capacities between layouts and the relative throughputs achieved between signals and roundabouts. It can be seen that signals constrain the network and vehicles divert to different routes, despite this reduction in traffic the signal scenarios still have associated delays higher than that of the roundabout scenarios. It should be noted that the column showing total vehicles in the network is displayed as an indicator of the relative attractiveness of the route depending on the layouts used. It should not be divided between the delay shown in the other columns as it encompasses all vehicles in the network and not just the ones present in the queuing assessed in the seconds and minutes columns.
- 5.2.5 It was observed in the modelling that for every scenario there were delays created by the Carnival Pool Roundabout that impacted the northbound A321 Finchampstead Road traffic. This was due to a high right turn from Denmark Street into Wellington Road and the Leisure Park preventing vehicles on Finchampstead Road entering the roundabout. The delays created tailed back to Tesco and with the northbound exit route blocked, this would quickly reach Molly Millar's Lane. This problem is confirmed by local observations and is likely to be exacerbated as traffic growth occurs in the future.
- 5.2.6 There is currently no identified improvement scheme available for the Carnival Pool Roundabout. A test was undertaken that assumed removal of the delay at Carnival Pool Roundabout, to assess whether an improvement scheme should be looked at here to help the wider corridor perform better. The results of this test are presented in Table 5.4 below – They show that across every scenario the delay reduces leaving both scenario 1 and 2 showing an improvement over the Do Nothing scenario. Scenario 1 was still the best performing of the two.

Table 5.4: Sum of the Average delay (per vehicle) on all approaches, excluding delays created by Carnival Pool Roundabout

Scenario	Sum of average delay per vehicle on all approaches. (Seconds)			Sum of average delay per vehicle on all approaches. (Minutes)			Total Vehicles In Entire Network	
	AM	PM	Total	AM	PM	Total	AM	PM
1 – Roundabout - Single Lane	622	652	1274	10	11	21	4144	4434
2 – Roundabouts – Dual Lane	860	710	1570	14	12	26	4312	4641
3 – Signals – Single Lane	1228	1758	2986	20	29	50	3811	4148
4 – Signals – Dual Lane	922	978	1900	15	16	32	4129	4196
Do Nothing	898	724	1622	15	12	27	4144	4434

- 5.2.7 Scenario 1 and 2 had assumed an uncontrolled crossing point for pedestrians while the signal junctions included for pedestrian facilities integrated into the junctions. Testing was undertaken to include for a signalised pedestrian crossing at the midpoint between the two roundabouts in scenarios 1 and 2. This showed that overall an extra two minutes delay was created by the signalised crossings in each scenario, making the Do Nothing scenario the option with least delay.
- 5.2.8 Any progression of scenario 1 over the Do Nothing would require provision of an uncontrolled crossing point, rather than a signalised one to maintain any traffic benefits created by the scheme.
- 5.2.9 The two scenarios with the lowest delay, Scenario 1 and 2, each attracted differing levels of traffic when modelled in the WSTM. It may be expected that the dual lane scheme offers greater benefits due to the increase in storage capacity between the junctions; however, due to the increased capacity attracting more vehicles to use the route, any benefits initially created by this at opening year are quickly eroded to the point of being worse in the forecast year.
- 5.2.10 A single lane configuration does the opposite and, relatively speaking, discourages vehicles using the route in the future and keeps total delay to a minimum. Even taking into consideration the greater number of vehicles present in the dual lane scenarios the delay is still proportional and a single lane configuration is optimal.

5.3 Summary

- 5.3.1 A significant investigation has been undertaken to examine the potential impacts of the SWDR on the surrounding highway network and routes through Wokingham Town and to the strategic highway network (A329 and A329(M)).
- 5.3.2 Of the three basic base options (A, B and C) there is likely to be minimal difference in the overall traffic patterns created by the introduction of the SWDR itself, and although slight differences in route length can, in theory, increase or decrease link flows the differences between options A, B and C would in practice be negligible.

-
- 5.3.3 A number of sensitivity tests were undertaken using the Option B case as the base option against which comparisons have been made. This testing has assisted in highlighting what aspects of the scheme are critical to achieving the overall objective of providing access to the SDL area and also reducing the overall impact of the SDL housing on the majority of the local highway routes whilst providing an alternative route for traffic which wants to pass through the town centre to other destinations.
- 5.3.4 WSP recommend closer of the Waterloo Road level crossing, when the proposed railway bridge crossing and through route is completed. This reduces traffic impacts on routes between the SDL areas and the existing routes through to the A329 (roads such as Rances Lane and Priest Avenue). However, we recognise that this could inconvenience local residents and an alternative pedestrian / cycle facility would need to be provided, which has its own constraints.
- 5.3.5 Some improvement to the highway route leading to Jennetts Park and the Southern Industrial Area would be beneficial, especially for access by non-car modes to the employment and residential areas and some options for consideration were set out in section 4, especially junction improvement at Old Wokingham Road and off road cycle link.
- 5.3.6 The micro-simulation assessment at the A321 Finchampstead Road / Molly Millars / Tesco roundabouts has indicated that the most appropriate junction layout option would be for improved roundabouts (including an increase in size of the A321 Finchampstead Road / Molly Millars Lane) linked by a single lane highway with suitable approach flares on all arms with pedestrian crossing facilities incorporated between the two roundabouts at the narrowest cross section. Testing with the WSTM and micro-simulation determined that there was minimal traffic benefit of having a dual lane link between the two roundabouts and that traffic signal junctions would be less efficient than roundabouts.
- 5.3.7 The team acknowledge that it is not possible to produce a “nil-detriment” highway layout at this location and that in the future there is an expectation of an increase in queuing and congestion in this section of the highway. However, we would outline that this needs to be balanced with the overall improvement in traffic conditions elsewhere; in and around the town and on routes leading from the SDL area northwards (through Rances Lane, Priest Avenue and Waterloo Road for example).

6 Recommendations

6.1 Recommended Option

- 6.1.1 A considerable evidence base and investigation has been undertaken to examine the provision of the South Wokingham Distributor Road (SWDR), the potential impacts of various route options and a number of sensitivity tests focusing on junction layouts at the A321 Finchampstead Road. There is a significant body of evidence and consultant comment within the reports and appendices. Where possible, summaries are provided.
- 6.1.2 The approach undertaken by the team has not included any assessment of the costs of interventions but the team appreciates that there are potential hurdles with delivery of certain aspects of the SWDR and there will be key challenges for the Council and Developers to overcome. These are focused most critically on:
- The bridge over the railway between the SW SDL and Montague Park;
 - Crossing the flood plain close to Tesco's;
 - Highway connection between SWDR and A321 Finchampstead Road;
 - Bridge improvements on the A321 Finchampstead Road; and
 - Provision of footway / cycle crossing of the railway linking the new Strategic Development Location (SDL) with existing residential areas, town centre and local facilities and schools.
- 6.1.3 The sensitivity testing undertaken in the Council's traffic model (WSTM) would indicate that there is a benefit in providing the above pieces of infrastructure and thus providing a continuous highway route to access the SDL and also to provide an alternative link between the A329 (Coppid Beech) to the A321 Finchampstead Road and Molly Millars area.
- 6.1.4 General route options (A, B and C) were examined and, given the limited space between the railway line (Reading – London Waterloo) and the southern boundary of the SDL, the evidence collected and summarised in this report would indicate that there is very little to choose between the main route alignments in terms of traffic impact.
- 6.1.5 However, there are enough small differences between the three (mainly on engineering and environment grounds) to identify that the SPD (Option B) alignment would be more appropriate. Option B, the general SDL SPD alignment, can provide a better balance of impact on the local area, if small changes in the alignment were made to reduce impacts on items such as the flood plain.
- 6.1.6 The provision of Option B will still require detailed assessment and investigation for the likely provision of mitigation measures to offset potential impacts on items such as noise, visual intrusion and flood plain for instance, but these can be incorporated in to the overall development area, as part of the SDL scheme.
- 6.1.7 Detailed traffic modelling of the A321 Finchampstead Road / Tesco's / Molly Millars area has indicated that there could be increased delays and congestion with and without the highway scheme and SDL development. WSP acknowledge that it is not possible to produce a "nil-detriment" highway layout at this location, given the land and flood constraints and the additional traffic movements that are expected, and as such we would anticipate there to be an increase in queuing and delay in this section of the highway. However, we would outline that this needs to be balanced with the overall improvement in traffic conditions elsewhere; in and around the town and on routes leading from the SDL area northwards (through Rances Lane, Priest Avenue and Waterloo Road for example).

-
- 6.1.8 The traffic modelling undertaken would indicate that there is little “traffic benefit” in providing a dual two lane link between the two roundabouts on Finchampstead Road. There would be greater impacts on local residents immediately in the vicinity of the dual link compared to a single link. However, the team recognise that there could be advantages of providing dual link for future operational maintenance.
- 6.1.9 To achieve a highway improvement (at A321 Finchampstead Road / Molly Millars) it is anticipated that the Southern Railway Bridge would need to be improved to allow full height HGV access to and from the industrial and commercial areas in Molly Millars Lane. The form of this bridge and highway layout will need some further refinement from those options presented by Network Rail (NwR) and consideration will be needed on the impacts of temporary works closures and construction approaches. The width of any bridge opening will need to be given careful consideration as to the potential to achieve longer term benefits in terms of highways operation and future maintenance if provided with a dual link (as outlined above).
- 6.1.10 Improvement of the Northern rail bridge is not necessarily needed as part of the traffic solution on the A321. However, the team consider that access to the town centre would be greatly improved by a wider bridge opening which could provide wider footways and provide options for improving the public realm. We would suggest that further work by WBC / NwR is undertaken to consider if an alternative to full bridge widening is needed and whether a separate subway approach might be more cost effective, through the existing western (Majestic Wine) embankments).

WSP UK Limited
Mountbatten House
Basing View
Basingstoke
RG21 4HJ
UK
Tel: +44 (0)12 5631 8800
Fax: +44 1256 318 700
www.wspgroup.co.uk

UNITED
BY OUR
DIFFERENCE

