A38 Derby Junctions

TR010022

Volume 6

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Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

April 2019

Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

A38 Derby Junctions Development Consent Order 202[ ]

6.3 Environmental Statement Appendices
Appendix 3.2: Options Assessment – Little Eaton

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A38 Derby Junctions Improvement

Options Assessment – Little Eaton

Report Number: 47071319-URS-06-RP-RD-013-6F
January 2016

Contents

EXECUTIVE SUMMARY

This report details the assessment of the alternative scheme options for the A38/A61 Little Eaton junction, as received following the public consultation held in February/March 2015. It sets out the options considered, provides cost estimates and assesses the options in terms of engineering, environmental and traffic/economic considerations.

General

Highways England (formerly Highways Agency) intends to improve the three, existing, at-grade junctions on the A38 at Derby, namely the

- A38/A5111 Kingsway roundabout
- A38/A52 Markeaton roundabout
- A38/A61 Little Eaton roundabout

As part of the scheme development, Highways England held a non-statutory consultation exercise to

- Raise awareness and understanding of the need and rationale for the proposed junction improvements; and
- Obtain objective feedback to enable the scheme design to be refined and developed prior to statutory consultation in advance of Development Consent Order (DCO) application planned for 2017.

Scheme Proposals

The proposed improvements at Little Eaton junction, as shown at the consultation events, involve the following key elements:

- Construction of the A38 on a new embankment to the south and east of the existing junction at Little Eaton, with construction of associated overbridges and slip roads for the local road network;
- Closure of the existing access from Ford Lane onto the A38

Consultation Feedback

Although the Little Eaton junction layout presented at the consultation (the Presented Option) was generally well received (63% of respondents in agreement with the proposals), some respondents felt that a decision on the preferred option had already been taken and their views would, therefore, be of no consequence. These individuals were of the opinion that the previous consultation exercise held in 2003 was never concluded so there was no evidence that the Presented Option was the 'preferred' option as stated in the consultation literature and display boards.

Options

As a result of the consultation feedback, which included some alternative options being suggested, an options assessment was carried out. Following an initial sifting exercise ("Initial Assessment"), several options were identified as warranting further examination:

- The Presented Option (as published in the 2015 consultation);
- Option 2 (from the 2003 consultation);
- Option 3A; and
- The "Southern Sweep".

The latter two options were provided by members of the public that had a specific interest in the impacts of the scheme on Breadsall village; they are essentially variants on the Presented Option but with the alignment moved further away from the village. There were

also other respondents who considered Option 2 should still be offered as an option as the 2003 consultation was never formally concluded.

The results of the Initial Assessment are presented in Appendix A. The full sifting process is detailed in the Report on Public Consultation (ref: 47071319-URS-02-PCF-PM-009).

The options to be assessed in more detail were developed to layout plans at 1:2500 scale to indicate the approximate dimensions of the embankments, cuttings and the locations of principal structures. From these layout plans, the engineering, environmental, traffic and economic advantages, disadvantages and constraints associated with the options were identified. These were used to evaluate and compare the options on a qualitative basis.

Comparison of Options

The results are summarised in the table below. Options were assessed and ranked in order of preference across a number of sub-headings for each of the themes: Cost, Engineering, Environment and Traffic and Economics. A ranking of 1 being assigned to the best performing option. The colours displayed in the table below represent the option preference; darkest green the most preferred option; lighter green second; amber is third and red represents the least preferred option.

Summary of Results	Presented Option	Option 2	Option 3A	Southern Sweep
Cost	1	3	4	2
Engineering	2	1	4	3
Environment	3	4	2	1
Traffic & Economics	1	3	4	2
Overall Ranking	**1**	**3**	**4**	**2**

Option 3A

Option 3A performs poorly across a number of the assessment headings and is consequently, least preferred. This is principally due to the cost of construction associated with the temporary diversion route and longer construction period compared to the Presented Option; the need for a temporary diversion and the higher traffic disruption expected during construction; and the effects of the restricted turning movements at the junction itself.

Option 2

While Option 2 offers a number of benefits due to the improved highway alignment and that the route can be constructed with least impact upon existing A38 traffic, the cost is noticeably higher than the Presented Option principally due to the high impact of land take affecting residential properties and local businesses. Similarly, the high land take contributes to the low environmental performance. In addition, the benefits of the improved alignment of the A38 in comparison to the other options is largely offset by the more complex slip road loops. This results in a net increase in daily vehicle-kilometres and potential road safety problems.

Presented Option and the Southern Sweep

Overall the Presented Option and the Southern Sweep are closely matched and the differences between the options are small. The Presented Option can be delivered for considerably lower cost principally as a result of the Southern Sweep requiring construction and maintenance of a temporary diversion route and a longer construction period. Although the Southern Sweep is preferred in environmental terms, the differences are marginal and it

should be noted that the construction and use of the temporary diversion route are likely to exacerbate land take effects and construction phase effects.

Although the Presented Option requires permanent land-take to the south and east of the existing junction within an area of open, previously undeveloped land, the Southern Sweep will also impact some of this area, as a result of the temporary diversion route. Despite the diversion route only being required for the duration of the construction works, and not post-construction, the effects on land use and nature conservation would be longer lasting. This includes the loss of some of the existing tree plantation between the western edge of Breadsall village and the A38.

The assessment shows that, compared to the Southern Sweep, the Presented Option is preferred as it performs better in terms of engineering aspects; and traffic and economics, while offering a considerable cost saving.

Recommendations and Conclusions

The comparison shows that while the Presented Option may not rank highest in each category or sub-category, in overall terms, the Presented Option performs the best.

Based on this assessment of the options and bearing in mind the limitations of the qualitative nature of the study, it is recommended that the Presented Option should be progressed as the preferred option for the A38/A61 Little Eaton junction.

However, there are areas where the Presented Option has greater impact than the alternative options. In order to minimise these effects it is important that appropriate mitigation measures are considered as part of the ongoing scheme assessment and incorporated into the final designs. These should be developed in conjunction with the key stakeholders.

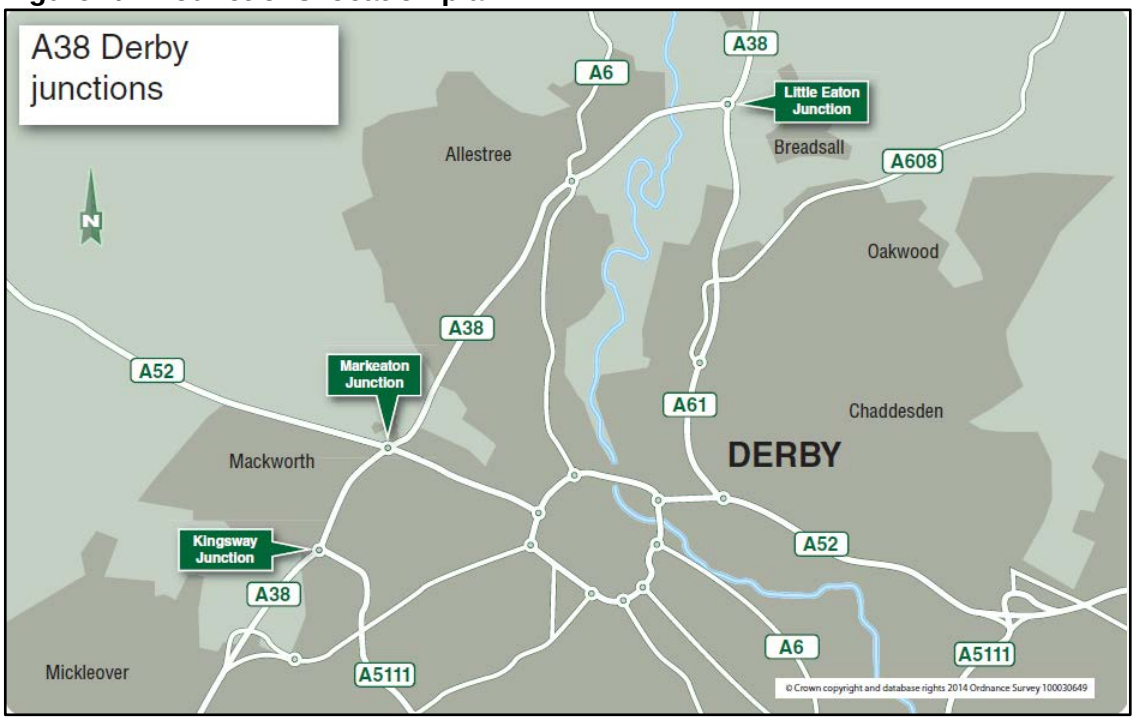
1. INTRODUCTION

1.1. Scheme Introduction

1.1.1. The A38 is the strategic route from Birmingham to Derby and through to the M1 at Junction 28. It carries significant volumes of north-south long distance traffic. Where the A38 passes through Derby, significant volumes of traffic making local journeys cross, join and leave the A38. This disrupts, and is disrupted by, the strategic traffic resulting in congestion and delay at the three at-grade roundabout junctions, to the west and north of Derby City Centre. A location plan showing the position of the junctions is shown in Figure 1/1 below. The three junctions are:

- A38/A5111 Kingsway roundabout;
- A38/A52 Markeaton roundabout; and
- A38/A61 Little Eaton roundabout.

Figure 1/1 – Junctions location plan



1.1.2. The free-flow of traffic on the A38 as it passes the west of Derby is currently constrained by the at-grade roundabout junctions at Kingsway, Markeaton and Little Eaton. Several proposals have been developed to address congestion at these junctions, most recently via the Government's 'Pinch Point' schemes, however these interim schemes were not intended to provide long-term relief from existing traffic congestion. As such, it has been identified that a grade-separated scheme on the A38 is still required.

1.1.3. The proposed A38 Derby Junctions Improvement scheme aims to improve economic competitiveness, the environment, journey time reliability and increase capacity; and to improve safety for both road users and non-motorised users.

1.2. Public Consultation

1.2.1. A non-statutory Public Consultation was carried out in February and March 2015. This included a two day exhibition in central Derby and supplementary exhibitions held in Breadsall, Little Eaton and Mackworth.

1.2.2. As a part of the consultation exercise, consultees were encouraged to indicate whether they were in favour of or against the scheme; to provide their comments on the scheme; and to provide suggestions for any alternative solutions.

1.2.3. All scheme options, identified from a review of the consultation feedback, have been considered under a two-stage assessment process comprising:

- an Initial Assessment as described below; and
- all options passing the Initial Assessment were then subject to a more detailed assessment as detailed in this report.

1.2.4. The purpose of the Initial Assessment was to sift the options to identify the better performing ones.

1.2.5. The Initial Assessment was a preliminary examination of each option carried out based on the information provided by the consultee and it followed the Department for Transport's web-based Transport Analysis Guidance (WebTAG) - The Transport Appraisal Process[1]. The assessment was against the following criteria:

- Scheme objectives;
- Deliverability; and
- Feasibility.

1.2.6. Options had to achieve a baseline score against each of these criteria in order to pass the Initial Assessment. The assessment process and outcomes are described in more detail in the Technical Note 47071319-HE-02-TN-PM-001 and the Report on Public Consultation (47071319-URS-02-PCF-PM-009). The summary of the outcomes is contained in Appendix A.

1.2.7. The Initial Assessment included the options published for the public consultation to form a baseline. Options identified by the public were then compared to the relevant baselined published option, combination of options or the whole scheme, as appropriate.

1.3. Report Purpose

1.3.1. The purpose of this Options Assessment report is to provide a detailed review of the alternative options for the A38/A61 Little Eaton junction deemed feasible and deliverable following the Initial Assessment and to recommend options to be progressed as part of the overall A38 Derby Junctions Improvement scheme.

1.4. Document Structure

1.4.1. This Options Assessment Report structure is based upon TD37/93 Stage 2 Assessment Report and is structured as follows:

Section 1 provides an introduction to the scheme and a brief background to its development

Section 2 provides details on the existing conditions of the junction.

Section 3 provides details on the options assessed.

[1] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/370529/webtag-tag-transport-appraisal-process.pdf

Section 4 provides the cost estimates of each of the junction options as well summarising the risks associated with each of the options and the programme for construction works.

Section 5 outlines the methodology used for engineering assessment and provides an engineering assessment of each of the junction options.

Section 6 outlines the methodology used for the qualitative environmental assessment and provides a qualitative environmental assessment of each of the junction options

Section 7 outlines the methodology used for the qualitative traffic and economic assessment and provides a qualitative traffic and economic assessment of each of the junction options.

Section 8 provides a comparison of the proposed options.

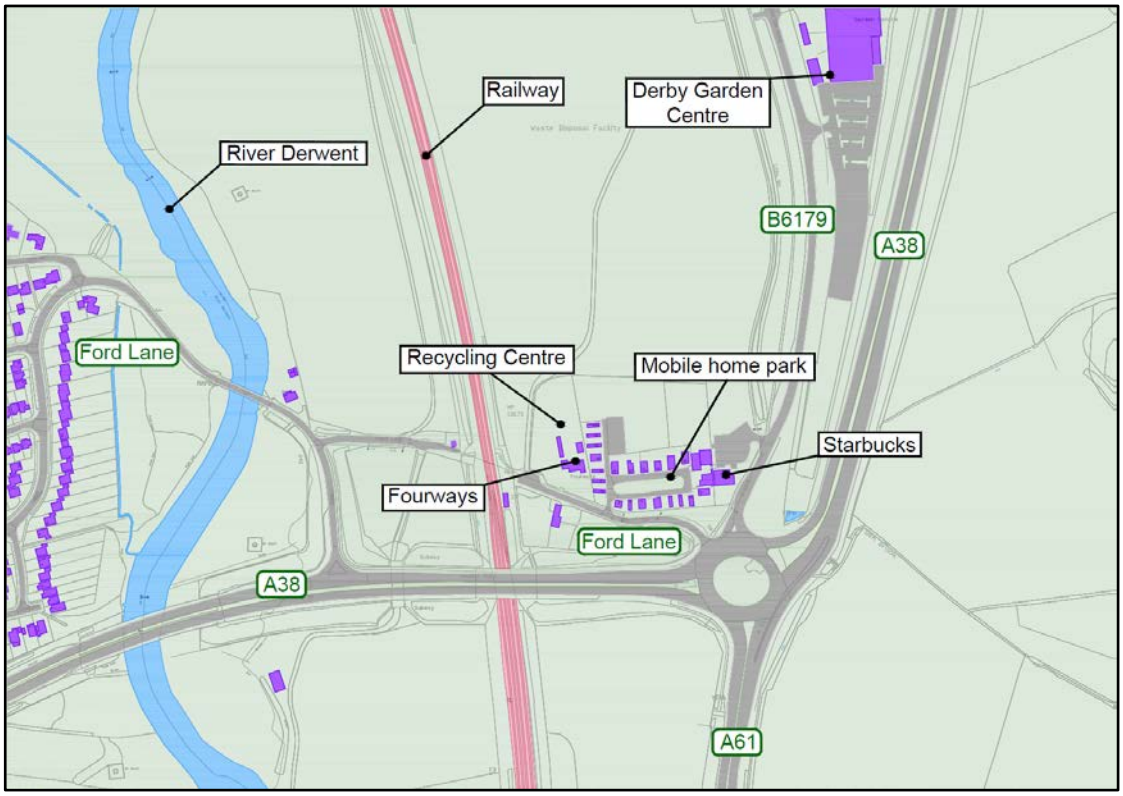
Section 9 provides recommendations for junction options to be progressed further.

2. EXISTING CONDITIONS

2.1. General

2.1.1. The A38/A61 Little Eaton Junction is situated to the north of Derby City. The 5 arms of the roundabout comprise the A38 dual carriageway to the north and west of the junction, the A61 dual carriageway to the south, the B6179 to the north and Ford Lane to the west. Ford Lane forms the only access to a mobile home park, "Fourways" and a recycling business. A garden centre occupies the space between the A38 and the B6179 Alfreton Road to the north of the roundabout.

Figure 2/1 – Existing Junction



2.1.2. Approaching the junction from the west, the A38 crosses over the River Derwent, a flood relief underbridge and then the Sheffield to Derby (Midland Mainline) railway before descending to the roundabout. Between the river bridge and the flood relief underbridge there is a "left in, left out" junction that provides access to the western element of Ford Lane. This section of Ford Lane is separated from the roundabout by the railway.

2.1.3. On the northbound exit from the roundabout, the A38 climbs at a gradient of approximately 5%. The A61 heads south from this junction to form a main radial route into Derby and also links to the A52 and the eastern part of Derby Ring Road. There is a dedicated left turn lane running from the southbound A38 to the A61.

2.1.4. The A38 to the north and to the west of the existing roundabout junction with the A61/B6179 is subject to the National Speed Limit (70mph). The A61 is also subject to the National Speed Limit; 70mph for a short distance before it becomes single carriageway when 60mph applies. The B6179 has a 40mph speed limit for some distance before it becomes 30mph through Little Eaton village.

2.1.5. The alignment of the A38 changes direction by approximately 90° through the existing junction. This feature provides a major challenge for any junction improvement. There is also a limited distance between the existing River Derwent bridge and the roundabout (approximately 500m), and between the roundabout and the underbridge at the water treatment works on the A38 to the north (approximately 650m).

2.1.6. High containment concrete barriers have been erected on the railway bridge and these are positioned at the edge of the carriageway and on the carriageway side of the footway to protect the original parapets, which do not meet current standards in terms of vehicle containment class.

2.1.7. The horizontal alignment over the River Derwent bridge is a right hand curve of approximately 810m radius. The existing visibility is in the order of 160m due to the central reserve safety fence when travelling east, and the bridge parapet when travelling west. The vertical geometry of the short element from the railway bridge to the current roundabout is likely to impose visibility constraints. This geometry equates to a design speed of 100kph (60mph) with a stopping sight distance 1 step below the desirable minimum when assessing it against current standards.

2.1.8. Modifications were made to the roundabout in 2014 as part of a 'Pinch Point' scheme. This was an interim measure to relieve congestion by carrying out improvements within the existing highway boundary. The scope of the Pinch Point works included:

- The installation of full-time traffic signals on the A38 northbound and southbound approaches and the A61 northbound approach to the junction;
- The introduction of a third lane on the northbound approach to increase the capacity of the junction, along with additional lanes provided on the circulatory carriageway for A38 northbound traffic turning right onto the A61;
- Minor geometry alterations to improve the A38 segregated left turn to the A61.

3. DESCRIPTION OF THE JUNCTION OPTIONS

3.1. The Presented Option

3.1.1. The layout of this option is shown on drawing HA514503-URS-06-DR-GD-25.012 contained in Appendix B.

3.1.2. Following an initial review of grade separation junction options in early 2003, this option was presented at a supplementary public consultation in October 2003. Work on the scheme was halted in 2005, recommenced in 2007 and put on hold again in 2008 before its revival in July 2014. In February 2015 the scheme was presented at public consultation to refresh and update public knowledge.

3.1.3. This solution provides full grade separation (two level) of the junction, with the A38 realigned to the south of the existing roundabout. This option avoids any impact on "Fourways", the mobile home park, Starbucks and the garden centre. However, the resulting alignment means that it lies to the south and east of the current dual carriageway and as a consequence is closer to the village of Breadsall to the east but further from Allestree to the west.

3.1.4. Extensive widening is required of both the central reserve and the northbound verge to provide the desirable minimum visibility for the stopping sight distance.

3.1.5. The existing underbridges over the railway line and the flood relief subway to the west of the railway line would need to be extended. The River Derwent bridge at the southern end of the scheme and the water treatment works underbridge at the northern end of the scheme would not be affected.

3.1.6. The existing roundabout would not be retained in its current layout, but some of the carriageway would be incorporated into a new roundabout. The existing A38 northbound carriageway would be retained for the northbound merge and diverge slip roads. Ford Lane east of the railway would be retained and would join the new roundabout between the northbound diverge slip and the B6179. Starbucks' and the garden centre's accesses off the B6179 would remain unaltered.

3.1.7. The A38 would cross the roundabout on two new bridges. Due to the alignment being close to the existing roundabout, lengths of retaining wall would be required where the A38 northbound merge and diverge and the southbound merge slip road connect to the new roundabout. The A61 and the A38 southbound slip roads would connect to the south side of the new roundabout.

3.1.8. The existing left in, left out junction immediately east of the river and west of the railway to Ford Lane (leading to and from Allestree) would be closed for safety reasons.

3.2. Option 2

3.2.1. The layout of this option is shown on drawing HA514503-URS-06-DR-GD-25.024 contained in Appendix B.

3.2.2. This option was presented at the 2003 supplementary public consultation.

3.2.3. The layout provides full grade separation (two level) of this junction with the A38 realigned along a sinuous horizontal alignment to minimise the impact on "Fourways", the mobile home park, Starbucks, and the garden centre. It has a design speed of 100kph (60mph). Extensive widening would be required both in the central reserve and the northbound verge to provide the minimum desirable stopping sight distance of 215m.

3.2.4. The alignment would result in the A38 being on the north side of the property 'Fourways' and the mobile home park requiring at least 2 of the mobile homes to be relocated.

3.2.5. The A38 would be realigned entirely on embankment from its tie-in at the eastern edge of the River Derwent bridge to its tie-in west of the water treatment works underbridge.

3.2.6. West of the river tie-in the forward visibility on the existing A38 would be 160m. This would not comply with current standards (215m) and a departure from standards will be required.

3.2.7. Two new underbridges would be required to carry the A38 over the railway and the B6179. In addition, the flood relief underbridge to the west of the railway line and the water treatment works underbridge would need to be extended.

3.2.8. A retaining wall would be constructed on the south side of the realigned A38 between the railway bridge and the B6179 to:

- avoid demolition of "Fourways";
- to minimise the impact on the mobile home park and
- avoid any direct impact on Starbucks.

3.2.9. The alignment passes through the garden centre and separates its parking area from the main shopping facility. A substantial retaining wall would also be required if demolition of the garden centre shopping area is to be avoided. Furthermore, it would be necessary to include a second span on the A38 underbridge so that an access connecting the shopping area and its severed parking area could be provided.

3.2.10. The existing roundabout would be retained in a modified form. The southbound carriageway west and east of the roundabout would also be retained for the A38 southbound on slip and the A38 southbound off slip roads respectively. The B6179 would be widened largely on line, with a modified entry/exit at the existing roundabout. Ford Lane would remain as a two-way link from the roundabout to "Fourways" and the mobile home park, with Starbucks' access connecting to this.

3.2.11. The B6179 would connect the existing roundabout to a new roundabout to the north. This new roundabout would form the junction between the B6179 and the A38 northbound slip roads.

3.2.12. The existing left in, left out junction immediately east of the river to Ford Lane (leading to/from Allestree) would need to be closed no alternatives provided.

3.3. Option 3A

3.3.1. The layout of this option is shown on drawing HA514503-URS-06-DR-GD-25.025 contained in Appendix B. The layout is been based on a sketch provided by Breadsall Parish Council and modified as necessary to meet minimum design criteria so that it could be compared on a like-for-like basis with the other options. Breadsall Parish Council's sketch is included in Appendix C for information.

3.3.2. This solution provides full grade separation (two level) of the junction, with the A38 following the existing alignment as closely as possible but still maintaining the horizontal alignment standards that have been adopted for the Presented Option.

3.3.3. Although not included in the original sketch, extensive widening would be required of both the central reserve and the northbound verge to provide the necessary stopping sight distance as for the Presented Option. This has been included in the layout drawing.

3.3.4. As for the Presented Option, the existing underbridges over the railway line and the flood relief subway to the west of the railway line would need to be extended. The River Derwent bridge at the southern end of the scheme and the water treatment works underbridge at the northern end of the scheme would not be affected.

3.3.5. The roundabout would be similar to the Presented Option although it would be located some 70m further to the north. The A38 would cross the gyratory roundabout on two new bridges and because the footprint of the scheme has been reduced as much as possible, retaining walls would be required between the A38 and all four slip roads.

3.3.6. The Ford Lane access to the businesses and dwellings including the mobile home park would be retained, joining the roundabout between the A38 northbound exit slip and the B6179. To maintain this link, a section of Ford Lane will require realignment to connect to the junction.

3.3.7. Due to the southbound merge slip road not being connected directly to the roundabout, all turning movements are not catered for in this option. Consequently, traffic leaving Little Eaton travelling south on the B6179 and wanting to travel southbound on the A38 would need to travel south on the A61 and perform a U-turn at the "Pektron" roundabout at Croft Lane. While it may be possible to connect the slip road to the roundabout; this design modification is addressed by the Southern Sweep Option – see below.

3.3.8. As for the Presented Option, the existing left in, left out junction immediately east of the river to Ford Lane (leading to and from Allestree) would be closed.

3.4. Southern Sweep Option

3.4.1. The layout of this option is shown on drawing HA514503-URS-06-DR-GD-25.026 contained in Appendix B. The layout is based on a sketch provided by Councillor Abey Stevenson and modified as necessary to meet certain minimum design criteria so that it could be compared on a like-for-like basis with the other options. Councillor Stevenson's sketch is included in Appendix C.

3.4.2. This solution provides full grade separation (two level) of the junction. It is a variant of Option 3A above with the A38 following the existing alignment through the centre of the existing roundabout; this results in it swinging away south of its current alignment to cross the railway then swinging back before crossing the River Derwent.

3.4.3. The existing underbridge over the railway line would be retained but would only carry the northbound diverge slip road. A new bridge would be required to the south to carry the A38 mainline and southbound merge slip road. The flood relief subway to the west of the railway line would need to be extended. The River Derwent bridge at the southern end of the scheme and the water treatment works underbridge at the northern end of the scheme would not be affected.

3.4.4. The roundabout would be larger than the Presented Option, more circular (as opposed to oval) and it would be centred closer to the existing. The A38 would cross the gyratory roundabout on two new bridges and because the footprint of the scheme has been reduced, retaining walls would be required between the A38 and all four slip roads.

3.4.5. The Ford Lane access to the businesses and dwellings including the mobile home park would be retained, joining the roundabout between the A38 northbound exit slip and the B6179.

3.4.6. As for the Presented Option, the existing left in, left out junction immediately east of the river to Ford Lane (leading to and from Allestree) would be closed.

4. COST ESTIMATES

4.1. Data Used

4.1.1. The estimated cost of each alternative options was derived using the same take off and quantification philosophy as that applied to the 2014 cost estimate of the Presented Option. A District Valuer's current estimate was used to price land take and Statutory Undertaker's estimates were used to price the works to Public Utilities. Preliminaries, Employers Agent costs, Risk, Programme Risk and Inflation were all derived pro rata from the 2014 scheme cost estimate.

4.2. Cost Estimate

4.2.1. The cost estimate was prepared by taking off the major quantities from the layout drawings prepared for each option. A schedule of key activities was created and then priced using Highways England's cost estimating database. The cost estimates are summarised in Table 4/1.

Table 4/1 Comparison of Options Cost Estimates

	Presented Option	Option 2	Option 3A	Southern Sweep
Land	1,350,000	6,900,000	2,150,000	1,300,000
Preliminaries	12,150,000	12,450,000	17,250,000	16,150,000
Direct Works	30,300,000	31,050,000	35,550,000	33,150,000
Preparation and Supervision	4,000,000	4,100,000	5,000,000	4,650,000
Statutory Undertakers	2,050,000	1,650,000	2,050,000	2,050,000
Other Costs	1,200,000	1,250,000	1,950,000	1,850,000
NRVAT	2,500,000	4,050,000	3,100,000	2.900,000
Risk and Uncertainty	5,950,000	7,650,000	6,600,000	6,600,000
Summary	**59,500,000**	**69,100,000**	**73,650,000**	**68,650,000**
Inflation	20,700,000	24,100,000	25,700,000	23,950,000
Programme Risk	5,700,000	6,600,000	7,050,000	6,550,000
Total Outturn	**£85,900,000**	**£99,800,000**	**£106,400,000**	**£99,150,000**

Note: Summary values at Q1 2014

4.3. Programme

4.3.1. The options have been costed using simplified programme information based on the limited information available at this stage of the scheme development.

4.3.2. The Southern Sweep and Option 3A schemes require significant temporary works in the form of a temporary diversion route adjacent to the A38 in order to maintain traffic flow. These options include associated cost allowances to reflect the construction and maintenance of the diversion route along with the increased construction duration (see section 5.13 for details of the construction sequence and programme).

4.4. Risk and Inflation

4.4.1. The uncertainty allowance relevant to the Presented Option was extracted from the 2014 scheme estimate and similarly applied to each of the proposed options based on the uncertainties identified remaining relevant for each option.

4.4.2. Programme risk and inflation were applied at the same proportion as found in the original estimate to derive an outturn cost.

4.5. Land, Compensation and Planning Blight

4.5.1. The total areas of land required for each option is shown in Table 4/2 below. Both the permanent land take and any temporary land required for construction purposes are shown.

Table 4/2 – Land Requirements

	Presented Option	Option 2	Option 3A	Southern Sweep
Permanent Land Take (m²)	57,391	68,902	35,813	40,061

4.5.2. Temporary land take in relation to the diversion route required for the construction of Option 3A and the Southern Sweep is estimated to be approximately 7,000m^2.

4.5.3. The associated land costs are reflected in the estimates. As seen in Table 4/1 and 4/2, Option 2 ranks as having the largest impact with cost reflecting land purchases from the garden centre, mobile home park and other affected businesses. Option 3A also takes land from the garden centre, the impacts of which are reflected in the estimate.

4.6. Summary and Conclusions

4.6.1. In terms of costs, the Presented option receives the highest ranking followed by the Southern Sweep then Option 2 with Option 3A ranking the lowest.

5. ENGINEERING ASSESSMENT

5.1. Introduction

5.1.1. The engineering assessment has been undertaken on the options based upon the engineering aspects of the approach equivalent to a Stage 2 Assessment detailed in TD 37/93, Scheme Assessment Reporting, of the Design Manual for Roads and Bridges (DMRB) Volume 5.

5.2. Methodology

5.2.1. Each of the scheme options has been sufficiently developed to indicate the approximate dimensions of the embankments and cutting and the locations of principal structures. These and other engineering characteristics are reported on, drawing attention to significant differences between the scheme options.

5.2.2. Each junction option is, as far as possible, assessed for compliance with standards. An assessment table has been prepared and a preferred option, in engineering terms has been selected by ranking the options.

5.2.3. The results of the engineering assessment are summarised in Table 5/3 at the end of this section.

5.3. Topography and Land Use

5.3.1. All the land lies to the east of the River Derwent and is predominantly within the river valley with a ridge to the north east where the ground rises towards the village of Breadsall to the east and the continuation of the A38 to the north.

5.3.2. Most of the land between the river and the existing route of the A38 is flat apart from the area of a former refuse tip where the ground is built up to a height of approximately 4 metres, in a manner that is uncharacteristic within its surroundings.

5.3.3. The land to the south and east of the existing A38 is predominantly in agricultural use before the fringes of the village are reached, although a large area east of the A61 has been planted with trees.

5.3.4. The land to the north of the A38 and east of the railway line is predominantly occupied by commercial outlets, i.e. the garden centre and Starbucks, a mobile home park, a waste recycling enterprise and a residential unit with extensive outbuildings. The original Ford Lane and its diversion to the A38, when the level crossing was removed, occupies the land immediately west of the railway line.

5.4. Constraints

5.4.1. There are a number of important and influential constraints to be overcome and/or be considered in the formulation of any design solution associated with the Little Eaton junction improvement. These are summarised in the following paragraphs.

5.4.2. The river valley between Allestree, to the west and the railway line to the east, forms part of the Derwent Valley Mills World Heritage Site. This will have to be taken into account in any proposals.

5.4.3. The Starbucks outlet, a residential mobile home park, a garden centre, a waste recycling facility and the property known as “Fourways” are such that they have a combined and conflicting effect on any solution that relies on a corridor to the north west of the current roundabout and the proximity of Breadsall village influences any solution to the east of the existing road.

5.4.4. The Derby Garden Centre is a purpose built complex with associated car parking facilities. This business presents additional challenges when considering the optimum alignment for any scheme that passes to the west of the current junction.

5.4.5. The land to the north and west of the current junction was formerly used as a refuse tip and as such there could be engineering, environmental and planning issues to address in order for it to be used for junction improvements.

5.4.6. The scheme is within an area designated by the Environment Agency as floodplain; there are existing structures on the affected section of the A38. These are:

- The River Derwent bridge;
- A flood relief underbridge;
- The railway bridge; and
- The water treatment works underbridge.

Network Rail

5.4.7. When options for this junction improvement were previously examined in 2004, Network Rail was opposed to options on the north west side of the existing roundabout. This was because "the track layout, signalling building and track access from Ford Lane are all live" and in their opinion "could not be affected/relocated by the proposals". No cost estimate for carrying out any necessary works to the rail network was supplied by Network Rail.

5.4.8. It was initially considered that the signalling building and the railway points at this location could be overspanned by the new railway bridge.

5.4.9. Network Rail also advised that for options to the south east of the existing roundabout "a new overbridge with a min 5.36m vertical clearance to highest rail should be acceptable provided that it does not affect existing signal sighting or infrastructure maintenance". It is considered that these items will not be affected by any of the layout options and no allowance for amending the rail network has been included in the cost estimates for these options.

5.4.10. In October 2014 and July 2015, meetings were held with Network Rail and the main issues raised were as follows;

- There is a plan for the Electrification of the Midland Mainline Railway due to commence in 2019/2020 (although now on hold);
- Network Rail confirmed, at a meeting on 15th October 2014, that the existing bridge 11b minimum headroom of 5.36m meets the minimum UK requirements for electrification. Since that meeting, however, Network Rail has expressed their desire that the headroom be increased to 5.8m, to meet the European requirements; the potential implications of this are currently under investigation.

5.5. Design Standards

5.5.1. The layouts considered during the development of the options were produced to Highways England Standards and Advice Notes, in particular:

- TD 9/93, Highway Link Design;
- TD 27/05, Cross Sections and Headroom;
- TD 22/06, Layout of Grade Separated Junctions ; and
- TD 16/07, Geometric Design of Roundabouts.

5.6. Geometry

5.6.1. Journey times and construction costs are a function of the carriageway length of the various elements making up the layout of the junction; journey times are also affected by the driving speed that the alignment and speed limits will safely permit.

5.6.2. The Presented Option has a main carriageway length (from the River Derwent bridge to the water treatment works underbridge) of 1280m. Although this will be subject to the National Speed Limit (70mph), it has a design speed of 100A kph (60 mph) and as the horizontal alignment has a 255m radius curve it would be subject to an advisory speed limit of 50mph.

5.6.3. Option 2 has a main carriageway length (from the River Derwent bridge to the water treatment works underbridge) of 1150m. The horizontal alignment has a 510m radius curve and therefore would not be subject to an advisory speed limit.

5.6.4. Option 2, however, would be less desirable for traffic leaving or joining the A38 northbound as it would have to negotiate the 'loop' arrangements of the slip roads and also negotiate an additional roundabout compared to the other options. This arrangement may appear to be less intuitive for drivers compared with the other options – the effects on the traffic are assessed in Section 7 of this report.

5.6.5. Option 3A has a main carriageway length (from the River Derwent bridge to the water treatment works underbridge) of 1240m. As for the Presented Option, the horizontal alignment has a 255m radius curve and would therefore be subject to an advisory speed limit of 50mph. Additionally, this option does not cater for all of the turning movements at the roundabout (traffic travelling south from Little Eaton heading to the A38 southbound would have to continue down the A61 to the next roundabout, U-turn and travel back to turn left at the Little Eaton junction). The impacts of this arrangement are assessed in Section 7 of this report.

5.6.6. The Southern Sweep option has a main carriageway length (from the River Derwent bridge to the water treatment works underbridge) of 1200m. As for the Presented Option, the horizontal alignment has a 255m radius curve and would therefore be subject to an advisory speed limit of 50mph.

5.6.7. To illustrate how each of the options could affect properties in Breadsall village, an assessment has been made of the distance each of the proposals would be from two representative dwellings; property no. 1 is the northernmost house in the village which is also the closest to the A38 and property no. 2 is one of the houses on the west side of Rectory Lane – the distances to the existing A38 are given for comparison.

Table 5/1 Comparison of Distances to Breadsall Dwellings from each of the options

		Property no. 1	Property no. 2
Existing A38	To edge of carriageway	200m	410m
	To toe of embankment	175m	400m
Presented Option	To edge of c/way (main line)	170m	335m
	To edge of c/way (slip road)	155m	320m
	To toe of embankment	140m	310m
Option 2	To edge of c/way (main line)	230m	450m
	To edge of c/way (slip road)	200m	410m
	To toe of embankment	175m	400m
Option 3A	To edge of c/way (main line)	195m	385m
	To edge of c/way (slip road)	185m	370m
	To toe of embankment	165m	360m
Southern Sweep	To edge of c/way (main line)	195m	385m
	To edge of c/way (slip road)	185m	365m
	To toe of embankment	165m	350m

5.6.8. The proximity of the A38 to the nearest domestic dwellings in Little Eaton would not be affected by any of the options. Whilst Option 2 appears to be closer to Little Eaton, the unaffected section of the existing A38 (to the north of the junction) is significantly closer to the properties in the village than the junction proposals. Therefore it is anticipated there would be no discernible impacts due to the closer proximity of Option 2 to these dwellings.

5.6.9. Similarly for properties in Allestree, as Option 2 is located to the north west of the existing A38, it will be no closer to the properties than the closest section of the existing alignment in the vicinity of the River Derwent bridge.

5.6.10. In relation to the property ‘Fourways’ and the mobile home park, Option 2 results in the A38 being repositioned from the south side to the north of the properties. Consequently, the A38 would be considerably closer to the properties necessitating relocation of 2no mobile homes.

5.6.11. The alignment of Option 2 permits the National Speed Limit to remain, compared to the other options which require a 50mph advisory speed limit. The proximity to residential properties is assessed in Section 6 (Environmental Assessment) and the lack of turning movements of Option 3A is assessed in Section 7 (Traffic Assessment). Based on this, in geotechnical terms Option 2 is ranked highest and the Presented Option, Option 3A and the Southern Sweep ranking next equally.

5.7. Public Utilities

Presented Option

5.7.1. Existing gas, Severn Trent Water (mains), Western Power Distribution (11kv) and BT apparatus pass through the centre of the existing roundabout in a north-south direction and would need to be diverted or protected as a part of the scheme proposals. An existing combined foul and surface water sewer passes under the existing A38 embankment immediately to the north of the existing roundabout which also may need to be diverted or protected under the proposed scheme's higher and wider embankment.

Option 2

5.7.2. Existing gas, Severn Trent Water (mains), Severn Trent Water (sewers), Western Power Distribution (11kv x 3) and BT apparatus pass along the existing B6179 and these would need to be diverted or protected as a part of the scheme proposals, this is mainly due to construction of the foundations of the B6179 bridge as this would require piling and excavation work in close proximity to these services.

Option 3A

5.7.3. This option would be very similar to the Presented Option in terms of its impacts on Statutory Undertakers' apparatus.

Southern Sweep

5.7.4. This option would be very similar to the Presented Option in terms of its impacts on Statutory Undertakers' apparatus.

Public Utilities Summary

5.7.5. Based on the above, Option 2 ranks slightly lower than the other options due to the risk to the Statutory Undertakers' apparatus caused by the new bridge construction over the B6179. The three other options ranking equally.

5.8. Non-Motorised User (NMU) Provision

5.8.1. All of the NMU routes that were identified in the NMU Context Report (report ref. 47071319-URS-06-RP-RD-001) would be retained for all options. Similarly, there is no discernible difference at this stage between each option's potential to improve existing NMU provision. Therefore all options are ranked equally in terms of preference.

5.9. Drainage

5.9.1. All Options

5.9.1.1 For all options, additional surface water outfall capacity or attenuation may be required to deal with the additional carriageway surface water runoff. This may require additional land to locate attenuation facilities and licences to make improvements along outfall watercourses. The footprint created by all options would reduce the potential that currently exists for the land to flood. Compensatory land would therefore need to be provided. This would need to be acquired either by purchase or licence.

5.9.1.2 There would be no increase in the likelihood of flooding in any of the residential communities near to the proposals as a result of any of the options being considered.

5.9.1.3 There are several watercourses that cross the Little Eaton junction area. These would all be diverted or culverted as appropriate and the implications of the engineering issues associated with them are not considered to cause any major difficulties

5.9.2. **Presented Option, Option 3A and the Southern Sweep**

5.9.2.1 There would be no effect on the watercourse on the west side of the A61 Alfreton Road, other than where the main alignment crosses. A culverted crossing would be required. The watercourses on the eastern boundary would require diversion in an open watercourse at the new eastern boundary position.

5.9.3. **Option 2**

5.9.3.1 The watercourse that currently runs alongside the west side of Alfreton Road would require culverting beneath the northbound slip roads link and the mainline.

5.9.3.2 The watercourses currently diverted at the existing eastern boundary of the A38 would require minor diversions in open watercourses where this option changes the boundary at this location.

5.9.4. **Drainage summary**

5.9.4.1 All options would require diversions of local watercourses and construction in the flood plain area. Consequently, mitigation measures and resultant impacts are expected to be similar. All have therefore been ranked equally in this aspect.

5.10. Geotechnics

5.10.1. The current roundabout at Little Eaton junction is on low embankment, with gabion basket retaining walls constructed as part of the Pinch Point scheme in 2014. A registered landfill site is located to the north and the route of the former Derby Canal runs through the junction.

5.10.2. **Ground Conditions**

Presented Option, Option 3A and Southern Sweep

5.10.2.1 Part of the junction comprises existing embankment fill and carriageway construction. In general the ground conditions are anticipated to comprise potentially soft and compressible cohesive alluvium, underlain by granular alluvium, underlain by rock of the Millstone Grit group. The in-filled former Derby Canal runs through the junction, which may include soft, compressible and contaminated materials.

5.10.2.2 The western part of the junction is located on a floodplain and high groundwater levels are anticipated, which will require management during construction.

Option 2

5.10.2.3 In general the ground conditions are anticipated to comprise potentially soft and compressible cohesive alluvium, underlain by granular alluvium, underlain by rock of the Millstone Grit group.

5.10.2.4 A section of the junction is located within the recorded extent of a landfill site. The types of waste recorded to have been deposited at the site include construction, demolition, and dredging waste. This material is likely to be soft, compressible and may contain large demolition debris.

5.10.2.5 The western part of the junction is located on a floodplain and high groundwater levels are anticipated, which will require management during construction.

5.10.3. **Earthworks**

Presented Option, Option 3A and Southern Sweep

5.10.3.1 Embankments are proposed to be constructed primarily from site-won Class 2 general fill material. Within the floodplain areas, flood protection measures are anticipated to be required. Due to the presence of potentially soft and compressible alluvium and infill to the former Derby Canal, a granular starter layer is proposed to provide a suitable construction platform.

5.10.3.2 Settlement of the alluvium due to embankment construction is likely to require the provision of surcharge, pause periods and associated monitoring to reduce settlement occurring after carriageway construction. This post construction settlement may be further reduced if ground treatment is carried out, such as installation of vertical band drains or stone columns and basal geogrid reinforcement.

5.10.3.3 The potential for encountering contaminated material related to infill of the former Derby Canal will require management during construction.

Option 2

5.10.3.4 Embankments are proposed to be constructed primarily from site-won Class 2 general fill material. Within the floodplain areas, flood protection measures are anticipated to be required. Due to the presence of potentially soft and compressible alluvium and landfill, a granular starter layer is proposed to provide a suitable construction platform.

5.10.3.5 Settlement of the alluvium and landfill material due to embankment construction is likely to require the provision of surcharge, pause periods and associated monitoring to reduce settlement occurring after carriageway construction. Within the alluvium this post construction settlement may be further reduced if ground treatment is carried out, such as installation of vertical band drains or stone columns and basal geogrid reinforcement.

5.10.3.6 Within the landfill material ground treatment may be necessary to provide suitable founding conditions for the embankment and reduce post-construction settlement. This may comprise in-situ compaction of the waste material. Post-construction gas and groundwater monitoring is anticipated to be required. The potential for encountering contaminated material related to the landfill will require management during construction.

5.10.4. **Structure Foundations**

Presented Option

5.10.4.1 Two new bridges are proposed, in addition to an extension of the existing railway bridge and flood arch. Piled foundations are anticipated to be required due to the foundations being underlain directly by potentially soft and compressible alluvium.

5.10.4.2 Underpinning of the existing railway bridge and flood arch foundations may be required to accommodate increased stresses due to construction of the adjacent embankment.

5.10.4.3 Temporary excavations and support (e.g. anchored sheet piling) will be required to provide adequate working room for a piling rig and pile cap excavations, especially for the railway bridge and flood arch extensions.

Option 2

5.10.4.4 Two new bridges are proposed, in addition to an extension of the existing flood arch. Piled foundations are anticipated to be required due to the foundations being underlain directly by potentially soft and compressible alluvium and/or landfill material. Bored piling techniques are likely to be required within the landfill due to the heterogeneous nature and probability of encountering large demolition debris. Excavated contaminated material and leachate is likely to require treatment and/or off-site disposal.

5.10.4.5 Underpinning of the existing flood arch foundations may be required to accommodate increased stress due to construction of the adjacent embankment.

5.10.4.6 Temporary excavations and support (e.g. anchored sheet piling) will be required to provide adequate working room for a piling rig and pile cap excavations, especially for the flood arch extension.

Option 3A

5.10.4.7 A new bridge is proposed, in addition to extensions of the existing flood arch and railway bridge. Piled foundations are anticipated to be required due to the foundations being underlain directly by potentially soft and compressible alluvium.

5.10.4.8 Underpinning of the existing flood arch and railway bridge foundations may be required to accommodate increased stress due to construction of the adjacent embankment.

5.10.4.9 Temporary excavations and support (e.g. anchored sheet piling) will be required to provide adequate working room for a piling rig and pile cap excavations, especially for the flood arch extension.

Southern Sweep

5.10.4.10 Three new bridges are proposed, in addition to an extension of the existing flood arch. Piled foundations are anticipated to be required due to the foundations being underlain directly by potentially soft and compressible alluvium.

5.10.4.11 Underpinning of the existing flood arch foundations may be required to accommodate increased stress due to construction of the adjacent embankment.

5.10.4.12 Temporary excavations and support (e.g. anchored sheet piling) will be required to provide adequate working room for a piling rig and pile cap excavations, especially for the flood arch extension.

5.10.5. **Retaining Walls**

Presented Option

5.10.5.1 Reinforced soil retaining walls are proposed to support the A38 embankment between the railway bridge and the Little Eaton west underbridge, to allow construction in conjunction with the embankment.

5.10.5.2 An extension to the northeast wing wall of Little Eaton east underbridge is proposed to be a reinforced concrete cantilever retaining wall with piled foundations due to the foundations being underlain directly by the potentially soft and compressible alluvium.

Option 2

5.10.5.3 The retaining wall located east of the junction underbridge is proposed to be reinforced soil to allow construction in conjunction with the embankment.

5.10.5.4 Retaining walls between the railway bridge and the junction underbridge are proposed to be reinforced concrete cantilever walls with piled foundations due to the foundations being underlain directly by the potentially soft and compressible alluvium and landfill material.

Option 3A

5.10.5.5 Reinforced soil retaining walls are proposed to support the A38 embankment, to allow construction in conjunction with the embankment.

5.10.5.6 A proportion of the wall to the south east of Little Eaton east underbridge is likely to be a concrete cantilever wall with piled foundations due to the foundations being underlain directly by the potentially soft and compressible alluvium.

Southern Sweep

5.10.5.7 Reinforced soil retaining walls are proposed to support the A38 embankment between the railway bridge and the Little Eaton west underbridge, to allow construction in conjunction with the embankment.

5.10.5.8 Retaining walls to the east of Little Eaton east underbridge are proposed to be reinforced concrete cantilever walls with piled foundations due to the foundations being underlain directly by the potentially soft and compressible alluvium.

5.10.6. **Temporary Construction – Options 3A and the Southern Sweep**

5.10.6.1 Due to the proposed alignment being coincident with existing infrastructure, a temporary carriageway would be required during construction. Due to the potentially soft nature of the alluvium excavation and replacement, and/or incorporation of geogrid reinforcement within the granular capping would be necessary to provide a stable foundation.

5.10.6.2 The temporary carriageway could incorporate a basal geotextile marker layer to allow the removal of construction materials and reinstatement of topsoil/subsoil.

5.10.7. **Geotechnical summary – all options**

5.10.7.1 The primary geotechnical constraint to the options is the necessity to construct new earthworks, retaining walls and structures coincident with existing infrastructure which would lead to differential settlement, and adverse effects on existing structure foundations. The primary benefit of Option 2 is that the majority of construction can be undertaken separated from the existing A38 main carriageway and structures. The Presented Option ranks second in this regard, with the Southern Sweep and 3A likely to be most adversely affected. The secondary geotechnical constraint is the potential for ground contamination, due to the landfill site. This is most likely to affect Option 2, with the other options ranking equally due to their location outside the landfill extents.

5.10.7.2 In overall geotechnical terms, Option 2 ranks the highest, followed by the presented Option, the Southern Sweep then Option 3A.

5.11. Structures

5.11.1. The impacts that each of the options has on the requirements for new or modified structures are described in the following paragraphs.

5.11.2. **Flood Arch Extension**

Presented Option

5.11.2.1 The existing flood arch requires an extension to accommodate the proposed A38 carriageway and the southbound merge slip road from Little Eaton roundabout.

5.11.2.2 The existing flood arch is single span that comprises of deep in-situ reinforced concrete coffered beams with curtain wall. The beams are simply supported between reinforced concrete retaining abutment structures, founded on mass concrete footings. The existing bridge square clear span of 9.15m between the abutment faces will be maintained for the 15.4m proposed extension to the south.

5.11.2.3 The extension construction will be a reinforced concrete portal with monolithic joint between the deck slab and the abutments. The foundations to the widened structure will be piled to reduce the settlement effects and new wing walls will also be constructed. The minimum existing headroom to the existing structure will be maintained to the widened section of the bridge.

Option 2

5.11.2.4 This option would have a similar impact on the Flood Arch structure as the Presented Option, though the required extension would be 47.0m long to the north (compared with 15.4m to the south for the Presented Option).

Option 3A

5.11.2.5 Option 3A would have a similar impact on the Flood Arch structure as the Presented Option, though the required extension would be 7.9m long to the south (compared with 15.4m for the Presented Option).

Southern Sweep

5.11.2.6 The Southern Sweep would have a similar impact on the Flood Arch structure as the Presented Option and option 3A, though the required extension would be 20.0m long to the south (compared with 15.4m for the Presented Option).

5.11.3. **Railway Bridge**

Presented Option

5.11.3.1 The existing Railway Bridge 11b has a skew span of 19.7m and a skew angle of 7 degrees. The existing bridge deck consists of prestressed post-tensioned concrete inverted T beams acting compositely with a reinforced concrete deck slab. The bridge deck beams are simply supported between reinforced concrete cellular abutment structures, founded on 450mm diameter bored cast-in-place reinforced concrete piles.

5.11.3.2 To accommodate the proposed A38 carriageway and the southbound on slip road, the existing structure will be widened by approximately 39.5m to the south. The minimum existing headroom of 5.36m will be maintained.

5.11.3.3 The construction of the bridge extension will be reinforced concrete and pre-stressed precast beams, similar to the existing bridge. Ideally the construction depth of the existing deck slab will be maintained to the bridge extension. The skew span of the bridge extension will be approximately 24.7m, which is greater than that of the existing bridge to allow for the construction of the abutments outside the red zone, and eliminate the requirement to design for impact loading to the abutments.

Option 2

5.11.3.4 A new railway bridge will be constructed north of the existing bridge 11b to carry the proposed new alignment of the A38 carriageway over the Midland Mainline Railway. The minimum headroom of 5.36m (subject to Network Rail confirmation) will be provided to accommodate the proposed Overhead Line Equipment for the proposed Electrification of the line. The proposed railway bridge has a skew span of 24.9m and a skew angle of 26 degrees.

5.11.3.5 The new bridge minimum span will allow for the construction of the abutments outside the red zone, and eliminate the requirement to design for impact loading to the abutments.

Option 3A

5.11.3.6 The existing bridge deck consists of prestressed post-tensioned concrete inverted T beams acting compositely with a reinforced concrete deck slab. The bridge deck beams are simply supported between reinforced concrete cellular abutment structures, founded on 450mm diameter bored cast-in-place reinforced concrete piles.

5.11.3.7 To accommodate the proposed widened A38 carriageway and the south on slip road, the existing structure will be widened 35.7m to the south. The minimum existing headroom of 5.36m will be maintained to the widened section of the bridge. The existing bridge has a skew span of 19.7m and skew angle of 7 degrees.

5.11.3.8 The construction of the bridge extension will be reinforced concrete and pre-stressed precast beams, similar to the existing bridge. The construction depth of the existing deck slab will be maintained to the bridge extension. The skew span of the bridge extension will be 24.7m, which is greater than that of the existing bridge to allow for the construction of the abutments outside the red zone, and eliminate the requirement to design for impact loading to the abutments.

Southern Sweep

5.11.3.9 A new railway bridge will be constructed north of the existing bridge 11b to carry the proposed new alignment of the A38 carriageway over the Midland Mainline Railway. The minimum headroom of 5.36m (subject to Network Rail confirmation) will be provided to accommodate the proposed Overhead Line Equipment for the proposed Electrification of the line. The proposed railway bridge has a skew span of 24.5m and skew angle of 19 degrees.

5.11.3.10 The new bridge minimum span will allow for the construction of the abutments outside the red zone, and eliminate the requirement to design for impact loading to the abutments.

5.11.4. **Little Eaton West Underbridge**

Presented Option

5.11.4.1 The bridge is to span east to west, carrying the proposed A38 over the Little Eaton roundabout. The bridge has a single clear skew span of approximately 28.6m and a skew angle of 10 degrees, with a full square width of 40.1m between the parapets.

5.11.4.2 The abutments and the wing walls will be reinforced concrete cantilever walls with piled foundations.

5.11.4.3 The proposed bridge structure will be designed with minimum headroom of 5.36m to the deck soffit from the A38 carriageway to eliminate the requirement to design the deck beams for impact loading.

Option 2

5.11.4.4 This option has a single bridge carrying the main line over the B6179. The bridge is to span east to west, carrying the proposed A38 over the A61 section connecting the new roundabout north of the existing Little Eaton roundabout. The bridge has a single clear skew span of 43.6 and a skew angle of 30 degrees.

Option 3A

5.11.4.5 The bridge is to span east to west, carrying the proposed A38 over the Little Eaton roundabout. The bridge has a single clear skew span of 27.4m and a skew angle of 19 degrees. The skew width of the bridge is 45.9m.

5.11.4.6 The abutments and the wing walls will be in form of reinforced concrete cantilever walls with piled foundations.

5.11.4.7 The structure will be designed with minimum headroom of 5.36m to the deck soffit from the A38 carriageway. This eliminates the requirement to design the deck beams for impact loading.

Southern Sweep

5.11.4.8 The bridge is to span east to west, carrying the proposed A38 over the Little Eaton roundabout. The bridge has a single clear skew span of approximately 28.92m and a skew angle of 4 degrees. The overall width of the bridge is 43.9m.

5.11.4.9 The structure will be designed with minimum headroom of 5.36m to the deck soffit from the A38 carriageway to eliminate the need to design the deck beams against impact loading.

5.11.5. **Little Eaton East Underbridge**

Presented Option

5.11.5.1 The bridge spans in the east to west direction carrying the A38 over the Little Eaton roundabout carriageway. The full square width of the bridge between parapets is 40.7m. The bridge has a clear skew span of 19.1m and a skew angle of 22 degrees.

5.11.5.2 The structure will be designed with minimum headroom of 5.36m to the deck soffit from the A38 carriageway. This eliminates the requirement to design the deck beams against impact loading. Retaining structures will be required for abutments and wing walls.

Option 2

5.11.5.3 This option has a single bridge carrying the A38 over the B6179. See Section 5.11.4.4 above.

Option 3A

5.11.5.4 The bridge spans in the east to west direction carrying the A38 over the Little Eaton roundabout carriageway. The bridge has a clear skew span of 29.25m and a skew angle of 28 degrees. The overall width of the bridge is 65.1m.

5.11.5.5 The abutments and the wing walls will be in form of reinforced concrete cantilever walls with piled foundations.

5.11.5.6 The structure will be designed with minimum headroom of 5.36m to the deck soffit from the A38 carriageway to eliminate the requirement design the deck beams against impact loading.

Southern Sweep

5.11.5.7 The bridge spans in the east to west direction carrying the A38 over the Little Eaton Roundabout carriageway. The bridge has a clear skew span of 27.6m and a skew angle of 16 degrees.

5.11.6. **Breadsall Underpass (Severn Trent Water authority (STW) Access Bridge)**

5.11.6.1 This structure, located at the northern extremity of the scheme, would only be affected by Option 2 which would require it to be extended on its east side in order to accommodate the proposed A38 southbound diverge slip road.

5.11.6.2 The existing underpass is a 450mm thick reinforced concrete box structure with clear height of 5.25m and clear width 7.11m. The bridge is skewed 10 degrees to the A38 horizontal alignment. The underpass is used as a bridleway and for STW access. The underpass will be widened 7.045m along to the east, maintaining the existing internal dimensions above and the reinforced concrete construction.

5.11.7. **Retaining Walls**

Presented Option

5.11.7.1 Reinforced earth retaining walls are proposed to support the A38 embankment between the railway bridge and the Little Eaton west underbridge. Supporting the north side of the A38 is a 125.5m long retaining wall and at the south side is a 130.2m long retaining wall.

5.11.7.2 An extension to the northeast wing wall of Little Eaton east underbridge is a 57.8m reinforced concrete cantilever retaining wall supported by a piled foundation.

Option 2

5.11.7.3 A 210m long retaining wall is proposed to support the south side of the A38 embankment between the new railway bridge and the Little Eaton underbridge.

5.11.7.4 The extension to the northeast wing wall of the Little Eaton underbridge is 192.3m long retaining wall supporting the embankment of the north on slip road and the A38 carriageway.

Option 3A

5.11.7.5 The proposed retaining walls support the A38 embankment between the railway bridge and the Little Eaton west underbridge. The retaining wall at the north side of the A38 is a 160.5m long and at the south side is a 165.5m.

5.11.7.6 Further east of the Little Eaton east underbridge, there are also two retaining walls supporting the A38 between the north and south slip roads and these are 133.2m and 264m long respectively.

Southern Sweep

5.11.7.7 The reinforced earth retaining walls are proposed to support the A38 embankment between the railway bridge and the Little Eaton west underbridge. To the north of the A38 is a 52.0m long retaining and to the south is a 136m long retaining wall supporting the southbound A38 carriageway.

5.11.7.8 An extension to the northeast wing wall of Little Eaton east underbridge is a 170m long retaining wall and similarly an extension to the south east wing wall is a 189.43m long retaining wall supporting the A38 embankment north east of the Little Eaton roundabout.

5.11.8. **Structures summary**

5.11.8.1 The Presented Option involves the least amount of construction required for both the bridge structures and the retaining walls. However, similar to Option 3A it requires the complex widening of the existing railway bridge.

5.11.8.2 Option 2 has a single bridge carrying the main line over the B6179 with a very long span and highly skewed which will present construction challenges. The new railway bridge will be very wide, requiring more possession time to construct. This option also has the widest extension to the Flood Arch.

5.11.8.3 Southern Sweep Option is preferred because it has the least requirement to extend the existing structures. It will also be simpler to construct a new railway bridge, and the two new underbridges at Little Eaton roundabout.

Table 5/2 – Summary of Structures

Structure	Units	Presented Option	Option 2	Option 3A	Southern Sweep	Comments
Flood Arch Extension						
Deck Area	m^2	169	568	151	282	Option 3A is most viable in terms of extension works required to the flood arch.
Length of Extension	m	15.4	52.0	13.8	25.7	
Existing Bridge 11b Extension						
Deck Area	m^2	1022	N/A	927	N/A	Option 2 and the Southern Sweep option are more favourable because there is no requirement to extend the existing railway bridge 11b.
Skew	Degrees	7	N/A	7	N/A	
Skew Length	m	26.34	N/A	26.34	N/A	
New Railway Bridge						
Deck Area	m^2	N/A	1251	N/A	1353	A new railway bridge is proposed north of the existing Bridge 11b. Southern Sweep option is preferred because the deck is less skewed and would not require large beams adequate for the torsion effects.
Skew	Degrees	N/A	26	N/A	18	
Skew Length	m	N/A	24.885	N/A	27.48	
Little Eaton West Underbridge						
Deck Area	m^2	1262	N/A	1188	1270	The Southern Sweep Option has the least skew as a result will be the favourable option, the differences in the deck areas is insignificant.
Skew	Degrees	10	N/A	19	4	
Skew Length	m	29.375	N/A	27.39	28.99	
Little Eaton East Underbridge						
Deck Area	m^2	978	N/A	1687	1220	The Presented Option appears to be the most viable in terms of the amount of construction required.
Skew	Degrees	22	N/A	28	16	
Skew Length	m	22.355	N/A	29.24	27.595	
Little Eaton Underbridge						Option 2 only has one underbridge to carry the A38 over the A61 link between the two roundabouts. Though this option only has one underbridge at the roundabouts, the bridge span is very large and highly skewed, making this option the least viable of all.
Deck Area	m^2	N/A	3307	N/A	N/A	
Skew	Degrees	N/A	30	N/A	N/A	
Skew Length	m	N/A	43.555	N/A	N/A	

Structure	Units	Presented Option	Option 2	Option 3A	Southern Sweep	Comments
Breadsall Underpass						
Deck Area	m^2	N/A	56	N/A	N/A	Option 2 is the only option that requires widening of the Breadsall underpass.
Skew	Degrees	N/A	10	N/A	N/A	
Skew Length	m	N/A	7.1	N/A	N/A	
Retaining Walls						
Total length of all retaining walls	m	314	412	719	548	The Presented Option has the least total length of retaining walls to be built.
Total deck area for each option	m^2	2409	5126	3953	4125	
Option Ranking	No.	2	4	3	1	The Presented Option involves the least amount of construction required for both the bridge structures and the retaining walls. However, similar to Option 3A it requires the complex widening of the existing railway bridge.
Comments for options' ranking		2no. existing bridge structure extensions and 2no. new bridge structures required.	2no. Existing structures extended, one long span and highly skewed new structure will be required.	2no. new bridge structures and 2no. existing bridge structures extensions.	3no. New structures, only one existing bridge extension required.	Southern Sweep Option is preferred because it has the least requirement for extending the existing structures. It is also easier to construct a new railway bridge.

5.12. Departures and Relaxations

Presented Option, Option 3A and the Southern Sweep

5.12.1. The most significant Departures from Standards that are likely to be required for these options are:

- Combination of a 3 step relaxation in horizontal radius (255m), 1 step relaxation in vertical crest curve (K=55) and reduced stopping sight distance (160m). It is proposed to mitigate this by introducing an advisory 50mph speed limit (all of these parameters would be compliant for a design speed of 85kph)
- Northbound and southbound merge tapers – the available traffic figures suggest that a lane gain with ghost island merge would be required for both of these slip roads. As we cannot provide additional lanes on the A38 beyond the scheme extents (as this would be beyond the scope of the scheme) an urban merge has been proposed in combination with an auxiliary lane in order to increase the capacity – this is a non-standard combination. Furthermore, the lengths of the auxiliary lane, taper and nosing are all based on 50mph urban standards as 100kph rural standards parameters would not be possible to accommodate without affecting the River Derwent bridge at the south end or the STWA access bridge at the north end of the scheme.
- Northbound and southbound diverge tapers – the available traffic figures suggest that a lane drop with ghost island merge would be required for both of these slip roads. As we cannot provide additional lanes on the A38 beyond the scheme extents (as this would be beyond the scope of the scheme), 2 lane parallel diverge tapers are proposed. Furthermore, the lengths of the auxiliary lane, taper and nosing are all based on 50mph urban standards as 100kph rural standards parameters would not be possible to accommodate without affecting the River Derwent bridge at the south end or the STW access bridge at the north end of the scheme.

Option 2

5.12.2. The most significant Departure from Standards that are likely to be required for this option is:

- A one step relaxation required for stopping sight distance on the northbound diverge in the proximity of the Derwent river crossing and the Rail crossing. This relaxation is classed as a Departure as this is within one and half time the required stopping sight distance of the junction. The visibility exceeds the one step relaxation distance (160m) by a significant margin increasing the likelihood of the Departure being granted

Departures and Relaxations Summary

5.12.3. The alignment of Option 2 allows a design compliant with standards to be provided for the main line. The other 3 options would require Departures from Standards due to the sub-standard horizontal curvature and reduced stopping sight distances. This makes Option 2 is the best in terms of Departures with the other three options ranking equally.

5.13. Construction Phasing

Presented Option

5.13.1. A construction sequence with six phases has been envisaged for this option. Construction of all those works off-line would be carried out in the first phase. The flood relief underpass and the railway bridge would be constructed in this phase along with much of the new embankment. Additionally it would be necessary to ensure that the southbound slip roads were constructed sufficiently wide to accommodate two lanes in order that in subsequent phases the main A38 traffic may be diverted on to them. It will also be necessary to construct a temporary smaller roundabout at the existing position for use in subsequent phases. Minor disruptions to all traffic would be inevitable in the first phase when temporary alterations to the existing roundabout are made.

5.13.2. The principal feature of the second phase is to divert southbound traffic from the A38 onto the southbound slips. This will enable the construction of the remainder of the northbound carriageway and those elements of the roundabout inaccessible before. This may result in traffic disruption to both the A61 and A38 southbound flows whilst operational.

5.13.3. Phase 3 would see the full roundabout being used with the completion of the bridge abutments lying within the roundabout.

5.13.4. In phases 4 and 5 the bridge beams would be placed during overnight closures of each side of the two underbridges, traffic being diverted round the opposite side of the roundabout as appropriate. The remaining elements of the bridges would be completed with the full roundabout being used.

5.13.5. Phases 3, 4 & 5 should see little disruption to traffic other than that attributable to the overnight closures.

5.13.6. Phase 6 sees traffic on the new alignment with minor completion of outstanding work.

Option 2

5.13.7. Construction of this option would be undertaken in 3 major phases. The bulk of the work, being off line, would be constructed during phase 1. The B6179 bridge beams would be placed during an overnight closure and the completion of the bridge and the widening of the B6179 would be undertaken during phase 2. Traffic would be diverted onto the new alignment and the remaining works modifying the existing roundabout and the A38 southbound slip road would be completed during phase 3.

5.13.8. This junction is located off line to the north of the A38, therefore disruption to the A38 traffic would be less than for the Presented Option. The A61 traffic would experience some inconvenience during phases 2 and 3. The B6179 will experience disruption during all three phases, the most being during phases 2 and 3. The garden centre is likely to experience major disruption to its trading during phase 1 and 2, when a large proportion of the parking facilities would be unusable.

5.13.9. Overall construction duration is expected to be similar to or slightly shorter than the Presented Option as a larger proportion of construction can be undertaken offline.

Option 3A and the Southern Sweep

5.13.10. A construction sequence similar to that for the Presented Option has been envisaged for this option. However, a number of variations are required in order to maintain traffic flows during construction due to the alignment being coincident with the existing A38 carriageway.

5.13.11. During the first phase, a temporary diversion route would need to be constructed parallel to the southbound diverge slip road. This is required as the existing northbound carriageway will not be available to carry the northbound traffic in phase 2.

5.13.12. In phase 2, north of the roundabout the northbound traffic would be diverted onto the southbound slip road and the southbound traffic onto the temporary diversion.

5.13.13. The A38 embankment area that lies above the existing northbound carriageway could then be constructed in phase 3.

5.13.14. Disruption to traffic flow in phases 2 and 3 would be expected to be greater for this option than for the Presented Option due to the diversion of traffic along the temporary route.

5.13.15. Overall construction programme is expected to be slightly longer than the Presented Option due to the need to construct and maintain the temporary diversion route to the east of the new A38 alignment.

Construction Programme

5.13.16. A potential construction programme has been developed out for the Presented Option. An assessment of the programme impacts for the other options has been made in comparison to this programme. It is considered that Option 2 would have a similar construction duration to the Presented Option. The construction period for Option 3A and the Southern Sweep would be longer due to the requirement for a temporary diversion to be constructed to accommodate the southbound traffic during construction.

Construction Summary

5.13.17. Option 2 would pose fewest challenges as the majority of the scheme could be built off-line whilst the traffic continues to use the existing road. The Presented Option would be the next simplest as the off-line parts (including the southbound slip roads) could be constructed whilst the traffic uses the existing route. The Southern Sweep and Option 3A would be similar in terms of buildability and would necessitate temporary diversion routes to be built to facilitate construction while keeping the A38 open.

5.14. Engineering Assessment Summary and Conclusions

Table 5/3 Comparison Matrix of the Significance of Potential Effects of all the considered Options

	Presented Option	Option 2	Option 3A	Southern Sweep
Geometry	2	1	2	2
	Option 2 has the best alignment thus allowing the National Speed Limit to remain whilst the other options would require a 50mph advisory speed limit.			
Public Utilities	1	2	1	1
	Option 2 is considered to be the worst due to the risk to the SU apparatus caused by the new bridge construction over the B6179.			
NMU Provision	1	1	1	1
	All options retain the existing NMU network equally (some minor local diversions required for each option).			
Drainage	1	1	1	1
	All options would require diversions of local watercourses and would all involve construction in the flood plain so would all require similar mitigation. All have therefore been scored equally in this aspect.			
Geotechnics	2	1	4	3
	The primary geotechnical constraint to the options is the necessity to construct new earthworks, retaining walls and structures coincident with existing infrastructure which would lead to differential settlement effects, and adverse effects on existing structure foundations. The primary benefit of Option 2 is that the majority of construction can be undertaken separated from the existing main line and structures. The Presented Option ranks second in this regard, with the Southern Sweep and 3A likely to be most adversely affected. The secondary geotechnical constraint is the potential for ground contamination, due to the landfill site. This is most likely to affect Option 2, with the other options ranking equally due to their location outside the landfill extents.			
Structures	2	4	3	1
	The Presented Option involves the least amount of construction required for both the bridge structures and the retaining walls. However, similar to Option 3A it requires the complex widening of the existing railway bridge. Southern Sweep Option is preferred because it has the least requirement for extending the existing structures. It is also easier to construct a new railway bridge than to widen the existing.			
Departures from Standards	2	1	2	2
	The alignment of Option 2 allows a design compliant with standards to be provided for the main line. The other 3 options would require Departures from Standards due to the sub-standard horizontal curvature and reduced stopping sight distances.			
Construction Phasing	2	1	3	3
	Option 2 has the potentially shortest construction period and will result in less traffic disruption as the majority of the scheme could be built off-line whilst the traffic continues to use the existing A38. The Presented Option has the next shortest construction period as the off-line parts (including the southbound slip roads) could be constructed whilst the traffic uses the existing A38. The Southern Sweep and Option 3A have the longest construction period and will result in the greatest level of traffic disruption as the layout necessitates a temporary diversion route to be built to facilitate construction.			

Note: The table shows how each option has been ranked for each of the assessment sub-headings. The options are ranked in order of performance 1 to 4. A score of 1 is given to the highest performing option.

5.15. Limitations

5.15.1. The following limitations are noted with regard to the qualitative assessment as presented above:

- **Geometry:** The design of Options 2, 3A and the Southern Sweep have not been developed in as much detail as the Presented Option. A basic 3D model was developed which allowed outline estimates of earthworks quantities to be obtained and the fundamental geometric parameters (horizontal and vertical curves, sight stopping distances) have had an outline assessment only for compliance with standards.
- **Geotechnics:** No detailed ground information is available for any of the options. The assessments have been carried out based on historic data and available geological mapping. A ground investigation is planned for 2016 from which more detailed information will become available.
- **Structures:** During the development of the Presented Option, outline design of all of the bridges and retaining walls was carried out. The assessment of the options considered the differences between the Presented Option and the likely requirements of each of the options.
- **Departures from Standards:** For all options, assessment of requirements of numbers of traffic lanes on main line and slip roads and slip road merge and diverge taper types have all been based on the traffic model developed in 2005.
- **Construction Phasing:** A construction phasing sequence and a construction programme has been developed for the Presented Option. For all of the options an assessment has been made of the likely changes that would be required when compared with the sequencing and programme developed for the Presented Option.

6. ENVIRONMENTAL ASSESSMENT

6.1. Introduction

6.1.1. The section of the report below provides a qualitative assessment of the potential environmental impacts as associated with the Presented Option followed by a comparison of those impacts that are anticipated to occur as associated with the options as detailed in this section.

6.2. Methodology

6.2.1. In accordance with the Design Manual for Roads and Bridges (DMRB) Volume 11 Environmental Assessment and associated guidance, this qualitative environmental assessment has considered the following environmental disciplines:

- Air Quality;
- Archaeology and Cultural Heritage;
- Landscape and Visual Impacts;
- Nature Conservation;
- Geology and Soils;
- Materials;
- Noise and Vibration;
- Effects on All Travellers;
- Community and Private Assets; and
- Road Drainage and the Water Environment (including flood risk).

6.2.2. The qualitative assessment considers the potential impacts and effects as associated with the Presented Option. The assessment includes a qualitative scoring of potential effect significance such as the following:

- Neutral/ negligible;
- Slight adverse/ beneficial;
- Moderate adverse/ beneficial;
- Large adverse/ beneficial; and
- Very large adverse/ beneficial.

6.2.3. Thereafter, a qualitative environmental assessment based on the available information and using professional judgement has been carried out for each option, including an evaluation of the potential environmental performance of the alternative in absolute terms, as well as in relative terms compared to the Presented Option.

6.2.4. It is noted that some assessments such as air quality, landscape and visual impacts and noise and vibration, focus upon potential operational phase effects, given that construction phase effects are temporary and can largely be managed by best-practice construction methods. However, it is noted that construction effects associated with Option 3A and the Southern Sweep option would require significant temporary works in order to maintain traffic flow and as such increased construction durations (see Section 5.13).

6.2.5. The findings of the qualitative environmental assessment are presented in a summary table for easy comparison (ref. Table 6/1 at the end of Section 6.7), whilst limitations associated with the assessment are detailed in Section 6.8.

6.3. Presented Option

6.3.1. Air Quality

6.3.1.1 There are a number of air quality sensitive receptors identified in the vicinity of the existing Little Eaton junction, including the residential area of Allestree to the west which faces directly onto the A38, the mobile home park immediately to the north of the junction, the village of Breadsall to the east / south-east, and an individual residential property located east of Allestree on Ford Lane close to the crossing of the River Derwent. The closest residential properties in the village of Breadsall are a minimum of between approximately 190m (north-west edge of village) and 420m (south-west edge of village) from the existing A38 - at these distances, adverse impacts on air quality are not anticipated.

6.3.1.2 A small number of commercial properties are located at the existing junction – these are located adjacent to the mobile home park, and a garden centre located to the north-west of the existing junction between the A38 and the B6179. Such commercial uses are not considered to be sensitive to changes in air quality. Immediately to the south and east of the existing junction are open farmland/ woodland which are not considered to be sensitive in terms of changes in pollutant concentrations.

6.3.1.3 Annual mean nitrogen dioxide (NO_2) concentrations are anticipated to be below, but close to the objective value adjacent to the existing A38, with concentrations dropping with distance from the road. Annual mean concentrations at the mobile home park, adjacent to the existing junction, are anticipated to be below the objective, with concentrations in Allestree being well below the objective.

6.3.1.4 The Presented Option would relocate the A38 and associated slip roads to the south and east of the existing A38 alignment. This would not significantly change the proximity of residential properties in Allestree to the A38. The mainline A38 would be slightly further away from the mobile home park to the north (by approximately 20m), with the new junction moving very slightly closer to the edge of the park. Pollutant concentrations are therefore likely to be similar with the Presented Option as compared to the current junction layout. As annual mean concentrations of NO_2 are anticipated to be below the objective, such effects are not anticipated to be significant.

6.3.1.5 The closest residential properties in Breadsall would be a minimum of between approximately 140m and 370m from the closest aspect of the Presented Option (i.e. the southbound off slip road). At these distances, adverse impacts on air quality are not anticipated.

6.3.1.6 Overall, the effect of the Presented Option on air quality is anticipated to be neutral to slight adverse, and not significant.

6.3.2. Archaeology and Cultural Heritage

6.3.2.1 The existing A38 traverses the designated Derwent Valley Mills World Heritage Site (WHS) (core area and buffer zone) (see Figure 6.1 in Appendix D). The WHS contains a series of 18th/ 19th century cotton mills and an industrial landscape of high historical and technological interest. The Derwent Valley saw the birth of the factory system, when new types of buildings were built to accommodate new technologies. Construction of the Presented Option with a new raised A38 on embankment and the introduction of new road structures into the River Derwent valley would impact the WHS resulting in a slight adverse effect upon its setting.

6.3.2.2 Similarly, the introduction of the Presented Option infrastructure (raised road, embankments and road structures) would bring the A38 closer to Breadsall village which would impact the setting of the designated Breadsall Conservation Area, Breadsall Manor (listed building) and a number of non-designated historic buildings, including the former Ford Farm and the historic waterworks buildings on Alfreton Road. The significance of potential effects upon Breadsall Manor and the Conservation Area would be slight adverse, however, the effect upon the other historic building assets within the village would be neutral, as would effects upon Ford Farm and the historic waterworks buildings on Alfreton Road.

6.3.2.3 The land take required for the Presented Option to the east and south of the existing A38 has the potential to impact an unknown buried archaeology resource that lies within the River Derwent floodplain, and would potentially impact upon unknown deeply stratified palaeo-environmental deposits within the same area. The effect upon the buried archaeology, if present, would be slight adverse; whilst the effect upon the palaeo-environmental deposits would be neutral, as this resource is likely to extend beyond the footprint of the Presented Option.

6.3.2.4 Overall, the effect of the Presented Option on archaeology and cultural heritage is anticipated to be slight adverse, and thus not significant.

6.3.3. Landscape and Visual Impacts

6.3.3.1 Within the area covered by the Presented Option, the A38 would be expanded to the south and east into agricultural land. This land is within the Riverside Meadows Landscape Character Type which falls in the Derbyshire Peak Fringe and Lower Derwent Landscape Character Area, with the western areas also being within the Derwent Valley Mills WHS. The main visual receptors are users of public rights of way (such as the Derwent Valley Heritage Trail) and receptors with partially screened views from properties within Breadsall village.

6.3.3.2 The Presented Option would result in the loss of characteristic flood plain landscape, as well as an increased perception of highway infrastructure encroachment into the adjacent rural landscape. Therefore, it is anticipated that the Presented Option would potentially result in a slight adverse effect on landscape character.

6.3.3.3 Raising the main A38 carriageway to facilitate the Presented Option would increase its visibility within the landscape, especially to users of the long-distance Derwent Valley Heritage Trail. This would potentially be exacerbated by the loss of existing screening features such as the trees immediately to the south of the existing Little Eaton junction. Similarly, views from Breadsall village would be impacted as a result of the additional height of the A38 carriageway and the potential for lighting columns above it. The magnitude of effects at Breadsall would, however, be limited given the distance between the village and the proposed A38 carriageway and the retention of intervening vegetation. Overall, it is anticipated that the Presented Option would potentially result in a moderate adverse visual effect.

6.3.4. Nature Conservation

6.3.4.1 The Presented Option has the potential to impact on the following statutory designated sites located within 2km of the Presented Option boundary (which are each of Regional Value, resulting in potential adverse effects at up to County or Unitary Authority Area level):

- Breadsall Railway Cutting Local Nature Reserve (LNR);
- Allestree Park LNR;
- Darley Abbey and Nutwood Wildlife Site LNR; and

- Chaddesden Wood LNR.

6.3.4.2 Refer to Figure 6.2 in Appendix D which illustrates the location of these statutory designated sites.

6.3.4.3 Potential impacts on the above statutory designated sites are likely to be indirect in nature and consequently it is not anticipated that impacts would generate adverse effects on the functional integrity of these sites equivalent to their baseline valuations.

6.3.4.4 The Presented Option has the potential to impact on Alfreton Road Field rough grassland Local Wildlife Site (LWS), located partially within and adjacent to the Presented Option. Refer to Figure 6.2 in Appendix D which illustrates the location of this non-statutory designated site which is of Regional Value. Construction of the Presented Option is likely to result in direct habitat loss and impact on the functional integrity of the site.

6.3.4.5 A further fourteen non-statutory designated wildlife sites are located within 2km of the Presented Option (refer to Figure 6.2 in Appendix D). It is not anticipated that the Presented Option would have any direct impacts on these sites, whilst any indirect effects are likely to be significant at no more than the Local level.

6.3.4.6 The Presented Option has the potential to impact on the following habitat receptors within or adjacent to the Presented Option boundary (potential effect and level of significance detailed in brackets):

- Semi-natural broadleaved woodland (likely adverse effect at up to Regional level);
- Semi-improved grassland (likely adverse effect at up to Regional level);
- Watercourses (likely adverse effect at up to Regional level as a consequence of potential direct and indirect impacts);
- Plantation broadleaved woodland (likely adverse effect at up to County or Unitary Authority Area level);
- Hedgerows (likely adverse effect at up to County or Unitary Authority Area level);
- Arable (likely adverse effect at Local level);
- Amenity grassland (likely adverse effect at Local level);
- Scattered trees (likely adverse effect at Local level);
- Dense scrub (likely adverse effect at Local level);
- Improved grassland (likely adverse effect at Local level); and
- Bare-ground and hard-standing (likely adverse effect at Site level).

6.3.4.7 Refer to Figures 6.3 and 6.4 in Appendix D which illustrate the habitats in the vicinity of the Presented Option and water bodies respectively.

6.3.4.8 The Presented Option also has the potential to impact on the following species receptors within or adjacent to the Presented Option boundary (potential effect and level of significance detailed in brackets):

- Bats – Roosting (likely adverse effect at up to Regional level, potentially National level, depending on the rarity of species and/ or size of the roost identified within or adjacent to the Presented Option). Refer to Figure 6.5 in Appendix D which shows the location of potential bat roosting features identified in the vicinity of the Presented Option;

- Bats – Foraging and Commuting (likely adverse effect at up to County or Unitary Authority Area level depending on the species and number of individuals impacted on by the Presented Option);
- Aquatic Invertebrates (likely adverse effect at up to Regional level, depending on the rarity of species identified during ongoing baseline surveys);
- Breeding Birds (likely adverse effect at up to Regional level, potentially including effects on local barn owl populations);
- White-Clawed Crayfish *Austropotamobius pallipes* (likely adverse effect at up to Regional level if found to be present within watercourse/ waterbodies in or adjacent to the Presented Option);
- Otter *Lutra lutra* (likely adverse effect at up to Regional level);
- Terrestrial Invertebrates (likely adverse effect at up to Regional level, depending on the rarity of species identified during ongoing baseline surveys); and
- Badgers *Meles meles* (likely adverse effect at Local level).

6.3.4.9 It is noted that water voles *Arvicola amphibius* and great crested newts *Triturus cristatus* were surveyed in 2015 as part of the baseline surveys for the Presented Option. However, water voles and great crested newts were not found to be present within any of the watercourses/ bodies surveyed. Therefore, water voles and great crested newts are not considered further in the assessment (or the assessment of other alternatives).

6.3.4.10 The potential spread of invasive plant species currently present on site as a result of Presented Option construction activities has the potential to result in an adverse effect at up to County or Unitary Authority Area level (refer to Figure 6.6 in Appendix D).

6.3.4.11 Given the above, it is considered that the Presented Option has the potential to result in an overall Large Adverse effect with regard to nature conservation. However, it is considered that an appropriate ecological mitigation strategy can be developed that has the potential to reduce residual nature conservation effects to non-significant levels. This strategy will be defined following confirmation of which option is to be taken forward.

6.3.5. Geology and Soils

6.3.5.1 The Presented Option has the potential to impact on both the geology and soils in the local area as associated with the following:

- Physical effects of the Presented Option: For example, changes in topography, soil compaction, soil erosion, ground stability;
- Effects associated with ground contamination that may already exist on site: For example, introducing or changing pathways of contamination migration, or changes to the characteristics and contamination receptors;
- Effects associated with the potential for polluting substances used during construction or operation to cause new ground contamination issues on site, such as the accidental loss/ spillage of fuels and oils to ground;
- Impacts associated with re-use of soils and waste soils: Re-use of site-sourced materials on- or off-site, disposal of site-sourced materials off-site, importation of materials to the site;
- Effects on soils as a valuable resource: For example, loss or damage to soils of good agricultural quality.

6.3.5.2 Of note is that the A. E. Hibbs & Son Ltd Ford Lane Landfill (Authorised) is located to the north of the Presented Option and previously accepted construction, demolition and dredging waste. The Environmental Permit for the landfill has not been surrendered according to data within the Envirocheck Report (dated 18th September 2014). The potential for leachate and/ or gas from the former landfill to affect the Presented Option will be investigated following the completion of a planned ground investigation.

6.3.5.3 An agricultural land survey has been undertaken which indicates that local soils have an Agricultural Land Classification of 3a and 3b, with the majority being 3b[2]. It is currently predicted that the Presented Option would result in the permanent loss of less than 6ha of agricultural land, of which approximately 0.9ha would be of subgrade 3a, 3.1ha would be of subgrade 3b, with the remainder being woodland. The Presented Option would thus result in the loss of a minor amount of 'best and most versatile agricultural land'.

6.3.5.4 Given the above, and given that standard good construction practices would be employed together with compliance with applicable land contamination legislation, overall it is considered that the Presented Option has the potential to result in a slight adverse effect upon soils and geology.

6.3.6. Materials

6.3.6.1 The potential materials impacts of the Presented Option are those as associated with the use of material resources during construction and the generation, storage and disposal of waste.

6.3.6.2 Although the quantities and type of materials are not known at present, the types of materials that are likely to be used include: steel safety barrier; steel reinforcement bars; kerbs and gullies; subsurface drainage; precast concrete chambers; imported acceptable material; imported topsoil; noise barriers; cement bound granular mixture; dense base/ binder asphalt concrete thin surface course system; concrete gullies/ culverts.

6.3.6.3 Waste arisings would potentially be from the demolition of the existing highway, excavations, vegetation clearance and top soil removal. The Presented Option is not anticipated to directly impact upon the area of historic landfilling located to the north of the existing Little Eaton junction (refer to Section 6.3.5), and thus contaminated waste arisings are not anticipated to be generated.

6.3.6.4 The transportation of materials and waste has the potential to have knock-on environmental impacts as associated with HGV usage. There is also the potential for waste arisings to impact on the capacity of local waste management facilities.

6.3.6.5 With adherence to appropriate materials souring and usage, and adherence to local waste and planning policies that promote and seek sustainable waste management practices, it is considered that materials effects as associated with the Presented Option would be no worse than slight adverse.

[2] The Agricultural Land Classification (ALC) provides a framework for classifying land according to the extent to which its physical or chemical characteristics impose long-term limitations on agricultural use. Agricultural land can be classified into one of five grades; Grade 1 land being of excellent quality and Grade 5 land of very poor quality. Grade 3, which constitutes about half of the agricultural land in England and Wales, is now divided into two subgrades designated 3a and 3b. The "*best and most versatile land*" is defined as ALC Grades 1, 2 and 3a by policy guidance (e.g. Annex 2 of National Planning Policy Framework (NPPF) (Department for Communities and Local Government, 2012)).

6.3.7. Noise and Vibration

6.3.7.1 Potentially noise sensitive receptors identified in the vicinity of the existing Little Eaton junction include the residential area of Allestree to the west which faces directly onto the A38, the mobile home park immediately to the north of the existing Little Eaton junction, and the village of Breadsall to the east/ south-east (including Breadsall Manor at the north end of the village). An individual residential property is located east of Allestree on Ford Lane close to the crossing of the River Derwent. The closest residential properties in the village of Breadsall are a minimum of between approximately 190m (north-west edge of village) and 420m (south-west edge of village) from the existing A38.

6.3.7.2 A small number of commercial properties are located in the vicinity of the existing Little Eaton junction – this includes facilities adjacent to the mobile home park and a garden centre located to the north-west between the A38 and the B6179. Such commercial uses are not considered to be sensitive to changes in road traffic noise and are not considered further in this assessment. Immediately to the south and east of the existing junction are open farmland/ woodland which are also not considered to be sensitive in terms of changes in traffic noise levels.

6.3.7.3 The Presented Option would relocate the A38 and associated slip roads to the south and east of the existing A38 alignment. This would not significantly change the proximity of the closest residential properties in Allestree to the A38. The mainline A38 would be slightly further away from the mobile home park to the north (by approximately 20m). The closest residential properties in the village of Breadsall would be a minimum of between approximately 140m and 370m from the closest aspect of the Presented Option (i.e. the southbound off slip road). The mainline A38 would be elevated through the junction, thereby reducing any existing noise mitigation as provided by any intervening topography/ structures.

6.3.7.4 With the Presented Option, a minor (1.0 - 2.9dB) increase in traffic noise levels is considered likely in the opening year at the closest affected properties in Breadsall village due to the realignment of the A38. A negligible (0.1 - 0.9dB) change in traffic noise levels (potential increase or decrease) is considered likely at the closest properties in Allestree, whilst a minor reduction in traffic noise levels is considered likely at the mobile home park. Based on the high sensitivity of residential receptors, a corresponding slight adverse noise effect is anticipated in Breadsall, a slight beneficial effect at the mobile home park and a negligible effect at Allestree.

6.3.7.5 It should be noted that the noise level changes presented above are subject to the limitations as detailed in Section 7.8 and are based upon professional judgement as no traffic noise modelling results or traffic data are available at this stage.

6.3.8. Effects on All Travellers

6.3.8.1 National Cycle Route 54 runs along the B6179 and the A61 and traverses the existing Little Eaton junction. There is also a designated route for cyclists and pedestrians extending westwards from the junction, along the northern edge of the A38 and then following a route along Ford Lane. The Derwent Heritage Valley Way passes beneath the A38 and passes very close to the existing Little Eaton junction. Another three footpaths cross the existing A38 close to the existing junction.

6.3.8.2 During the construction phase, it is anticipated that there would be a temporary adverse impact on views from the road and driver stress due to construction activities, diversions, congestion and queuing that could increase journey times that is common with many road infrastructure projects. However, during Presented Option operation, these impacts would be eliminated and driver benefits would be delivered by reducing congestion and delays.

6.3.8.3 With regard to non-motorised users (NMUs), there may be some temporary disruption during the construction phase, although the Presented Option has the potential to improve NMU infrastructure resulting in a moderate beneficial effect by separating cycle routes and footpaths from A38 traffic.

6.3.9. **Community and Private Assets (including impacts upon Land Use)**

6.3.9.1 Approximately 5.8ha of land outside of the existing highway boundary would be required for the Presented Option (land take within the existing highway boundary is approximately 8.3ha).

6.3.9.2 Community and private assets in the vicinity of the A38 Little Eaton junction include private residences and places of business, such as the mobile home park and Fourways, Starbucks and the garden centre located to the north-west between the A38 and the B6179. The Presented Option would not require the demolition of any buildings or take land from any of these assets. However, the Presented Option would take land from approximately six agricultural holdings. It is currently considered that most agricultural holdings would experience a slight adverse effect, although one agricultural holding has the potential to experience a moderate adverse if an alternative form of access cannot be provided.

6.3.9.3 The construction of the Presented Option would be on land designated as Green Belt. This local policy designation seeks to maintain openness between the settlements of Ilkeston, Long Eaton and Derby, prevent the coalescence of settlements and safeguard the open countryside. Guidance at the national level advises that 'appropriate' development within the Green Belt includes local transport infrastructure where it can demonstrate a requirement for a Green Belt location. As the A38 is currently in a Green Belt location it has an established and accepted presence with much of the surrounding area washed over by the Green Belt. In the context of a scheme that seeks to improve the A38, there is no reasonable and viable alternative to deliver an improved A38 outside of the Green Belt. The Presented Option would result in development within the Green Belt, but in broad terms it would follow a similar alignment to the existing A38, albeit extending further to the south and east. There would be no material conflict with the fundamental objectives of Green Belt policy where developments require a Green Belt location. There would be some loss of openness, but this is unavoidable and the introduction of a new alignment would in part be offset by the removal of parts of the existing A38 alignment.

6.3.9.4 The Presented Option has the potential to result in a slight adverse effect with regard to the amount of land take required from an area designated as Green Belt, and a slight to moderate adverse effect upon agricultural land holdings. There would be no other adverse land use effects on local community and private assets.

6.3.10. **Road Drainage and the Water Environment (including Flood Risk)**

Water Resources

6.3.10.1 The Presented Option is situated within the river valley and flood plain of the River Derwent which is a main river which flows north to south under the A38 to the west of the Presented Option (refer to Figure 6.4 in Appendix D). The River Derwent is classified under the Water Framework Directive (WFD) (GB104028053240 River Derwent from Bottle Brook to River Trent) as being currently of moderate potential; with a status objective of 'good' by 2027 (the limiting element is listed as phosphate).

6.3.10.2 The Presented Option would require land take to the south and east of the existing A38 - this area contains tributaries to the River Derwent, namely the Dam Brook and Boosemoor Brook. These brooks rise on land approximately 1km to the east and north-east, respectively, of Breadsall village. Dam Brook and Boosemoor Brook do not have WFD classifications, so are assumed to be of similar quality status to the River Derwent.

6.3.10.3 The area surrounding the Presented Option is contained within a groundwater Source Protection Zone (SPZ) for a public drinking water supply associated with abstraction from the River Derwent in the Little Eaton area. The western extent of the Presented Option is contained within Zone 1, with Zone 2 extending from the river to the area of the Midland Mainline railway, whilst the remainder of the area is contained within the Total Catchment (Zone 3). The superficial deposits and bedrock are classified as Secondary A aquifers.

6.3.10.4 The Presented Option would have the potential to impact upon the water resources as detailed above as follows:

- The Presented Option would not require a new bridge or bridge alterations over the River Derwent. There is a flood arch underpass approximately 200m east of the River Derwent which would be retained with the Presented Option;
- Although there would be no works over the River Derwent, the Presented Option construction works would have the potential to affect the river directly or indirectly via accidental deposition, spillage or leakage of soils, fuels, oils or other construction materials;
- The Presented Option would require the diversion of an approximately 250m stretch of Dam Brook. Construction activities would thus have the potential to impact upon Dam Brook during these diversion works;
- Boosemoor Brook is located just upstream of the Dam Brook diversion, and would not be directly affected by the Presented Option;
- The Presented Option would increase impermeable area coverage and thus potentially alter local surface water runoff quantities and quality.

6.3.10.5 Assuming that best practice measures to protect the water environment are adopted during construction activities, it is considered that the construction of the Presented Option would have the potential to result in a slight adverse effect on surface water resources, and a neutral effect on groundwater resources.

6.3.10.6 Assuming that the Presented Option is provided with a suitable surface water drainage and management system, it is considered that the Presented Option operation would have no more than a slight adverse effect upon water resources as related to surface water runoff and operational runoff contamination/ potential operational spillage risk.

Flood Risk

6.3.10.7 In terms of flooding, the main risk associated with the Presented Option would be the requirement for development works within the floodplain of the River Derwent (located to the north-west and south-west of the A38 and to the west of the A61).

6.3.10.8 The Presented Option would entail the construction of a new A38 mainline on embankment together with various junction rearrangements. Such earthworks and embankments would be required within the River Derwent floodplain to raise road levels, which would then have the potential to displace flood water and increase flood risks to neighbouring areas. The risk would need to be mitigated with provision of compensatory flood storage, and this in turn could increase the scheme land take requirements.

6.3.10.9 Hydraulic modelling of the River Derwent is currently being undertaken to analyse the existing river flows and the potential effects of the Presented Option - this would be used to identify the need for and the amount of compensatory flood storage that would be required.

6.3.10.10 Dam Brook, which flows from near Breadsall to a confluence with the River Derwent south of the existing junction, would also need to be diverted to accommodate the eastern area of the Presented Option. However, early assessments indicate that this is unlikely to present a problem in terms of local flood risk.

6.3.10.11 The increase in impermeable road surface area due to the Presented Option as compared to permeable greenfield is likely to result in increased rainfall runoff, and this would need be controlled (e.g. provision of balancing ponds) so that flood risks are not increased away from the site. This could also require additional land take but will be consistent for each of the options.

6.3.10.12 Overall, the Presented Option has been qualitatively assessed as having a potential moderate adverse flood risk effect relative to the existing junction. However, an appropriate flood mitigation strategy can be developed with the aim that residual flood risk effects are reduced to neutral/ negligible. This flood risk management strategy will be defined following confirmation of which option is to be taken forward and completion of the hydraulic modelling.

6.4. Option 2

6.4.1. Air Quality

6.4.1.1 Details of air quality sensitive receptors and existing air quality conditions in the vicinity of the existing junction are as detailed in Section 6.3.1.

6.4.1.2 Option 2 would relocate the mainline A38 to the west of the existing A38. The existing A38 would be reused as the southbound on and off slip roads. A new northbound on and off slip roads would be provided to the west of the realigned A38 mainline, including a new roundabout on the B6179. This option would not reduce the minimum distance between properties in south east Allestree and the A38; however, it would bring the A38 closer to properties in north eastern Allestree which are currently located at some distance from the existing A38. Option 2 would also reduce the distance between the A38 and the individual property on Ford Lane by approximately 15m. The mainline A38 would be relocated from the east of the mobile home park to the west, and some of the mobile homes (estimated two) would be lost to the scheme. For homes in the south-east corner of the mobile home park, there is the potential for an improvement in air quality as the A38 mainline would move away from these properties. For homes in the north-west corner of the mobile home park (where some properties would be lost), there is the potential for increases in pollutant concentrations given the relocation of the A38 mainline and the northbound off-slip. As the new A38 mainline would be elevated as compared to the properties in the mobile home park, and as current concentrations in close proximity to the junction are below the NO_2 objective, it is considered likely that sensitive receptors in the mobile home park would experience annual mean pollutant concentrations below the objective value with Option 2 - as such the effect of the option is not anticipated to be significant.

6.4.1.3 As detailed in Section 6.3.1, the closest residential properties in the village of Breadsall to the existing A38 are a minimum of between approximately 190m (north-west edge of village) and 420m (south-west edge of village) - at these distances adverse impacts on air quality are not anticipated. As Option 2 would not locate the A38 closer to Breadsall, the village would not experience any air quality changes. In addition, air quality at Little Eaton village would also be unaffected.

6.4.1.4 Overall, the effect of Option 2 on air quality is anticipated to be slight adverse, and thus not significant.

6.4.1.5 As compared to the Presented Option, receptors on the mobile home park would experience a higher air quality impact with Option 2 at receptors in the north-west section of the mobile home park, and a lower air quality impact at the south-east end of the park. As annual mean concentrations of NO_2 at receptors in this area are anticipated to be below the air quality objective, the effect is not anticipated to be significant. Nevertheless, air quality effects of Option 2 are considered to be slightly worse than those as would be experienced with the Presented Option.

6.4.2. Archaeology and Cultural Heritage

6.4.2.1 As detailed in Section 6.3.2, the existing A38 traverses the designated Derwent Valley Mills WHS (core area and buffer zone). Option 2 would require the construction of a new bridge across the Midland Main railway line, and require land take to the north of the A38, construction of a new raised A38 on embankment, as well as new road connections and structures into the River Derwent valley which is an essential component of the setting of the WHS. Option 2 would impact the asset, resulting in a moderate adverse effect upon the WHS's setting.

6.4.2.2 The introduction of Option 2 infrastructure (raised road, embankments, retaining walls and road structures) would impact the setting of the designated Breadsall Conservation Area, Breadsall Manor (listed building) and a number of non-designated historic buildings, including the former Ford Farm and the historic waterworks buildings on Alfreton Road. The significance of potential effect upon Breadsall Manor and Breadsall Conservation Area would be neutral, however, the effect upon both Ford Farm and the historic waterworks buildings on Alfreton Road would be slight adverse as Option 2 would bring the road network closer to these assets.

6.4.2.3 Part of the historic 18th century Derby Canal, Little Eaton Branch would be impacted by Option 2 to the north of Thorn Farm as a result of the construction of the new road infrastructure – this would result in a slight adverse potential effect upon that asset.

6.4.2.4 The land take required for Option 2 to the north and west of the existing A38 crosses an area that is known to be a historic landfill (refer to Section 6.4.5) and where there is no potential for buried archaeology. However, to the west of the Midland Mainline Railway there is potential for Option 2 to impact an unknown buried archaeology resource within a small area of the River Derwent floodplain, and would also potentially impact an unknown deeply stratified palaeo-environmental deposit within the same area. The potential effect upon the buried archaeological resource, if present, would be slight adverse; whilst the effect upon the palaeo-environmental deposits would be neutral as this resource is likely to extend beyond the footprint of Option 2.

6.4.2.5 Option 2 has the potential to result in a moderate adverse effect with regard to heritage assets, which is significant. Due to the additional land take and the introduction of new structures, the overall effect of Option 2 is therefore likely to be slightly worse than the effect that which would result due to the Presented Option.

6.4.3. **Landscape and Visual Impacts**

6.4.3.1 Option 2 would expand the road network onto brownfield land to the north and west of the existing A38, effectively cutting the corner off the existing Little Eaton junction - this represents a large expansion in the road footprint. This land is within the Riverside Meadows Landscape Character Type which falls in the Derbyshire Peak Fringe and Lower Derwent Landscape Character Area, whilst some land to the west would also be within the Derwent Valley Mills WHS. The main visual receptors are users of public rights of way such as the Derwent Valley Heritage Trail.

6.4.3.2 Option 2 would result in an increased perception of the highway infrastructure in what is predominantly a rural landscape. In addition, Option 2 would require the construction of a new bridge on embankment across the Midland Main railway line (within the Derwent Valley Mills World Heritage Site), thereby increasing adverse landscape effects. It is anticipated that Option 2 would potentially result in a moderate adverse landscape effect.

6.4.3.3 The land take required for Option 2, along with the raising of the main A38 carriageway would increase the road's visibility within the landscape. This would potentially be exacerbated by the loss of existing screening features such as the trees to the north of the existing Little Eaton junction. There would, however, be a reduction in effects on visual amenity at Breadsall village as a result of locating the elevated section of the A38 carriageway further from it. Overall, it is anticipated that Option 2 would result in a moderate adverse effect on visual amenity.

6.4.3.4 Given the above, the overall landscape effect of Option 2 is slightly worse than that which would be experience due to the Presented Option, whilst overall visual amenity effects are comparable.

6.4.4. **Nature Conservation**

6.4.4.1 Option 2 would be unlikely to result in any change in the significance of effects on statutory designated sites (see Figure 6.1 in Appendix D) relative to those that would arise through construction and operation of the Presented Option.

6.4.4.2 Option 2 would, however, avoid direct habitat loss within Alfreton Road Field rough grassland LWS non-statutory designated site, although the rough grassland LWS could experience potential indirect effects.

6.4.4.3 As compared to the Presented Option, Option 2 would have reduced losses to habitats as follows (potentially changes in level of effect detailed in brackets):

- Hedgerow (reduced from up to County or Unitary Authority Area level to Local level);
- Plantation broadleaved woodland (reduced from up to County or Unitary Authority Area level to Local level); and
- Improved grassland (reduced from Local level to Site level).

6.4.4.4 However, Option 2 would result in further loss of, or impacts upon, the following:

- Semi-improved grassland, which would result in adverse effect at up to Regional level (no change in level of effect in comparison to the Presented Option);
- Marshy grassland habitat, which would result in adverse effect at up to Regional level (this represents a new effect in comparison to the Presented Option);
- Wet ditch, which would result in an adverse effect at up to County or Unitary Authority Area level (this does not represent an increase in the level of effect on watercourses in comparison to the Presented Option); and

- Scrub and scattered trees, which would result in an adverse effect at up to Local level (no change in the level of effect in comparison to the Presented Option).

6.4.4.5 Option 2 would be unlikely to result in any change in the significance of effects on other habitats present (as detailed above) relative to those that would arise due to the Presented Option.

6.4.4.6 This mosaic of habitats as details above has the potential to support species/ species groups, which could be affected by Option 2 (with associated effects noted) as follows:

- A diverse assemblage of terrestrial invertebrates, the loss of which would result in an adverse effect of up to Regional level (no change in the level of effect in comparison the Presented Option);
- Populations of wintering birds, which if significantly impacted upon would result in an adverse effect at up to Regional level (this represents a new effect relative to the Presented Option, the level of which will be dependent on the species and numbers concerned);
- Foraging and commuting bats, which if significantly impacted upon would result in an adverse effect at up to Regional level (this potentially increases the level of effect relative to the Presented Option, depending on the species and numbers concerned);
- Populations of common reptiles, the loss of which would result in an adverse effect at up to County or Unitary Authority Area level (this represents a new effect relative to the Presented Option); and
- Populations of badger, the loss of which would result in an adverse effect at up to Local level (no change in the level of effect in comparison the Presented Option).

6.4.4.7 Further baseline surveys would be required to inform a full ecological impact assessment and to confirm those species/ species groups present within the land required for Option 2.

6.4.4.8 Given the above, it is considered that Option 2 has the potential to result in an overall Large Adverse effect with regard to nature conservation. The effects of Option 2 are potentially significantly worse than those associated with the Presented Option, as there are potential impacts upon several more receptors of up to Regional value than associated with the Presented Option. It is, however, considered that an appropriate ecological mitigation strategy can be developed that has the potential to reduce residual nature conservation effects to non-significant levels. This strategy will be defined following confirmation of which option is to be taken forward.

6.4.5. Geology and Soils

6.4.5.1 The geology and soils effects as associated with Option 2 would be similar to some of those that would be experienced with the Presented Option. However, Option 2 would result in a number of different soils effects as follows:

- Option 2 would cross the A. E. Hibbs & Sons Ford Lane landfill site and thus leachate and/ or gas from the landfill could have a potential direct adverse impact upon the proposed road infrastructure, whilst contaminated materials could be encountered during the construction phase with knock on impacts upon controlled water and construction workers;

- Option 2 would result in lower losses of agricultural land of ALC 3a and 3b in comparison to the Presented Option.

6.4.5.2 Given the above, it is considered that Option 2 would have a negligible effect with regard to the loss of agricultural land. However, given that Option 2 would cross the Ford Lane landfill site; overall it is considered that Option 2 has the potential to result in a moderate adverse effect upon soils and geology. It is also considered that an appropriate soils mitigation strategy could be developed that has the potential to reduce residual effects to non-significant levels.

6.4.6. **Materials**

6.4.6.1 The materials effects as associated with Option 2 are considered to be comparable to those as associated with the Presented Option. However, Option 2 would encroach upon an area of historic landfilling to the north of the existing Little Eaton junction, thus potentially generating contaminated waste which would require off site treatment and/ or disposal and therefore a slight/ moderate impact is considered likely. Significant effects would be avoided through adherence to appropriate materials sourcing and usage, and adherence to good construction practices and compliance with relevant land local waste and planning policies.

6.4.7. **Noise and Vibration**

6.4.7.1 Details of noise sensitive receptors and receptor distances from the existing A38 are detailed in Section 6.3.7.

6.4.7.2 Option 2 would relocate the mainline A38 to the north/ west of the existing A38. The existing A38 would be reused as the southbound on and off slip roads. New northbound on and off slip roads are proposed to the north/ west of the realigned A38 mainline including a new roundabout on the B6179. This option would not reduce the minimum distance between properties in south-east Allestree and the A38; however, it would bring the A38 closer to properties in north-eastern Allestree which are currently located at some distance from the existing A38. Option 2 would also reduce the distance between the A38 and the individual property on Ford Lane by approximately 15m. The mainline A38 would be relocated from the east of the mobile home park to the west, with some mobile homes being lost (estimated two). The closest approach of the mainline A38 to the north-west edge of Breadsall would be comparable to the existing situation. The south-west edge of the village would be further away from the mainline at approximately 640m. The minimum distance between the southern edge of Little Eaton village and the closest approach to the A38 to the east would be unchanged. However, the A38 mainline through the junction to the south, and the new slip roads are closer to the southern edge of the village. The mainline A38 would be elevated through the junction, thereby reducing any existing noise mitigation provided by any intervening topography/ structures.

6.4.7.3 A negligible (0.1 - 0.9dB)/ minor (1.0 - 2.9dB) increase in traffic noise levels is considered likely in the Option 2 opening year at the eastern edge of Allestree and at the individual property on Ford Lane. The change in traffic noise levels at the mobile home park is considered likely to vary from moderate (3.0 - 4.9dB) decrease to moderate increase depending on the property position within the mobile home park relative to the existing and new A38 mainline. With Option 2 the north-west edge of Breadsall village would be a comparable distance to the A38 as the existing situation, therefore a negligible (0.1 - 0.9dB) decrease in traffic noise is considered likely. The south-west edge of the village would be further from the mainline A38 at around 640m, therefore a minor decrease in traffic noise levels is considered likely.

6.4.7.4 With Option 2 the minimum distance between the southern edge of Little Eaton and the closest approach of the A38 to the east would be unchanged. However, a negligible (0.1 - 0.9dB)/ minor (1.0 - 2.9dB) increase may occur in the opening year as the A38 mainline through the junction to the south, and the new slip roads, would be closer to the southern edge of the village.

6.4.7.5 With Option 2 the slight adverse noise effect at Breadsall village as associated with the Presented Option would be avoided. However, the slight beneficial noise effect of the Presented Option at the mobile home park would likely be lost at some mobile homes and replaced by an adverse effect. In addition, Option 2 may have a slight adverse noise effect on the western edge of Allestree and the southern edge of Little Eaton. As Option 2 would reduce noise effects in some locations and increase them elsewhere, on balance the overall noise effects of Option 2 are likely to be neutral, as compared to the Presented Option.

6.4.8. **Effects on All Travellers**

6.4.8.1 Provisions for NMUs in the vicinity of the existing A38 at Little Eaton are detailed in Section 6.3.8.

6.4.8.2 During the construction phase, it is anticipated that there would be a temporary impact on views from the road and driver stress due to construction activities, diversions, congestion and queuing that could increase journey times that is common with many road infrastructure projects. However, during Option 2 operation, these impacts would be eliminated and driver benefits would be delivered by reducing congestion and delays.

6.4.8.3 With regard to NMUs, there may be some temporary disruption during the construction phase, although Option 2 has the potential to improve NMU infrastructure resulting in a major beneficial effect by separating cycle routes and footpaths from A38 traffic.

6.4.8.4 It is considered that effects on all travellers as associated with Option 2 would be comparable to those that would be experienced due to the Presented Option.

6.4.9. **Community and Private Assets (including impacts upon Land Use)**

6.4.9.1 Community and private assets in the vicinity of the existing Little Eaton junction are as detailed in Section 6.3.9.

6.4.9.2 Approximately 6.9ha of land outside of the existing highway boundary would be required for construction of Option 2 (land take within the existing highway boundary is approximately 8.3ha) – thus approximately 1.2ha more land than required for the Presented Option.

6.4.9.3 The community and private asset impacts as associated with Option 2 would be different to those that would be experienced due to the Presented Option as follows:

- Option 2 would require approximately 1.2ha more land outside the existing highway boundary than required for the Presented Option;
- Option 2 would require the demolition/ relocation of some mobile homes (estimated two) within the mobile home park located immediately to the south of the proposed A38 carriageway;
- Option 2 would encroach upon land currently occupied by Fourways located to the west of the mobile home park – however, building demolition would be avoided through the use of a retaining wall;
- A section of the new alignment would impact on land belonging to the garden centre located east of the B6179;

- Option 2 would avoid land take impacts upon the six agricultural holdings located to the east and south of the existing A38 that would be impacted by the Presented Option, although the option would take land from some holdings located to the north and west of the A38 as well as impact upon some farm accesses - effects would likely be slight to moderate adverse;
- Option 2 would cross the A. E. Hibbs & Sons Ford Lane landfill site;
- Option 2 would be located within an area designated as Green Belt - although this would not result in a fundamental conflict with Green Belt policy objectives, it is considered that Option 2 would be more outwardly intrusive and arguably more harmful to the openness of the Green Belt than the Presented Option.

6.4.9.4 Option 2 has the potential to result in a moderate adverse effect with regard to land take required from an area designated as Green Belt, and a slight to moderate adverse effect upon agricultural land holdings. Option 2 also has the potential to result in a potential large adverse effect due to the demolition of some mobile homes within the mobile home park.

6.4.9.5 Option 2 land use effects would be worse than those associated with the Presented Option, due to the requirement for the demolition of some mobile homes within the mobile home park (and encroach upon land currently occupied by Fourways), and greater encroachment into the Green Belt.

6.4.10. **Road and the Water Environment (including Flood Risk)**

Water Resources

6.4.10.1 Water resources in the vicinity of the existing A38 at Little Eaton are detailed in Section 6.3.10 (also refer to Figure 6.4 in Appendix D).

6.4.10.2 Water resources impacts as associated with Option 2 would be similar to those that would result due to construction and operation of the Presented Option, although there are a number of notable differences as follows:

- Option 2 would avoid diversion to Dam Brook to the east of the existing A38, although some works to watercourse ditches would likely be required to the north-west of the existing A38;
- Option 2 would require construction works within the former landfill area (refer to Section 6.4.5) which could have the potential to create pathways for contaminants to enter groundwater and, subsequently, the groundwater source protection zones (SPZ) and the River Derwent. The magnitude of potential adverse effects would be dependent upon local groundwater conditions in the area and the depth of any excavations required in this area, and the characteristics of the materials deposited within the historic landfill.

6.4.10.3 Assuming best practice measures to protect the water environment are adopted during Option 2 construction activities, it is considered that construction of Option 2 has the potential to result in slight adverse impacts on surface water resources, and a slight adverse effect on groundwater resources.

6.4.10.4 Assuming that Option 2 is provided with a suitable surface water drainage and management system, it is considered that Option 2 operation would have no more than a slight adverse effect upon water resources as related to surface water runoff and operational runoff contamination/ potential operational spillage risk.

6.4.10.5 Given the above, it is considered that Option 2 would perform slightly worse than the Presented Option, due to potential impacts on groundwater during construction.

Flood Risk

6.4.10.6 Flood plain details in the vicinity of the existing A38 at Little Eaton are detailed in Section 6.3.10.

6.4.10.7 Some of the flood risk issues as associated with Option 2 would be similar to some of those as associated with construction and operation of the Presented Option. However, Option 2 would require approximately 1.2ha more land outside of the existing highway boundary than the Presented Option, with land take being required to the north and west of the existing A38.

6.4.10.8 Option 2 has been qualitatively assessed as having a potential large adverse flood risk effect relative to the existing junction. Potential flood risk effects associated with Option 2 are thus assessed as being potentially more significant than those as associated with the Presented Option. Should Option 2 be selected, an appropriate flood mitigation strategy will be developed with the aspiration that this strategy reduces residual flood risk effects to be neutral/ negligible. Given the needed for more flood compensation than the Presented Option, and locational constraints, it is considered that development of a suitable flood mitigation strategy (with suitable compensation areas) would be more problematic than for the Presented Option.

6.5. Option 3A

6.5.1. Air Quality

6.5.1.1 Details of air quality sensitive receptors and existing air quality conditions in the vicinity of the existing junction are as detailed in Section 6.3.1.

6.5.1.2 Option 3A would relocate the A38 and associated slip roads to the south and east of the existing A38 alignment. Option 3A would relocate the A38 and associated slip roads slightly to the south and east of the existing A38 alignment. This would not significantly affect the proximity of residential properties in Allestree to the A38.

6.5.1.3 This option would require a temporary diversion route to the south of the proposed A38 alignment during the construction phase. Construction and use of the temporary diversion route could exacerbate temporary air quality effects, although these are anticipated to be manageable by best-practice construction methods.

6.5.1.4 The mainline A38 would be a comparable distance from the mobile home park to the north as compared with the existing A38. The access off the roundabout into the mobile home park would be closer to properties on the eastern side of the park, although the volume of traffic on this link is likely to be minimal as it would be used as a park access road. Pollutant concentrations are therefore likely to be similar with Option 3A, as compared to the current junction layout. As annual mean concentrations of NO_2 are anticipated to be below the objective, air quality effects are not anticipated to be significant.

6.5.1.5 The closest residential properties in Breadsall village would be a minimum of between approximately 170m and 390m from the closest aspect of Option 3A (i.e. the southbound off slip road). At these distances, adverse impacts on air quality are not anticipated.

6.5.1.6 With this option there would be no direct access from the B6179 onto the southbound A38. A number of potential alternative routes are available, the most likely being to use the A61 to the next junction to the south at Croft Lane and doubling back to the A38 junction. The likely increase in traffic flows on this section of the A61 is estimated to be around 13%. No air quality sensitive receptors have been identified immediately adjacent to this section of the A61, the closest residential properties being in Breadsall approximately 320m to the east of the A61.

At this distance adverse impacts on air quality at these receptors are not anticipated.

6.5.1.7 Overall, the effect of Option 3A on air quality is anticipated to be neutral to slight adverse, and thus not significant.

6.5.1.8 As compared to the Presented Option, receptors on the mobile home park would experience a slightly higher air quality impact with Option 3A. As annual mean concentrations of NO_2 at receptors in this area are anticipated to be below the air quality objective, the effect is not anticipated to be significant. Overall, air quality effects of Option 3A are considered to be similar to those that would be experienced with the Presented Option.

6.5.2. Archaeology and Cultural Heritage

6.5.2.1 As detailed in Section 6.3.2, the existing A38 traverses the designated Derwent Valley Mills WHS (core area and buffer zone). Option 3A would require the construction of a new raised road on embankment, retaining walls, and new road structures into the River Derwent valley – this would impact the asset resulting in a slight adverse effect upon the WHS's setting.

6.5.2.2 Similarly, the introduction of the Option 3A infrastructure (raised road, embankments, retaining walls and road structures) would impact the setting of the designated Breadsall Conservation Area, Breadsall Manor (listed building) and a number of non-designated historic buildings, including the former Ford Farm and the historic waterworks buildings on Alfreton Road. The significance of potential effects upon Breadsall Conservation Area, Breadsall Manor and Ford Farm would be slight adverse, however, the effect upon the other historic building assets within the village would be neutral.

6.5.2.3 The land take required for Option 3A to the south of the existing A38 alignment, and the land required for the temporary diversion route to the east (approximately 0.3ha), has the potential to impact an unknown buried archaeology resource that lies within the River Derwent floodplain, and the potential to impact upon unknown deeply stratified palaeo-environmental deposits within the same area. The potential effect upon the buried archaeological, if present, would be slight adverse; whilst the effect upon the palaeo-environmental deposits would be neutral as this resource is likely to extend beyond the Option 3A footprint.

6.5.2.4 Option 3A has the potential to result in slight adverse effect with regard to heritage assets and thus not significant. The overall effect is thus likely to be similar to that which would result due to the Presented Option.

6.5.3. Landscape and Visual Impacts

6.5.3.1 Option 3A is broadly similar to the Presented Option insofar as the road would be extended to the south and east of the existing A38 into agricultural land. This land is within the Riverside Meadows Landscape Character Type which falls in the Derbyshire Peak Fringe and Lower Derwent Landscape Character Area, whilst some land to the west is also within the Derwent Valley Mills WHS. The main visual receptors are users of public rights of way such as the Derwent Valley Heritage Trail.

6.5.3.2 Option 3A would result in a slight loss of characteristic flood plain landscape, as well as an increased perception of the highway infrastructure in what is otherwise a rural landscape. It is expected that Option 3A would result in a slight adverse landscape effect.

6.5.3.3 To undertake Option 3A, the permanent land take required would be slightly less than the Presented Option (approximately 2.2ha) not including the requirement for approximately 0.7ha for the temporary diversion route during the construction phase. The raising of the main A38 carriageway would increase the road's visibility within the landscape. This would potentially be exacerbated by the loss of existing screening features such as the trees to the immediate south of the existing Little Eaton junction. The use of retaining walls would locally restrict the ability to use tree planting as a landscape/ visual mitigation technique. There would, however, be a reduction in effects on visual amenity at Breadsall village as a result of locating the elevated section of the A38 carriageway marginally further from the village. Overall, it is anticipated that Option 3A would result in a moderate adverse effect on visual amenity.

6.5.3.4 Given the above, the overall landscape effect of Option 3A would be similar to the effects associated with Presented Option, namely a slight adverse effect with regard to landscape character and a moderate adverse effect in relation to visual amenity (although some visual effects upon Breadsall village would be reduced). However, the use of retaining walls would locally restrict the ability to use tree planting as a landscape/ visual mitigation technique.

6.5.4. **Nature Conservation**

6.5.4.1 Option 3A would be unlikely to result in any change in the significance of effects on statutory and non-statutory designated sites (see Figure 6.1 in Appendix D) relative to those that would arise through construction and operation of the Presented Option. Option 3A would result in a slight increase in the area of habitat loss on Alfreton Road Field rough grassland LWS, however the level of effect is considered likely to be the same as would occur with the Presented Option.

6.5.4.2 Option 3A would result in an increase in the loss of semi-improved grassland and semi-natural broadleaved woodland to the south of the existing Little Eaton junction. However, Option 3A would lead to a reduction in the permanent loss of semi-improved grassland, semi-natural broadleaved woodland, arable and plantation broadleaved woodland habitats due to Option 3A land take being less than that required for the Presented Option (by approximately 2.2ha, although approximately 0.7ha of land would be required during the construction phase for the temporary diversion route). The change in the extent of loss of each of these habitat types is unlikely to result in changes to the effects upon these receptors relative to the Presented Option.

6.5.4.3 Option 3A would be unlikely to result in changes in effects on species receptors relative to those that would arise through construction and operation of the Presented Option.

6.5.4.4 Given the above, it is considered that Option 3A has the potential to result in an overall Large Adverse effect which would be comparable to that which would be experienced due to the Presented Option (although total permanent habitat losses would be approximately 2.2ha smaller). However, it is considered that an appropriate ecological mitigation strategy can be developed that has the potential to reduce residual nature conservation effects to non-significant levels. This strategy will be defined following confirmation of which option is to be taken forward.

6.5.5. **Geology and Soils**

6.5.5.1 The geology and soils effects as associated with Option 3A would be very similar to those that would be experienced with the Presented Option. However, Option 3A would result in a number of different soils effects as follows:

- Option 3A would locate the A38 carriageway slightly closer to the Ford Lane landfill site than the Presented Option. Option 3A would thus be at potential slightly higher risk of encountering leachate and/ or gas from the landfill;
- Option 3A would result in slightly less permanent loss of agricultural land (approximately 2.2ha) as compared to the Presented Option (with approximately 0.3ha of land associated with the temporary diversion route being impacted during the construction phase).

6.5.5.2 Given the above, it is considered that overall Option 3A would have a slight adverse effect upon soils and geology, thus being comparable to the effects associated with the Presented Option (although permanent losses of agricultural soils would be reduced).

6.5.6. **Materials**

6.5.6.1 The materials effects as associated with Option 3A are considered to be comparable to those as associated with the Presented Option.

6.5.7. **Noise and Vibration**

6.5.7.1 Details of noise sensitive receptors and receptor distances from the existing A38 are detailed in Section 6.3.7.

6.5.7.2 Option 3A would relocate the A38 and associated slip roads slightly to the south and east of the existing A38 alignment. This would not significantly affect the proximity of residential properties in Allestree to the A38. The mainline A38 would be a comparable distance from the mobile home park to the north. The access off the roundabout into the mobile home park is closer to properties on the eastern side of the park, although the volume of traffic on this link is likely to be minimal. The closest residential properties in Breadsall village would be a minimum of between approximately 170m and 390m from the closest aspect of Option 3A (i.e. the southbound off slip road). The mainline A38 would be elevated through the junction, thereby reducing any existing noise mitigation provided by any intervening topography/ structures. With this option there would be no direct access from the B6179 onto the southbound A38. A number of potential alternative routes are available, the most likely being to use the A61 to the next junction to the south at Croft Lane and doubling back to the A38 junction. The likely increase in traffic flows on this section of the A61 is estimated to be around 13%. No traffic noise sensitive receptors have been identified immediately adjacent to this section of the A61; the closest residential properties are in Breadsall approximately 320m to the east.

6.5.7.3 A negligible (0.1 - 0.9dB) increase in traffic noise levels is considered likely in the Option 3A opening year at the closest affected properties in Breadsall due to the slight realignment of the A38. A negligible (0.1 - 0.9dB) change (potential increase or decrease) in traffic noise levels is also considered likely at the closest properties in Allestree and the mobile home park, as the alignment is comparable to the existing situation in these areas. A negligible (0.1 - 0.9dB) increase in traffic noise levels is considered likely along the A61, between the A38 junction and the Croft Lane junction, due to the diversion of traffic wishing to access the A38 southbound from the B6179. Based on the high sensitivity of these residential receptors, a corresponding negligible effect is anticipated in Breadsall, the mobile home park and Allestree.

6.5.7.4 The proposed alternative is likely to reduce the adverse noise effect at Breadsall as compared to the Presented Option, although at the south-eastern edge of the village this may be offset by the increase in traffic on the A61. The beneficial effect of the Presented Option at the mobile home park is likely to be lost. On balance, the overall impact is therefore likely to be slight beneficial, as compared to the Presented Option.

6.5.8. **Effects on All Travellers**

6.5.8.1 Provisions for NMUs in the vicinity of the existing A38 at Little Eaton are detailed in Section 6.3.8.

6.5.8.2 During the construction phase, it is anticipated that there would be a temporary adverse impact on views from the road and driver stress due to construction activities, diversions, congestion and queuing that could increase journey times that is common with many road infrastructure projects. However, it is anticipated that construction of Option 3A would take longer than construction of the Presented Option. This option would thus extend the adverse construction phase effects upon views from the road and driver stress.

6.5.8.3 During Option 3A operation, driver benefits would be delivered by reducing congestion and delays. It is noted that during Option 3A operation, travellers from the B6179 (Alfreton Rd) would need to use the A61 roundabout to access the A38 southbound carriageway. This would result in an increase in journey times and driver stress.

6.5.8.4 With regard to NMUs, there may be some temporary disruption during the construction phase (which would be longer than construction of the Presented Option). However, Option 3A has the potential to improve NMU infrastructure resulting in a major beneficial effect by separating cycle routes and footpaths from A38 traffic.

6.5.8.5 It is considered that effects on all travellers as associated with Option 3A would be similar to those that would be experienced due to the Presented Option, although Option 3A would perform slightly worse than the Presented Option due to the extended construction programme and the need for travellers from the B6179 (Alfreton Rd) to use the A61 roundabout to access the A38 southbound carriageway.

6.5.9. **Community and Private Assets (including impacts upon Land Use)**

6.5.9.1 Community and private assets in the vicinity of the existing Little Eaton junction are as detailed in Section 6.3.9.

6.5.9.2 Approximately 3.6ha of land outside of the existing highway boundary would be required for Option 3A (land take within the existing highway boundary is approximately 8.3ha) - thus approximately 2.2ha less land than required for the Presented Option. In addition, Option 3A would require approximately 0.7ha of land temporarily during the construction phase for a temporary diversion route which would increase losses in adjacent land plots. Option 3A would not require the demolition of any community and private assets.

6.5.9.3 The community and private asset impacts as associated with Option 3A would be similar to those that would be experienced due to the Presented Option, although the following differences are noted:

- Option 3A would require approximately 2.2ha less land than required for the Presented Option (not including the requirement for approximately 0.7ha of land temporarily during the construction phase for a temporary diversion route);

- Option 3A would reduce land take impacts upon some of the six agricultural holdings that would be impacted by the Presented Option, although effects would likely remain as slight to moderate adverse;
- Option 3A would be located within an area designated as Green Belt, although it would not result in a fundamental conflict with Green Belt policy objectives. However, Option 3A would require less land take from the Green Belt.

6.5.9.4 Option 3A has the potential to result in a slight adverse effect with regard to land take required from an area designated as Green Belt, and a slight to moderate adverse effect upon agricultural land holdings. However, Option 3A land use effects would be slightly less adverse than those associated with the Presented Option, due to the requirement for approximately 2.2ha less land take.

6.5.10. **Road Drainage and the Water Environment (including Flood Risk)**

Water Resources

6.5.10.1 Water resources in the vicinity of the existing A38 at Little Eaton are detailed in Section 6.3.10 (also refer to Figure 6.4 in Appendix D).

6.5.10.2 Water resources impacts as associated with Option 3A would not be significantly different from those that would result due to construction and operation of the Presented Option.

6.5.10.3 As such, during the construction phase, surface water resource effects are anticipated to be slight adverse, whilst effects on groundwater resources are anticipated to be neutral. Assuming that Option 3A is provided with a suitable surface water drainage and management system, it is considered that option operation would have no more than a slight adverse effect upon water resources as related to surface water runoff and operational runoff contamination/ potential operational spillage risk.

Flood Risk

6.5.10.4 Flood plain details in the vicinity of the existing A38 at Little Eaton are detailed in Section 6.3.10.

6.5.10.5 Flood risk impacts as associated with Option 3A would not be significantly different from those that would result due to construction and operation of the Presented Option. However, given that Option 3A would require approximately 2.2ha less land outside of the existing highway boundary, the areal coverage of potential flood compensation areas would potentially be less than associated with the Presented Option.

6.5.10.6 Option 3A has been qualitatively assessed as having a potential moderate adverse flood risk effect relative to the existing junction. However, an appropriate flood mitigation strategy can be developed with the aim that residual flood risk effects are reduced to neutral/ negligible (noting that Option 3A flood compensation requirements are likely to be less than those required for the Presented Option). This flood risk management strategy will be defined following confirmation of which option is to be taken forward.

6.6. Southern Sweep

6.6.1. Air Quality

6.6.1.1 Details of air quality sensitive receptors and existing air quality conditions in the vicinity of the existing junction are as detailed in Section 6.3.1.

6.6.1.2 The Southern Sweep option would relocate the A38 and associated slip roads slightly to the south and east of the existing A38 alignment. This option would not reduce the minimum distance between properties in south east Allestree and the A38. The Southern Sweep option would relocate the A38 and associated slip roads slightly to the south and east of the existing A38 alignment. This would not significantly change the proximity of residential properties in Allestree to the A38. The closest residential properties in Breadsall village would be a minimum of between approximately 170m and 370m from the closest aspect of the scheme (i.e. the southbound off slip road). At these distances adverse impacts on air quality are not anticipated.

6.6.1.3 This option would require a temporary diversion route to the south of the proposed A38 alignment during the construction phase. Construction and use of the temporary diversion route could exacerbate temporary air quality effects, although these are anticipated to be manageable by best-practice construction methods.

6.6.1.4 The mainline A38 would be a comparable distance from the mobile home park to the north as compared with the existing A38. Pollutant concentrations as associated with the Southern Sweep option would likely be similar when compared to the current junction layout. As annual mean concentrations of NO_2 are anticipated to be below the objective, air quality effects are not anticipated to be significant here.

6.6.1.5 Overall, the effect of the Southern Sweep option on air quality is anticipated to be neutral to slight adverse, and thus not significant.

6.6.1.6 As compared to the Presented Option, receptors in the mobile home park would experience a similar air quality impact with the Southern Sweep option. As annual mean concentrations of NO_2 at receptors in this area are anticipated to be below the air quality objective, thus the effect is not anticipated to be significant. Overall, air quality effects of the Southern Sweep option are considered to be similar to those that would be experienced with the Presented Option.

6.6.2. Archaeology and Cultural Heritage

6.6.2.1 As detailed in Section 6.3.2, the existing A38 traverses the designated Derwent Valley Mills WHS (core area and buffer zone). The Southern Sweep option would include the construction of a new bridge over the Midland Mainline, a raised road on retaining walls, the introduction of embankments and new road structures. The Southern Sweep option would have a potential slight adverse effect on the setting of the WHS due to the introduction of new structures within the River Derwent valley.

6.6.2.2 The introduction of the Southern Sweep option infrastructure (raised road, temporary diversion route, embankments and road structures) would bring the road closer to Breadsall and would impact the setting of the designated Breadsall Conservation Area, Breadsall Manor (listed building) and a number of non-designated historic buildings, including the former Ford Farm and the historic waterworks buildings on Alfreton Road. The significance of the potential effect upon Breadsall Conservation Area and Breadsall Manor would be slight adverse, however, the effect upon Ford Farm and the historic waterworks buildings on Alfreton Road would be neutral.

6.6.2.3 The land take required for the Southern Sweep option to the east and south of the existing A38 (including approximately 0.3ha needed during the construction phase for temporary diversion route) has the potential to impact an unknown buried archaeology resource that lies within the River Derwent floodplain, and potentially impact upon unknown deeply stratified palaeo-environmental deposits within the same area. The potential effect upon the buried archaeological, if present, would be slight adverse; whilst the effect upon the palaeo-environmental deposits would be neutral as this resource is likely to extend beyond the Southern Sweep option footprint.

6.6.2.4 The Southern Sweep option has the potential to result in slight adverse effect with regard to heritage assets, and thus not significant. The overall effect is thus likely to be similar to that which would result due to the Presented Option.

6.6.3. **Landscape and Visual Impacts**

6.6.3.1 The Southern Sweep option is broadly similar to the Presented Option and would entail expanding the A38 to the south and east into agricultural land. This land is within the Riverside Meadows Landscape Character Type which falls in the Derbyshire Peak Fringe and Lower Derwent Landscape Character Area, whilst some land to the west is within the Derwent Valley Mills WHS. The main visual receptors are users of public rights of way such as the Derwent Valley Heritage Trail.

6.6.3.2 The Southern Sweep option would result in a slight loss of characteristic flood plain landscape, as well as an increased perception of the highway infrastructure in what is otherwise a rural landscape. It is anticipated that the Southern Sweep option would result in a potential slight adverse landscape effect.

6.6.3.3 To undertake the Southern Sweep option, the permanent land take required would be slightly less than the Presented Option (approximately 1.7ha), not including the requirement for approximately 0.7ha for the temporary diversion route during the construction phase. Raising of the main A38 carriageway would increase the road's visibility within the landscape. This would potentially be exacerbated by the loss of existing screening features such as the trees to the immediate south of the existing Little Eaton junction. The use of retaining walls would locally restrict the ability to use tree planting as a landscape and visual mitigation. There would, however, be some reduction in effects on visual amenity at Breadsall village as a result of locating the elevated section of the A38 carriageway marginally further from the village. Overall, the Southern Sweep option is anticipated to result in a moderate adverse visual effect.

6.6.3.4 Given the above, the overall landscape effect of the Southern Sweep option would be similar to the effects as associated with Presented Option, namely a slight adverse effect with regard to landscape character and a moderate adverse effect in relation to visual amenity. However, some visual effects upon Breadsall village would be reduced although the use of retaining walls would locally restrict the ability to use tree planting as a landscape/ visual mitigation technique.

6.6.4. **Nature Conservation**

6.6.4.1 The Southern Sweep option would be unlikely to result in any change in the significance of effects on statutory and non-statutory designated sites (see Figure 6.2 in Appendix D) relative to the Presented Option. The Southern Sweep option would result in a slight increase in the area of habitat loss on Alfreton Road Field rough grassland LWS, however the level of effect is considered likely to be the same as would occur due to the Presented Option.

6.6.4.2 The Southern Sweep option would result in a slight increase in the loss of semi-natural broadleaved woodland to the south of the existing Little Eaton junction by the rail bridge. However, the Southern Sweep option would lead to a reduction in the permanent loss of semi-improved grassland, semi-natural broadleaved woodland, arable and plantation broadleaved woodland habitats due to the Southern Sweep option land take being less than that required for the Presented Option. The change in the extent of loss of each of these habitat types is unlikely to result in changes to the effects upon these receptors relative to the Presented Option.

6.6.4.3 The Southern Sweep option would unlikely result in changes in effects on species receptors relative to those that would arise through construction and operation of the Presented Option.

6.6.4.4 Given the above, it is considered that the Southern Sweep option has the potential to result in an overall Large Adverse effect which would be comparable to that which would be experienced with the Presented Option (although permanent total habitat losses would be approximately 1.7ha smaller, not including the requirement for approximately 0.7ha of land would be required during the construction phase for the temporary diversion route). However, it is considered that an appropriate ecological mitigation strategy can be developed that has the potential to reduce residual nature conservation effects to non-significant levels. This strategy will be defined following confirmation of which option is to be taken forward.

6.6.5. Geology and Soils

6.6.5.1 The geology and soils effects as associated with the Southern Sweep option would be very similar to those that would be experienced with the Presented Option. However, the Southern Sweep option would result in a number of different soils effects as follows:

- The Southern Sweep option would locate the A38 carriageway slightly closer to the Ford Lane landfill site than the Presented Option. The Southern Sweep option would thus be at potential slightly higher risk of encountering leachate and/ or gas from the landfill;
- The Southern Sweep option would result in slightly less permanent agricultural land (approximately 1.7ha) being lost as compared to the Presented Option (with approximately 0.7ha of land associated with the temporary diversion route being impacted during the construction phase).

6.6.5.2 Given the above, it is considered that the Southern Sweep option would have a slight adverse effect upon soils and geology, thus being comparable to the effects associated with the Presented Option (although permanent losses of agricultural soils would be slightly reduced).

6.6.6. Materials

6.6.6.1 The materials effects as associated with the Southern Sweep option are considered to be comparable to those as associated with the Presented Option.

6.6.7. Noise and Vibration

6.6.7.1 Details of noise sensitive receptors and receptor distances from the existing A38 are detailed in Section 6.3.7.

6.6.7.2 The Southern Sweep option would relocate the A38 and associated slip roads slightly to the south and east of the existing A38 alignment. This would not significantly change the proximity of residential properties in Allestree to the A38. The mainline A38 would be a comparable distance from the mobile home park to the north. The closest residential properties in Breadsall village would be a minimum of between approximately 170m and 370m from the closest aspect of the scheme (i.e. the southbound off slip road). The mainline A38 would be elevated through the junction, thereby reducing any existing noise mitigation as provided by any intervening topography/ structures.

6.6.7.3 A negligible (0.1 - 0.9dB) increase in traffic noise levels is considered likely in the Southern Sweep option opening year at the closest affected properties in Breadsall due to the slight realignment of the A38. A negligible (0.1 - 0.9dB) change (potential increase or decrease) in traffic noise levels is also considered likely at the closest properties in Allestree and the mobile home park, as the A38 alignment is comparable to the existing situation in these areas. Based on the high sensitivity of these residential receptors, a corresponding negligible noise effect is anticipated in Breadsall, the mobile home park and Allestree.

6.6.7.4 The Southern Sweep option is likely to reduce the slight adverse noise effect at Breadsall village, although the slight beneficial effect of the Presented Option at the mobile home park is likely to be lost. On balance, the overall noise impact is therefore likely to be slight beneficial, as compared to the Presented Option.

6.6.8. Effects on All Travellers

6.6.8.1 Provisions for NMUs in the vicinity of the existing A38 at Little Eaton are detailed in Section 6.3.8.

6.6.8.2 During the construction phase, it is anticipated that there would be a temporary adverse impact on views from the road and driver stress due to construction activities, diversions, congestion and queuing that could increase journey times that is common with many road infrastructure projects. However, it is anticipated that construction of Southern Sweep option would take longer than the construction of the Presented Option. This option would thus extend the adverse construction phase effects upon views from the road and driver stress.

6.6.8.3 During Southern Sweep option operation, driver benefits would be delivered by reducing congestion and delays.

6.6.8.4 With regard to NMUs, there may be some temporary disruption during the construction phase, although the Southern Sweep option has the potential to improve NMU infrastructure resulting in a major beneficial effect by separating cycle routes and footpaths from A38 traffic.

6.6.8.5 It is considered that effects on all travellers as associated with the Southern Sweep option would be similar to those that would be experienced due to the Presented Option, although it would perform slightly worse than the Presented Option due to the extended construction programme.

6.6.9. Community and Private Assets (including impacts upon Land Use)

6.6.9.1 Community and private assets in the vicinity of the existing Little Eaton junction are as detailed in Section 6.3.9.

6.6.9.2 Approximately 4 ha of land outside of existing highway boundary would be required for the Southern Sweep option (land take within the existing highway boundary is approximately 8.3ha) – thus approximately 1.7 ha less land than required for the Presented Option. In addition, the Southern Sweep option would require approximately 0.7ha of land temporarily during the construction phase for a temporary diversion route which would increase losses in adjacent land plots. Construction of the Southern Sweep option would not require the demolition of any community and private assets.

6.6.9.3 The community and private asset impacts as associated with the Southern Sweep option would be similar to those that would be experienced due to the Presented Option, although the following differences are noted:

- The Southern Sweep option would require approximately 1.7ha less land than required for the Presented Option (noting the need for approximately 0.7ha of land temporarily during the construction phase for a temporary diversion route);
- The Southern Sweep option would reduce land take impacts upon some of the six agricultural holdings that would be impacted by the Presented Option, although effects would likely remain as slight to moderate adverse;
- The Southern Sweep would be located within an area designated as Green Belt, although it would not result in a fundamental conflict with Green Belt policy objectives. However, the Southern Sweep would require less land take from the Green Belt than the Presented Option.

6.6.9.4 The Southern Sweep has the potential to result in a slight adverse effect with regard to land take required from an area designated as Green Belt, and a slight to moderate adverse effect upon agricultural land holdings. However, the Southern Sweep option land use effects would be slightly less adverse than those associated with the Presented Option, due to the requirement for approximately 1.7ha less permanent land take.

6.6.10. **Road Drainage and the Water Environment (including Flood Risk)**

Water Resources

6.6.10.1 Water resources in the vicinity of the existing A38 at Little Eaton are detailed in Section 6.3.10 (also refer to Figure 6.4 in Appendix D).

6.6.10.2 Water resources impacts as associated with the Southern Sweep option would not be significantly different from those that would result due to construction and operation of the Presented Option.

6.6.10.3 As such, during the construction phase, surface water resource effects are anticipated to be slight adverse, whilst effects on groundwater resources are anticipated to be neutral. Assuming that the Southern Sweep option is provided with a suitable surface water drainage and management system, it is considered that option operation would have no more than a slight adverse effect upon water resources as related to surface water runoff and operational runoff contamination/ potential operational spillage risk.

Flood Risk

6.6.10.4 Flood plain details in the vicinity of the existing A38 at Little Eaton are detailed in Section 6.3.10.

6.6.10.5 Flood risk impacts as associated with the Southern Sweep option would not be significantly different from those that would result due to construction and operation of the Presented Option. However, given that the Southern Sweep option would require approximately 1.7ha less land outside of the existing highway boundary, the areal coverage of potential flood compensation areas would potentially be less than associated with the Presented Option.

6.6.10.6 The Southern Sweep option has been qualitatively assessed as having a potential moderate adverse flood risk effect relative to the existing junction. However, an appropriate flood mitigation strategy can be developed with the aim that residual flood risk effects are reduced to neutral/ negligible (noting that the Southern Sweep option flood compensation requirements are likely to be less than those required for the Presented Option. This flood risk management strategy will be defined following confirmation of which option is to be taken forward.

6.7. Summary and Conclusions

6.7.1. Air Quality

6.7.1.1 With regard to air quality, the Presented Option is anticipated to result in a neutral to slight adverse effect, with potential adverse air quality impacts at the sensitive receptors closest to the scheme (although effects would not be significant).

6.7.1.2 With Option 2, sensitive receptors on the mobile home park would experience a higher air quality impact in the north-west section of the park and a lower air quality impact at the south-east end of the park as compared to the Presented Option. As annual mean concentrations of NO_2 at receptors in this area are anticipated to be below the air quality objective, the effect is not anticipated to be significant. Nevertheless, air quality effects of Option 2 are considered to be slightly worse than those as would be experienced with the Presented Option.

6.7.1.3 Overall, air quality effects of Option 3A and the Southern Sweep option are considered to be similar to those that would be experienced with the Presented Option (noting that construction phase air quality effects as associated with Option 3A and the Southern Sweep would be experienced for a longer duration than associated with the Presented Option).

6.7.2. Archaeology and Cultural Heritage

6.7.2.1 All of the options would require the construction of a new road embankment to the west of the Midland Main railway line and to the east of the River Derwent, with land take from the River Derwent Valley. The options would also require the introduction of new associated infrastructure such as road furniture, lighting and increased urbanisation of the river valley, which would have an adverse effect on the setting of the Derwent Valley Mills WHS as well as impacting any buried archaeological remains in the River Derwent floodplain. The Presented Option, Option 3A and the Southern Sweep would all result in a slight adverse effect upon the WHS setting. However, Option 2 would result in a moderate adverse effect due to the greater land take that would impinge on the river valley and the setting of the WHS.

6.7.2.2 The Presented Option, Option 3A and the Southern Sweep would move the A38 alignment closer to the Breadsall Conservation Area and the Grade II Listed Breadsall Manor. Effects upon these heritage assets would be slight adverse. Option 2 would result in a neutral effect upon the Breadsall Conservation Area and Breadsall Manor. However, Option 2 would have a slight adverse effect upon both Ford Farm and the historic waterworks buildings on Alfreton Road.

6.7.2.3 Of the assessed options, Option 2 would have the greatest potential to impact upon heritage assets, with effects potentially being moderate adverse, which is significant. The Presented Option, Option 3A and the Southern Sweep all have the potential to result in a slight adverse effect with regard to heritage assets, which is not significant.

6.7.3. Landscape and Visual

6.7.3.1 The Presented Option is anticipated to result in a slight adverse effect on landscape character and a moderate adverse effect on visual amenity due to the loss of characteristic floodplain landscape and vegetation, as well as the raised visibility of the A38 junction due to the raised road profile.

6.7.3.2 Option 3A and the Southern Sweep option are likely to have similar landscape and visual effects as their land take and road profile do not alter notably from the Presented Option (although some visual effects upon Breadsall village would be reduced). However, the use of retaining walls would locally restrict the ability to use tree planting as a landscape/ visual mitigation technique. Option 2, however, has a higher land take than any of the other option and accordingly the effect of this option on landscape character and visual amenity are assessed to be moderate adverse.

6.7.4. Nature Conservation

6.7.4.1 The Presented Option has the potential to result in an overall large adverse effect with regard to nature conservation (unmitigated). Option 2 is also considered to have the potential to result in a large adverse nature conservation effect, although the effects are potentially significantly worse than those associated with the Presented Option as there are potential impacts upon several more receptors of up to regional value than associated with the Presented Option. Further baseline surveys would be required to inform a full ecological impact assessment and to confirm those species/ species groups present within the land required for Option 2.

6.7.4.2 Option 3A and the Southern Sweep option have the potential to result in an overall large adverse nature conservation effect (unmitigated) – this overall adverse effect is considered to be comparable to that which would be associated with the Presented Option (although permanent total habitat losses would be approximately 2.2ha and 1.7ha smaller, respectively).

6.7.4.3 It is considered that whichever option is selected, that an appropriate ecological mitigation strategy could be developed that has the potential to reduce residual nature conservation effects to non-significant levels. This strategy will be defined following confirmation of which option is to be taken forward.

6.7.5. Geology and Soils

6.7.5.1 The Presented Option would not have a direct impact on the Ford Lane landfill which is located to the north of the existing A38 Little Eaton junction. The Presented Option would result in the permanent loss of some agricultural land, although losses of ‘best and most versatile agricultural land’ would be small (0.9ha). Overall, it is considered that the Presented Option has the potential to result in a slight adverse effect upon soils and geology.

6.7.5.2 Both Option 3A and the Southern Sweep option are similar to the Presented Option and the overall impacts upon soils and geology are anticipated to be comparable to the effects associated with the Presented Option (although permanent losses of agricultural soils would be reduced by approximately 2.2ha and 1.7ha, respectively).

6.7.5.3 With regard to Option 2, this option would pass directly over the Ford Lane Landfill and thus there is increased risk of encountering ground contamination. However, Option 2 would significantly reduce the loss of agricultural soils. Overall it is considered that Option 2 has the potential to result in a moderate adverse effect upon soils and geology.

6.7.6. Materials

6.7.6.1 All the options would require large amounts of construction material resources that are commonly used for road projects, as well as generate waste materials.

6.7.6.2 With adherence to appropriate materials souring and usage, and adherence to local waste and planning policies that promote and seek sustainable waste management practices, it is considered that materials effects as associated with all options other than Option 2 would be no worse than slight adverse. Option 2 would encroach upon an area of historic landfilling to the north of the existing Little Eaton junction, thus potentially generating contaminated waste which would require off site treatment and/ or disposal.

6.7.7. Noise and Vibration

6.7.7.1 In terms of road traffic noise, the Presented Option is anticipated to result in a slight adverse effect at the closest affected properties in Breadsall village due to the realignment of the A38 closer to the village. A negligible noise effect is considered likely at the closest properties in Allestree, whilst a slight beneficial noise effect is anticipated at the mobile home park due to the realignment of the A38 further away from properties within the park.

6.7.7.2 Option 2 is likely to reduce the slight adverse noise effect at Breadsall village, although the slight beneficial effect of the Presented Option at the mobile home park is likely to be lost at some homes and replaced by an adverse effect. In addition, Option 2 would likely result in a slight adverse effect on the western edge of Allestree and the southern edge of Little Eaton. As Option 2 would reduce noise effects in some locations and increase them elsewhere, on balance, the overall noise effects of Option 2 are likely to be neutral, as compared to the Presented Option.

6.7.7.3 Option 3A and the Southern Sweep option would both likely reduce the slight adverse noise effect at Breadsall village as associated with the Presented Option. However, the slight beneficial effect of the Presented Option at the mobile home park is likely to be lost. The overall impact is therefore likely to be slight beneficial, as compared to the Presented Option.

6.7.8. Effects on All Travellers

6.7.8.1 All the options would have a temporary adverse impact on views from the road and driver stress due to construction activities, diversions, congestion and queuing that could increase journey times. All the options would also result in temporary disruption to NMUs during the construction phase. However, such adverse construction phase effects would be longer during construction of Option 3A and the Southern Sweep option.

6.7.8.2 All options would deliver driver benefits by reducing congestion and delays during operation, as well as improve NMU infrastructure. However, during operation Option 3A would perform slightly worse than the other options due to the need for travellers from B6179 (Alfreton Rd) to use the A61 roundabouts to access the A38 southbound carriageway. Both Option 3A and the Southern Sweep would require an extended construction period, thus adverse construction effects upon travellers would be extended with these options as compared to the Presented Option.

6.7.9. **Community and Private Assets**

6.7.9.1 The Presented Option has the potential to result in a slight adverse effect with regard to the amount of land take required from an area designated as Green Belt, and a slight to moderate adverse effect upon agricultural land holdings. Land use effects for Option 3A and the Southern Sweep would be similar to those as associated with the Presented Option, although effects would be slightly less adverse due to the requirement for less land take (noting that both these options require approximately 0.7ha of land during the construction phase for a temporary diversion route).

6.7.9.2 Option 2 would be located to the north west of the existing A38 and has the potential to result in a moderate adverse effect with regard to land take required from an area designated as Green Belt, and a slight to moderate adverse effect upon agricultural land holdings and a potential large adverse effect due to the demolition of some mobile homes within the mobile home park. Land use effects associated with Option 2 would thus be worse than those as associated with the Presented Option.

6.7.10. **Road Drainage and the Water Environment**

Water Resources

6.7.10.1 Assuming that best practice measures to protect the water environment are adopted during construction activities, it is considered that the Presented Option would have the potential to result in a slight adverse effect on surface water resources, and a neutral effect on groundwater resources. Assuming that the Presented Option is provided with a suitable surface water drainage and management system, it is considered that the Presented Option operation would have no more than a slight adverse effect upon water resources as related to surface water runoff and operational runoff contamination/ potential operational spillage risk.

6.7.10.2 Water resource effects associated with Option 3A and the Southern Sweep option would not be significantly different from those that would result due to construction and operation of the Presented Option.

6.7.10.3 Option 2 would pass to the north of the existing A38 and would have the potential to disturb a historic landfill – such works would have the potential to have a slight adverse effect on surface water resources, and a slight adverse effect on groundwater resources during Option 2 construction and operation.

Flood Risk

6.7.10.4 In terms of flooding, the main risk associated with the Presented Option would be the requirement for development works within the floodplain of the River Derwent. Land would be required for flood compensation as well as for the appropriate control of surface runoff (e.g. provision of balancing ponds). The Presented Option has been qualitatively assessed as having a potential moderate adverse flood risk effect relative to the existing junction. However, an appropriate flood mitigation strategy can be developed with the aim that residual flood risk effects are reduced to neutral/negligible.

6.7.10.5 The potential flood risk effects of Option 3A and the Southern Sweep option would be similar to those as associated with the Presented Option. However, Option 3A and the Southern Sweep option would require approximately 2.2ha and 1.7ha less land respectively outside of the existing highway boundary than the Presented Option - as such the areal coverage of potential flood compensation areas for these options could potentially be less than associated with the Presented Option. For both these options, an appropriate flood mitigation strategy could be developed with the aim that residual flood risk effects would be reduced to neutral/negligible.

6.7.10.6 With regard to Option 2, this option would require approximately 1.2ha more land outside of the existing highway boundary than the Presented Option, with land take being required to the north and west of the existing A38. Option 2 has been qualitatively assessed as having a potential large adverse flood risk effect relative to the existing junction. Potential flood risk effects associated with Option 2 are thus assessed as being potentially more significant than those as associated with the Presented Option. Should Option 2 be selected, an appropriate flood mitigation strategy will be developed with the aspiration that this strategy reduces residual flood risk effects to be neutral/negligible. Given the needed for more flood compensation than the Presented Option, and locational constraints, it is considered that development of a suitable flood mitigation strategy (with suitable compensation areas) would be more problematic than for the Presented Option.

6.7.11. **Environmental Assessment Summary and Conclusions**

6.7.11.1 Table 6/1 provides a summary of the findings of the qualitative environmental assessment. This table illustrates that Option 3A and the Southern Sweep option offer the potential to reduce environmental and community effects as compared to the Presented Option due to reduced permanent land take requirements, as well as marginally reduce noise effects upon Breadsall village. However, Option 3A and the Southern Sweep option would perform slightly worse than the Presented Option in terms of effects upon travellers due to the extended construction programme. Option 3A also performs worse due to the need for travellers from the B6179 (Alfreton Rd) to use the A61 roundabout to access the A38 southbound carriageway

6.7.11.2 Both Option 3A and the Southern Sweep would require a temporary diversion route during the construction phase (covering an area of approximately 0.7ha). Construction and use of the temporary diversion route would exacerbate land take effects and construction phase effects.

6.7.11.3 Although the diversion route would only be required for the duration of the construction works, and not post-construction, the effects on land use and nature conservation would be longer lasting. This includes the loss of some of the existing tree plantation between the western edge of Breadsall village and the A38.

6.7.11.4 It should be noted that the Presented Option and the Southern Sweep are closely matched and the differences in assessments are marginal.

6.7.11.5 The potential environmental effects of Option 2 would be higher as compared to the Presented Option, with elevated effects in terms of air quality, cultural heritage, landscape, nature conservation, geology and soils, materials, community and private assets, water resources and flood risk.

Table 6/1: Comparison Matrix of the Significance of Potential Effects of the Various Options (including a comparison with the Presented Option)

	Presented Option	Option 2	Option 3A	Southern Sweep
Air Quality	Neutral to slight adverse	Slight adverse (slightly worse than Presented Option effects)	Neutral to slight adverse (similar to Presented Option effects)	Neutral to slight adverse (similar to Presented Option effects)
Cultural Heritage	Slight adverse	Moderate adverse (worse than Presented Option effects)	Slight adverse (not significantly different to Presented Option effects)	Slight adverse (not significantly different to Presented Option effects)
Landscape & Visual	Landscape: Slight adverse Visual: Moderate adverse	Landscape: Moderate adverse (worse than effects associated with Presented Option) Visual: Moderate adverse (not significantly different to Presented Option effects)	Landscape: Slight adverse Visual: Moderate adverse (not significantly different to Presented Option effects)	Landscape: Slight adverse Visual: Moderate adverse (not significantly different to Presented Option effects)
Nature Conservation	Large adverse effect (unmitigated) potentially reducing to non-significant levels with mitigation	Large adverse effect (unmitigated) potentially reducing to non-significant levels with mitigation (potentially significantly worse than Presented Option effects)	Large adverse effect (unmitigated) potentially reducing to non-significant levels with mitigation (not significantly different to Presented Option effects, although less habitat loss)	Large adverse effect (unmitigated) potentially reducing to non-significant levels with mitigation (not significantly different to Presented Option effects , although less habitat loss)
Geology & Soils	Slight adverse	Moderate adverse (worse than Presented Option effects)	Slight adverse (similar to effects as associated with Presented Option, although less loss of agricultural soils)	Slight Adverse (similar to effects as associated with Presented Option, although less loss of agricultural soils)
Materials	Slight adverse	Slight/ moderate adverse (slightly worse than Presented Option effects)	Slight adverse (not significantly different to Presented Option effects)	Slight adverse (not significantly different to Presented Option effects)
Noise	Slight beneficial to slight adverse	Slight beneficial to slight adverse (neutral as compared to Presented Option)	Negligible (slight beneficial as compared to Presented Option)	Negligible (slight beneficial as compared to Presented Option)
Effect on All Travellers	Slight adverse - construction phase (C) & moderate beneficial - operation phase (O)	Slight adverse (C) & moderate beneficial (O) (not significantly different to Presented Option effects)	Slight adverse (C) & moderate beneficial (O) (slightly worse compared to Presented Option due to extended construction phase)	Slight adverse (C) & moderate beneficial (O) (slightly worse compared to Presented Option due to extended construction phase)
Community & Private Assets	Slight adverse - Green belt; slight to moderate adverse – agricultural holdings	Moderate adverse – Green belt; slight to moderate adverse - agricultural holdings; large adverse – property demolition (significantly worse than Presented Option effects)	Slight adverse - Green belt; slight to moderate adverse – agricultural holdings (slightly better than Presented Option effects due to less land take)	Slight adverse - Green belt; slight to moderate adverse – agricultural holdings (slightly better than Presented Option effects due to less land take)
Water Resources	Slight adverse – surface water (C); Neutral – groundwater (C) Slight adverse - surface water & groundwater (O)	Slight adverse - surface water & groundwater (C & O) (slightly worse effects on groundwater (C) when compared to Presented Option)	Slight adverse – surface water (C); Neutral – groundwater (C) Slight adverse - surface water & groundwater (O) (not significantly different to Presented Option effects)	Slight adverse – surface water (C); Neutral – groundwater (C) Slight adverse - surface water and groundwater (O) (not significantly different to Presented Option effects)
Flood Risk	Moderate adverse (unmitigated) potentially reducing to negligible/ neutral with mitigation	Large adverse (unmitigated), potentially reducing to negligible/ neutral with mitigation (unmitigated effects more significant than Presented Option)	Moderate adverse (unmitigated) potentially reducing to negligible/ neutral with mitigation (similar to Presented Option – although less need for flood compensation)	Moderate adverse (unmitigated) potentially reducing to negligible/ neutral with mitigation (similar to Presented Option – although less need for flood compensation)

6.8. Limitations

6.8.1. The following limitations are noted with regard to the qualitative environmental assessment as presented herein:

- **Air Quality:** The assessments reported are based on professional judgement of the likely magnitude of the changes in air quality at the closest receptors based on the changes in proximity to the road with each option. It is stressed that no detailed modelling of traffic data are available, therefore it is not possible to accurately determine the magnitude of the changes in pollutant concentrations, both in the vicinity of the option and on the wider road network.
- **Cultural Heritage:** The heritage walkover for the Presented Option was undertaken from public access points only, including public footpaths, and therefore the assessment of setting of heritage assets is based upon this initial assessment. There has been no consultation with the local planning authority (conservation officer, local planning archaeologist) with regard to heritage assets that would be impacted the scheme options. The assessment has been undertaken with regard to datasets that were collected from the historic environment record (Derbyshire County Council) and Historic England (formerly English Heritage) in September 2014.
- **Landscape and Visual:** The assessment is based upon the provided engineering drawings. A site visit was conducted during June and so a comparison of visibility of visual effects over four seasons or during a wide range of light and weather conditions was not possible. The timescale for production of this assessment precluded a winter survey with trees devoid of leaf cover. This qualitative assessment of landscape and visual impacts has taken place before the completion of the scheme Landscape and Visual Impact Assessment (LVIA) and thus conclusions are preliminary and potentially subject to amendment.
- **Nature Conservation:** This is a precautionary appraisal in which levels of effects are detailed ‘as up to’ unless it is considered that there is sufficient baseline/ detailed design information to inform a more definitive assessment. The potential adverse effects arising from construction or operation of each option are precautionary and are based on current understanding of baseline information and potential impacts upon receptors. The assessment excludes consideration of any mitigation measures.
- **Geology and Soils**: This assessment is based on professional judgement of the likely effects of the options, the provided engineering drawings and on collated desk top information. No intrusive ground investigations have been undertaken at the site at this stage.
- **Materials:** The assessment is partly based on technical information on the types of materials resources associated with the construction of major road projects. At this stage in the design, detailed information on the types and quantities to be used for each option is unavailable; therefore, the assessment would be more comprehensive when specific details on the use of materials are known. With regards to waste, the assessment is indicative of the types of waste that could potentially be generated from road construction schemes, historic land use of the site, types of soils at the site as well as the types of material resources that would be used during construction. The assessment of the options excludes consideration of any mitigation measures.

- **Noise and Vibration:** The assessments reported are based on professional judgement of the likely magnitude of the changes in traffic noise levels at the closest receptors based on the changes in proximity to the road with each option. It is stressed that no traffic noise modelling results or traffic data are available at this stage, therefore it is not possible to accurately determine the magnitude of the changes in road traffic noise levels, both in the vicinity of the each option and on the wider road network. No account of local topography or the benefit of potential noise mitigation measures has been taken in the assessment. In the absence of traffic data no account of potential changes in traffic composition or speed has been made.
- **Effects on Travellers:** The baseline for the qualitative assessment is informed by an initial NMU (pedestrian, cyclist, equestrian or disabled user) survey carried out in August 2014. The assessment excludes consideration of any mitigation measures.
- **Community and Private Assets:** Other than the on-going consultation with potentially affected landowners, specific land use surveys have not been undertaken at this stage. In the absence of a detailed assessment on the effects of the proposed improvements on community and private assets, this assessment should be treated as indicative. The assessment excludes consideration of any mitigation measures.
- **Water Resources:** Surface water features beyond the Presented Option have been observed via online mapping of the area and no walkover survey has been carried out to determine the validity of this data. The drainage strategies for the proposed options is not known at the time of writing. Assumptions have been made for the resulting culvert alterations/ diversions.
- **Flood Risk:** Flood Risk Assessments (FRAs) including hydraulic modelling for the River Derwent and highways drainage networks are in progress for the Presented Option only and have not been used to complete this assessment. For example, at this stage it is not possible to confirm the need for, scale of, or location of compensation storage areas. Additional modelling would be required for the options.

7. TRAFFIC AND ECONOMIC ASSESSMENT

7.1. Introduction

7.1.1. This section presents a qualitative traffic assessment of the Presented Option and alternative options for Little Eaton junction described in Section 3.

7.1.2. Each option is considered qualitatively in terms of its key traffic-related features, the potential impacts upon trip reassignment (rerouting), transport economic efficiency (TEE), road safety, and delays during construction.

7.1.3. The paragraphs below consider the potential traffic impacts of the Presented Option. The traffic impacts associated with the options are then compared with the impacts associated with the Presented Option.

7.1.4. Where daily traffic flows are provided, these are based upon 12-hour manual classified turning counts undertaken in March 2015. These have been converted to annual average daily traffic (AADT) flows by multiplying by an E-factor (=1.15) and an M-factor (=394/365). These values produce an overall expansion factor of 1.241.

7.2. Key Traffic-Related Features

7.2.1. Presented Option

7.2.1.1 In traffic terms the key features of the Presented Option are;

- The existing roundabout would be extended to the south and new slip roads would be constructed;
- Two new bridges would be constructed to take the A38 traffic over the roundabout;
- A new bridge over the railway would be provided for the southbound carriageway, the existing bridge would be retained for the northbound carriageway;
- Access to/from the A38 at Ford Lane would be closed;
- Two lane dual carriageway would be provided in each direction;
- Footways and cycleways would be retained and diverted around roundabout;
- The national speed limit would be retained.

7.2.1.2 In traffic terms the key benefits of the Presented Option would be;

- A38 traffic would be able to pass through the junction without stopping;
- Queueing on the A61/local roads would be reduced;
- Pedestrian and cycle routes would be separated from main A38 traffic;
- Dedicated A38 to A61 southbound link into Derby would be maintained.

7.2.1.3 The main traffic impacts of the Presented Option would be;

- Ford Lane Junction west of the railway would be closed to motorised vehicles.

7.2.1.4 The main traffic benefits of closing Ford Lane would be;

- Reduced traffic flows on Ford Lane;
- Removal of ‘cut-through’ traffic using Ford Lane between the A6 and the A38.

7.2.1.5 The main traffic impacts of closing Ford Lane would be;

- Traffic would be diverted via the A6 (Palm Court) junction which would increase some journey lengths from the Ford Lane/Derwent Avenue residential area;

- The number of local accesses into the Ford Lane/Derwent Avenue residential area would be reduced from 3 to 2;
- There would be an increased use of the Derwent Avenue/A6 junction.

7.2.2. **Option 2**

7.2.2.1 Option 2 would have the A38 mainline grade-separated and realigned to the north of the existing roundabout, with a southern roundabout approximately situated where the existing roundabout is currently; a new northern roundabout would be located 400 metres to the north of the south roundabout on the B6179.

7.2.2.2 The existing dedicated left turn free flow lane would be maintained southbound from A38 north to the A61 southbound. A new left turn free-flow filter lane would be incorporated into the north roundabout layout between the A61 south and A38 northbound.

7.2.2.3 The Option 2 layout would introduce additional conflict points, which would be hazards that could increase the likelihood of road traffic accidents.

7.2.2.4 The length of the movement from A38 south to A61 southbound towards Derby would be increased, compared with the 2015 existing case, by approximately 200 metres. The 2015 observed 12-hour flow on this movement was 9,400 vehicles, which equates to an annual average daily flow of about 11,700 vehicles per day. This implies that the daily traffic would be increased by at least 2,340 vehicle-kilometres.

7.2.2.5 The length of the movement from A61 Derby to the A38 north would be increased, compared with the 2015 existing case, because of the requirement to travel through a second roundabout and around the looped connector road on the north side of the junction. The additional distance travelled per vehicle would be approximately 200 metres. The observed 12-hour flow on this movement in 2015 was 7,813 vehicles, which equates to an annual average daily flow of about 9,700 vehicles per day. This implies that the daily traffic would be increased by at least 1,940 vehicle-kilometres.

7.2.2.6 The distance travelled on the movements between A38 south and A38 north would be reduced in length, compared with the existing 2015 case, because the A38 elevated movement would be re-aligned to the north to cut across the ‘corner’ or the A38 route. The saving in the distance travelled would be approximately 80 metres. The observed two-way 12-hour flow on this movement in 2015 was 25,268 vehicles per day, which equates to an annual average daily flow of about 31,400 vehicles per day. This implies that the daily traffic would be reduced by about 2,500 vehicle-kilometres.

7.2.2.7 The overall change in traffic for the three movements described above can be added together to produce a net change in the traffic for Option 2 compared with the 2015 existing layout. Option 2 would result in a net increase in daily traffic of 1,780 vehicle-kilometres.

7.2.2.8 The layout of Option 2 would therefore increase the distances travelled by vehicles. The additional distances travelled by vehicles on the A61 northbound would be greater than the distance savings for vehicles travelling along the A38. This would have a detrimental impact on fuel use and greenhouse gases emissions.

7.2.2.9 With two roundabouts there would be more than one conflict point for some movements; for example, the movement from Little Eaton to A38 south and the movement from A38 south to A61 towards Derby. This would add an additional delay to these movements.

7.2.2.10 The additional conflict points could lead to a detrimental impact on road traffic safety record, compared with the Presented Option.

7.2.2.11 The grade separation of the movements between A38 north and A38 south would remove many of the existing conflicts, compared with the 2015 existing layout, which would improve the road traffic safety record. The accident savings from grade separating the A38 traffic are likely to be greater than the detrimental impacts of diverting the Little Eaton movements to A38 south.

7.2.3. **Option 3A**

7.2.3.1 Option 3A proposes an alignment for the A38 similar to the Presented Option. The main traffic impact is that this option does not allow for an immediate right turn onto the A38 southbound from the B6179 north. Drivers wanting to make this manoeuvre are required to make a diversion, the simplest of which would be to travel to the A61/Croft Lane/Alfreton Road junction (Croft Lane roundabout), make a U-turn, proceed northbound, and then take the dedicated left turn onto the A38.

7.2.3.2 In order to assess the impact of the diversion, turning movement flows were extracted from the March 2015 Manual Classified Count at Little Eaton (i.e. post pinch-point scheme improvements). Expanding the count to an AADT flow, the movement from the B6179 to A38 south amounted to 2,600 vehicles per day.

7.2.3.3 These 2,600 trips would need to find a suitable diversion route. The simplest route given a relativity uncongested A61 would be to use the A61 Alfreton Road south – U-turn at Croft Lane roundabout (the A61/Alfreton Road/Frank Whittle Road/Croft Lane roundabout) – and then return along the A61 Alfreton Road. The detrimental impacts of this diversion are:

- AADT flow on A61 Alfreton Road (i.e. the A38 to Croft Lane roundabout length) increases by up to 5,200 vehicles per day two-way
- Compared to existing AADT flow on A61 Alfreton Road of about 40,000 vehicles per day, this could be up to a 13% increase (or less if other diversion routes are used by some of these trips).
- Some local trips (for example some trips originating in Little Eaton) would increase in length by 1 mile (1.6 kilometres).
- This represents approximately (1.6 x 2,600 =) 4,200 vehicle-kilometres of extra travel per average day; which has both a vehicle operating cost and a greenhouse gases detrimental impact.
- Diverting trips would add to the existing congestion on the A61 and at the Croft Lane roundabout.
- Social Impacts – for example, the higher flow on A61 would lead to more difficult pedestrian crossing movements and an increase in hazards to reach the bus stop, footpaths and cycleway on the west side of A61.

7.2.4. **Southern Sweep**

7.2.4.1 The Southern Sweep is the option that most closely resembles the Presented Option, although the alignment has been moved slightly to the north of the Presented Option.

7.2.4.2 Operationally, and in terms of the mainline traffic, this option will perform in a similar way to the Presented Option.

7.2.4.3 The dedicated left turn free flow lane would be maintained from the A38 southbound to the A61 southbound.

7.3. Reassignment Effects

7.3.1. Presented Option, Option 2, and Southern Sweep

7.3.1.1 In general, where distances and times of travel change there is likely to be a reassignment effect, which will occasionally induce trips.

7.3.1.2 It is our professional view, however, that changes in travel time and distances will be too small to change the traffic demands on the junction for Option 2 and the Southern Sweep, compared to the Presented Option. On this basis we can conclude that the traffic flow forecasts for these options will be no different to the Presented Option.

7.3.2. Option 3A

7.3.2.1 For Option 3A where trips have to potentially divert onto the A61 southbound before u-turning back up the A61 to make the left turn onto A38 west, there would be some reassignment.

7.3.2.2 Depending upon where the B6179 road users are originating (from for example Morley, to the north-east of Breadsall village) trips may divert through Breadsall Village, down Croft Lane and onto the A61 further to the south, before travelling back up to the A38.

7.3.2.3 If these trips were heading westwards towards Ashbourne, there may be a reassignment towards Duffield, using Makeney Road then onto the B5023 and A517 to Ashbourne rather than using the A38.

7.4. Transport Economic Efficiency Effects

7.4.1. A key element of the impact on traffic of the Presented Option and the options is the economic benefit provided by the scheme in terms of time savings or vehicle operating costs. The following paragraphs describe in a qualitative manner how the options are likely to affect the transport economic efficiency (TEE) of the road network.

7.4.2. Presented Option

7.4.2.1 The main transport economic benefits resulting from the Presented Option are as follows;

- The A38 strategic trips would pass through the junction without stopping. This will provide an economic benefit due to the removal of delays at the existing ‘at-grade’ junction.
- Queueing on the A61 and local roads would be reduced. This will provide an economic benefit as local roads previously conflicting with A38 ahead traffic will be relieved.
- Pedestrian and cyclist routes will be separated from the A38 route, hence reducing the amount of conflict with vehicular trips.
- The dedicated A38 to A61 southbound link would be retained.

7.4.2.2 The main transport economic disbenefit potentially resulting from the Presented Option is summarised as follows;

- Ford Lane junction west of the railway will be closed to motorised vehicles. This may mean that local trips around Ford Lane have to join the A38 at the A6 ‘Palm Court’ junction.

7.4.2.3 Overall the Presented Option is highly likely to provide a positive economic benefit and represent a very high value for money scheme.

7.4.3. **Option 2**

7.4.3.1 The economic efficiency benefits for Option 2 would be similar to those described for the Presented Option. However, the presence of two roundabouts enabling on-off movements, one to the south of the realigned A38 and one to the north, may mean slightly increased journey times for those drivers on the A61 that want to access or egress from the A38.

7.4.3.2 Overall Option 2 is highly likely to provide a positive economic benefit, but due to the increased journey lengths envisaged in accessing/leaving the A38, this benefit will not be as large as for the Presented Option.

7.4.4. **Option 3A**

7.4.4.1 The economic efficiency benefits for Option 3A would be similar to those described for the Presented Option. However, the B6179 southbound movements are not able to immediately turn right onto the A38 south. Drivers choosing to make this manoeuvre are required to travel to the A61/Croft Lane/Alfreton Road Junction, make a U-turn, proceed northbound and then use the dedicated left turn onto the A38 south. This will increase the journey distance/time at this junction for travellers making this movement.

7.4.4.2 Overall Option 3A is highly likely to provide a positive economic benefit, but due to the increased journey lengths envisaged in accessing the A38 southbound from the B6179, this benefit will not be as large as for the Presented Option.

7.4.5. **Southern Sweep**

7.4.5.1 The economic efficiency benefits for the Southern Sweep Option would be similar to those described for the Presented Option. The main difference between the two schemes is the alignment of the Southern Sweep, which is moved slightly north of the Presented Option alignment. As such this will have a negligible impact on journey times/distances/vehicle operating costs as compared with the Presented Option.

7.4.5.2 Overall the Southern Sweep Option is highly likely to provide a positive and similar economic benefit to the Presented Option.

7.5. Road Safety

7.5.1. It is expected that the road safety records of the Presented Option and the Southern Sweep would be similar.

7.5.2. It is expected that Option 2 would have a similar road safety record to the Presented Option. Although the A38 through movements would induce faster average vehicle speeds, the road alignment would be straighter and provide good forward visibility.

7.5.3. Option 3A would have reduced road safety, compared with the Presented Option and the Southern Sweep because vehicles travelling between Little Eaton and A38 south would be diverted along additional road lengths (i.e. the A61 and back) and through an additional junction (i.e. the Croft Lane roundabout).

7.6. Construction Sequencing/Buildability

7.6.1. The phasing of the construction of the Presented Option and other alternatives has been discussed previously in Section 5.13, and so is not repeated here.

7.6.2. In traffic terms, the process of constructing of a new junction is almost always neutral or detrimental to the travelling public due to the queues and delays it creates whilst the road network is being disrupted. This is because it is difficult to maintain a level of service equivalent to the existing layout whilst road works are being undertaken. Additionally, vehicle speeds will be reduced by temporary speed limits where there are construction staff working in vulnerable positions adjacent to the carriageway.

7.6.3. **Presented Option Construction**

7.6.3.1 A construction sequence with six phases has been envisaged for the Presented Option. For this, it is assumed that the off-line parts (including the southbound slip roads) would be constructed whilst the traffic uses the existing route in Phase 1.

7.6.3.2 The principal feature of the second phase is to divert westbound traffic from the A38 onto the westbound slips. This will enable the construction of the remainder of the eastbound carriageway and those elements of the roundabout inaccessible before. This may result in traffic disruption to both the A61 and A38 southbound flows whilst this construction phase is operational.

7.6.3.3 Phases 3, 4 & 5 should see little disruption to traffic other than that attributable to the overnight closures.

7.6.3.4 Phase 6 sees traffic on the new alignment with completion of minor outstanding work, so again little disruption to traffic.

7.6.4. **Option 2 Construction**

7.6.4.1 In terms of traffic impacts, Option 2 could be constructed with the least effect on traffic. The majority of this scheme can be built off-line whilst the existing A38 traffic continues to use the existing mainline. Construction of this option would be undertaken in 3 major phases. The bulk of the work, being off line, would be constructed during phase 1.

7.6.4.2 This junction is located off line to the north of the A38, therefore disruption to the A38 traffic would be minimal. The A61 traffic would experience some inconvenience during construction phases 2 and 3. The B6179 will experience disruption during all three phases, the most being during phases 2 and 3.

7.6.4.3 The garden centre is likely to experience disruption to its trading during phase 1 and 2, when a large proportion of the parking facilities would be inaccessible.

7.6.5. **Option 3A/Southern Sweep Construction**

7.6.5.1 A construction sequence similar to that for the Presented Option has been envisaged for these options with the following variations:

7.6.5.2 During the first phase, an additional temporary diversion route would need to be constructed parallel to the southbound diverge slip road.

7.6.5.3 In phase 2, north of the roundabout the northbound traffic would divert onto the southbound slip road and the southbound traffic onto the temporary road.

7.6.5.4 The A38 embankment area that lies above the existing northbound carriageway could then be constructed in phase 3.

7.6.5.5 Disruption to traffic flow in phases 2 and 3 would be expected to be greater for this option than the Presented Option. There is a risk that drivers will attempt to avoid the queues on the A38 by diverting to other local roads in the area. The local roads experiencing an increase in traffic flows might include the B6179 through Little Eaton and local roads through the communities at Morley and Breadsall.

7.6.5.6 The duration of the construction period for Option 3A and the Southern Sweep would also be greater than the other options. This will have a negative impact on the transport efficiency of these options, as the longer that construction is ongoing, the greater the monetary impact on travellers in terms of queues and delays.

7.7. Traffic Assessment Summary and Conclusions

7.7.1. The traffic impacts of the options have been summarised above in a qualitative manner.

7.7.2. The main four traffic impacts caused by the upgrading of the Little Eaton Junction are reassignment, delays during construction, road safety, and transport economic efficiency benefits post-construction.

Table 7/1: Traffic Impacts Comparison Matrix

Scheme Objective	Option			
	Presented Option	**Option 2**	**Option 3A**	**Southern Sweep**
Reassignment Effects	1	1	2	1
	The Presented Option, Southern Sweep and Option 2 are all similar and maintain the existing movements as per the existing Little Eaton junction. Option 3A option requires trips from B6179 north to A38 south to make a diversion via the Croft Lane roundabout.			
TEE post-construction	1	2	3	1
	The Presented Option, Southern Sweep and Option 2 would be similar in terms of transport economic efficiency. Option 2 would be slightly quicker for through-A38 movements but this benefit is more than offset by the longer route taken by trips from A61 south. Option 3A would be disadvantaged by not providing for turns from B6179 north to A38 West (southbound).			
Delay during construction	2	1	3	3
	Option 2 would have first phase constructed off-line, which would reduce impact on existing traffic. Option 3A and 'Southern Sweep' options are constructed over the existing A38 and construction durations, and hence impact on existing traffic, are the longest. The Presented Option falls between these in terms of construction impact.			
Road Safety	1	3	4	1
	The Presented Option and the Southern Sweep would be similar in terms of road safety. Option 2 would be expected to have a similar safety record; although speeds on the A38 would be higher the mainline alignment would be straighter. However, some of the connector roads include loops, which can introduce safety issues for motor cycles. Option 3A diverts some trips via the A61 Croft Lane roundabout and this would increase the number of hazards for these trips.			

Note: The table shows how each option has been ranked for each of the assessment sub-headings. The options are ranked in order of performance 1 to 4. A score of 1 is given to the highest performing option.

7.7.3. The matrix suggests that the Presented Option would be the most beneficial option in transport terms. This is because it is the option which maintains the status quo in terms of traffic routeing, and would be the best option in terms of its transport economic efficiency benefits. Although second to Option 2 in terms of minimising delays during construction, overall it scores best for traffic impacts.

7.7.4. The Southern Sweep and Option 2 are very closely matched with the Presented Option. The Southern Sweep is not preferred to the Presented Option due to the increased durations of delayed and diverting trips arising in the 'during construction' phase. By comparison, Option 2 requires longer distances to be travelled overall after its opening due to the layout of the two roundabout design.

7.7.5. Option 3A is ranked last for all four traffic objectives. However, this can be attributed to the lack of ability to turn right from the B6179 to A38 south; the option is severely disadvantaged when compared with the other options.

7.8. Limitations

7.8.1. The following limitations are noted with regard to the qualitative traffic assessment as presented herein:

- **Reassignment Effects**: The assessments reported are based on professional judgement of the likely magnitude of the changes in traffic flows and routes taken. Use has been made of traffic flow survey results undertaken up to March 2015. No mathematical nor traffic model analysis has been undertaken to determine the reassignment impacts; but logical deduction combined with a basic understanding of the traffic patterns has been used. A qualitative assessment has been made.
- **Travel Benefits**: The assessments of potential changes to transport economic efficiency (TEE) of the highway network are based upon the layouts indicated and knowledge of the flows in March 2015 where these were available. A traffic model has not been used; therefore it has not been possible to undertake TEE using the methods described in the DfT's Transport Analysis Guidance.
- **Delays During Construction**: A construction phasing sequence and a construction programme has been developed for the Presented Option. Traffic models have not been used for this option assessment stage.
- **Road Safety**: The assessments reported are based on professional judgement of the likely impacts of each layout. It is usual that Stage 1 Road Safety Audits are carried out at later stages of option development. A qualitative assessment has been made.

8. COMPARISON OF OPTIONS

8.1. Methodology

8.1.1. In sections 4, 5, 6 and 7, the options have been assessed and ranked by sub-category in terms of Cost, Engineering, Environmental and Traffic & Economics. The outcome of each of these assessments is shown in Tables 8/1A to 8/1E which present the findings shown in the summary tables at the end of each of the sections listed above.

8.1.2. The colours used in these tables represent the option preference; darkest green the most preferred option; lighter green second; amber is third and red represents the least preferred option.

Table 8/1A: Overall Assessment Results (Cost)

Cost Sub-Category	Presented Option	Option 2	Option 3A	Southern Sweep
Total Outturn Cost	£85,900,000	£99,800,000	£106,400,000	£99,150,000
	1	3	4	2

Table 8/1B: Overall Assessment Results (Engineering)

Engineering Sub-Category	Presented Option	Option 2	Option 3A	Southern Sweep
Geometry	2	1	2	2
Public Utilities	1	2	1	1
NMU Provision	1	1	1	1
Drainage	1	1	1	1
Geotechnics	2	1	4	3
Structures	2	4	3	1
Departures from Standards	2	1	2	2
Construction Phasing	2	1	3	3

Table 8/1C: Overall Assessment Results (Environment)

Environment Sub-Category	Presented Option	Option 2	Option 3A	Southern Sweep
Air Quality	1	2	1	1
Cultural Heritage	1	2	1	1
Landscape	1	2	1	1
Visual	1	1	1	1
Nature Conservation	2	3	1	1
Geology & Soils	2	3	1	1
Materials	1	2	1	1
Noise	2	2	1	1
Effect on All Travellers	1	1	2	2
Community & Private Assets	2	3	1	1
Water Resources	1	2	1	1
Flood Risk	2	3	1	1

Table 8/1D: Overall Assessment Results (Traffic & Economics)

Traffic & Economics Sub-Category	Presented Option	Option 2	Option 3A	Southern Sweep
Reassignment Effects	1	1	2	1
Travel Benefits (TEE post-construction)	1	2	3	1
Delay during construction	2	1	3	3
Road Safety	1	2	3	1

Table 8/1E: Overall Assessment Results (Overall Summary)

Summary of Results	Presented Option	Option 2	Option 3A	Southern Sweep
Cost	1	3	4	2
Engineering	2	1	4	3
Environment	2	3	2	1
Traffic	1	3	4	2
Overall Ranking	**1**	**3**	**4**	**2**

8.1.3. Each of the options has also been compared separately to the Presented Option. The outcomes of these comparisons are shown in Tables 8/2, 8/3 and 8/4.

8.2. Option 2 Compared to the Presented Option

8.2.1. The tables used in sections 8.2 to 8.4 show the preferred option in green and the least preferred option in red.

Table 8/2 Compares the assessment results for Option 2 to the Presented Option.

Assessment Category	Presented Option	Option 2
Cost		
Total Outturn Cost	£85,900,000	£99,800,000
	1	2
Engineering		
Geometry	2	1
Public Utilities	1	2
NMU Provision	1	1
Drainage	1	1
Geotechnics	2	1
Structures	1	2
Departures from Standards	2	1
Construction Phasing	2	1
Environment		
Air Quality	1	2
Cultural Heritage	1	2
Landscape	1	2
Visual	1	1
Nature Conservation	1	2
Geology & Soils	1	2
Materials	1	2
Noise	1	1
Effect on All Travellers	1	1
Community & Private Assets	1	2
Water Resources	1	2
Flood Risk	1	2
Traffic		
Reassignment Effects	1	1
Travel Benefits (TEE post-construction)	1	2
Delay during construction	2	1
Road Safety	1	2

Summary of Results	Presented Option	Option 2
Cost	1	2
Engineering	2	1
Environment	1	2
Traffic	1	2
Overall Ranking	**1**	**2**

8.2.2. **Cost**

8.2.2.1 From Tables 8/1A and 8/2 it can be seen that the Presented Option can be delivered at a significantly lower cost. Option 2 principally incurs higher land costs although costs are further adversely affected by VAT charges due to more of the route being away from the existing A38 and risks associated with remediating the existing landfill site.

8.2.2.2 Option 3A and the Southern Sweep incur additional costs as a consequence of the construction requiring significant temporary works in order to maintain A38 traffic flow.

8.2.2.3 As a consequence, the Presented Option is preferred on cost grounds.

8.2.3. **Engineering**

8.2.3.1 From Table 8/2, it can be seen that both options have been ranked equally for NMU provision and drainage.

8.2.3.2 The Presented Option has a lower impact on public utilities due to the additional disruption resulting in Option 2 from the new bridge at the B6179. The Presented Option is also ranked higher in terms of highway structures.

8.2.3.3 Option 2 has been ranked highest for highway geometry and Departures from Standard as the design achieves a mainline alignment which is compliant with standards at national speed limit. Option 2 is also ranked highest for geotechnics and construction phasing as the design require fewer retaining walls and avoids difficulties associated with differential settlement. The majority of the scheme could be constructed off line from the existing A38 thereby minimising traffic disruption and facilitating construction.

8.2.3.4 The length of the mainline A38 is 130m shorter for Option 2 thereby resulting in marginally shorter journey times.

8.2.3.5 Overall the differences are relatively small in engineering terms. However, Option 2 is ranked highest for the greatest number of sub-categories and is consequently preferred in engineering terms.

8.2.4. **Environmental**

8.2.4.1 From Both options are ranked equally for visual impacts, noise impacts and effects on travellers.

8.2.4.2 Option 2 is ranked lower for air quality due to potential impacts on the mobile home park, although the differences compared to the Presented Option are small. Option 2 is also ranked lower for cultural heritage and landscape impacts due to the additional land take required, the introduction of new structures, the visibility of the road within the landscape and the loss of screening features.

8.2.4.3 In terms of nature conservation, Option 2 has reduced impacts upon some local habitats but increased impacts on several receptors of up to regional-value. As a consequence, the Presented Option is considered to perform better.

8.2.4.4 In terms of geology and soils, and materials impacts, the performance of the two scheme options is comparable. However, in both cases the Presented Option is preferred due to the increased potential for adverse effects associated with works to the existing landfill site, although it is expected that this could be managed through an appropriate mitigation strategy.

8.2.4.5 The Presented Option has the potential to result in a slight adverse effect due to the land take required from Green Belt areas, and a slight to moderate adverse effect upon agricultural land holdings. However, Option 2 has the potential for a moderate adverse effect on Green Belt areas, and a slight to moderate adverse effect upon agricultural land holdings principally due to the greater land take required. Option 2 will also result in a potential large adverse effect due to disruption to local businesses including the garden centre, and the demolition of part of the mobile home park. Overall, land use effects for Option 2 would be worse than those associated with the Presented Option.

8.2.4.6 The Presented Option ranks higher for impacts on water resources and flood risk. This is due to the potential tor Option 2 to create pathways for contaminants to enter groundwater in the vicinity of the landfill site and the increased requirement for flood compensation measures.

8.2.4.7 Overall, the Presented Option is preferred in environmental terms.

8.2.5. **Traffic and Economics**

8.2.5.1 From Table 8/2, it can be seen that both options have been ranked equally for reassignment effects.

8.2.5.2 Option 2 has a lower impact of delays during construction due to a greater proportion of the scheme being constructed offline from the existing A38.

8.2.5.3 The Presented Option is expected to provide slightly higher economic benefits post-construction and perform better in terms of road safety due to the lack of connector road loops which may present safety issues, particularly for motorcycles.

8.2.5.4 Overall, the Presented Option is preferred in terms of traffic and economics.

8.2.6. **Conclusion**

8.2.6.1 The Presented Option is preferred as it performs better in terms of cost, environment and traffic and economics.

8.3. Option 3A Compared to the Presented Option

Table 8/3 Compares the assessment results for Option 3A to the Presented Option.

Assessment Category	Presented Option	Option 3A
Cost		
Total Outturn Cost	£85,900,000	£106,400,000
	1	2
Engineering		
Geometry	1	1
Public Utilities	1	1
NMU Provision	1	1
Drainage	1	1
Geotechnics	1	2
Structures	1	2
Departures from Standards	1	1
Construction Phasing	1	2
Environment		
Air Quality	1	1
Cultural Heritage	1	1
Landscape	1	1
Visual	1	1
Nature Conservation	2	1
Geology & Soils	2	1
Materials	1	1
Noise	2	1
Effect on All Travellers	1	2
Community & Private Assets	2	1
Water Resources	1	1
Flood Risk	2	1
Traffic		
Reassignment Effects	1	2
Travel Benefits (TEE post-construction)	1	2
Delay during construction	1	2
Road Safety	1	2

Summary of Results	Presented Option	Option 3A
Cost	1	2
Engineering	1	2
Environment	2	1
Traffic	1	2
Overall Ranking	**1**	**2**

8.3.1. **Cost**

8.3.1.1 From Tables 8/1A and 8/3 it can be seen that the Presented Option can be delivered at a significantly lower cost. Option 3A incurs additional costs as a consequence of a temporary diversion route in order to maintain A38 traffic flow and a longer construction period.

8.3.1.2 As a consequence, the Presented Option is preferred on cost grounds.

8.3.2. **Engineering**

8.3.2.1 Both options are ranked equally for impact to existing public utilities, NMU provision, drainage matters and Departures from Standard. This is due to the similarities between the options.

8.3.2.2 The Presented Option performs better in terms of structures and geometry. Although the mainline alignment is geometrically similar, Option 3A restricts turning movements onto the A38 southbound. Option 3A is ranked lower for geotechnics due to the increased impact of differential settlement between the existing and proposed earthworks embankments.

8.3.2.3 The Presented Option also ranks highest in terms of construction phasing as Option 3A will require the construction of a temporary diversion route in order to maintain traffic flow for the A38.

8.3.2.4 Overall, the Presented Option ranks highest for the greatest number of sub-categories and is consequently preferred in engineering terms.

8.3.3. **Environmental**

8.3.3.1 From Table 8/3, it can be seen that both options have been ranked equally for air quality, cultural heritage, landscape and visual impacts, materials and water resources.

8.3.3.2 Option 3A is preferred in terms of nature conservation impacts due to overall habitat losses being lower than for the Presented Option. Impacts for geology and soils are also slightly lower for Option 3A as the losses of agricultural soils are reduced compared to the Presented Option.

8.3.3.3 Option 3A is also preferred in terms of noise and vibration. This arises from the reduced noise impacts on the village of Breadsall.

8.3.3.4 With regards to the effects on all travellers, the differences between the schemes are small. However, the Presented Option is preferred due to Option 3A requiring an extended construction programme and the need for travellers from the B6179 to use the A61 Croft Lane roundabout to access the A38 southbound.

8.3.3.5 Both the Presented Option and Option 3A have the potential for a slight adverse effect due to the land take required from Green Belt areas, and a slight to moderate adverse effect upon agricultural land holdings. However, Option 3A is slightly preferred as land use effects would be slightly lower due to the requirement for less land take.

8.3.3.6 It should be noted that the construction and use of the temporary diversion route are likely to exacerbate land take effects and construction phase effects.

8.3.3.7 In terms of flood risk, Option 3A is considered to have a marginally lower impact due to a reduced requirement for the flood compensation areas compared to the Presented Option.

8.3.3.8 Overall the Presented Option and Option 3A are closely matched and the differences between the options are small, However, Option 3A is preferred in environmental terms.

8.3.4. **Traffic and Economics**

8.3.4.1 The Presented Option is ranked highest for all sub-categories. This is due to Option 3A requiring some traffic movements to be diverted via the Croft Lane roundabout and the increased delays during construction which will arise as a result of the temporary diversion required for A38 traffic.

8.3.5. **Conclusion**

8.3.5.1 In terms of environmental impacts, the difference between the two options is very small. Although the Presented Option requires permanent land-take to the south and east of the existing junction within an area of open, previously undeveloped land, Option 3A will also result in impacts to some of this area, particularly as a result of the temporary diversion route.

8.3.5.2 The Presented Option is preferred as it performs better in terms of engineering aspects; and traffic and economics, while offering a considerable cost saving.

8.4. Southern Sweep Option Compared to the Presented Option

Table 8/4 Compares the assessment results for the Southern Sweep to the Presented Option.

Assessment Category	Presented Option	Southern Sweep
Cost		
Total Outturn Cost	£85,900,000	£99,150,000
	1	2
Engineering		
Geometry	1	1
Public Utilities	1	1
NMU Provision	1	1
Drainage	1	1
Geotechnics	1	2
Structures	2	1
Departures from Standards	1	1
Construction Phasing	1	2
Environment		
Air Quality	1	1
Cultural Heritage	1	1
Landscape	1	1
Visual	1	1
Nature Conservation	2	1
Geology & Soils	2	1
Materials	1	1
Noise	2	1
Effect on All Travellers	1	2
Community & Private Assets	2	1
Water Resources	1	1
Flood Risk	2	1
Traffic		
Reassignment Effects	1	1
Travel Benefits (TEE post-construction)	1	1
Delay during construction	1	2
Road Safety	1	1

Summary of Results	Presented Option	Southern Sweep
Cost	1	2
Engineering	1	2
Environment	2	1
Traffic	1	2
Overall Ranking	**1**	**2**

8.4.1. **Cost**

8.4.1.1 From Tables 8/1A and 8/4 it can be seen that the Presented Option can be delivered at a significantly lower cost. The Southern Sweep incurs additional costs as a consequence of a temporary diversion route in order to maintain A38 traffic flow and a longer construction period.

8.4.1.2 As a consequence, the Presented Option is preferred on cost grounds.

8.4.2. **Engineering**

8.4.2.1 Both options are ranked equally for impact to existing public utilities, NMU provision, drainage matters and Departures from Standard. This is due to the similarities between the options.

8.4.2.2 The Presented Option performs better in terms of geotechnics and construction phasing. This is due to the lower of differential settlement between the existing and proposed earthworks embankments; and because the Southern Sweep requires the construction of a temporary diversion route in order to maintain traffic flow for the A38 The Southern Sweep is ranked higher for structures.

8.4.2.3 Overall, the Presented Option is ranked highest for the greatest number of sub-categories and is consequently preferred in engineering terms.

8.4.3. **Environmental**

8.4.3.1 From Table 8/4, it can be seen that both options have been ranked equally for air quality, cultural heritage, landscape and visual impacts, materials and water resources.

8.4.3.2 The Southern Sweep is preferred in terms of nature conservation impacts due to overall habitat losses being lower than for the Presented Option. Impacts for geology and soils are also slightly lower for the Southern Sweep as the losses of agricultural soils are reduced compared to the Presented Option.

8.4.3.3 The Southern Sweep is also preferred in terms of noise and vibration. This arises from the reduced noise impacts on the village of Breadsall.

8.4.3.4 Both the Presented Option and the Southern Sweep have the potential for a slight adverse effect due to the land take required from Green Belt areas, and a slight to moderate adverse effect upon agricultural land holdings. However, the Southern Sweep is slightly preferred as land use effects would be slightly lower due to the requirement for less land take.

8.4.3.5 It should be noted that the construction and use of the temporary diversion route are likely to exacerbate land take effects and construction phase effects.

8.4.3.6 In terms of flood risk, the Southern Sweep has a marginally lower impact due to a reduced requirement for the flood compensation areas compared to the Presented Option.

8.4.3.7 Overall the Presented Option and the Southern Sweep are closely matched and the differences between the options are small, However, the Southern Sweep is preferred in environmental terms.

8.4.4. **Traffic and Economics**

8.4.4.1 From Table 8/4, it can be seen that both options have been ranked equally for reassignment effects, travel benefits and road safety.

8.4.4.2 The Presented Option has a lower impact of delays during construction due to a greater proportion of the scheme being constructed offline from the existing A38.

8.4.4.3 Overall, the Presented Option is preferred in terms of traffic and economics.

8.4.5. **Conclusion**

8.4.5.1 In terms of environmental impacts, the difference between the two options is small. Although the Presented Option requires permanent land-take to the south and east of the existing junction within an area of open, previously undeveloped land, the Southern Sweep will also impact some of this area, particularly as a result of the temporary diversion route.

8.4.5.2 The Presented Option is preferred as it performs better in terms of engineering aspects; and traffic and economics, while offering a considerable cost saving.

8.5. Overall Summary and Conclusions

8.5.1. Each of the options has been compared to the Presented Option. This shows that, while the Presented Option may not rank highest for every category or sub-category, in each case it performs better than the alternative options in overall terms.

8.5.2. Examining Table 8/1 shows that, in overall terms, Option 3A performs the worst and is least preferred. This is primarily due to the restricted turning movements to the A38 southbound and the delays during construction resulting from the alignment overlying the existing A38 and the need for a temporary diversion.

9. RECOMMENDATIONS

9.1. Summary

9.1.1. This report sets out the options considered for Little Eaton junction, provides cost estimates and assesses the options in terms of engineering, environmental and traffic/economic considerations.

9.1.2. Each of the options has been compared to the Presented Option as described in Section 8. This comparison shows that while the Presented Option may not rank highest in each category or sub-category, in overall terms, the Presented Option performs the best.

9.1.3. However, there are areas where the Presented Option has greater impact than the alternative options and detailed mitigation strategies should be developed for each of these aspects in conjunction with key stakeholders.

9.2. Recommendations

9.2.1. Based on this assessment of the options and bearing in mind the limitations of the study as described in this report, it is recommended that the Presented Option is progressed as the preferred option for grade separation of the Little Eaton junction.

9.2.2. In order to minimise the impact of the Presented Option, particularly in terms of design geometry, noise, permanent land use, nature conservation and flood risk, it is important that appropriate mitigation measures are considered as part of the ongoing scheme assessment and incorporated into the final designs.

Appendix A

Summary of the Initial Assessment

A38 Derby Junctions Improvement Scheme
Initial Sift of Options

Option Details							Assesment against Identified Objectives									Deliverability Assessment		Feasibility Assessment		Sumamry of Initial Assessment				
Option Ref No	Submitted by	Alternative option for: Kingsway Junction	Markeaton Junction	Little Eaton Junction	Overall project	Option Description	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5	Objective 6	Objective 7	Objective 8	Total	Assessment		Assessment		A	B	C	Does the Option warrant further assessment?	Comments
	Options fopr Whole Scheme																							
1	Whole scheme					Junctions as published for consultation, excl Ford Lane line at Little Eaton, incl K1 link at Kingsway (excl K2).	4	2	3	3	3	4	4	5	3.5	3	Likely to be deliverable, with some challenges	3	Likely to be feasible, with some challenges	✓	✓	✓	✓	
15	Mr Peake				X	Bypass from south of Derby to North of Little Eaton	5	5	1	1	2	4	3	2	2.875	1	Unlikely to be deliverable	2	Feasible with major challenges	✗	✗	✗	✗	No further assessment required.
	Options for Little Eaton Junction																							
3	Option published for consultation			X		Little Eaton (excluding Ford Lane link to B6179)	4	3	4	2	3	4	4	4	3.5	3	Likely to be deliverable, with some challenges	3	Likely to be feasible, with some challenges	✓	✓	✓	✓	Provides baseline for assessment of alternative options
4	Option 1 (published as Rejected)			X		Option shown on the consultation brochure as rejected Option 1. (2004 Options report = Option 9). Goes through Mobile Home Park.	4	4	3	2	3	3	3	3	3.125	2	Deliverable with major challenges	3	Likely to be feasible, with some challenges	✓	✗	✓	✗	No further assessment required.
5	Option 2 (published as Rejected)			X		Option shown on the consultation brochure as rejected Option 2. (2004 Options report = Option 7). Retains Mobile Home Park.	4	4	3	2	3	3	3	4	3.25	3	Likely to be deliverable, with some challenges	3	Likely to be feasible, with some challenges	✓	✓	✓	✓	Further assessment required.
6	Breadsall Parish Council			X		Option 3A	4	2	3	2	3	4	4	4	3.25	3	Likely to be deliverable, with some challenges	3	Likely to be feasible, with some challenges	✓	✓	✓	✓	Further assessment required, particularly with regards to design/engineering assessment.
7	Breadsall Parish Council			X		Option 4	4	2	3	2	3	4	4	4	3.25	2	Deliverable with major challenges	3	Likely to be feasible, with some challenges	✓	✗	✓	✗	No further assessment required.
8	Cllr Stevenson			X		A38 to follow existing alignment adjacent to Breadsall and extend floodplain to south of Little Eaton jcn.	4	3	2	1	3	4	4	3	3	2	Deliverable with major challenges	3	Likely to be feasible, with some challenges	✓	✗	✓	✗	Exact details to be confirmed with the respondee to confirm result of this assessment. This option has been superseeded by option 18
9	Campaign for Better Transport			X		Flyover from A61 to A38 North	1	4	4	2	3	3	4	2	2.875	2	Deliverable with major challenges	3	Likely to be feasible, with some challenges	✗	✗	✓	✗	No further assessment required.
17	Mr Bradwell			X		Roundabout to north of A38 on landfill site. Layout does not permit Little Eaton traffic onto A38 southbound.	2	2	4	2	3	2	4	2	2.625	2	Deliverable with major challenges	2	Feasible with major challenges	✗	✗	✗	✗	No further assessment required.
18	BAAG			X		A38 to follow existing alignment adjacent to Breadsall and extend floodplain to south of Little Eaton jcn.	4	2	3	2	3	4	4	4	3.25	3	Likely to be deliverable, with some challenges	3	Likely to be feasible, with some challenges	✓	✓	✓	✓	Further assessment required, particularly with regards to design/engineering assessment.
	Options for Markeaton																							
	NO ALTERNATIVE OPTIONS RECEIVED																							

A38 Derby Junctions Improvement Scheme
Initial Sift of Options

Option Details							Assesment against Identified Objectives									Deliverability Assessment		Feasibility Assessment		Sumamry of Initial Assessment				
Option Ref No	Submitted by	Alternative option for:				Option Description	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5	Objective 6	Objective 7	Objective 8	Total	Assessment		Assessment		A	B	C	Does the Option warrant further assessment?	Comments
		Kingsway Junction	Markeaton Junction	Little Eaton Junction	Overall project																			
	Options for Kingsway																							
2	Option published for consultation	X				Kingsway Includes local access option K1.	4	3	4	3	2	3	2	3	3	3	Likely to be deliverable, with some challenges	3	Likely to be feasible, with some challenges	✓	✓	✓	✓	Provides baseline for assessment of alternative options
10	John Buttress	X				2-overbridge roundabout at Kingsway	4	3	2	3	2	3	2	3	2.75	3	Likely to be deliverable, with some challenges	3	Likely to be feasible, with some challenges	✗	✓	✓	✗	The scores reflect the use of Greenwich Drive South for local access. The design requires further review to confirm whether acces via Kingsway Park Close can be achieved.
11	Mark Jennison	X				Alternative roundabout layout at Kingsway. No access to Mackworth.	4	3	4	3	3	2	4	3	3.25	2	Deliverable with major challenges	3	Likely to be feasible, with some challenges	✓	✗	✓	✗	Traffic figures to be reviewed to confirm operational assessemnt of the single overbridge.
12	Mark Jennison (project team variation)	X				Variation on Option Ref 11 to include link to Greenwich Drive South.	4	3	4	3	2	3	2	3	3	3	Likely to be deliverable, with some challenges	3	Likely to be feasible, with some challenges	✓	✓	✓	✓	Scores similar to Option K1. Further assessment required unless viability of option K1 is confirmed in comparison to option K2.
13	Campaign for Better Transport	X				Arrangement to keep existing Mackworth access roads open.	4	3	4	1	4	1	3	3	2.875	3	Likely to be deliverable, with some challenges	2	Feasible with major challenges	✗	✓	✗	✗	No further assessment required.
14	Mr Peake	X				Service roads between Kingsway & Markeaton to keep Mackworth accesses open.	3	4	3	1	2	3	3	2	2.625	2	Deliverable with major challenges	3	Likely to be feasible, with some challenges	✗	✗	✓	✗	No further assessment required.
	Alternative Options for Kingsway & Markeaton combined																							
2a	Option published for consultation	X	X			Markeaton/Kingsway combined.	4	2	3	3	3	4	4	5	3.5	3	Likely to be deliverable, with some challenges	3	Likely to be feasible, with some challenges	✓	✓	✓	✓	Provides baseline for assessment of alternative options
16	Mr Bradwell	X	X			Tunnel from south of Kingsway to north of Kedleston Road	5	2	1	3	4	4	4	1	3	1	Unlikely to be deliverable	2	Feasible with major challenges	✓	✗	✗	✗	No further assessment required.
	Compare Local Access Road Options at Kingsway																							
see Option 2	Option published for consultation	X				Existing access roads closed. Link to Greenwich Drive South (Option K1)	4	3	4	3	2	3	2	4	3.125	3	Likely to be deliverable	3	Likely to be feasible	✓	✓	✓	✓	
K2	Option published for consultation	X				Existing access roads closed. Link to Kingsway Park Drive (Option K2)	4	3	4	3	3	4	3	4	3.5	3	Likely to be deliverable	3	Likely to be feasible	✓	✓	✓	✓	
K3	Option published for consultation	X				Existing access roads closed. No new local accesses provided . (Option K3)	4	2	4	4	3	4	3	4	3.5	2	Likely to be deliverable (with challenges)	3	Likely to be feasible	✓	✗	✓	✗	

Client Scheme Requirements - Transport Objectives		Category	Comments	Ref
Economy	To reduce congestion and increase reliability of journey times on the strategic corridor	Must		1
	Assist in bringing forward development and regeneration opportunities in the surrounding area and immediately adjacent to the scheme	Aim	All improvement options would achieve this	-
	To minimise traffic disruption due to construction works and incidents	Must		2
	To achieve optimum whole life costs taking into account future maintenance and operation, and disruption to users	Must		3
Environment	To minimise impacts on both the natural and built environment, including designated landscape/biodiversity features	Must		4
	To seek to mitigate impacts on air quality and noise	Must		5
	To ensure effective measures are in place to protect watercourses from pollutant spillage on the highway	Business as Usual	Adequate drainage strategy to be developed despite option taken forwards	-
	To investigate and encourage the use of environmentally friendly operations and products throughout the project life cycle	Business as Usual	Construction and maintenance strategy will consider use of environmentally friendly operations and products despite option taken forwards	-
Society	To improve the safety for all road users	Must		6
	To manage the safety for road workers in accordance with the requirements of GD04/12 – Standard for the Safety Risk Assessment on the Strategic Road Network and the Health & Safety at Work 1974 Act to be So Far As Is Reasonably Practicable (SFAIRP)	Business as Usual	Construction and maintenance strategy will consider safety of road workers despite option taken forwards	-
	To improve safety for residents in the vicinity of the junction	Aim	All improvement options would achieve this	-
	To facilitate integration with other transport modes where applicable	Aim	All improvement options would achieve this	-
	To ensure a consistent high standard of signing relating to the junction and scheme	Business as Usual	Appropriate signing will be considered despite option taken forwards	-
	To seek to reduce severance by maintaining or providing appropriate facilities for crossing, and travelling along the route for non-motorised users	Must		7
Public Accounts	To be affordable and represent High Value for Money according to DfT's appraisal criteria	Must		8
Scheme Specific Objectives	Improve integration by supporting the local transport plan	Aim	All improvement options would achieve this	-
	Facilitate regional development and growth in Derby City and its surrounding areas and increase capacity of the strategic road network to absorb growth	Aim	All improvement options would achieve this	-

Category Key

Must - The project must deliver this objective, it is mandatory.

Aim - The project should aim to achieve this objective, but will not be accountable for it. The objective will be considered when making design decisions.

Business as Usual - These objectives are to be delivered indeopendently of the scheme being taken forwards.

Qualitative assessment against identified 'must deliver' objectives		
1	Poor fit	There is significant conflict with other policies/options affecting the study area which needs to be resolved. Possibly also conflicts with other modes.
2	Low fit	There is some conflict with other policies/options or modes.
3	Reasonable fit	Overall the option fits well with other policies affecting the study area.
4	Good fit	The option fits very well with other policies affecting the study area.
5	Excellent fit	Option complements other policies/proposals affecting study area, has no negative impacts on other modes or outcomes and demonstrates 'doing more with less'.

Qualitative assessment of deliverability (e.g. political, planning, timescale or third party issues) considering the overall project	
1	Unlikely to be deliverable
2	Deliverable with major challenges
3	Likely to be deliverable, with some challenges

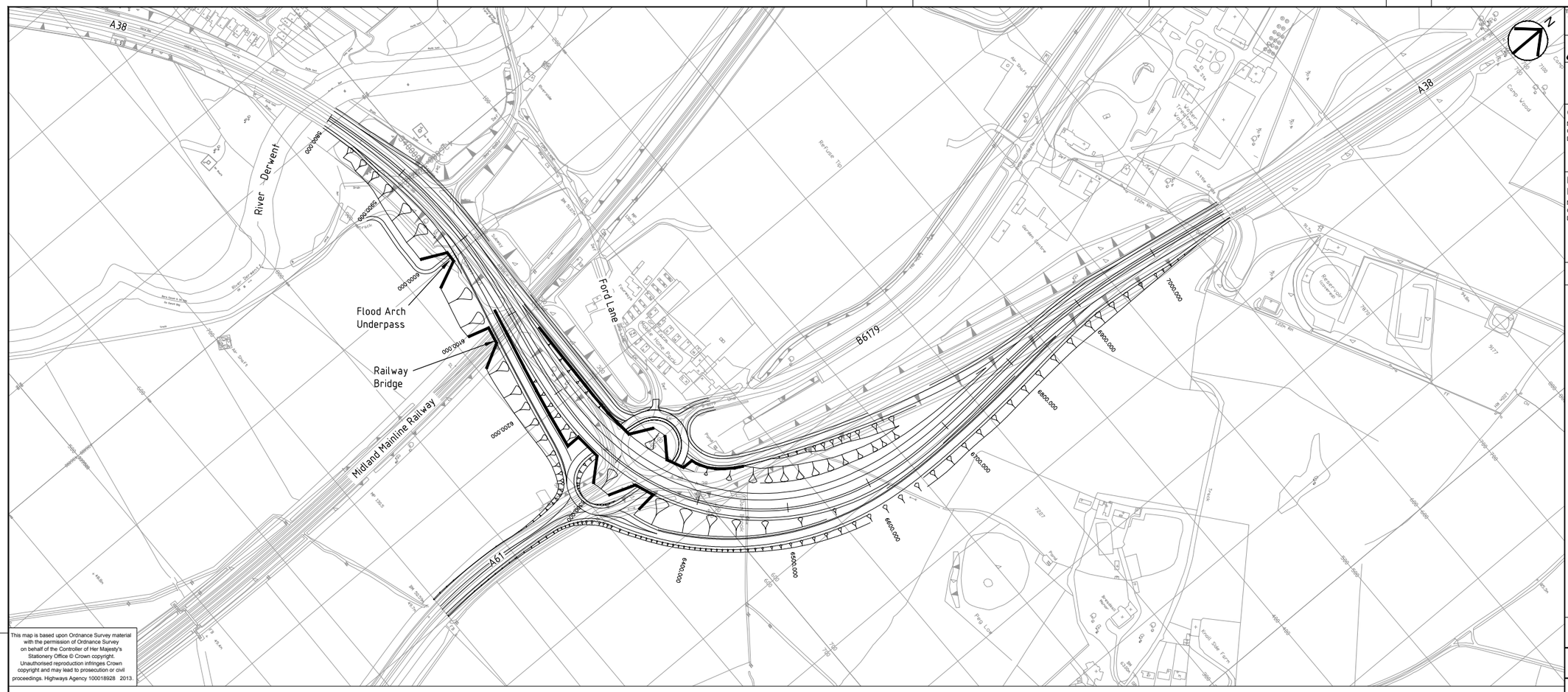
Qualitative assessment of feasibility (e.g. physical constraint, land availability and design standards) considering the overall project	
1	Unlikely to be feasible
2	Feasible with major challenges
3	Likely to be feasible, with some challenges

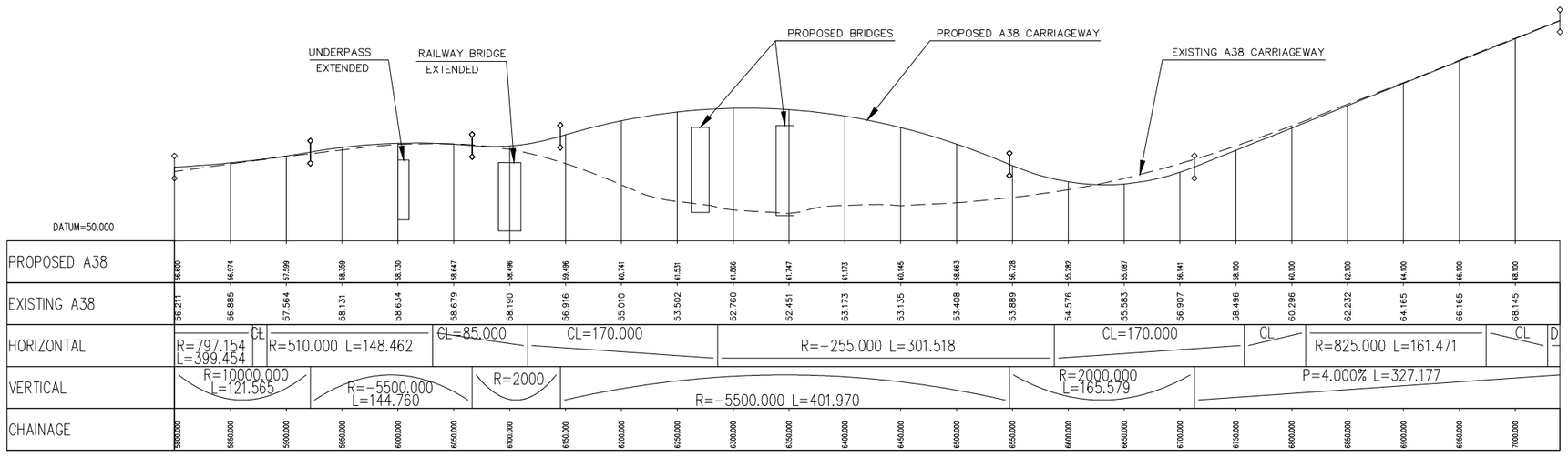
PASS criteria for alternaive option to proceed to next level of assessment		
A	Objectives	Overall reasonable fit with identified objectives (assesment score > 3)
B	Deliverability	Must be likely to be deliverable (assesment score = 3)
C	Feasibility	Must be likely to be feasible (assesment score = 3)

Appendix B

Option Layout Drawings

Presented Option	**Dwg: HA514503-URS-06-DR-GD-25.012**
Option 2	**Dwg: HA514503-URS-06-DR-GD-25.024**
Option 3A	**Dwg: HA514503-URS-06-DR-GD-25.025**
Southern Sweep Option	**Dwg: HA514503-URS-06-DR-GD-25.026**





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NOTES

THIS DRAWING IS DRAFT ONLY AND WILL BE SUBJECT TO CHANGE AS THE DESIGN IS DEVELOPED

PRELIMINARY

Rev						
5	CROSS SECTION TEXT COLOUR AMENDED					
	LE	21/08/15	GG	21/08/15	AW	21/08/15
4	DRAFT NOTE ADDED					
	JRH	18/02/15	SLS	18/02/15	AW	19/02/15
3	EXISTING CARRIAGEWAY LEVELS ADDED, SLIP AND EXISTING LEVELS OF PROPOSED CENTRELINE REMOVED					
	JRH	03/02/15	AP	03/02/15	AW	03/02/15
2	ANNOTATION ADDED TO PLAN					
	JRH	26/01/15	IWM	26/01/15	SLS	27/01/15
1	SLIP ROAD ALIGNMENTS ADDED TO SECTION					
	JRH	03/12/14	IWM	03/12/14	AW	03/12/14
0	DRAWING CREATED FROM SCOTT WILSON DRAWING D114946/GD/003 REV A, RENAMED TO LITTLE EATON FROM ABBEY HILL					
	JRH	11/09/14	AW	12/09/14		

Rev #	Revision Details					
	Drawn By	Date	Checked By	Date	Approved By	Date
P	PRELIMINARY					27/01/15 SS

Job Title

A38 DERBY JUNCTIONS IMPROVEMENTS

Drawing Title

LITTLE EATON JUNCTION PLAN AND SECTION

AECOM Internal Project Number		Zone / Mileage		Suitability
47071319				P
Designed	Drawn	Stage 1 check	Stage 2 check	Approved
	JRH	AW	AW	SS
Scale at A1		Originated		Date
1:2500		CH-ROADS		11/09/14

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Manchester
M1 2WD

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Basil Close, Chesterfield
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Drawing Number

HA514503-URS-06-DR-GD-25.012-5P

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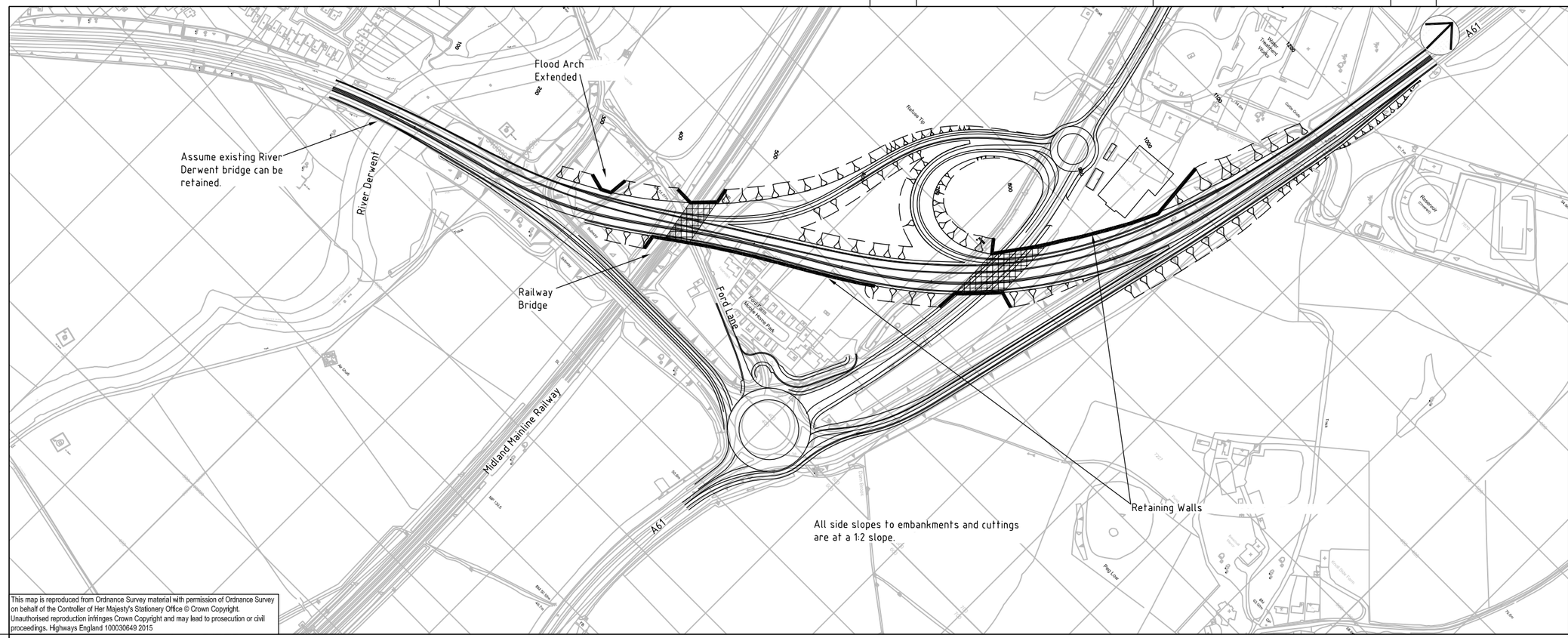

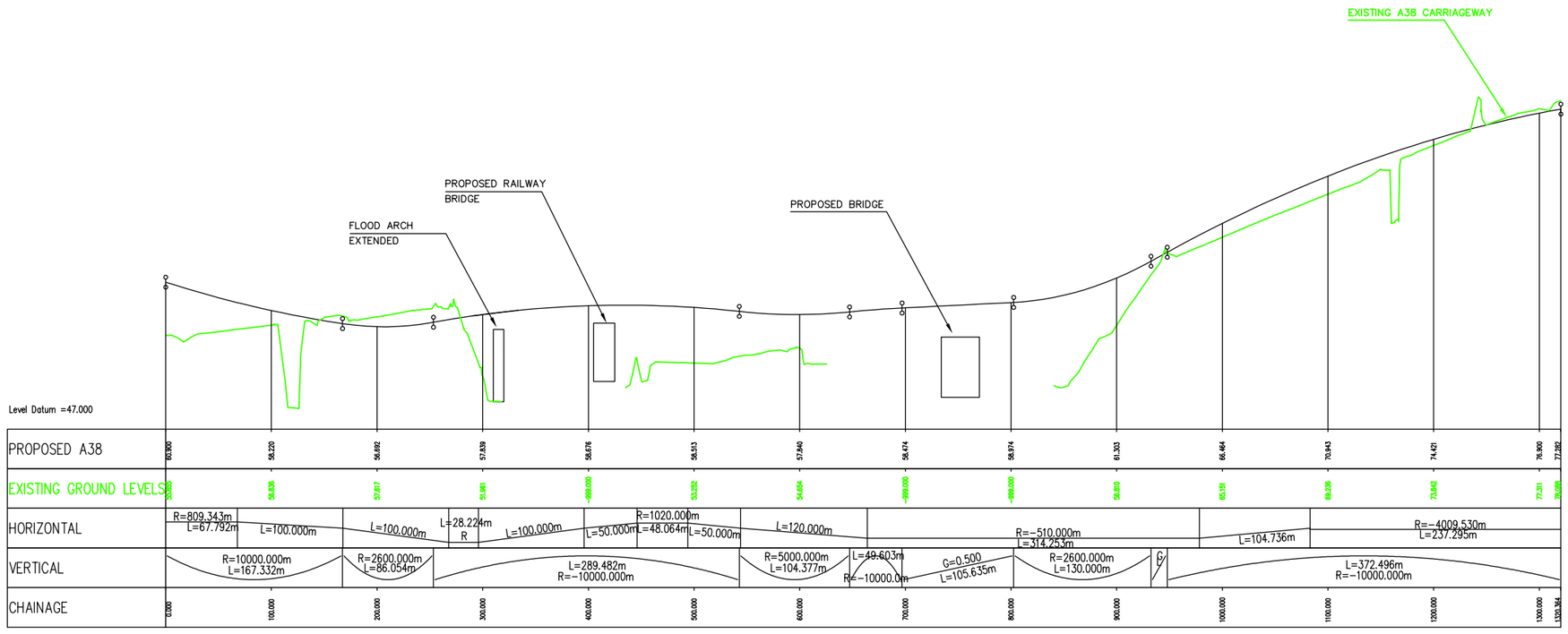

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NOTES

1. Little topographical data available so high risk of variance in earthwork volumes.

2. All side slopes were modeled at 1:2 - it should be noted these are more likely to be 1:2.5 (or 1:3 in flood paln).

PRELIMINARY

Rev #	Revision Details					
	Drawn By	Date	Checked By	Date	Approved By	Date
1	Additional text added, and drawing re-numbered.					
	SB	15/07/15	GJS	15/07/15	AW	16/07/15
0	DRAFT ISSUE					
	SB	09/07/15				
D						

Job Title

A38
DERBY JUNCTIONS
IMPROVEMENTS

Drawing Title

LITTLE EATON JUNCTION
OPTION 2
PLAN AND SECTION

AECOM Internal Project Number		Zone / Milleage		Suitability
47071319				
Designed	Drawn	Stage 1 check	Stage 2 check	Approved
	SB	GJS		AW
Scale at A1		Originated		Date
1:2500				

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Drawing Number

HA514503-URS-06-DR-GD-25-024-1D

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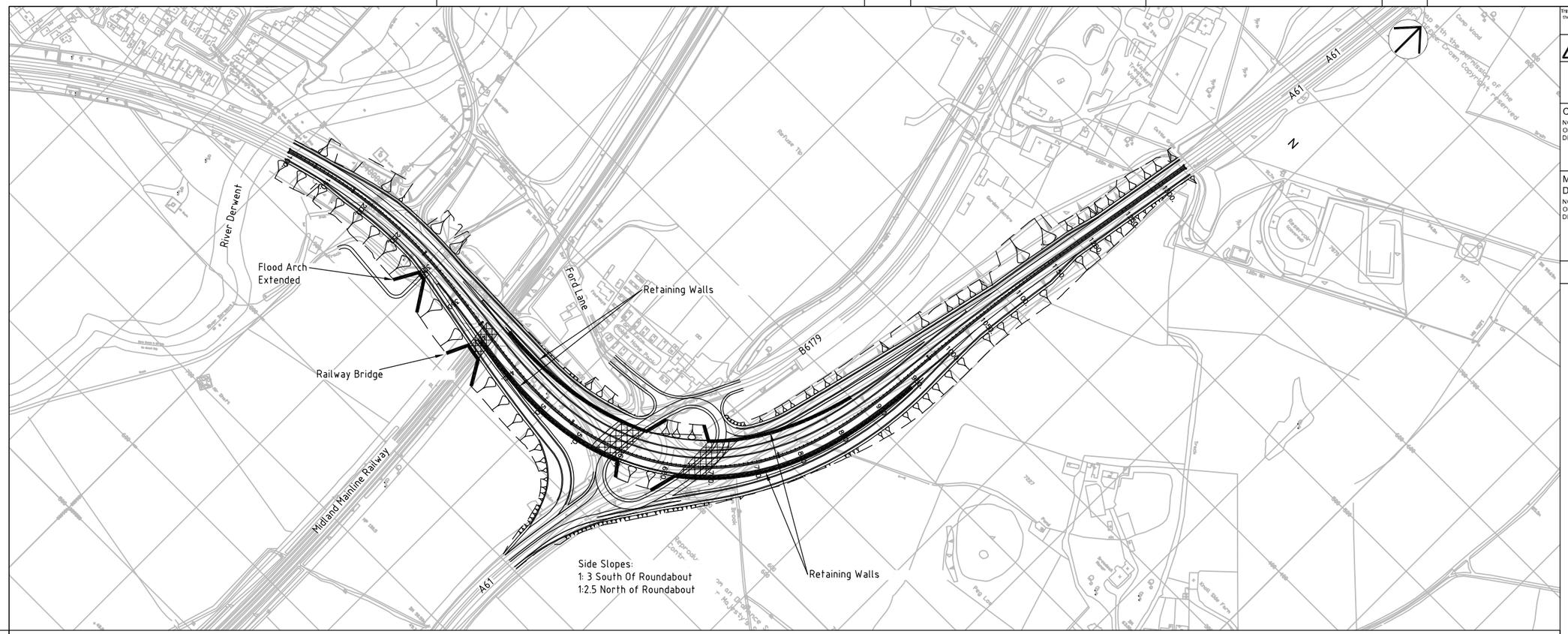
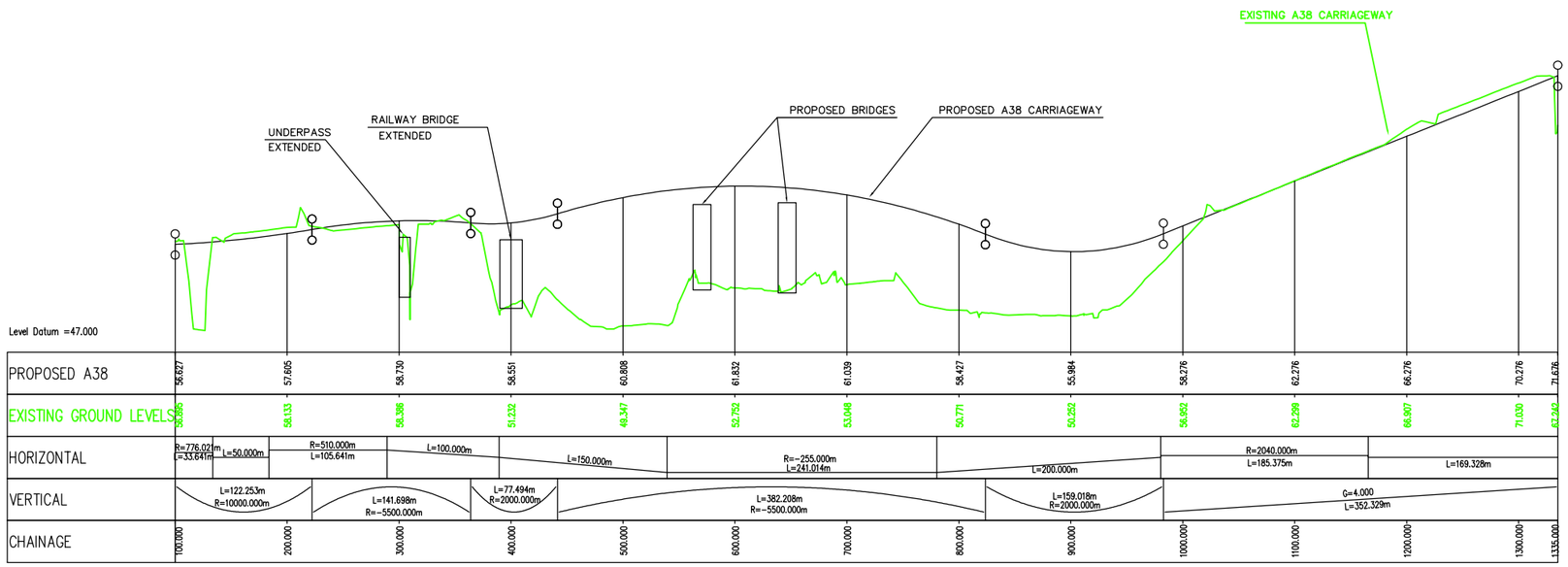
DB1Va





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NOTES

PRELIMINARY

Rev #	Revision Details	Drawn By	Date	Checked By	Date	Approved By	Date
1	Additional text added, and drawing re-numbered.	SB	15/07/15	GJS	15/07/15	AW	16/07/15
0	DRAFT ISSUE	SB	09/07/15				
D	DRAFT						

Job Title

A38
DERBY JUNCTIONS
IMPROVEMENTS

Drawing Title

LITTLE EATON JUNCTION
OPTION 3a
PLAN AND SECTION

AECOM Internal Project Number		Zone / Mileage		Suitability
47071319				
Designed	Drawn	Stage 1 check	Stage 2 check	Approved
AP	SB	GJS		AW
Scale at A1		Originated		Date
1:2500				

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Drawing Number

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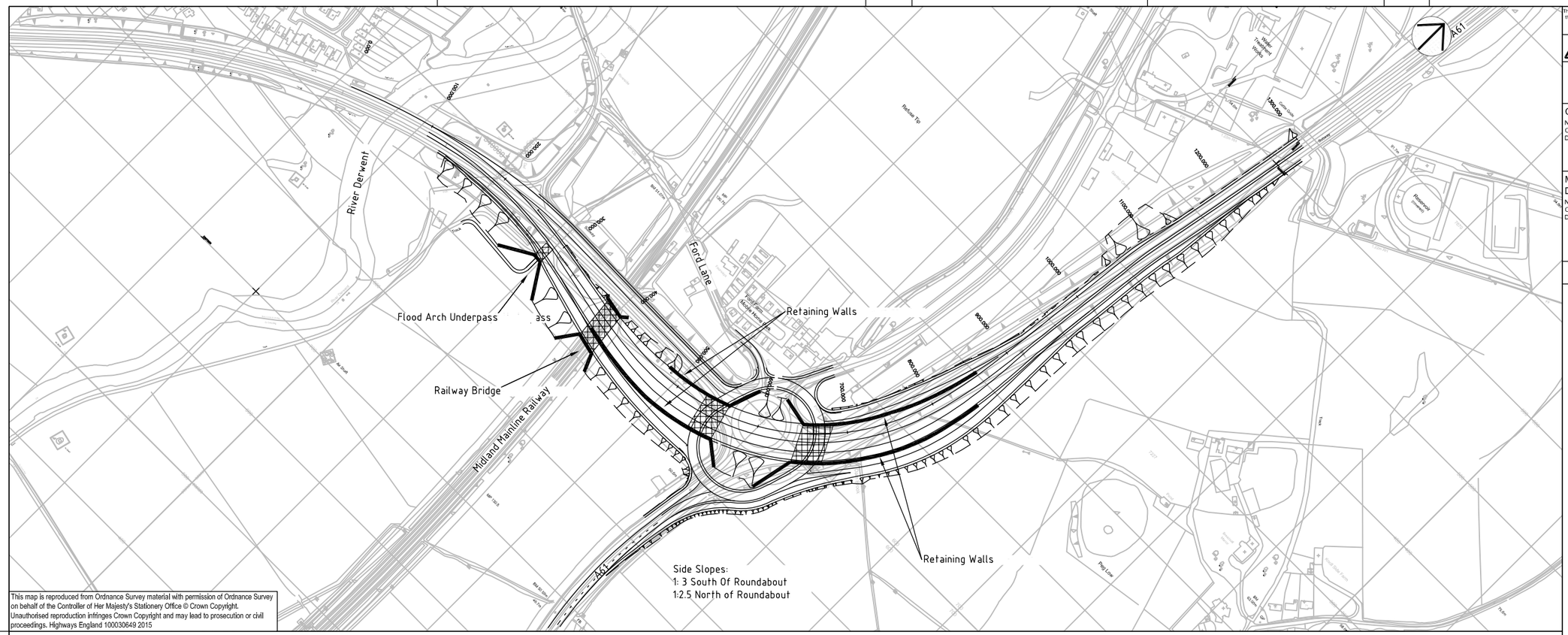

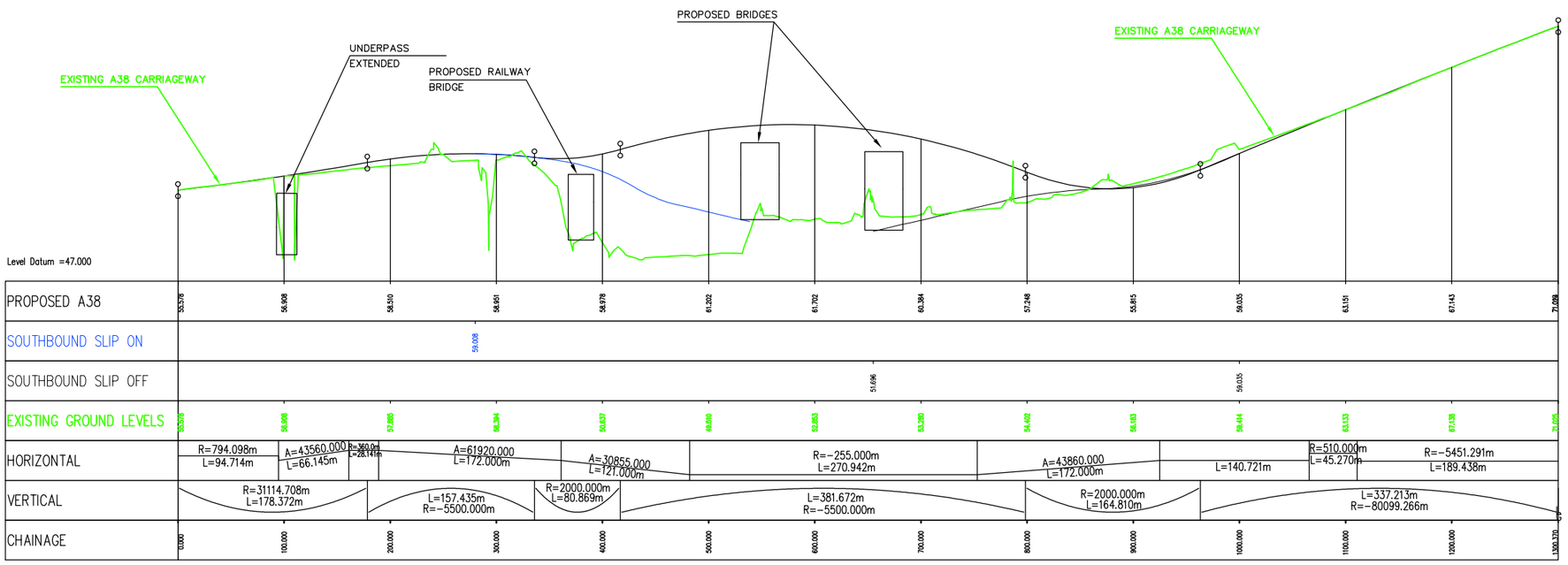

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PRELIMINARY

Rev #	Revision Details					
1	Additional text added, and drawing re-numbered.					
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0	DRAFT ISSUE					
	SB	09/07/15				
D	DRAFT					

Job Title

A38
DERBY JUNCTIONS
IMPROVEMENTS

Drawing Title

LITTLE EATON JUNCTION
'SOUTHERN SWEEP' OPTION
PLAN AND SECTION

AECOM Internal Project Number		Zone / Mileage		Suitability
47071319				
Designed	Drawn	Stage 1 check	Stage 2 check	Approved
SB	SB	GJS		AW
Scale at A1		Originated		Date
1:2500				

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Drawing Number

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Appendix C

Public Submitted Sketches

Option 3A

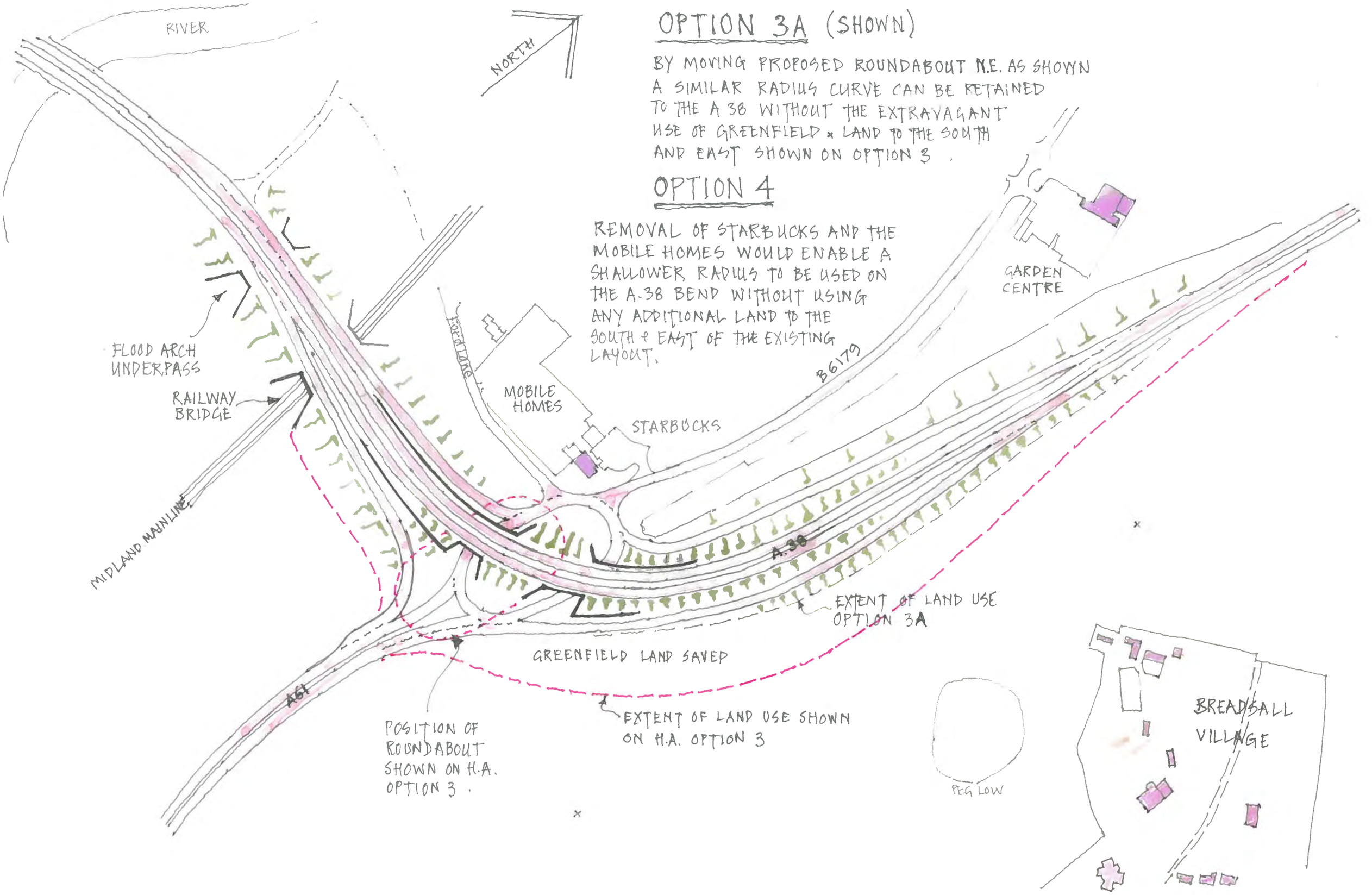
Southern Sweep and Promoter's Notes

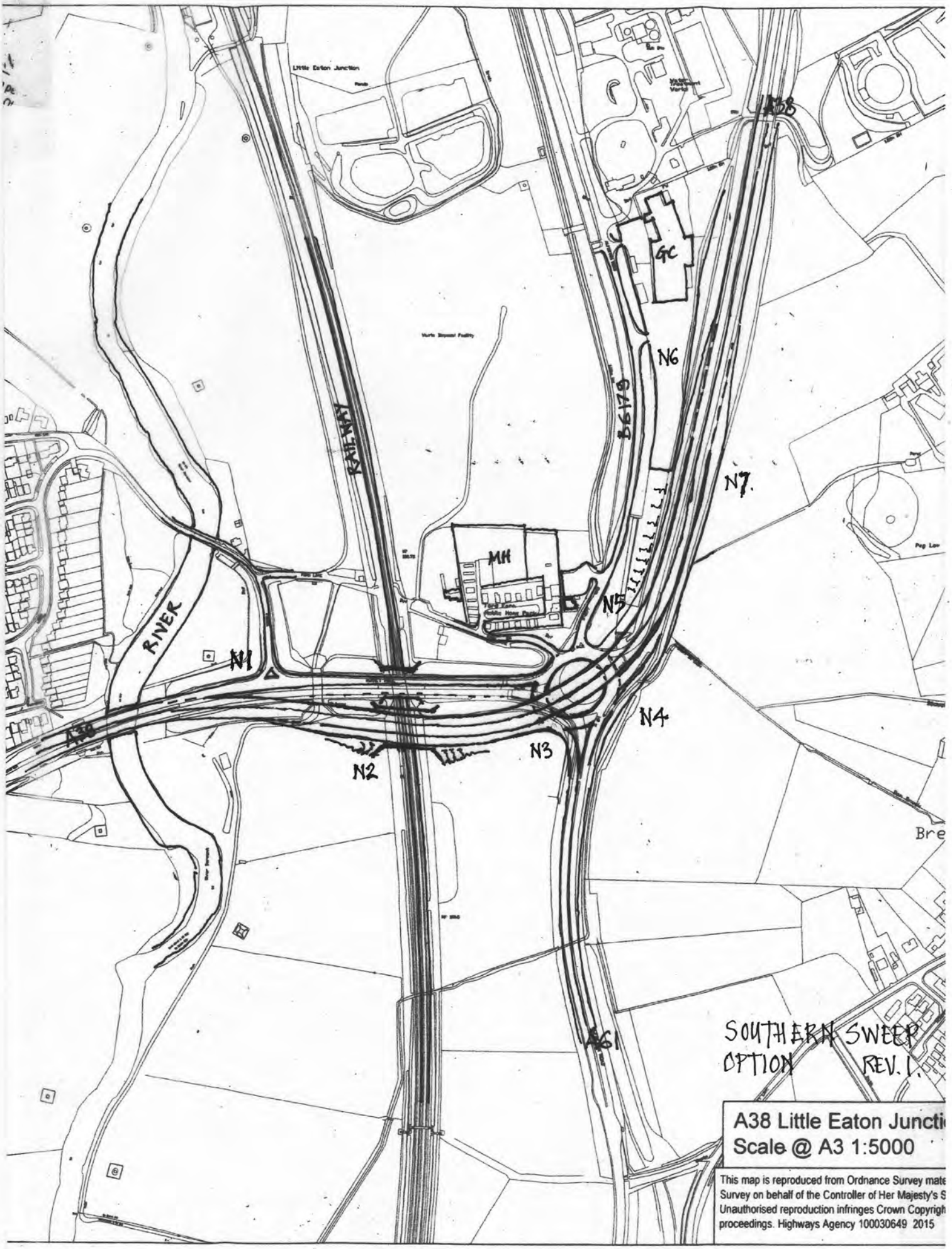
OPTION 3A (SHOWN)

BY MOVING PROPOSED ROUNDABOUT N.E. AS SHOWN A SIMILAR RADIUS CURVE CAN BE RETAINED TO THE A 38 WITHOUT THE EXTRAVAGANT USE OF GREENFIELD × LAND TO THE SOUTH AND EAST SHOWN ON OPTION 3 .

OPTION 4

REMOVAL OF STARBUCKS AND THE MOBILE HOMES WOULD ENABLE A SHALLOWER RADIUS TO BE USED ON THE A.38 BEND WITHOUT USING ANY ADDITIONAL LAND TO THE SOUTH & EAST OF THE EXISTING LAYOUT.

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RAILWAY
RIVER
GC
MH
N1
N2
N3
N4
N5
N6
N7
A38
A61
B6179
SOUTHERN SWEEP
OPTION
REV. 1.
A38 Little Eaton Junct
Scale @ A3 1:5000
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A.38. SOUTHERN SWEEP OPTION NOTES (REV 1)

N.1. EXISTING EASTBOUND CARRIAGEWAY OF A.38 RETAINED AS SLIP ROAD DOWN TO EXISTING ROUNDABOUT.
ADVANTAGE MAY BE KEPT FULLY OPERATIONAL WHILE NEW/EXTENDED RAILWAY BRIDGE AND SOUTHERN SWEEP IS CONSTRUCTED. FORD LANE CONNECTION CAN BE RETAINED. NO ALTERATIONS TO RIVER BRIDGE.

N.2. NEW (OR EXTENDED) RAILWAY BRIDGE - CONSTRUCTED FIRST.

N.3. NEW SLIP ACCESS ROAD FROM A.61 TO A.38 (WESTWARDS)
NB THE ROUNDABOUT IS SHOWN ENLARGED TO THE S.W. TO ENABLE THIS TO BE CONNECTED AT THE ROUNDABOUT. IF SEPARATED SLIPS FROM THE A61 & ROUNDABOUT ARE PREFERRED (AS FOR THE SOUTHBOUND EXIT) THE ROUNDABOUT COULD STAY AS EXISTING.

N.4. EXISTING ROUNDABOUT & SLIP ROADS FROM A.38 (SOUTHBOUND) TO A61 RETAINED AS IS.
RAISED SECTION OF A.38 OVER ROUNDABOUT ON PILOTIS RATHER THAN BANKING TO MINIMISE SPACE USE.

N5. B.6179 AND STARBUCKS RETAINED AS IS.
NB TURN FROM B.6179 ONTO NORTHBOUND SLIPROAD IS TIGHT SO CONSIDERATION MAY BE GIVEN TO A NO LEFT TURN (VEHICLES GO ROUND ROUNDABOUT PRIOR TO HEADING NORTH) OR ALTERNATIVELY DEMOLITION OF STARBUCKS TO ALLOW AN EASIER TURN.

N6. GARDEN CENTRE SHOLD REMAIN AS IS THOUGH NORTHBOUND A.38 SLIPROAD WILL REQUIRE RETAINING WALL ALONGSIDE CAR PARK RATHER THAN BANKING TO SAVE SPACE.

N.7. AS THE A.38 NORTH OF THE ROUNDABOUT IS BASICALLY ON IT'S EXISTING LINE, A TEMPORARY LINE COULD BE MADE TO THE EAST DURING CONSTRUCTION. THIS AREA COULD THEN BE PLANTED ETC. AS A SOUND BUFFER FOLLOWING CONSTRUCTION.

Appendix D

Environmental Figures 6/1 to 6/6

Figure 6/1 – Heritage Baseline

Figure 6/2 – Desk Study – Designated Sites

Figure 6/3 – Phase 1 Habitat Survey

Figure 6/4 – Water Bodies

Figure 6/5 – Bat Roost potential in Trees and Buildings

Figure 6/6 – Invasive Non-Native Species

N

Little Eaton
Breadsall
Breadsall Hilltop
Darley Abbey
Allestree Park
Golf Course
Gorses' Wood
Path
Roundabout
Burley Hill
Budleyhill Farm
The Bungalow
Fields Farm
Holme Nook
Holme Nook Farm
Nut Wood
Allestree Ford Bridge
Mobile Home Park
Peg Low
Moor End Farm
Moor End Farm Bungalow
Meter House
The Bungalow
Reservoirs
Cotter Wood
Bleak House
Elms Farm
Bsns Pk
Works
Camp Wood
Camp Wood
Water Treatment
Garden Centre
Little Eaton Junction
Air
Fog Sta
Wks
Warehouse
Nooney's Pond
Croft Wood
Manor Farm
The Retreat
Knoll Side Farm
Breadsall Manor
Rectory Farm
Brookside Farm
Church Farm
Recn Gd
Hall
Mill Plantation
Willow Holt Plantation
The Slip
Glebe Farm
Boosemoor Brook
Dam Brook
Frog Hall
Sch
Vic
Trav Cs
Factory
Foll
Superstore
The Meteor Centre
Park & Ride
House
Ground
Pav
PO
PW
LC
Hall
Mill
Croft
Ford Lane
Derwent Avenue
Main Ave
Short Ave
Evans Avenue
Duffield Road
Lambourn Drive
Rockingham Close
Farnborough Gdns
Spenbeck Dr
Frogatt Cl
Medway Drive
Haven Cl
Windrush Cl
Cuckmere Cl
Eaton Avenue
Abbeyfield
Holme Farm Drive
Woodside Drive
Ashberry Cl
Gisborne Cl
Gema Cl
Park La
Church Walk
Church Lane
Abbeyfields Cl
Darley Abbey Drive
Weirfield Road
Old Coppice Cl
Coppice Cl
Haslam's Lane
North Avenue
South Avenue
Duffield Rd
Parkfield Rd
Church La South
Holly Cl
Derwent
Derwent Cl
Lambourn Dr
Ashberry Cl
Gisborne Cl
Holme Farm Dr
Woodside Dr
Gema Cl
Park La
Church Walk
Abbeyfields Cl
Darley Abbey Dr
Weirfield Rd
Old Coppice Cl
Coppice Cl
Haslam's Ln
North Ave
South Ave
Duffield Rd
Parkfield Rd
Church La South
Holly Cl
Morley Lane
Park View
Barley Close
Briar Tree Hill
Duffield Road
Park Cl
Holm Ave
Church La
New St
Sheffield Road
New Inn La
Wood Cl
Main Rd
Rectory Lane
Station Road
Brookside Road
Briar Tree
Croft Lane
Beechcroft
Brookfields Drive
Ashbourne Rd
Derby Rd
Ashbourne Road
Elmwood Drive
Lime Avenue
Hawkshead Ave
Scarborough Rise
Langdale Dr
Salterbrook Cl
Newark Road
Coniston Crescent
Alder Close
Blackthorn Cl
Spindle Tree Drive
Bishop's Drive
Dunsmore Cl
Chgate Cl
Corbel Close
Minsfer Road
Deacon
Ashbourne Rd
Charter La
Hillcrest
Frankcombe Lane
Bunscote Lane
Calver Cl
Wearwood Dr
Sycamore Cl
Sycamore Rd
Alder Close
Blackthorn Cl
Spindle Tree Drive
Bishop's Drive
Dunsmore Cl
Chgate Cl
Corbel Close
Minsfer Road
Deacon
Ashbourne Rd
Charter La
Hillcrest
Frankcombe Lane
Bunscote Lane
Calver Cl
Wearwood Dr
Sycamore Cl
Sycamore Rd

150 0 150 300 450 600 750 Meters

Legend

- Site boundary
- 500m buffer
- 1000m buffer
- Non Designated Asset
- Listed Building
- **World Heritage Site**
- Buffer Zone
- Core Area

File Name:\\ch-wip-001\CH_Roads\A38 Derby Jcns - PO1339\12 CAD\12.1 WIP\Little Eaton Alternative Options Assessment GIS Figures\Figures\FIGURE 7.1 - LITTLE EATON HERITGAE BASELINE.mxd

Project Title/Drawing Title

A38 DERBY JUNCTIONS IMPROVEMENT
LITTLE EATON
HERITAGE BASELINE

AECOM Internal Project Number
47071319

Drawn	Checked	Approved
GB	AC	AC
Date	**Scale @ A3**	**Purpose of issue**
18/08/2015	1:10,000	FINAL
Drawing Number		**Rev**
Figure 6.1		0

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AV119
Burley Hill Farm Scrub and Grassland

ER125/3

ER019
Camp Wood, Little Eaton

DE011
Allestree Park

DE R6335

DE/3

Lake in Lowkand Derbyshire

Ford Lane field

DE050/3

ER002
Alfreton Road Rough Grassland

ER018/3

DE088/3

DE007
River Derwent

ER001

ER003/3

ER017/3

ER005
Breadsall Disused Railway

ER008

ER R6496

Holme Nook, Derby

DE033

ER004

DE047
Watermeadows Ditch

DE R6440

DE033
Nooney's Pond

Croft Wood

Nutwood Landslip

DE005
Darley & Nutwood

DE015
Breadsall Railway Cutting

Legend

- Site boundary
- 50m buffer
- 500m buffer
- 1000m buffer
- Local Nature Reserve
- Local Wildlife Site
- Potential Local Wildlife Site
- Regionally Important Geological Site
- Other recorded site of interest
- Parkland
- Lakes in Lowland Derbyshire

200 0 200 400 600 800 1000 Metres

File Name:J:\Highways Agency\47071390 A38 Derby Jcns - Environment\TechnicalEcology\2014-15 Ecology Folder\GIS\project_files\Little Eaton\Desk study\A38 Little Eaton Designated sites 26052015.mxd

Project Title/Drawing Title

A38 DERBY JUNCTIONS IMPROVEMENT
LITTLE EATON
DESK STUDY
DESIGNATED SITES

AECOM Internal Project Number 47071319		
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Date 18/08/2015	Scale @ A3 1:10,000	Purpose of issue FINAL
Drawing Number Figure 6.2		Rev 0

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N

Pb2a
Pb2b
Pb3b
Pb1
Pb3a
Pb6
Pb4
Pb8
TNb2
TNb3
H1
H4
H7
H5
Pb7
Pb5
H3
H6
TNb1
H2
Pb9

Legend

- Site boundary
- 50m buffer
- 250m buffer
- 500m buffer

Habitats

- Semi-natural broad-leaved woodland
- Plantation broad-leaved woodland
- Dense scrub
- Semi-improved grassland
- Improved grassland
- Open water
- Boulders
- Arable
- Amenity grassland
- Building
- Bare ground
- Hard standing
- Invasive non-native species
- Wet ditch
- Hedgerow
- Fence
- Dry ditch
- Tree
- Target notes

Invasive non-native species

- Himalayan balsam
- Japanese knotweed
- Giant knotweed
- Variegated yellow-archangel
- Swamp sandstone

100 0 100 200 300 400 500 Metres

File Name:J:\Highways Agency\47071390 A38 Derby Jcns - Environment\Technical\Ecology\2014-15 Ecology Folder\GIS\project_files\Little Eaton\Phase 1\A38 Little Eaton Phase 1 26052015.mxd

Project Title/Drawing Title

A38 DERBY JUNCTIONS IMPROVEMENT
LITTLE EATON
PHASE 1 HABITAT SURVEY

AECOM Internal Project Number
47071319

Drawn	Checked	Approved
GSB	SR	OB
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18/08/2015	1:5,000	FINAL
Drawing Number		**Rev**
Figure 6.3		0

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Pb1
Pb2a
Pb2b
Pb3a
Pb3b
Pb4
Pb5
Pb6
Pb7
Pb8
Pb9

Boosemoor Brook
Dam Brook
Water meadow ditch
Derwent

100 0 100 200 300 400 500 Meters

Legend

- Site boundary
- 50m buffer
- 250m buffer
- 500m buffer
- Water body
- Dry pond

File Name:J:\Highways Agency\47071390 A38 Derby Jcns - Environment\Technical\Ecology\2014-15 Ecology Folder\GIS\project_files\Little Eaton\Aquatic surveys\A38 Little Eaton Aquatic 26062015.mxd

Project Title/Drawing Title

A38 DERBY JUNCTIONS IMPROVEMENT
LITTLE EATON
WATER BODIES

AECOM Internal Project Number 47071319			
Drawn GSB	Checked SR	Approved OB	
Date 18/08/2015	Scale @ A3 1:6,500	Purpose of issue FINAL	
Drawing Number Figure 6.4		Rev 0	

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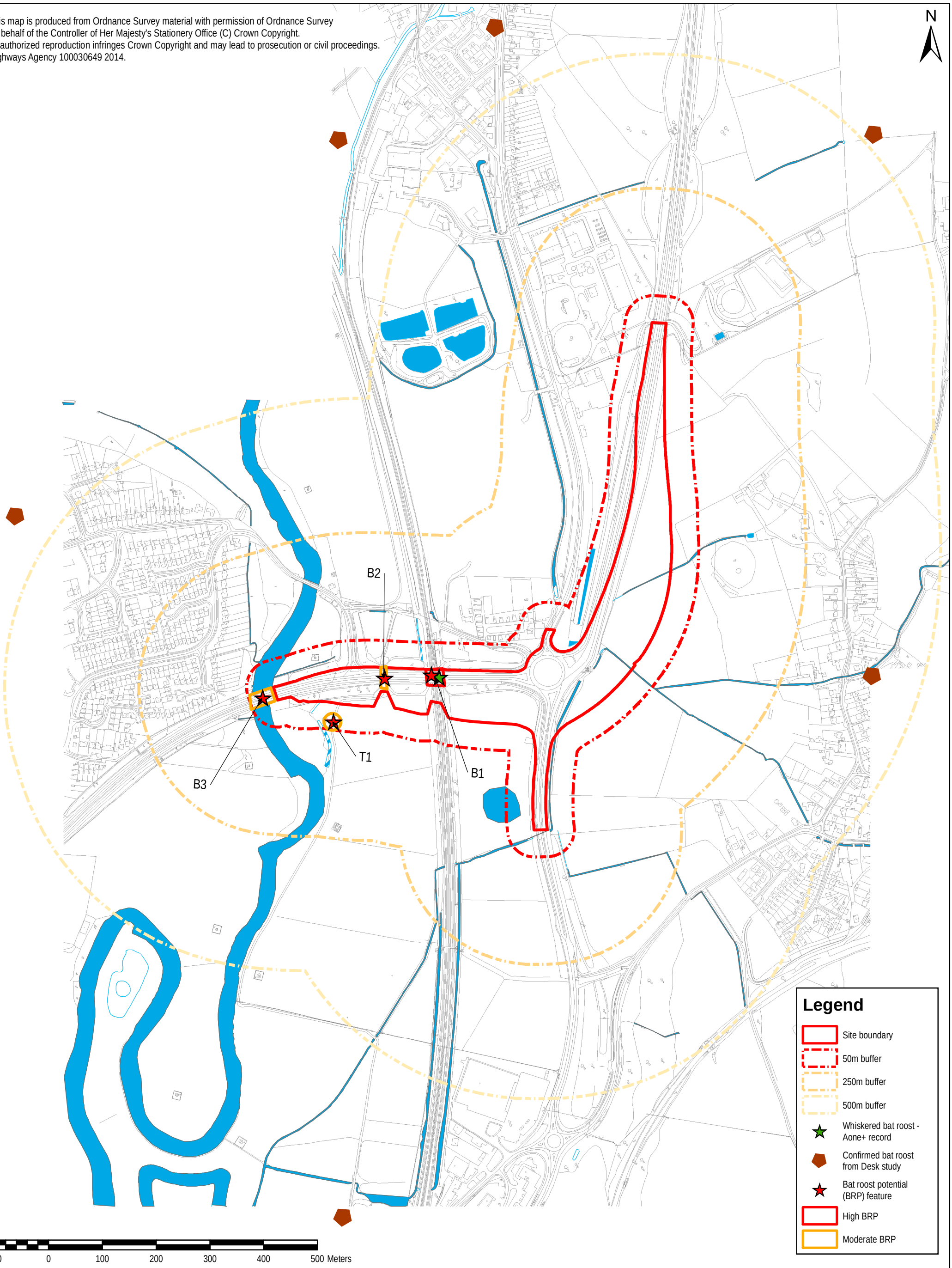

File Name:J:\Highways Agency\47071390 A38 Derby Jcns - Environment\Technical\Ecology\2014-15 Ecology Folder\GIS\project_files\Little Eaton\Bats\A38 Little Eaton BRP 26062015.mxd

Project Title/Drawing Title

A38 DERBY JUNCTIONS IMPROVEMENT
LITTLE EATON
BAT ROOST POTENTIAL (BRP) IN TREES AND BUILDINGS

AECOM Internal Project Number
47071319

Drawn	Checked	Approved
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Figure 6.5		0

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HBb1
JKb1
JKb2
GKb1
SSb1
HBb2
YAb1

100 0 100 200 300 400 500 Meters

Legend

- Site boundary
- 50m buffer
- 250m buffer
- 500m buffer
- Himalayan balsam
- Japanese knotweed
- Giant knotweed
- Variegated yellow-archangel
- Swamp Stonecrop

File Name:J:\Highways Agency\47071390 A38 Derby Jcns - Environment\TechnicalEcology\2014-15 Ecology Folder\GIS\project_files\Little Eaton\Invasive species\A38 Little Eaton Invasive species 26062015.mxd

Project Title/Drawing Title

A38 DERBY JUNCTIONS IMPROVEMENT
LITTLE EATON
INVASIVE NON-NATIVE SPECIES

AECOM Internal Project Number
47071319

Drawn	Checked	Approved
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Date	Scale @ A3	Purpose of issue
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Drawing Number		Rev
Figure 6.6		0

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