

## **A38 DERBY JUNCTIONS SCHEME—LITTLE EATON JUNCTION. APPLICATION FOR DEVELOPMENT CONSENT ORDER.**

WRITTEN REPRESENTATIONS BY BREADSALL PARISH COUNCIL TO THE  
EXAMINING AUTHORITY

### **Part 1. Selection of the preferred route**

Breadsall Parish Council believes that the process by which Highways England (HE) and its predecessor the Highways Agency (HA) selected the preferred route for the Little Eaton junction was deeply flawed. As a result, the selection of the preferred route should be completely re-examined before the current Development Consent Order is processed.

The selection process for the preferred route is described in Highways England's own document "A38 Derby Junctions Scheme Assessment Report (PCF Stage 2)" a copy of which is attached. See especially section 5. BPC's comments below quote paragraph numbers from this report. Much of the same material is contained in the "6.1 Environmental Statement Chapter 3 -Scheme history and assessment of alternatives" submitted by HE as part of the DCO application

In highway terms the obvious way to re-design the Little Eaton junction is to route the A38 to the north of the present junction. This is the shortest and most direct route for the A38, and this was indeed the basis for options 1 and 2 originally proposed by the HA in 2002 (See para 5.4.1). In 2003 HA held a public consultation exercise based on revised high-speed versions of options 1 and 2 and a new third option routed to the south of the present junction (See para 5.4.6).

In 2004 HA decided "on balance" to support the third option which is the basis of the current scheme. (See Para 5.4.13). HA gave two key reasons for adopting option 3 and abandoning the routes north of the present junction.

- A high-speed route north of the present junction would have adverse effects on adjoining property especially the mobile home park. (See Para 5.4.11-5.4.13)
- In the 2003 public consultation exercise option 3 was the most popular. (See Para 5.4.8).

In reality HA's reasoning was deeply flawed

It was true that Options 1 and 2 would adversely affect adjoining property but there were potential ways of overcoming these issues and it appears that HA simply abandoned Options 1 and 2 without making any attempt whatsoever to address adverse effects on adjoining property. As late as 2016 HE admitted that they had no record of approaching a single one of the affected tenants or landowners. HE had thus wasted some 13 years during which they could have attempted to overcome issues related to property north of the existing junction. In practice there were several measures which HE could have taken including the following: -

- The possibility of relocating the mobile home park could have been explored and indeed the owner of the park stated at the Reference Group meeting on 18 May 2016 that he would co-operate with HE on such a move. (It should be noted that the mobile home park is hardly well placed even under option 3 as it is close to busy roads, a railway line and a former tip).
- Individual mobile homes are regularly offered for sale and HE could have acquired some of them on the open market at relatively low cost.
- The Little Chef outlet (now Starbucks) closed down during the period that the scheme was on hold and could have been acquired vacant on the open market by HE.
- There was land in the vicinity which could have been made available to the garden centre to replace lost parking spaces
- HE could have sought co-operation with the local authority in carrying out a comprehensive review and remodelling of the area north of the present junction.
- HE claimed to have limited compulsory purchase powers but made no attempt to acquire property by agreement nor to work in co-operation with the local authority which had much wider compulsory purchase powers under section 226 of the Town and Country Planning Act 1990

Turning to the 2003 public consultation exercise there were two huge flaws with HA's analysis.

- 1 A petition against Option 3 submitted by Breadsall Parish Council was counted ***as a single vote*** despite being signed by around 330 people of whom 283 were identified as living in Breadsall (See Para 5.4.7). Many residents of Breadsall believed that they had expressed their views through the petition and thus the opinion of Breadsall residents was massively under-represented in HA's analysis of the public consultation. Quite apart from the statistical approach to the petition the HA's analysis was again seriously deficient in attributing no significance to the fact that Breadsall residents felt sufficiently strongly to arrange a petition (the only petition noted in the public responses to all three junctions). The receipt of the petition was merely noted and otherwise totally ignored in the decision-making process.
- 2 At the same time HA's analysis did give full weight to all other votes, the majority of which were from residents who would experience no physical or visual effects from any version of the Little Eaton Junction and who thus had no direct stake in the outcome. This includes, for example residents of most parts of Allestree and Little Eaton which are (on HE's own analysis) too distant from the junction to experience any effects. On top of this it is understood that some totally anonymous votes were also counted. It is a sobering thought that, using HA's analysis, a vote by a resident of, say, Lands End or John o' Groats would carry equal weight with the combined signatories of the Breadsall petition. (It should be noted that the 2015 public consultation used a similar flawed process under which all votes were counted equally irrespective of the degree to which voters were actually affected by the scheme)

HA's analysis of the 2003 public consultation was thus based mainly on votes from residents who would be totally unaffected by the visual or physical effects of any version of the scheme while at the same time the numerous signatories of the petition from Breadsall were all but ignored although Breadsall clearly was affected directly by the scheme. As such HA's analysis could not provide a meaningful measure of public opinion.

The flaws in HA's approach, as described above, were absolutely critical in the selection of the preferred scheme because, as admitted in the HE's Scheme Assessment Report, "there was very little to differentiate between options 8a and 9" (equivalent to options 1 and 3 at the public consultation). See Para 5.4.13. Thus, even a minor change in HA's analysis of the options could have led to a different outcome.

The whole matter was made even worse by HA's decision not to announce the choice of Option 3 at the time (See Para 5.4.17). Breadsall Parish Council did not therefore become aware of this decision until 2015, that is twelve years after the initial public consultation. Because of this delay Breadsall residents were placed at a considerable disadvantage in being informed suddenly out of the blue that HE was promoting Option 3, leaving much less time to explore and promote alternatives. This caused considerable ill feeling in the village which was aired at a public meeting conducted by the constituency MP. The Parish Council duly formed an Action Group to represent village residents and liaise with HE.

The Action Group and local borough council members concentrated first on proposing alternative alignments to the south of the existing junction in accordance with HE's wish to avoid property acquisitions to the north of the junction. These are described briefly in HE's scheme assessment report with an option analysis at the end. The most promising alternative was the "southern sweep" which slewed the alignment of the A38 further away from all nearby dwellings. It is understood that this was quite acceptable in highway terms but failed in HE's option appraisal because part of the alignment lay on top of the existing carriageway and would involve extra expense in installing temporary carriageways to keep the road open during the construction period. The decision to reject the southern sweep therefore involved giving priority to short term cost savings over the adoption of a superior long-term alignment for the A38.

When the southern alternatives were rejected the Action Group turned to look again at potential alignments north of the existing junction and put forward two proposals, shown as 2A and 2B in the scheme assessment report, which routed the A38 slightly further north than the original option 2 to minimise the impact on the mobile home park. HE concluded that Options 2A and 2B had "a reasonable fit with the defined essential objectives" but declined to carry out detailed appraisals of these proposals because, according to the scheme assessment report, the garden centre would lose parking spaces and HE lacked compulsory powers to acquire land to provide replacement spaces. (See para 5.4.34). There was in practice a very obvious area of land for replacement parking to the south-west of the garden centre and this, at least in part, was existing highway land which would later become redundant under the scheme. It was quite inexcusable that HE rejected options 2A and 2B so readily with no detailed analysis and not even the slightest attempt to overcome land acquisition issues (e.g. by purchasing land by agreement).

The Action Group finally put forward an Option X1 which involved keeping the A38 on its present alignment and replacing the roundabout with a flyover for the A61. This was again rejected out of hand by HE and never pursued in any detail.

In summary Breadsall Parish Council's position is that the original process for selection of the preferred route was deeply flawed and should be considered invalid. This was exacerbated by the fact that HE did not announce the preferred route until twelve years after the original consultation in 2003, leaving little time for either the Parish Council or HE itself to examine alternatives. The Parish Council did endeavour to put forward alternatives in the short time available but believes that HE rejected them too readily, giving the impression that it was by then irrevocably committed to its preferred option.

The Parish Council now requests the Examining Authority to require a complete review of the process for selecting the preferred route for the Little Eaton junction and, as a minimum, to insist on a fresh appraisal of the alternatives, in particular the "southern sweep" and options 2A and 2B.

### **Part 2 Detailed comments on the current application**

As stated in Part 1 the Parish Council believes that the current scheme should not proceed. In the event that it does proceed the Parish Council wishes to make the following comments on the current DCO application.

1 The woodland/tree belt on the eastern side of the A38 and the slip road will be important in providing visual screening from the Breadsall direction. The Parish Council has three comments about this.

- The section of woodland alongside the ponds at the southern end of the southbound slip road and the adjoining section of the A61 is extremely narrow and is much narrower than the woodland further north. This is quite inadequate in this location where the woodland belt provides important screening from overhead lighting and traffic negotiating the roundabout. (Conversely the woodland on the western side of the A61 is much wider although it has no equivalent screening function). The ponds should be moved further east to create a woodland strip around 20m wide. HE claims that this may involve additional land acquisition and proposes to "investigate opportunities" to widen the woodland belt. This is quite inadequate, and HE should amend the scheme boundary if that is necessary to obtain the relevant land.
- The woodland should principally comprise robust evergreen species to ensure reliable year-round screening. This is a higher priority for this section of woodland than the use of native species and other ecological factors.
- There must be a guaranteed permanent regime for maintenance of the woodland and replacement of dead or dying species. HE has stated that the contractor and subsequently HE itself will be responsible for maintenance. This is fine in principle as long as the maintenance is always carried out promptly and is not, for example, subject to budget constraints

2 The 2.5m high noise barrier is critical in mitigating noise levels in the Breadsall direction. This must be retained and must be constructed of durable materials and coloured green to give the most harmonious visual impact. As with the woodland the noise barrier must be subject to a reliable permanent maintenance regime.

3 The absence of overhead lighting and signage on the A38 is important in protecting Breadsall from light pollution and must be retained in the final design. Lighting must be confined to the roundabout and the adjoining sections of the slip roads.

4 The use of low noise surfacing is welcomed as a critical factor in reducing noise pollution in Breadsall. The introduction of a 50-mph speed limit at this junction (as at Kingsway and Markeaton) would be a further useful measure in reducing noise and air pollution.

5 There is currently a footpath which leads from Rectory Lane Breadsall (alongside the telephone exchange) directly to the A38 and the B6179 just north of the A61 junction. It is understood that HE proposes a diversion of this footpath which involves pedestrians walking about 700 yards south to cross the A61 via new pedestrian crossing near the old Croft Lane and then northward again on the western side of the A61. This is an extremely long detour of almost a mile which is quite unacceptable and would effectively cause all pedestrians to stop using the footpath. It should be noted that the footpath gives the appearance of having already been diverted on the ground while the original route has been allowed to become very overgrown in an apparent attempt to deter use of the existing route. HE is requested to retain the existing footpath and provide a pedestrian route to the B6179 near Starbucks across the two slip roads and beneath the A38 main carriageway. This is safer than the existing route which involves crossing the main carriageway of the A38 in addition to a slip road.

6 HE and the local authorities must produce a robust traffic management plan for the construction period to avoid the long delays and disruption which frequently accompany such roadworks. This should include the following elements

- Given that the new road construction is off-line the contractor must be required to keep both existing lanes of the A38 open at all times except to facilitate bridge construction.
- HE and the local authorities will liaise to produce a plan to keep delay on adjoining roads to an absolute minimum with speed limits, closures and lane-restrictions used only when absolutely necessary.
- Where delays are unavoidable electronic signage must be erected on all local roads to give real time information on the extent of delays.
- Signage on roads and motorways leading to the A38 Derby junctions should advise diversion of through traffic via the M1/A42/M42 or other routes when there are delays on the A38 in Derby.
- Construction traffic will be instructed not to pass through Breadsall and at the same time general traffic will not be advised to divert through Breadsall

# **A38 Derby Junctions**

**Scheme Assessment Report (PCF Stage 2)**

**Report Number: 47071319-URS-06-PCF-RD-008-2F  
November 2019**

# A38 Derby Junctions

## Scheme Assessment Report (PCF Stage 2)

Report No: 47071319-URS-06-PCF-RD-008-2F  
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# 1 INTRODUCTION

## 1.1 Purpose of the Report

1.1.1 The purpose of this report is to provide a summary of the Technical Appraisal Report (TAR) that was produced in 2009, the more recent (2015) Report on Public Consultation, the options development and assessment work undertaken in PCF Stage 2 and to recommend a Preferred Route.

## 1.2 Scheme Development and History

1.2.1 In April 2001 Highways England (the Highways Agency became Highways England in early 2015 and is referred to as Highways England throughout this report) commissioned a Road Based Study (RBS) to consider options for dealing with congestion and safety, environmental impacts, economic, accessibility and integration problems as associated with the three roundabout junctions on the A38 through Derby, namely:

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

Refer to Figure 2/1 for location diagram.

1.2.2 A public consultation on various short-term (interim) and long-term options was held in July 2002, with the RBS being issued in October 2002. The RBS recommended that the long term improvements should involve grade-separation of each of the three junctions.

1.2.3 Following the public consultation in 2002, consultants were appointed to further develop the design options for grade-separation. The short- and medium-term options have since been implemented by Highways England, this includes improvements between 2014 and 2015 via the Government's 'Pinch-Point Programme', which aimed to provide short-term congestion relief to Markeaton junction and Little Eaton junction.

1.2.4 The RBS was independently reviewed early in 2003 and a number of operational and design limitations were identified with the preferred options for the grade-separation of the three junctions. Recommendations were made for further development of the scheme design, in particular at Little Eaton junction.

1.2.5 A written ministerial statement was issued in April 2003 and announced the Secretary of State for Transport's support for the improvements in principle. The Minister asked that Highways England carry out further design work at Little Eaton junction before making a decision on whether to include the scheme in the Government's Targeted Programme of Improvements (TPI).

1.2.6 Further preliminary design work was undertaken and a supplementary public consultation on revised options for Little Eaton junction was undertaken in October 2003. During this work the need for further preliminary design to assess the A38 capacity, merge and diverge tapers and the number of weaving lanes between junctions was identified.

1.2.7 Following a cost challenge workshop undertaken by Highways England in September 2004, the A38 Derby Junctions scheme was put on the list of regionally important schemes for the Regional Transport Board (RTB) to decide on the priority of the scheme. Pending a decision by the RTB, worked was stopped in April 2005.

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- 1.2.8 In January 2007 work recommenced to prepare the required information to facilitate a decision by the Secretary of State to include the A38 Derby Junctions scheme in the Major Schemes Programme. The A38 Derby Junctions scheme was subsequently put on hold again in 2008 following a Government funding review and this was before this decision was published. At that time a preferred option for the scheme had been identified but no formal Preferred Route Announcement had been made.
- 1.2.9 In 2009 a PCF Stage 1 Technical Appraisal Report was produced – this summarised all of the work that had been completed up to that time.
- 1.2.10 The A38 Derby Junctions scheme remained on hold until 2013 when it was announced as part of the Government’s 2013 spending review. Thereafter in January 2014, Highways England commissioned a review of the scheme status and to identify the work required to take the A38 Derby Junctions scheme to the next development stage. The scope of the review included re-examining the traffic problems and confirming if a solution was required; reviewing the options considered; determining the work required in the next stage, along with programmes and budgets; providing an indicative update of the economics appraisal and considering procurement strategies. The purpose of the review was to enable Highways England to consider the entry of the A38 Derby Junctions scheme into the planned programme of improvement works.
- 1.2.11 Following completion of the review, AECOM Infrastructure & Environment UK Limited (AECOM) was awarded the contract by Highways England on 14 July 2014 to provide design services for the A38 Derby Junctions scheme.
- 1.2.12 Since AECOM was commissioned, the government launched its first ‘Road Investment Strategy’ (RIS) which sets out an ambitious, long-term programme for motorways and major roads with the stable funding needed to plan ahead effectively<sup>1</sup>. The RIS announced 127 major schemes to be delivered over the course of the first Road Period (2015/16 to 2019/20), one of which is the A38 Derby Junctions scheme (referred to as “*replacement of three roundabouts on the A38 in Derby with grade-separated interchanges, raising the A38 in the East Midlands to Expressway standard and removing congestion*”).

### 1.3 Approach and Scope

- 1.3.1 The report follows the content of a PCF Stage 2 Scheme Assessment Report (SAR). The report discusses the existing conditions and describes the options considered for each junction location.
- 1.3.2 The design development has included conducting an environmental assessment to assess whether the proposed scheme has the potential to result in significant environmental effects. The results of the assessment are documented in the Environmental Assessment Report and summarised in this report.
- 1.3.3 The findings of the environmental assessment are detailed across the following topics which were scoped into the environmental assessment in accordance with DMRB:

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<sup>1</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/408514/ris-for-2015-16-road-period-web-version.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/408514/ris-for-2015-16-road-period-web-version.pdf)

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- Air quality;
  - Cultural heritage;
  - Landscape and visual impacts;
  - Nature conservation;
  - Geology and soils
  - Materials;
  - Noise and vibration;
  - People and communities;
  - Road drainage and the water environment; and
  - Cumulative impacts.

1.3.4 A number of traffic forecasting and economic assessment reports have been produced as required under PCF Stage 2. The content of these reports which is summarised in the traffic and economic section of this report which describes the existing and future traffic conditions and includes an economic assessment of the preferred option for each junction.

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## 2 SUMMARY OF EXISTING CONDITIONS

### 2.1 Scheme Brief

- 2.1.1 Having been put on hold on 2008, work on the scheme re-commenced in response to the Government's 2013 Spending Review.
- 2.1.2 Since the commencement of PCF Stage 2, the government launched its first 'Road Investment Strategy' (RIS) which sets out an ambitious, long-term programme for motorways and major A roads with the stable funding needed to plan ahead effectively<sup>2</sup>. The RIS announced 127 major schemes to be delivered over the course of the first Road Period (2015/16 to 2019/20), one of which is the A38 Derby Junctions Scheme (referred to as "*replacement of three roundabouts on the A38 in Derby with grade-separated interchanges, raising the A38 in the East Midlands to Expressway standard and removing congestion*").
- 2.1.3 The scheme comprises grade-separation of the three remaining at-grade junctions located at Derby on the A38 between the M6 Toll and the M1. The A52 Markeaton and A5111 Kingsway junctions are within the Derby City urban area. The A61 Little Eaton junction is in the Erewash Borough and Derbyshire County areas.
- 2.1.4 An overall objective is to provide a scheme that is affordable and delivers high value for money.
- 2.1.5 Scheme-specific objectives (as confirmed within the Highways England Client Scheme Requirements) as follows have been set for the proposed scheme:

#### Economy

- To reduce delays and increase reliability of journeys on the strategic corridor
- Assist in bringing forward development and regeneration opportunities in the surrounding area and immediately adjacent to the scheme
- To minimise traffic disruption due to construction works and incidents
- To achieve optimal whole-life cost taking into account future maintenance, operation and disruption to users

#### Environment

- To minimise impacts on both the natural and built environment, including designated landscape/biodiversity features
- To seek to mitigate impacts on air quality or noise
- To ensure effective measures are in place to protect watercourses from pollutant spillage on the highway
- To investigate and to encourage the use of environmentally friendly operations and products throughout the project life cycle

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<sup>2</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/408514/ris-for-2015-16-road-period-web-version.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/408514/ris-for-2015-16-road-period-web-version.pdf)



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## **Society**

- To improve the safety for all road users
- 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 and Safety at Work 1974 Act to be So Far As Is Reasonably Practicable (SFAIRP)
- To improve safety for residents in the vicinity of the junctions
- To facilitate integration with other transport modes where applicable
- To ensure a consistent high standard of signing relating to the junctions
- To reduce severance by maintaining or providing appropriate facilities for crossing, and travelling along the route for NMUs

## **Public Accounts**

- To be affordable and represent High Value for Money according to Department for Transport (DfT) appraisal criteria

## **Scheme Specific Objectives**

- Improve integration by supporting the local transport plan
- Facilitate regional development and growth in Derby City and its surrounding areas and increase capacity of the strategic road network to absorb growth

2.1.6 The proposed scheme objectives were defined prior to publication of the Highways England Road Investment Strategy. As such, the proposed scheme objectives will be reviewed in PCF Stage 3, following the Preferred Route Announcement. It is anticipated that they will be aligned with the RIS Performance Specification key performance indicators. The Performance Specification<sup>3</sup> part of the RIS suite of documents, sets out key performance indicators that the government expects of Highways England over the first Road Period (2015 - 2020)

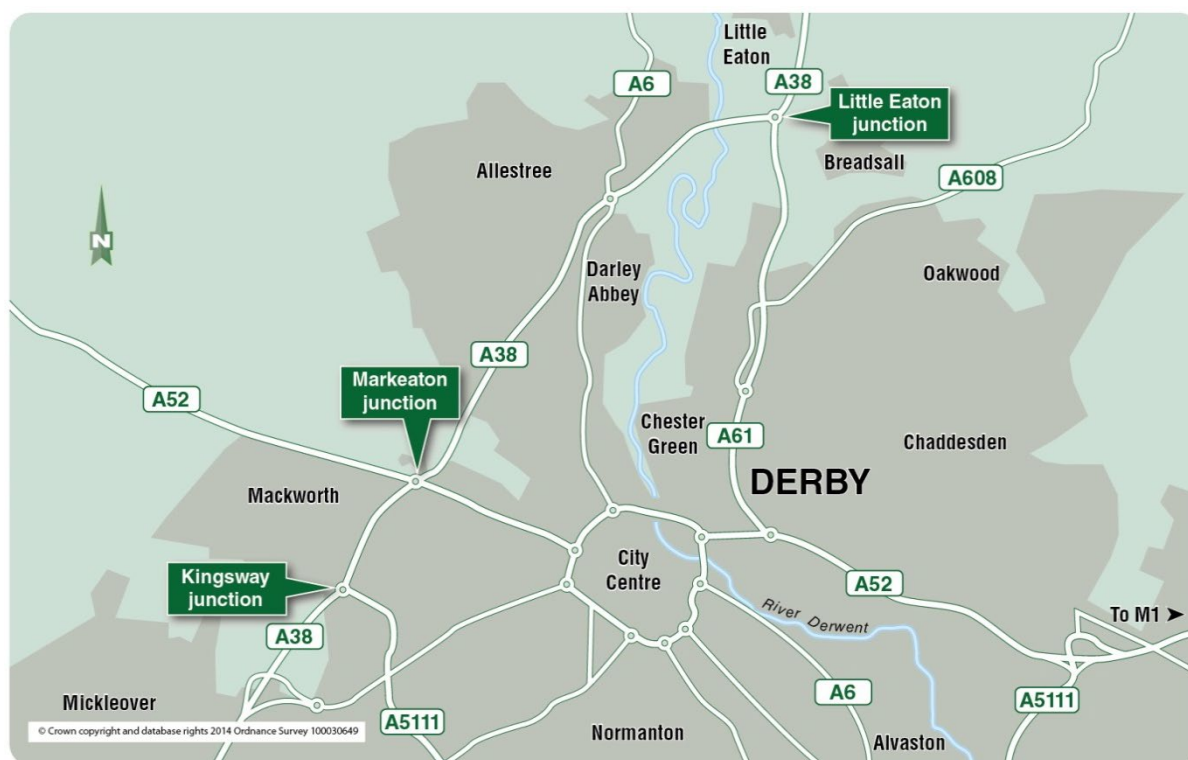
## **2.2 Locality and Existing Highway Network**

2.2.1 The A38 runs roughly northeast from Birmingham to the M1 at junction 28 and forms part of the Derby Ring Road as it passes to the west and north of the City of Derby. On the section of A38 around Derby there are 6 junctions, 3 of which are the at grade roundabouts that are to be improved under the scheme, these are shown in Figure 2/1 below.

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<sup>3</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/382814/dft-ris-performance-specification.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/382814/dft-ris-performance-specification.pdf).

**Figure 2/1: A38 Derby Junctions – Location Plan**



2.2.2 Running southwest to northeast the existing junctions are:

- A38/A5111 Kingsway junction. This is an at-grade partly signalised roundabout connecting to the A5111 to the east. The A5111 to the south of the city forms part of the Derby Ring Road.
- A38/Brackensdale Avenue. This junction provides left-off and left-on movements on both carriageways to the adjacent residential and light industrial areas to the west of Derby City Centre. Brackensdale Avenue continues beneath each carriageway of the A38 in separate underpasses. The proposed scheme would close this junction.
- A38/A52 Markeaton junction. This is an at-grade roundabout connecting with the A52 which forms an arterial route from areas to the west with the City Centre. The roundabout was modified in 2014 to increase the number of some of the approach lanes and to make it fully signalised.
- A38/Kedleston Road. This is a grade separated junction with northbound off and southbound on slip roads only. This provides access to the University of Derby, surrounding residential areas and villages to the west.
- A38/A6 Palm Court junction. This is a fully grade separated roundabout junction connecting with the A6 to the Peak District and beyond to Manchester. This junction would remain unaltered by the proposed scheme.
- A38/A61 Little Eaton junction. This is an at-grade roundabout connecting with the A61 from Derby and the B6179 from Little Eaton. The A61 forms part of the Derby Ring Road to the east of the City. The roundabout was modified in 2014 to increase the number of some of the approach lanes and to make it fully signalised.

## 2.3 Statement of the Problem

2.3.1 The existing junction layouts create conflict with local traffic crossing the A38 and non-motorised users. All three junctions suffer from long periods of congestion on weekdays, and also occasionally at weekends, throughout the year.

### Traffic

2.3.2 In early 2015 two Pinch-Point schemes were completed at Little Eaton and Markeaton in order to mitigate the delays and queues at the respective junctions. The Pinch-Point schemes generally consisted of localised widening at the junctions (i.e. extra flares), or the implementation of traffic signals (either partial or full signalisation)

2.3.3 Little Eaton is prone to queuing on the A38 approaches in both the AM and PM weekday peaks. Traffic on the A61 heading out of Derby also queues regularly in the PM peaks. Since the implementation of the Pinch-Point schemes the queues and delays at this junction have reduced.

2.3.4 Queuing occurs regularly on the A38 arms of the Markeaton junction in the AM and PM peaks in both directions. The delays continue frequently into the Inter peak periods and also during the lunchtime Saturday peak. There are also regular queues on the A52 eastbound entry to the roundabout in the AM peak hours and in the opposite direction on the A52 westbound entry to the roundabout in the PM peak hours. Since the implementation of the Pinch-Point schemes the queues and delays at this junction have reduced, although not as markedly as at the Little Eaton junction.

2.3.5 At Kingsway there is regular queuing during weekday AM and PM peak periods. Queues form on the A5111 westbound entry to the roundabout in the AM peak.

2.3.6 The 2015 24 hour Average Annual Daily Traffic (AADT) using this section of the A38 is 46,425 south of the A38/A5111 Kingsway junction and 42,157 north of Little Eaton with the highest flows recorded between the Kingsway and A38/A52 Markeaton junctions (61,320 AADT).

2.3.7 At the Markeaton junction, the percentage of heavy goods vehicles (HGVs) varies throughout the day and is highest in the inter-peak period (13%). The percentage is lower in the two peak periods (8% AM peak and 5% PM peak) but this is sufficiently high enough to exacerbate the peak period congestion and is a significant factor in the inter-peak period. The HGV directional split is roughly similar for all time periods.

### Accidents and Journey Time Reliability

2.3.8 The Pinch-Point improvements at Markeaton and Little Eaton junctions have only been operating for just over one year so there is no meaningful collision data available at the time of writing that takes the Pinch-Point improvements into consideration.

2.3.9 For the pre Pinch-Point situation, to give a comparison of the safety record of the existing Derby junctions, personal injury accident (PIA) figures have been used. On the A38, the PIA rates (in units of hundred-million vehicle kilometres per annum) for the Kingsway and Markeaton junctions are much lower than the England 2012 A-road typical values (taken from the COBA manual), whilst Little Eaton junction is more than double the typical value for the type of road. This is shown in Table 2/1.

**Table 2/1: PIA rates for the existing junctions**

Junction	PIA rate (per 100 million vehicle kilometres)	
	Observed PIA rate	Typical value (from COBA manual)
A38 Kingsway junction	31.92	51.65
A38 Markeaton junction	38.05	85.94
A38 Little Eaton junction	41.75	17.36

Note: The Observed Rate is the average for 5 years (2008 – 2012)

- 2.3.10 For this transport model, observed journey times were extracted and collated from the Trafficmaster GPS database, as described in the TDCR, which covered the period January 2015 to March 2015. Observed times were extracted and collated across a total of 14 routes in both directions and in all six modelled time periods (14 x 2 x 6 = 168 journey times). These observed times were compared against the computed travel times extracted from each of the time-period highway assignment models.
- 2.3.11 The relevant journey time route for the A38 was Route 13 which spanned from Rykneld Road near Littleover to Coxbench. Table 2/2 shows the observed mean journey times by time period.

**Table 2/2: Observed Mean Journey Times – A38 N/B-S/B**

JT Route	Distance (m)	AM1 (mins)	AM2 (mins)	IP (mins)	PM1 (mins)	PM2 (mins)	EV (mins)	OP (mins)
A38 NB	14,239	10.52	15.07	10.45	11.35	10.48	10.00	10.09
A38 SB	14,572	14.10	19.03	10.50	10.49	11.10	10.12	10.08

## 2.4 Topography, Land Use, Property and Industry

### A38/A5111 Kingsway Junction:

- 2.4.1 The existing Kingsway roundabout is situated generally on embankment, with the exception of a cut slope on its southern side, where the westbound A5111 joins the roundabout adjacent to the southbound A38. The A38 approach to the roundabout from the north is also on embankment. The central reserve between the northbound and southbound carriageways is generally very wide and this appears to have been to allow for the future grade-separation of the junction. On the south side of the roundabout the valley of Bramble Brook, a local watercourse, is located within the central reserve and this continues through the roundabout island. The brook then continues in a culvert from the east side of the roundabout towards the city centre. The Bramble Brook valley through the junction is well vegetated and has been designated a local wildlife site. A disused railway runs east to west through the middle of the junction.
- 2.4.2 There is extensive residential development to the north east and north west of the junction. To the east of the roundabout there is a disused tip on which a superstore and retail park have been developed.

- 2.4.3 To the northeast, between the retail park and the residential area, there are some light industrial units; to the south east of the junction is the Kingsway Hospital site and some open fields which are currently under housing development and to the south west there are open field which are designated Public Open Space.

#### **A38/A52 Markeaton Junction**

- 2.4.4 Markeaton junction is an at-grade, signalised roundabout, and is situated in a built-up urban area. The roundabout is surrounded by residential developments to the east and south, whilst to the north lies an area of parkland, comprising both open and wooded areas. Immediately west of the roundabout is a petrol station and a fast-food restaurant, beyond which lie residential developments. The A38 crosses the roundabout from northeast to southwest and the A52 crosses from southeast to northwest.

#### **A38/A61 Little Eaton Junction**

- 2.4.5 The Little Eaton junction is an at-grade roundabout at a similar level to the land to the north and northwest, whilst being raised above the land to the east, south and west on low embankment. The land surrounding the roundabout to the east, south and west consists of flat farmland. To the immediate north and northwest lies a mobile home park and roadside restaurant, beyond which lies hummocky, grassy open land. The current A38 leaves the roundabout northeast and westwards on shallow embankment, rising to the west to pass over the London St Pancras to Sheffield railway line and the River Derwent. The A61 leaves the roundabout southwards, also on shallow embankment.
- 2.4.6 The B6179 Alfreton Road runs northwards from the roundabout (roughly parallel to the A38) is shown, and is flanked by line of the disused Derby Canal, which crosses through the roundabout and follows the line of the A61 towards Derby. The Midland Mainline (Sheffield to Derby section) runs north to south, approximately parallel to, and approximately 200m west of, Alfreton Road and the A61. There are several airshafts in the vicinity of the water works and in the fields to the west; there are also several airshafts following the River Derwent from north to south across the entire area, located alternately near both sides of the river. These air shafts are associated with a filter tunnel system for drinking water abstracted from the River Derwent.
- 2.4.7 To the north of the mobile home parks and between the railway line and the disused canal, there is an extensive area that is the site of a former refuse tip. The level of the ground in this area is slightly higher than the surrounding land. To the west of the mobile home park there is a waste recycling business.
- 2.4.8 Between the B6179 and the A38 to the north of the roundabout there is a garden centre (and its associated parking area) and to the north of this there is a Severn Trent water treatment works.
- 2.4.9 The field immediately to the southwest of the roundabout is prone to flooding during the winter months in particular.

## **2.5 Climate**

- 2.5.1 The climate is typical of weather for land at 50-80m above sea level in the East Midlands and there are no records of unusual or unexpected local weather patterns.

## 2.6 Drainage

- 2.6.1 Existing highway drainage is typically by gullies outfalling to open ditches that run to the River Derwent or its tributaries at the Little Eaton junction. At Markeaton the highway drainage consists of gullies that outfall into public sewers connected to Markeaton Brook. At Kingsway, the surface water is collected into gullies that outfall into Bramble Brook; this is culverted from the east side of the roundabout towards Derby centre where flooding some distance downstream has historically occurred.
- 2.6.2 Markeaton Brook flows beneath the A38 just north of the Markeaton junction and levels are controlled by an overflow into a large diameter Victorian horseshoe culvert at a distance to the west that connects to the River Derwent to the east. This culvert passes beneath the A38 immediately to the north of the Kedleston Road overbridge.
- 2.6.3 The Little Eaton junction lies within the flood plain of the River Derwent. A flood relief underbridge lies between the River Derwent bridge and the railway bridge, which forms part of existing mitigation for the A38 footprint in the floodplain.

## 2.7 Geology

### General

- 2.7.1 The 1:50,000 scale geological maps (sheet 125) and associated Memoir, and the 1:10,560 geological map sheets (SK33NW – Kingsway & Markeaton and SK33NE & SK34SE – Little Eaton) provide information on the published geology in the area of the junctions. It should be noted that bedrock geology group and formation names were modified for the 2014 mapping along with their relative locations and positions of faults. Superficial deposit names have been revised but remain relatively unchanged in location.

### A38/A5111 Kingsway and A38/A52 Markeaton Junctions

- 2.7.2 Kingsway and Markeaton junctions are underlain by rocks of the Mercia Mudstone Group: the Sidmouth Mudstone Formation, Gunthorpe Member (*formerly Keuper Marl*) and the Tarporley Siltstone Formation (*formerly Waterstones*). The Sidmouth Mudstone Formation includes beds of grey-green dolomitic siltstone, and the Tarporley Siltstone Formation includes beds of fine grained sandstone (*known as "skerries"*).
- 2.7.3 The geological map describes the Gunthorpe Member as red-brown to grey-green gypsiferous mudstone with beds of grey-green dolomitic siltstone. The Tarporley Siltstone Formation is described as red-brown and green mudstone and siltstone with beds of fine grained micaceous sandstone.
- 2.7.4 Superficial deposits in the vicinity comprise Alluvium and River Terrace Deposits (Allenton Sand and Gravel Member). Made Ground and Infilled Ground are also identified.
- 2.7.5 The Memoir describes the "Waterstones" as containing a "preponderance" of laminated, silty and sandy beds. The "Keuper Marl" is described as comprising of predominantly blocky red-brown mudstones, with sporadic green beds and patches interlaminated and interbanded pale grey siltstones. Some of the thicker more persistent siltstones combine to form "skerries". Some "skerries" are of sand grade and cemented by dolomite.

2.7.6 The Memoir notes that evaporites (gypsum and anhydrite) in the Keuper Marl are confined to secondary veins, stringers and nodules. Sulphate solution in the surface beds leaves numerous small cavities and collapse-structures. The depth of the solution zone increases in the vicinity of faults.

**A38/A61 Little Eaton Junction:**

2.7.7 Little Eaton junction is underlain by rocks of the Millstone Grit Group: Morridge Formation. To the north are the Marsden Formation and Ashover Grit.

2.7.8 The geological map describes the Morridge Formation as dark grey mudstone with beds of pale grey protoquartzitic siltstone and sandstone, and marine bands. The Marsden Formation is described as grey mudstone and siltstone, with feldspathic sandstone, marine bands and coal seams. The Ashover Grit is described as grey medium to coarse grained sandstone, locally pebbly. Some previous mapping identifies the Morridge Formation as the Bowland Shale Formation (dark grey mudstone with thin beds of siltstone, sandstone and dolomitic limestone).

2.7.9 Superficial deposits in the vicinity comprise Alluvium, Head and Glaciofluvial Deposits. Made Ground is also identified.

**2.7.10 A38/A5111 Kingsway Junction**

**General**

2.7.11 The ground conditions in the vicinity of the junction are anticipated to comprise:

- Topsoil, overlying
- Artificial ground including Made Ground
- Superficial deposits including Alluvium
- Underlain by rocks of the Mercia Mudstone Group

2.7.12 The mapping indicates that the superficial deposits comprise a zone of Alluvium crossing through the site in an approximately south-west to east direction along the course of Bramble Brook. This continues in an easterly direction towards the River Derwent. Made Ground and Infilled Ground are shown approximately 100m to the east of the junction.

2.7.13 The bedrock geology is shown to comprise the Tarporley Siltstone Formation, with a south-east to north-west trending fault crossing the alignment approximately 100m north of the junction. The dip of the strata is indicated to be 5° to the south-east. To the north of the fault the Sidmouth Mudstone Formation, Gunthorpe Member is shown. Siltstone and sandstone beds (skerries) are indicated within both formations.

2.7.14 The fault is possibly the Mackworth Fault, downthrown towards the north-east with a maximum throw of 15m, comprising two sub-parallel faults approximately 9 m apart.

2.7.15 Earlier mapping from 1972 indicates Mercia Mudstone strata including Dolomitic Siltstone (Skerry bands) shown under most of the junction with an area of the Tarporley Siltstone Formation in the north-eastern area.

**Topsoil**

2.7.16 Topsoil was encountered in the majority of exploratory holes to a thickness of up to 0.61m, although typically in the range 0.2-0.4m, The Topsoil is typically described as grey to brown, sometimes with brick and ash.

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### **Artificial Ground**

- 2.7.17 Made Ground was recorded in the 2005 window sample holes and comprises embankment fill and previous road construction material.
- 2.7.18 The embankment fill material was encountered beneath the topsoil to depths of up to 2.3m, and is variously described as soft to stiff red, sometimes slightly sandy, clay with black ash and brick fragments, and sand.
- 2.7.19 The possible old road surface was encountered in some holes (WS3, 4, 5 & 6) in the range 0.2 - 0.5m thick, at depths of between 0.5 and 2.3m BGL. This is typically described as “dense black ash and stone, sometimes containing granite fragments with tar, tarmac and a hydrocarbon odour.”
- 2.7.20 Within BH140 (0.15 – 1.07m) described as “ash, soil and clay fill”.

### **Superficial Deposits**

#### Alluvium:

- 2.7.21 A strip of Alluvium is indicated running south-west to north-east through the junction. Exploratory hole logs (132, 133, 134 & 136) indicate the presence of Alluvium, described as soft mottled marly clay with peat to depths of up to 3.66m. This material is recorded beneath the topsoil.
- 2.7.22 Testing indicates material to be generally clay of high plasticity occasionally intermediate or low plasticity.
- 2.7.23 In addition material encountered in boreholes B39, B41 and B42A may be Alluvium, but may alternatively be weathered Mercia Mudstone Group material.

### **Bedrock Geology**

#### Mercia Mudstone Group:

- 2.7.24 Logs from 2005 describe the near surface material beneath Made Ground as stiff and very stiff, friable Clay with mudstone fragments (lithorelics), which increase to gravel size below 2m depth. Mudstone bands are also noted. The colour is described as red and mottled grey. A thickness of up to 1.9m is indicated.
- 2.7.25 Silty Clay was described at 1.52-3.66m depth (2.14m thick) in BH38 (1967) beneath “Clay (Marl)”. Testing of this material indicates that it is silt of intermediate plasticity with a moisture content of 56%.
- 2.7.26 The material beneath topsoil is described in BH42A (1968) as Clay (2.13m thick), as Clay & Silt (2.44m thick) in B41 (1967) and Clay 0.69m thick in B39 (1967). Testing indicates material to be clay of high plasticity (B39 & B41) or low plasticity (B42A). All or some of this material may alternatively be Alluvium. Moisture contents tend to be higher for this near surface material.
- 2.7.27 Logs from 2005 describe weak to moderately weak interlaminated bands of mudstone, siltstone and sandstone, becoming stronger with depth. Older logs predominantly describe the material as “Clay (Marl)” from near surface. The material variously includes the description of sandstone, bands of sandstone, silt and marl, soft sandstone and marl, gravel, small stones and sandy silt. In addition, soft Mudstone was noted at 2.9-3.66m depth (BH37) and Sand 1.98-3.05m depth (BH39). The material is described as laminated (3.66-4.42m depth in BH38) and as hard and laminated (9.14-13.72m in B42A).
- 2.7.28 The material is described as firm or stiff clay sometimes marly near surface, then hard marl, clayey in parts. Beneath this, the material is described as weathered,



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sometimes hard, occasionally friable, red brown or red green, clayey marl, becoming less weathered with depth. Sandstone bands and sandy horizons are noted.

- 2.7.29 Sandstone and sand horizons are likely to represent skerry bands. In BH133 between 1.52 and 3.35m BGL, the material is described as a compact medium gravel with red clay matrix, which could be a weathered skerry band.
- 2.7.30 Material testing indicates that this material is clay or silt of low to sometimes intermediate plasticity. Moisture contents tend to be higher near surface but are lower than for the more weathered material.
- 2.7.31 Some material was described as very soft up to 2.74m depth. In-situ SPT-N values vary between 13 and refusal, indicative of the varying strength of the different horizons. It is recorded in the log for B42 that the “borehole lost water” at 7.31m depth. The cause of water loss is not stated however a number of possible reasons could be, but not limited to; the presence of voided ground (e.g. dissolution of gypsum), fault disturbed material or the presence of a more permeable sandstone horizon.

Summary:

- 2.7.32 The sequence is considered to indicate the weathering profile within the predominantly argillaceous material with subordinate units described as siltstone to sandstone. Therefore, the material is also variously described as clay, silt and gravel. It is inferred from the geology map sheet that this unit is possibly the Tarporley Siltstone Formation. Weathered skerry bands may have been identified in the exploratory holes.
- 2.7.33 A south-east to north-west trending fault crosses the alignment approximately 100m north of the junction as shown on the geology map sheet.

**Groundwater**

- 2.7.34 Standing water levels in the boreholes are recorded as being 0.5 - 1.5m BGL in the winter of 1967 – 1968. Since the majority of the junction is located on embankment, the current carriageway level is situated several metres above these water levels. However, the land surrounding the junction, and the depression in the centre of the existing roundabout, may be subject to near-surface groundwater levels. No surface water was noted during earthwork inspections, but the ground at the toe of some embankment sections were recorded as damp.

**2.7.35 A38/A52 Markeaton Junction**

- 2.7.36 The ground conditions in the vicinity of the junction are anticipated to comprise:

- Topsoil, overlying
- Artificial ground including Made Ground
- Superficial deposits including Alluvium and River Terrace deposits
- Underlain by rocks of the Mercia Mudstone Group

- 2.7.37 The mapping indicates River Terrace Deposits (Allenton Sand and Gravel Member), previously indicated to be 1<sup>st</sup> Terrace Deposits, approximately 150m north-east of the junction to the area of Markeaton Lake. Alluvium is shown north-east of this to the junction with Kedleston Road.

- 2.7.38 The bedrock geology is shown to comprise of the Sidmouth Mudstone Formation; Gunthorpe Member to the south of the junction and Tarporley Siltstone Formation to the north.
- 2.7.39 An east to west trending fault is indicated to divide these formations. The dip within a siltstone horizon of the Gunthorpe Member is shown to be towards the east. The fault is possibly the Markeaton Fault, downthrown to the south, with a variable throw of up to 61m. This was previously shown to be south-east to north-west trending, crossing the alignment approximately 150m to the north of the current shown position.
- 2.7.40 Earlier mapping from 1972 indicates Mercia Mudstone strata including Dolomitic Siltstone (skerry bands) shown under the south-western area of the junction with the Tarporley Siltstone Formation to the centre and north-eastern area; the fault forms the transition back to Mercia Mudstone strata.

### **Topsoil**

- 2.7.41 Topsoil was encountered in many exploratory holes to a thickness of up to 0.7m, although it is typically around 0.3m thick. It is typically described as topsoil with roots or turf, sometimes brown. Sometimes it is not distinguished from underlying fill or made ground materials.

### **Artificial Ground**

#### Made Ground:

- 2.7.42 The Made Ground comprises embankment fill and previous road construction material up to 3.2m depth. The material is described as brown, red, green, yellow and grey, compact clay and soil fill or boulder clay fill, sand, clay, gravel and sandstone fragments, with occasional concrete and reinforced concrete (possible original road construction), kerbs, flags, tarmac, and cinder, coal, clinker, brick and ash content. Testing indicates that this material may typically be of low to intermediate plasticity, occasionally clay or silt of high plasticity.

### **Superficial Deposits**

#### Alluvium:

- 2.7.43 Alluvium is indicated approximately 400m north-east of the junction. Exploratory holes indicate this material down to a depth of 5.0m, with a thickness of up to 4.1m. The material is typically very soft to firm, although variously described up to very stiff.
- 2.7.44 The material is predominantly silty clay or sandy silty clay, also clay, clayey silt, and marly clay with sand and gravel. Occasionally the inclusion of pebbles and organic material are described. The colour is variously brown-grey, red-brown and grey, grey-black, and light brown-orange mottled yellow.
- 2.7.45 Testing indicates that this material is clay of low or intermediate plasticity to clay or silt of high plasticity, occasionally clay of low plasticity.

#### River Terrace:

- 2.7.46 River Terrace deposits are indicated approximately 150m to the north-east of the junction. Exploratory holes indicate this material up to a depth of 6.2m, with a thickness of up to 4.1m. The material is loose to dense, sometimes described as poorly to well graded, fine to coarse, sand and/or gravel, sometimes silty or clayey. Occasionally it is described to contain cobbles. The colour is brown, yellow-brown and red-brown. Organic material is sometimes present and a band of clayey sand is described. Testing indicates some material to be clay of low plasticity.

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## **Bedrock Geology**

### Mercia Mudstone Group:

- 2.7.47 Exploratory hole logs describe the material as stiff to hard, sometimes soft, weathered, occasionally friable red and grey, sometimes silty sandy, marl with bands of grey siltstone and marly siltstone. Some descriptions include siltstone pieces and hard skerry bands. The less weathered material is described as a very weak mudstone, with laminations of stronger siltstone and sandstone. Testing indicates some material to be clay of low to intermediate plasticity.
- 2.7.48 The 1978 Site Investigation Report published by A. Monk & Company Ltd indicates that the upper layers of the Marl comprised a residual soil derived from bedrock, with lithorelics of mudstone and siltstone. It was usually possible to obtain undisturbed samples from these strata. However, some of the samples were too hard for triaxial testing to be carried out. SPT tests carried out in the boreholes give results of between 30 and 60 (for 300mm) down to a depth of 6 – 9m, Refusal is commonly encountered below this depth.

### Summary:

- 2.7.49 The sequence is considered to indicate the weathering profile within the predominantly argillaceous material with subordinate units described as siltstone to sandstone. Therefore, the material is also variously described as clay, silt and gravel. It is inferred from the geology map sheet that this unit is possibly the Tarporley Siltstone Formation to the north of the junction and Sidmouth Mudstone Formation, Gunthorpe Member to the south of the junction.
- 2.7.50 Weathered skerry bands may have been identified in the exploratory holes. Sandstone and siltstone beds (skerries) are indicated on geological mapping to the south-east of the junction. The log description for trial pit T2 indicates green/grey Siltstone (skerry) at least 0.57m thick (total thickness not proven) at a depth of 2.43m,
- 2.7.51 Mapping indicates an east to west trending fault is shown to cross the alignment at the junction, although previous mapping indicates this to be south-east to north-west trending, crossing the alignment approximately 150m to the north.

## **Groundwater**

- 2.7.52 Information on local groundwater conditions is limited to information on a number of BGS borehole logs. The boreholes were drilled in 1971 and were offset from the alignment of the A38 by between 20m and 50m to the north-west.
- 2.7.53 Water strikes and standing water levels recorded during drilling provide an indication of groundwater conditions:
- Shallow groundwater conditions (around 1 to 3m BGL) were encountered to the north-east of the roundabout and in the near vicinity of Markeaton Lake primarily within Alluvium and River Terrace deposits. This is expected because the Alluvium and Allenton Sand and Gravel Member are classified as a Secondary A aquifer.
  - Immediately to the north-east of the roundabout groundwater levels were recorded at around 2.5 to 3.5m BGL. Where superficial deposits are absent, water level information on the borehole logs suggests that the bedrock may be in partial hydraulic continuity with the superficial deposits nearer to the Lake. Immediately to the south-west of the roundabout the borehole logs suggest that

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groundwater strikes may only occur at depths greater than 9m BGL. The discrepancy between conditions either side of the roundabout coincides with the mapped geological fault and change in outcrop geology. It is possible that the geological fault is acting as a barrier to groundwater flow and/or the bedrock geology to the south of the fault (mapped as the Gunthorpe Member of the Sidmouth Mudstone Formation) has a lower permeability than the bedrock geology to the north (mapped as Tarporley Siltstone Formation).

- The water strikes and standing water levels recorded during drilling suggest there are semi-confining layers within bedrock.

#### 2.7.54 **A38/A61 Little Eaton Junction**

##### **General**

2.7.55 The ground conditions in the vicinity of the junction are anticipated to comprise:

- Topsoil, overlying
- Artificial ground including Made Ground
- Superficial deposits including Alluvium
- Underlain by rocks of the Millstone Grit Group

2.7.56 The thickness of alluvial deposits and consequently the depth to rock is not proven towards the River Derwent in the west.

2.7.57 The mapping indicates that the superficial deposits beneath and immediately surrounding the junction consist of Alluvium. Glacio-fluvial (undifferentiated sand and gravel) and Head deposits are shown approximately 600m to the north of the junction and Head deposits are shown approximately 300m to the south of the junction. Made Ground is shown approximately 100m north and west, and 400m south of the junction.

2.7.58 The bedrock geology beneath the junction is shown to comprise Millstone Grit Group: Morrige Formation. Published dip readings indicate bedding to be inclined at approximately 5-8° towards the north-east at a distance of approximately 1.5km to the west of the junction.

2.7.59 A south-east to north-west trending fault is described with downthrow towards the south-west approximately 1km to the west of the junction. The fault is considered to be the Quarndon Fault with a maximum throw of 15m,

##### **Topsoil**

2.7.60 Topsoil was encountered in the majority of exploratory holes to a thickness of up to 0.5m, although typically in the range 0.2 - 0.3m,

##### **Artificial Ground**

###### Made Ground:

2.7.61 The Made Ground encountered during the 2012 investigation comprises embankment fill material to a maximum depth of 5.75m. The material is typically described as Sand and /or Gravel, with secondary constituents of gravel, silt, sand and clay. The Sand is generally fine to coarse. The Gravel is fine to coarse angular to sub-angular of sandstone and limestone, occasionally quartzite. The material is variously described as brown yellow grey, dark red brown.

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- 2.7.62 Horizons are also described as slightly sandy slightly gravelly Clay, sometimes friable. Typically firm to stiff consistency, orange brown, brown and brown grey. The material is noted to be soft in WS12.
- 2.7.63 There is occasional, medium to high cobble content, angular of limestone and sandstone. Boulders are noted in the inspection pit for BH3. The material is noted to sometimes contain fragments of brick, concrete, ash, clinker, slag, ceramic tile, coal, flint, glass, wood and shell fragments.
- 2.7.64 Testing indicates that this material may typically be clay and silt of low to intermediate plasticity. Moisture content varies without a particular trend throughout the depth of the material, although may be slightly higher near surface. SPT-N values vary between 4 and 50.
- 2.7.65 In WS12 a number of zones of no recovery and a moderate hydrocarbon odour is recorded, from material described as “probable collapse and fallen down hole”.
- 2.7.66 Made Ground was encountered in the 1972 investigation within borehole 7R described as loose brown very silty very sandy clay with organics and sandstone fragments and cobbles.

### **Superficial Deposits**

#### Alluvium (Predominantly Silt & Clay):

- 2.7.67 For the 2012 investigation, the material typically underlies Topsoil or Made Ground (embankment fill) to a thickness of up to 2.6m, The material is generally firm to stiff beneath embankment fill, sometimes soft to firm, typically described as Clay with secondary constituents in varying proportions of sand, gravel and silt. Sand is generally fine to medium, and gravel subangular to subrounded, of fine to coarse limestone, sandstone, mudstone and siltstone. The material is typically brown with orange grey mottling also noted. Occasional decomposed roots are recorded.
- 2.7.68 Distinct horizons are recorded as dark grey or grey brown, variably sandy to very sandy, silty and slightly gravelly Clay or Silt. The material is typically soft, sometimes firm to stiff. Organic Silt, and frequent decomposed roots are noted in some holes. Fine gravel size fragments of carbonaceous material or coal are occasionally noted.
- 2.7.69 Some holes recorded no recovery and in WS12 it is likely that material from the overlying Made Ground horizon has collapsed into the windowless sampler hole.
- 2.7.70 Testing indicates that this material may typically be clay of low to high plasticity, up to clay of very high plasticity. Moisture contents tend to decrease with depth. SPT-N values vary between 1 and 32 recorded during the 2012 investigation; lower values are probably affected by groundwater strikes.
- 2.7.71 The 1972 investigation indicates typically soft and firm brown and yellow brown grey, sometimes dark brown and mottled, silty Clay to depths of up to 2.7m, Lenses of sand and gravel (fine to medium of sandstone and flint) are noted. Organics are occasionally noted.

#### Alluvium (Predominantly Sand & Gravel):

- 2.7.72 The 2012 investigation indicates the material to be primarily Gravel, with less frequent horizons of sand and sand & gravel. The material underlies the silt & clay alluvial material to an unproven thickness of up to 8m,
- 2.7.73 Gravel, variously very sandy and slightly to very clayey is recorded. Sand is fine to coarse. The gravel is subangular to subrounded, of fine to coarse sandstone,

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mudstone and siltstone, limestone and mixed lithologies. Typically brown and grey brown.

- 2.7.74 The Sand is gravelly and very clayey, brown locally mottled orange brown. The Sand and Gravel is typically medium dense, sometimes loose and sometimes dense with depth. Pockets of grey sandy silt are identified.
- 2.7.75 Some horizons at depth are noted to be very dark grey fine to coarse Sand with rare shell fragments, and dark grey and grey brown slightly clayey Sand and Gravel. Sand is fine to coarse. Gravel fine to coarse of mixed lithologies.
- 2.7.76 SPT-N values recorded from the 2012 investigation vary between 6 and 50.
- 2.7.77 The 1972 investigation indicates that the coarse alluvial material underlies the predominantly silt & clay alluvial material. It is typically described as loose to medium dense fine to coarse Sand and Gravel or sandy Gravel. Sometimes the upper horizon is described as silty Sand, clayey in part. The material is described as brown in colour.

River Terrace Deposits:

- 2.7.78 These deposits are not indicated on the mapping in the immediate vicinity, although an exposure is identified approximately 1km to the south-west of the junction.

**Bedrock Geology**

Millstone Grit Group:

- 2.7.79 The materials encountered predominantly comprise mudstone overlain further north by siltstone. Sandstone was also recorded to the north of the junction.

Mudstone:

- 2.7.80 Logs indicate material near surface to be predominantly firm, sometimes soft to firm, described as silty or sandy Clay with some gravel /fragments (of sandstone and siltstone) and occasional sand bands. The material is described as brown, yellow brown, grey and dark grey mottled brown. With depth, the material is described as fissured or laminated and as hard broken mudstone.
- 2.7.81 The material becomes dark grey and black, very silty, sometimes shaly, Clay. The material is noted to contain fragments of dark grey and black shaly Mudstone. Frequent horizontal jointing with iron staining is identified in BH57B.
- 2.7.82 In borehole A3 beneath the Alluvium a material was encountered described as very stiff friable grey shaly Clay with some Shale which may represent Mudstone of the Millstone Grit Group. SPT-N values generally increase with depth through the profile. Chiselling was occasionally used to advance the borehole.

Siltstone:

- 2.7.83 Typically the material is firm silty Clay or clayey Silt near surface, with fragments of siltstone, sandstone and mudstone, sometimes cobbles. It is typically light brown mottled yellow brown in colour.
- 2.7.84 The material becomes grey brown very weak shaly Siltstone, with occasional bands of sandstone. Iron staining is noted and it is sometimes shattered throughout. SPT-N values generally increase with depth through the profile. Chiselling was occasionally used to advance the borehole.

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Sandstone:

- 2.7.85 The material is described as soft becoming firm brown silty sandy Clay with sandstone fragments near surface. Beneath this or below siltstone units, the material is described as weak (also medium hard) fine to medium light brown micaceous Sandstone. SPT-N values generally increase with depth through the profile. Chiselling was occasionally used to advance the borehole.

Summary:

- 2.7.86 The sequence is considered to indicate the weathering profile within the predominantly argillaceous material with sandstone units present further to the north. Therefore, the material is also variously described as comprising clay, silt and sand near to surface. It is inferred from the geology map sheet that this unit is possibly the Millstone Grit Group: Morridge Formation, potentially with a transition into the Marsden Formation and Ashover Grit towards the north.

**Groundwater**

- 2.7.87 Water strikes from the investigations indicate levels of around 0.5m to 3m below existing or previous (where below embankment fill) ground levels, principally within the alluvial material. Monitored levels from the 2012 investigation indicate similar levels.

## **2.8 Mining, Gypsum and Mineral Extraction**

### **Coal Mining**

- 2.8.1 Coal Authority Mining Reports state that none of the three roundabouts are within the likely zone of influence from past, present or future underground mining. Likewise, no mine entries are recorded, nor are any past, present or proposed future opencast operations; no damage notice or claim against the Coal Authority in relation to subsidence has been recorded in the vicinity of any of the roundabouts since 1984.

### **Gypsum**

- 2.8.2 There are no recorded occurrences of man-made mining cavities or natural cavities within the areas of the junctions. They are also recorded as having very low potential for collapsible ground stability hazards.

### **Mineral Extraction**

- 2.8.3 Kingsway junction: Rowditch Brick Works, located approximately 100m to the east of the proposed works, which has ceased to operate. The site was an opencast quarry extracting Clay and Shale. The quarry was later used for landfilling.
- 2.8.4 Markeaton junction: Rowditch Brick Works, located approximately 25m to the east of the proposed works, which has ceased to operate. The site was an opencast quarry extracting Clay and Shale.
- 2.8.5 Little Eaton junction: Breadsall Gravel Pit, located approximately 270m to the north-east of the proposed works, which has ceased to operate. The site was an opencast quarry extracting Sand and Gravel.

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## 2.9 Public Utilities

### A38/A5111 Kingsway Junction

2.9.1 The following services exist in the area of the Kingsway junction:

#### Western Power Distribution - high voltage cables

2.9.2 There is an 11kV high voltage cable that runs along the southern boundary of the properties on Greenwich Road South backing onto the disused railway which crosses the junction roughly on the line of the disused railway line. The cables are ducted beneath the existing embankments.

2.9.3 In early 2016 a fault developed on an existing 11kV line that crossed through the middle of the Kingsway roundabout in an east-west direction. This was replaced on a new alignment to the north of the existing roundabout using directional drilling; the profile of the cable was such that it will pass beneath the proposed excavation level for the grade separation scheme without requiring further diversion or protection work.

2.9.4 There are further cables at the toe of the A38 embankments to the north of the junction and in the northern verge of the A5111.

2.9.5 A ducted crossing of the A38 is present approximately 100m to the north of Brackensdale Avenue.

2.9.6 Additionally, there is a 132kV cable that runs along the eastern verge of the A38 from Windmill Hill Lane at Markeaton through to the northern verge of the A5111 Kingsway.

#### British Telecom (BT) - underground cables

2.9.7 There are BT cables in the east verge of Greenwich Drive South, both verges of the A5111 and at the toe of the southbound A38 embankment.

#### National Grid - gas mains

2.9.8 There is a 15" cast iron medium pressure gas main at the toe of the A38 southbound embankment and a 200mm ductile iron distribution main in the south verge of Brackensdale Avenue. The distribution main on Greenwich Drive south is in the west and north footpath and also in the south footpath in front of the properties backing onto the disused railway. The 15" cast iron medium pressure gas main is also found in the north verge of the A5111.

#### Severn Trent Water - sewers

2.9.9 Bramble brook is shown as being culverted within the centre of the junction and also beneath the A38 southbound carriageway and for some considerable distance along the disused railway line towards the city centre. Gravity surface water sewers drain into Bramble Brook within the centre of the junction.

#### Severn Trent Water - water mains

2.9.10 There are distribution mains at the toe of the A38 Southbound embankment, the A5111 north verge, Brackensdale Avenue South verge and Greenwich Drive South west and north footway.



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### **A38/A52 Markeaton Junction**

2.9.11 The following services exist in the area of the Markeaton junction:

Western Power Distribution (high voltage cables)

2.9.12 There is a high voltage cable that runs along the verge of Greenwich Drive North which then runs in the western verge of the A38 up to Kedleston Road. This cable is ducted under the A52 at the easternmost access to the petrol station. A cable also runs across the roundabout, ducted beneath the A38 carriageways, and down the southern verge of Ashbourne Road towards the city centre.

2.9.13 The 132kV cable runs along the eastern verge of the A38 and then runs up Windmill Hill Lane.

2.9.14 There are various low voltage cables in roads fronting the various properties.

British Telecom (BT) underground cables

2.9.15 There are BT cables on all four approaches to the roundabout. Those running along the A52 are suspected of being major fibre optic cables.

National Grid - gas mains

2.9.16 There is a 15" cast iron medium pressure gas main running along the east verge of the A38 to the north of the A52 and along the west verge of the A38 to the south of the A52. There is a "T-off" consisting of a 15 inch steel main running along the A52 to the west. To the east there is a 125mm polyethylene distribution main in the southern footpath of the A52 leading into the city centre.

Severn Trent Water - sewers

2.9.17 There are gravity sewers running along the line of the A38 and down the A52 Ashbourne Road leading towards the city centre. The A38 crosses Markeaton Brook at the northern end of the scheme which is culverted beneath the carriageways.

Severn Trent Water - water mains

2.9.18 There are distribution mains on all four approaches to the roundabout.

### **A38/A61 Little Eaton Junction**

2.9.19 The following services exist in the area of the Little Eaton junction:

Western Power Distribution (high voltage cables)

2.9.20 There are several high voltage cables in the area of the junction:

2.9.21 Ducted diagonal crossing under the A38 approximately 40m south of the Waterworks Access structure running northwest to southeast

2.9.22 Underground cable in the east verge of the B6179 to the north and east verge of the A61 running N to S in ducts beneath the roundabout.

2.9.23 Underground cables in the west verge of the B6179 which turn into Ford Lane East and cross the railway to the north of the A38

2.9.24 There are low voltage cables in Ford Lane East serving the adjacent properties.

British Telecom (BT) - underground cables

2.9.25 There are BT cables running north/south under the B6179 and A61, some of which turn and run along Ford Lane East before crossing beneath the railway to the north of the A38.

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National Grid - gas mains

2.9.26 There is a 24" medium pressure gas main running along the west verge of the B6179 to the north, through the centre of the roundabout then along the west verge of the A61 to the south. There is a "T-off" to the north of the roundabout consisting of a 630mm medium pressure main running along Ford Lane East with a parallel 63mm supply pipe serving the mobile home park and restaurant. The 630mm medium pressure main continues along Ford Lane and crosses the railway to the north of the A38, and then turns to cross under the A38 through the Flood Arch/Underpass between the River Derwent and the railway line.

Severn Trent Water - sewers

2.9.27 There is a combined gravity sewer crossing the A38 diagonally south of the Water Works Access structure shown to be running from Breadsall to the water works. There is also a combined use pressurised sewer running north/south through the junction that crosses beneath the A38 on the southbound approach/northbound exit to the roundabout.

Severn Trent Water - water mains

2.9.28 There is a 1.2m diameter strategic main running beneath the A38 approximately 80m south of the Waterworks Access structure from the River Derwent towards Breadsall and two 18" distribution mains running north/south through the centre of the roundabout. Water mains are also located within the Waterworks Access structure and along Ford Lane East.

## **2.10 Technology**

2.10.1 The existing A38 around Derby has very limited communications infrastructure; the only items of existing technology assets are pole mounted CCTV cameras, one at each junction.

2.10.2 At Kingsway the camera is located on the central reserve at the northbound exit from the roundabout; at Markeaton junction it is located on the footway between the A38 northbound entry and the A52 westbound exit from the roundabout whilst the one at Little Eaton is located in the verge near to the start of the splitter island for the segregated left turn lane at the A38 southbound entry into the roundabout.

## **2.11 Maintenance Access**

2.11.1 The following features currently exist that have been provided specifically to provide maintenance access or were provided for other reasons but are suitable for maintenance access.

### **A38/A5111 Kingsway Junction**

2.11.2 There is a layby on the northbound A38 approach to the roundabout (approximately 520m south of the roundabout) and this provides access to some electrical cabinets (most likely to be lighting feeder pillars). The layby could also serve as an access point for general maintenance in that vicinity.

2.11.3 There is a maintenance hard standing accessed from the circulatory carriageway just before the northbound A38 joins the roundabout. This provides access to the traffic signals controller cabinets. Another hard standing is access from the circulatory carriageway just after the northbound A38 leaves the roundabout; this one provides access to the cabinets associated with the CCTV camera.

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2.11.4 Between Kingsway and Markeaton junctions there are 4 laybys – these were originally intended to serve as bus stops but it is understood that local bus services no longer travel along the A38 hence these have become redundant. The laybys could serve as access points for general maintenance in that vicinity.

**A38/A52 Markeaton junction**

2.11.5 At Markeaton junction there are cabinets (associated with the CCTV mast) on the footway between the A38 northbound entry and the A52 westbound exit from the roundabout. To access these, operatives would need to park on Enfield road and walk along the footway to the cabinet site (a distance of approximately 150m).

2.11.6 There are signal control cabinets located in the A38 wide central reserve immediately to the north of the roundabout. Access to these can be made by vehicles driving over the kerb from the circulatory carriageway.

2.11.7 Another set of cabinets exist at the back of the footway between the A38 southbound entry and the A52 eastbound exit from the roundabout. Access to these can be readily achieved from the Queensway service road that runs parallel to the A38.

**A38/A61 Little Eaton junction**

2.11.8 The cabinets for the traffic signals controllers are located at the end of Ford lane at the junction with the roundabout. A hard standing has been provided adjacent to the cabinets to provide vehicular access.

2.11.9 To access the cabinets associated with the CCTV mast located in the verge of the A38 southbound entry into the roundabout, it is likely that the segregated left lane would need to be closed to traffic. The cabinets are located at the bottom of the embankment accessed by steps from the base of the CCTV mast.

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## **3 PLANNING FACTORS**

### **3.1 Planning Procedure**

- 3.1.1 It is currently considered that the proposed scheme constitutes a Nationally Significant Infrastructure Project (NSIP). Thus following Preferred Route Announcement, it is anticipated that in order for the necessary statutory provisions to be secured and to enable the proposed scheme to proceed, it will be necessary to make a Development Consent Order (DCO) application to the Planning Inspectorate (PINS).

### **3.2 Options Investigated**

- 3.2.1 The alternative options investigated are described in detail in Section 5 of this report. The effects of the constraints detailed in section 5 are summarised below.
- 3.2.2 A set of drawings showing the scheme's engineering and environmental constraints is included in Appendix 1.

### **3.3 Options Constraints - A38/A5111 Kingsway Junction**

- 3.3.1 The local topography, land use and road network all constrain the layouts considered at the Kingsway junction.
- 3.3.2 The existing junction was designed to allow for grade separation in the future; with the northbound and southbound carriageways moving away from each other as they approach the roundabout. This facility readily accommodates the A38 being routed through the centre of the existing roundabout.
- 3.3.3 Vertically, the environmental impacts will be reduced by placing the main traffic flows on the A38 in a cutting with the lower traffic flows on the slip roads routed along the existing A38 carriageways. Further constraints on the vertical alignment are Bramble Brook, which runs through the A38 central reservation from southwest to northeast, and the Brackensdale Avenue bridge which is east of the Kingsway junction.
- 3.3.4 Public land lies immediately north-west of the existing junction and any encroachment into this public open space would require exchange land to be provided.

### **3.4 Options Constraints – A38/A52 Markeaton Junction**

- 3.4.1 The major constraints at Markeaton junction are Markeaton Park to the northwest of the existing roundabout, and the proximity of the Kedleston Road junction to the north. The main concerns with respect to Markeaton Park are the visual impact of the proposals on the park and encroachment into the public open space land.
- 3.4.2 Other constraints are the proximity of urban development alongside the A38 and the A52, in particular the properties on Queensway and the petrol station and fast food outlet immediately to the south-west.
- 3.4.3 The existing Markeaton Park footbridge crosses over the A38 approximately 300m north of the existing junction. If retained, the Markeaton Park footbridge would restrict the width of alterations to the A38 and the vertical alignment. A further constraint is Markeaton Brook which flows in a culvert beneath the A38 from Markeaton Lake, within the park, to a series of mill ponds east of the A38.

### **3.5 Options Constraints – A38/A61 Little Eaton Junction**

- 3.5.1 The local topography, land use and road network all constrain the layouts considered at the Little Eaton junction, where the route of the A38 turns through approximately 90 degrees. A further significant constraint is the presence of the River Derwent floodplain which extends from the river to the east side of the A38 and A61.
- 3.5.2 The junction is situated adjacent to, and in sight of the Derwent Valley Mills World Heritage Site (WHS), which has been compromised already by the existing A38 and the housing estate that forms the western boundary of the WHS in this locality.
- 3.5.3 Constraints include the River Derwent Bridge, flood relief underbridge, the Sheffield to Derby railway bridge, the garden centre, the Mobile Home Park, Starbucks, the property “Fourways”, and a railway signal box, all of which lie north and west of the existing A38. Other constraints are, Breadsall Conservation Area which lies to the east of the existing A38, and a local wildlife site, which is south west of the existing A38. A further constraint on the A38 north of the existing junction is the Breadsall Underpass (Water Treatment plant accommodation bridge)

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## 4 SUMMARY OF DO-NOTHING CONSEQUENCES

### 4.1 Traffic and Economics

- 4.1.1 The A38 is part of the Strategic Road Network (SRN) and as such carries a significant number of inter-urban car trips and a large number of freight trips when compared to local authority maintained routes.
- 4.1.2 The A38, where it routes through Derby, also fulfils a number of other functions. For example, the A38 crosses the River Derwent flood plain and provides one of seven opportunities for Derby City's road vehicles to cross the River Derwent. Thus the length of the A38 between the Kingsway and Little Eaton junctions not only provides for strategic trips but also carries trips between local origins and destinations.
- 4.1.3 Some of the potential local trips that could make use of the A38 might be avoiding it because of the congestion and delays. However, a capacity improvement of the junctions could attract existing road users into the A38 route corridor. It is possible that the quicker journey times could also induce new trips onto the highway network.
- 4.1.4 The consequences of doing nothing are that users currently travelling on congested local roads do not have the opportunity to reassign to the improved strategic route, hence queues and delays on local roads around Derby are not resolved.
- 4.1.5 A consequence of doing nothing would be that the A38 maintains its relative unattractiveness to long-distance strategic trips, and hence discourages both car and freight trips to use the route in peak traffic flow periods.
- 4.1.6 As a further safety issue, because the three Derby junctions are at-grade, long-distance and heavy-goods vehicle trips using the strategic road network come into conflict with local intra-urban trips and non-motorised user (NMU) movements. These conflicts are a risk to road safety that would not exist if the junctions were grade-separated.
- 4.1.7 The Local Plan identifies the A38 as key to economic and development growth in the Derby area. Derby and its immediate surrounding area is expected to accommodate significant housing and employment growth. As a result, the traffic demands on the A38 are expected to grow quicker than the national average.
- 4.1.8 Whilst the strategic economic plan is being taken forward independently from transport infrastructure improvement schemes, the A38 improvement scheme will facilitate this regeneration.
- 4.1.9 There is a requirement to consider whether alternative mode options could address the existing problems on the A38. Improvements to both long-distance and local rail services would incur large capital investment and operational costs. It can be reasonably concluded that relieving the A38 to the same degree as the proposed scheme by mode-transfer is anticipated to be not viable.
- 4.1.10 In analysing the traffic model, the forecast maximum volume of origin-destination movements that could transfer from road to rail is insufficient to negate the need for the proposed junction improvements, even assuming that all trips change modes.
- 4.1.11 The A38 grade separation proposals also form one of the key bus corridor improvement measures within the "Derby Local Transport Plan, LTP3 2011-2026" LTP3 strategy. It can therefore be assumed that the bus corridors crossing the A38 are supported by the A38 improvements.

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## 5 SUMMARY OF ALTERNATIVE SCHEMES

### 5.1 Description of Scheme Options

5.1.1 Since 2001, there have been several phases of development of the scheme that have resulted in carrying out the assessment of different alternative options for each of the junctions, these can be summarised as follows:

- 2002 Road Based Study – this looked at short term interim improvements (mainly involving signalisation and relining of parts of the junction) as well as long term solutions for each junction. The long term solutions comprised some form of grade separation. There was a public consultation exercise carried out at this time and the Road Based Study concluded with a preferred solution for each junction.
- 2003 Supplementary Consultation for Little Eaton junction – following the Road Based Study, some further alternatives for Little Eaton were investigated and presented at a supplementary Public Consultation exhibition – from this a new preferred option emerged.
- Design development at Kingsway and Markeaton junctions - a number of operational and design limitations were identified with the Road Based Study preferred options and some basic modifications were made – Kingsway was modified so that the main line was placed in an underpass below the level of the existing junction (the RBS solution was for an embankment over the junction) and, at Markeaton, the single bridge for the A52 over the A38 was replaced with a 2 bridge roundabout.
- Further design development up to 2008 when the scheme was put on hold;
- Design development from 2014 to the 2015 public consultation;
- Alternative options emerging from the 2015 public consultation and PCF Stage 2 options design.

### 5.2 A38/A5111 Kingsway Junction Alternative Options

#### Road Based Study (2002) Options

5.2.1 Two options for grade separation emerged from the Road Based Study (RBS):

- Option 1 was a free-flowing arrangement with links from the A511 to the A38 south, from the A5111 to the A38 north (with a flyover across the A38 that remained at existing ground level) and a link from the A38 (SB) to the A511. Traffic flow from the NB A38 to the A511 was not catered for.
- Option 2 was for a partial dumb-bell arrangement with provision for the Express Bus route (this provision prevented the movement of traffic from the NB A38 and the Greenwich Drive South link to the A511). The A38 main line passed over the dumbbell link on an embankment.

5.2.2 Option 2 emerged as the preferred option from the Road Based Study. For the layout of this option refer to Appendix 2.

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### **Design Development (2002 – 2008)**

- 5.2.3 As a number of operational and design limitations were identified with the Road Based Study preferred options some basic modifications were made. The main limitations were the lack of provision for all turning movements and the visual intrusion of the A38 embankment.
- 5.2.4 Due to the existing constraints it was considered that reversing the preferred arrangement such that the A38 passed through the existing roundabout at low level would offer cost, traffic management, construction, operational and environmental benefits.
- 5.2.5 From this concept, three options were developed for evaluation and assessment, i.e.:
- Option K8 - retain the existing gyratory roundabout and re-align the A38 through it at low level
  - Option K7 - retain as much as possible of the existing gyratory roundabout and re-align the A38 through it at low level
  - Option K6 - as Option K7 but with a dumbbell roundabout layout
- For layouts of these options refer to Appendix 3
- 5.2.6 Each of these options was divided into four sub-options:
- Basic layout with no provision for the Express Bus route
  - Basic layout with provision for Express Bus route sharing the junction
  - Provision for a totally separated Express Bus route with signalised at grade crossings of the approach road and slip roads
  - Provision for a totally separated Express Bus route with an underbridge on the approach road and signalised at grade crossings of the slip roads
- 5.2.7 As the Express Bus route is no longer being promoted by Derby City Council, the options that provide for this are not discussed further in this report.
- 5.2.8 Options K7 and K8 were discounted as there was a fundamental problem. The existing roundabout falls 2m north to south, whilst the existing ground level within the roundabout rises north to south. As a consequence, adequate clearance can be achieved at the north bridge location, but not at the southern bridge location. This means that either the roundabout needs to be lifted, which would defeat the objective of retaining as much of the existing gyratory carriageway, or the A38 alignment lowered. Lowering the A38 alignment would mean that drainage of surface and sub-grade water by gravity would not be possible and a concrete trough with a pumping station would be necessary. These options are unlikely to offer significant cost savings as they all require two new bridge crossings of the A38. For these reasons the options were not considered further.
- 5.2.9 Option K6 was therefore identified as the preferred option to be entered into the TPI programme when the scheme was put on hold in 2008.

### **Developments up to 2015 Public Consultation**

- 5.2.10 Work recommenced on the scheme in 2014 and a Public Consultation exhibition was held early in 2015. Design work prior to consultation focussed on re-affirming that the design option could accommodate the forecast traffic flows for the new design year. It



was the arrangement described above that was presented to the public at the consultation (referred to as the 'Presented Option' hereafter).

5.2.11 The consultation showed three options for providing local access to the Mackworth area as variants to the previously developed scheme. These were:

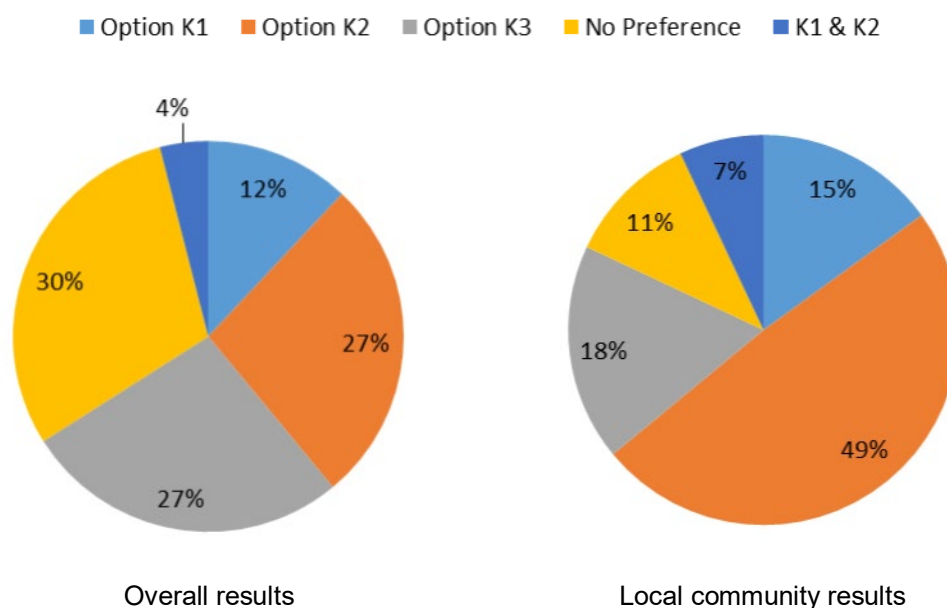
- Local Access Option K1 – link to Greenwich Drive north from the west dumbbell roundabout
- Local Access Option K2 – link to Kingsway Park Close from the east dumbbell roundabout
- Local Access Option K3 – no local access link provided – traffic heading into Mackworth would need to leave the A38 at the Markeaton junction

5.2.12 Following the public consultation, Local Access Option K2 (Kingsway Park Close link road) emerged as the preferred option. The main reasons for this were:

- Access into the Mackworth estate was maintained
- Impact of traffic, including HGVs, adjacent to residential properties (particularly on Greenwich Drive South) is reduced
- Virtual severance of the public open space from properties on Greenwich Drive South and surrounding area would be removed

5.2.13 In addition, the outcome of the public consultation supported the development of Local Access Option K2. Of the 578 consultation responses received, there was no clear preference shown. However, when examining the responses of the communities within the immediate vicinity of the junction, the clear preference was for Option K2 (49%). This finding was supported by informal discussions with local residents and councillors at the consultation events. As there was no overall impact on traffic benefits for either Local Access Option K1 or K2, it was recommended that Option K2 was progressed. Figure 5/1 shows the consultation responses.

**Figure 5/1: Consultation responses to local access arrangements at A38/A5111 Kingsway junction**



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### Alternative Options Emerging After the 2015 Public Consultation

5.2.14 Following the public consultation in early 2015, several alternative solutions or variations were put forward by members of the public. All of the alternatives received were subject to a two-stage assessment process, comprising the following:

- An initial sifting assessment
- Options passing initial sifting were then subject to the more detailed qualitative assessment

5.2.15 The purpose of the initial sifting assessment was to identify those options that were potentially viable and worthy of further consideration. The initial sifting assessment entailed a preliminary examination of each alternative option using information as provided by the consultee and the Department for Transport's web-based Transport Analysis Guidance (WebTAG) - The Transport Appraisal Process<sup>4</sup>. The performance of the various alternatives were assessed against the following criteria:

- Achieving the scheme objectives
- Deliverability
- Feasibility

5.2.16 Options had to achieve a baseline score against each of these criteria in order to pass the initial sift. The sifting assessment included the relevant options published for the public consultation events in order to form a baseline for comparison. Alternative options were then compared to the relevant baselined published option, combination of options or the whole scheme, as appropriate.

5.2.17 The initial sifting assessment process and outcomes are described in more detail in:

- Technical Note - Public Consultation Assessment Methodology (47071319-HE-02-TN-PM-001)
- Report on Public Consultation (47071319-URS-02-PCF-PM-009)
- Alternative Options Assessment – Kingsway (47071319-URS-06-RP-RD-014)

5.2.18 Table 5/1 presents the options for Kingsway junction that passed the initial sift and which were subsequently subjected to further assessment. This further assessment entailed the analysis of the following:

- Costs estimates
- Engineering assessment (including constraints; structures; design standards; geometry; public utilities; non-motorised users; drainage; geotechnics; construction phasing and programme);
- Environmental assessment (including the qualitative consideration of 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))
- Traffic and economics assessment

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<sup>4</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/370529/webtag-tag-transport-appraisal-process.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/370529/webtag-tag-transport-appraisal-process.pdf)

**Table 5/1 Summary of Qualitative Alternative Options Assessment for Kingsway Junction**

Options	Key Elements of Option	Summary of Qualitative Environmental Appraisal	Assessment Outcomes
<b>Kingsway Junction</b>			
Presented Junction Layout with Option K1 (see Appendix 4)	<p>This option is based upon the preferred option as presented at the 2015 public exhibitions, but with local access Option K1.</p> <p>As a result of having to close existing local access routes to and from Brackensdale Avenue and Raleigh Street, Option K1 would enable residents in the Mackworth area to access the A38 via Greenwich Drive South.</p>	<p>The Presented Junction Layout with Option K2 offers the potential to significantly reduce the loss of public open space (by approximately 1,500 m<sup>2</sup>) and reduce landscape and visual effects. Whilst Option K2 would result in the loss of some public open space, given that losses would be significantly smaller than with Option K1 (approximately 500 m<sup>2</sup>), sourcing potential exchange land would be less problematic (whilst also avoiding public open space severance). Option K2 would also be less visible to residential receptors than Option K1, thus requiring less landscape mitigation.</p>	<p>Based upon the results of the costs estimates, engineering, environmental and traffic and economics assessments, Option K2 was identified as being preferred as it performs better in terms of engineering and traffic and economics, whilst it reduces long-term impacts upon an area of public open space, and reduces traffic severance issues along Greenwich Drive South. The Consultee J Option ranked lowest in each category.</p> <p>Based on the assessment of the options, it was recommended that Option K2 was progressed with the Presented Junction Layout as the preferred option for grade separation of Kingsway junction.</p>
Presented Junction Layout Option K2 (see Appendix 4)	<p>This option is based upon the preferred option as presented at the 2015 public exhibitions, but with local access Option K2.</p> <p>This option would provide local access for residents in the Mackworth area, but via a link road to the east of the proposed Kingsway junction (link to Kingsway Park Close). The proposed link would pass at-grade behind the existing Kingsway Retail Park and in cutting across a historic landfill site and dismantled railway.</p>	<p>The Presented Junction Layout with Option K2 would potentially perform slightly worse than the Presented Junction Layout with Option K1 in terms of (unmitigated) effects upon geology and soils, materials and water resources due to Option K2 being located over an area of former landfilling. However, with adherence to standard construction practices and appropriate design, adverse residual effects could be readily reduced to non-significant levels (such that residual effects would be similar to those that would be experienced with the Presented Junction Layout with Option K1).</p> <p>Option K2 would avoid the significant traffic noise level increases along Greenwich Drive South (as associated with the Presented Junction Layout with Option K1). However, Option K2 would transfer the moderate/large adverse noise effect identified for the Presented Junction Layout with Option K1 from Greenwich Drive South onto Kingsway Park Close.</p>	<p>Option K2 has thus been integrated into the proposed scheme design as illustrated in Appendix 8 (figures 1.1, 1.2 and 1.3).</p>
Consultee J Option with Option K1 (see Appendix 4)	<p>This Option is a variant of the Presented Junction Layout, but replaces the east roundabout, originally accommodating A38 southbound and Kingsway traffic movement, with a merge and a diverge slip road from and to the A38 southbound. This option has been amended to accommodate the K1 local access route. Due to the removal of the roundabout located to the east, it was not possible to accommodate the option with K2.</p>	<p>The Consultee J Option would potentially perform worse than the Presented Junction Layout with Option K1 in terms of effects upon air quality and noise along a section of the A5111 which would be used as a diversion, and along any minor local roads used by traffic avoiding the congestion at the Kingsway Retail Park roundabout.</p>	

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5.2.19 An overview of the assessment findings for the following alternative options at Kingsway junction is provided in Table 5/1

- Presented Junction Layout with Local Access Option K1
- Presented Junction Layout with Local Access Option K2
- Consultee J's alternative with Local Access Option K1

For the layouts of these options refer to Appendix 4.

5.2.20 Following the public consultation exercise and the subsequent Alternative Options Assessment, the Presented Option with Local Access Option K2 emerged as the preferred option. The main reasons for this were:

- Access into the Mackworth estate was maintained
- Impact of traffic, including HGVs, adjacent to residential properties (particularly on Greenwich Drive South) is reduced
- Virtual severance of the public open space from properties on Greenwich Drive South and surrounding area would be removed

5.2.21 Full details of the assessments are reported in Alternative Options Assessment – Kingsway, Report Number: 47071319-URS-06-RP-RD-014-3F (March 2016) and these are summarised in Appendix 9.

### **5.3 A38/A52 Markeaton Junction Alternative Options**

#### **Road Based Study (2002) Options**

5.3.1 Four options for grade separation emerged from the Road Based Study (RBS):

- Option 1 was for the A38 to pass beneath the junction in an underpass. There would be a single bridge carrying the A52 over the A38 with slip road providing all turning movements between the A38 and A52. The slip roads would join the A52 at signalised junctions. Additional land required to accommodate the underpass and slip roads would be on the east side of the A38 to avoid impacts on Markeaton Park and the petrol filling station and fast food restaurant on the west side of the junction. This would adversely affect 16 detached houses on Queensway, 2 semi-detached houses on Ashbourne Road and would require land from the TA Centre.
- Option 2 is similar to Option 1 except that the additional land required to accommodate the underpass and slip roads would be on the west side of the A38 to avoid impacts on the houses on Queensway and Ashbourne Road. Land would be taken from Markeaton Park, the petrol filling station and fast food restaurant on the west side of the junction.
- Option 3 is similar to Option 1 but with the A38 being on embankment over the junction as opposed to being in an underpass.
- Option 4 is similar to Option 2 but with the A38 being on embankment over the junction as opposed to being in an underpass.

5.3.2 The RBS concluded that Option 1 was the preferred option. The primary reason being that an underpass solution was considered preferable to an embankment and flyover at it would be less visually obtrusive in the urban and parkland setting. It was also considered preferable to reduce the impact on the Markeaton Park and petrol filling station and fast food restaurant at the expense of increased impact on the residential properties on Queensway. For the layout of this option refer to Appendix 2.

#### **Design Development (2002 – 2008)**

5.3.3 Traffic modelling of the RBS preferred option highlighted operational issues in that the signalised single bridge junction could not effectively accommodate the forecast traffic flows. This led to the layout becoming amended such that the A38 passed through the junction at low level with a roundabout on the A52 above. It was considered that this would offer traffic management, construction and operational benefits. This alternative became known as Option M6.

5.3.4 As part of the development of this option, consideration was given to revisions required to increase the speed limit from 40mph to 50mph through Kingsway and Markeaton junctions. A major issue is the distance between the Markeaton and Kedleston Road junctions where there is insufficient weaving length for a higher design speed. An option to remove the need for weaving by closing the existing A38 slip roads at Kedleston Road and providing link roads for local traffic between Kedleston Road and Markeaton junction was investigated as a possible solution. This alternative was assessed (Ref. Report No D114946/PM/017 Sept 2008) and the results can be summarised as:

- The proposed layout of the link roads option would be capable of operating satisfactorily up to the design year with the projected traffic flows.
- Although no additional properties would be required to be purchased for this option, an additional 2.5ha of Public Open Space would be required at the Markeaton Park area, and therefore an equivalent (or greater) additional area of POS Exchange land would be required.
- The link roads option would result in some increased adverse environmental impacts, which are all related to the effect on the Markeaton Park area.

5.3.5 Although the link roads option had the potential to deliver the scheme requirements, it had a major disadvantage in the need for an additional Public Open Space Exchange land due to the encroachment into Markeaton Park. It may be very difficult to find sufficient suitable exchange land in an acceptable location. In addition this encroachment is likely to generate strong opposition to the scheme from the general public and stakeholders due to impacts on Markeaton Park. It was considered that the alternative options should be considered further as these would be likely to provide better value for money and would avoid encroachment into Markeaton Park.

5.3.6 The layout that was then further developed as follows:

- A38 realigned along a horizontal alignment slightly further to the east
- Vertical alignment steepened from 5% to 8% resulting in shorter slip roads and less retaining walls to reduce cost
- Speed limit increased from 40mph to 50mph through and to each side of the junction, terminating just north of the Kedleston Road slip roads
- Partly signalised roundabout replaced signalised A52/slip road junctions

- An additional lane for weaving between the Kingsway and Markeaton junctions and between the Markeaton and Kedleston Road junctions, northbound and southbound
  - Third traffic lane southbound and third maintenance lane northbound through Markeaton junction
  - Parallel southbound merge in place of taper merge
  - Two properties on Ashbourne Road require demolition, in addition to those on Queensway
  - Land required from 2 further properties on Ashbourne Road and 2 on Sutton Close for access to properties
- 5.3.7 In addition, engineering design was developed in much greater detail, sufficient to determine land required and provide a more robust cost estimate.
- 5.3.8 15 detached and 2 semi-detached residential properties would need to be purchased and demolished and the existing access to Sutton Close off Ashbourne Road closed and a revised access provided, which would require purchase of land from 4 further residential properties.
- 5.3.9 This was identified as the preferred option to be entered into the TPI programme when the scheme was put on hold in 2008.
- 5.3.10 Drawing D114946/GD/002A showing the proposed layout and long section at the Markeaton junction is included in Appendix 8 (Figure 1.2).

#### **Developments up to 2015 Public Consultation**

- 5.3.11 Work recommenced on the scheme in 2014 and a Public Consultation exhibition was held early in 2015. Design work prior to consultation focussed on re-affirming that the design option could accommodate the forecast traffic flows for the new design year. It was the arrangement described above that was presented to the public at the consultation (referred to as the 'Presented Option' hereafter).
- 5.3.12 Overall 67% of consultation respondents agreed with the Presented Option.
- 5.3.13 The public were also asked whether the existing footbridge at Markeaton Park should be replaced with a new bridge or not; as the existing bridge would require demolition under the scheme proposals to accommodate the widened carriageway.
- 5.3.14 As a result of the consultation process, and discussions with Derby City Council, it was concluded that the footbridge should be replaced with a new one.

#### **Alternative Options Emerging After the 2015 Public Consultation**

- 5.3.15 Although some alternative options were received for Markeaton junction (e.g. tunnel from south of Kingsway junction to the north of Markeaton junction; new trunk road from A38/A50 Toyota junction to north of Little Eaton junction), none of these options passed the initial sifting process (as described in paragraphs 5.2.14 – 5.2.16) and were thus excluded from further assessment.

#### **Design Development Post-2015 Public Consultation**

- 5.3.16 Following the completion of the 2015 public consultation, further design work was undertaken to focus on specific aspects of the junction to ensure the option was feasible and deliverable. These included:

- Reviewing the layout of the roundabout with a view to it operating under traffic signal control. This was identified as a necessary measure to accommodate the latest design traffic flows and to accommodate controlled pedestrian crossings on all arms of the roundabout
- Examining the operation of the short weaving length between Markeaton junction and Kedleston Road
- Developing the outline design for facilities for non-motorised users based upon feedback received during the consultation
- Developing designs for maintaining access to Markeaton Park and the McDonalds/petrol filling station site
- Conducting environmental surveys and assessments to quantify the adverse impacts and positive benefits of the scheme; and to inform the design of mitigation measures

## 5.4 A38/A61 Little Eaton Junction

### Road Based Study (2002) Options

5.4.1 Two options for grade separation emerged from the Road Based Study (RBS):

- Option 1 would entail the A38 passing on embankment to the north of the existing Little Eaton junction. This option would result in the loss of the Mobile Home Park, Starbucks and the property 'Fourways' as well as having an adverse impact on the garden centre car park.
- Option 2 was similar to Option 1 but the alignment of the A38 was moved further to the north so as to reduce the impact on the Mobile Homes but at the expense of increasing the impact on the garden centre.

5.4.2 At the time of the RBS, these options were based on a 40mph speed limit being imposed (70kph design speed). Option 2 emerged as the preferred option from the Road Based Study. For the layout of this option refer to Appendix 2.

### Design Development (2002 – 2008)

5.4.3 During the review of the RBS options for the Little Eaton junction, a number of operational and design limitations were identified. Option 2, which had emerged as the preferred option, was designed for an operational speed limit of 40mph, whereas it was agreed with Highways England that the speed limit used in the design should be increased to 60mph for safety reasons (this junction being at the end of a long section of high speed rural dual carriageway from the M1 junction 28 to the north). It was envisaged that motorists would not expect a large reduction in speed at this semi-rural location. Also, the layout did not include any over-widening for visibility and the radius of the loop connecting the north roundabout to the A38 northbound carriageway was too small and hence the connecting gradient was too steep to comply with current standards.

5.4.4 As a consequence, the impact of the preferred option on the garden centre, the Mobile Home Park, the Little Chef (now Starbucks) and the property "Fourways" was underestimated. Further preliminary studies of the options were undertaken to establish the potential impact when designed to current standards and to consider the impact of a further option to the south of the existing roundabout which would avoid the garden centre, the Mobile Home Park, now Starbucks and "Fourways".

5.4.5 A supplementary Public Consultation was carried out in 2003 to seek the public's views on these options.

5.4.6 The options presented at the supplementary consultation were:

- Option 7 - As the Road Based Study Option 2 (the preferred option), but to a design speed of 100kph (a 60mph speed limit was envisaged). The objective was to minimise the impact on "Fourways", the Mobile Home Park and the garden centre. This was presented at the exhibition as Option 2.
- Option 8 - A completely new option to the south of the existing at grade roundabout to a design speed of 100kph – this included a dumbbell arrangement with the A31 being on embankment over a link for the A61/B6179. The objective was to eliminate any impact on "Fourways", the Mobile Home Park and the garden centre.
- Option 9 - As the Road Based Study Option 1, but to a design speed of 100kph. The objective was to minimise the impact on the garden centre. This was presented at the exhibition as Option 1.
- During the development of Option 8, a variation, Option 8(a), was identified for consideration. This was a variation of Option 8 whereby the A38 alignment was moved closer to the existing alignment – this had a single roundabout and 2 bridges in place of the dumbbell roundabout of Option 8. The objective was to eliminate any impact on "Fourways", the Mobile Home Park and the garden centre, whilst keeping the alignment as far as possible from the village of Breadsall to the southeast. This was presented at the exhibition as Option 3.

For layouts of these options refer to Appendix 5.

5.4.7 In response to the consultation, a single issue petition was also received from Breadsall Parish Council and the Local MP for Amber Valley/Mid Derbyshire wrote on behalf of 30 residents of Breadsall. The petition was signed by 343 people, of which 283 were identified as residing in Breadsall. This petition objected to Option 3, the closest to Breadsall, without stating any preference for any of the other options.

5.4.8 Excluding the petition, 66% of the respondents were in favour of Option 8a (identified in the consultation materials as Option 3), 17% in favour of Option 7 (identified in the consultation materials as Option 2) and 2% in favour of Option 9 (identified in the consultation materials as Option 1). 84% of the respondents resided in Allestree, Breadsall or Little Eaton, which were the residential areas closest to the proposed junction improvement.

5.4.9 From a comparison of these options, Options 7 and 8 were eliminated as they were less preferable than Options 9 and 8(a) respectively in terms of engineering, traffic and economics. The decision was then whether to recommend Option 8(a) to the south and east of the existing A38 or Option 9 to the north.

5.4.10 The key issue identified was how to subjectively balance the environmental impact of Option 8(a) with the impact of Option 9 on the garden centre, "Fourways", Starbucks and particularly the residents of the Mobile Home Park. A meeting with Statutory Consultees, confirmed this was the key issue, particularly the impact on the residents. Opinion was divided with the Local Authorities supporting Option 8(a) and the Environment Agency, English Nature and English Heritage seeking the least impact but without making a choice of preferred option, and hence no clear preference was established.



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- 5.4.11 The residents of the Mobile Home Park would be unaffected by Option 8(a) but would need to be re-housed if Option 9 were selected. They form a community that would be lost if they were re-housed and may suffer distress if relocated against their wishes.
- 5.4.12 From the Supplementary Public Consultation in 2003, the public identified that reducing the impact on the local residents and commercial premises was their major concern. In this respect, the impact of Option 8(a) is considerably less than that of Option 9.
- 5.4.13 There was very little to differentiate between Options 8(a) and 9, both having advantages and disadvantages. However, it was felt on balance that Option 8(a) was preferable to Option 9, because, whilst the environmental impacts of Option 8(a) could be largely mitigated, the impacts of Option 9, particularly on the residents of the Mobile Home Park, could not.

#### **Options 8(a) and 8(b)**

- 5.4.14 After the supplementary Public Consultation exercise, Highways England carried out a Cost Challenge Workshop in August 2004 with the aim of identifying measures that could reduce the scheme cost whilst remaining within the brief for grade separation of all three Derby junctions. From this it emerged that reducing the design speed of the A38 at Little Eaton from 100kph to 85kph (by introducing a mandatory 50mph speed limit) would allow considerable environmental benefits and cost savings to be made at the Little Eaton junction. The lower design speed would lead to shorter forward visibility requirements, thereby reducing verge and central reserve widths, also, the tighter curves would allow the alignment to be closer to the existing A38 with reduced land take and associated impacts. This revised option became Option 8(b).
- 5.4.15 Option 8(b) offered considerable savings in construction cost, and has benefits over Option 8(a) in engineering terms, principally as it does not affect the River Derwent Bridge or the Water Treatment Works Access Bridge and requires less compensatory flood storage area. The traffic and economic benefits would be slightly reduced for Option 8(b) but it still represented good value for money. The main disadvantage of Option 8(b) over Option 8(a) is that Option 8(b) requires the closure of Ford Lane (to/from Allestree) on safety grounds.
- 5.4.16 Option 8(b) was identified as the preferred option to be entered into the TPI programme when the scheme was put on hold in 2008
- 5.4.17 No announcement was made on the preferred option emerging from the Supplementary Public Consultation at Little Eaton before the scheme was put on hold in 2007.

#### **Developments up to 2015 Public Consultation**

- 5.4.18 Work recommenced on the scheme in 2014 and a Public Consultation exhibition was held early in 2015. Design work prior to consultation focussed on re-affirming that the design option could accommodate the forecast traffic flows for the new design year. Option 8(b) was presented to the public at the consultation (referred to as the 'Presented Option' hereafter). A layout of this option is included in Appendix 8 (figure 1.3).
- 5.4.19 The public were also asked whether a new link should be provided to replace the junction of Ford Lane with the A38 that would be closed under the proposals. The options proposed were:

- **Option L1:** This option would close the Ford Lane access onto the new A38, with no alternative link road being provided.
- **Option L2:** This option would also close Ford Lane, but a new link road would run to the north and parallel to the A38, crossing the railway and the River Derwent flood plain at grade and on embankment to join the B6179. The link road would be one-way to prevent it being used as a rat-run between the A38 and A6. It would entail construction of a new embankment within the Derwent Valley Mills World Heritage Site and within the River Derwent floodplain – with consequent adverse effects upon cultural heritage, landscape, ecology and flood risks.

5.4.20 Following the Public Consultation, the public responded marginally in favour of the new link being provided. However, considering the cost and small benefit of this link, it was felt that the outcome was not sufficiently conclusive to warrant the additional expenditure and environmental impacts, unless further traffic and economic analysis showed a strong justification. The additional link between Ford lane and the B6179 was removed from the scheme proposals.

#### **Alternative Options Emerging After the 2015 Public Consultation**

5.4.21 Following the public consultation exercise in early 2015, several alternative solutions or variations were put forward by members of the public. All of the alternatives received were subject to a two-stage assessment process, comprising the following:

- An initial sifting assessment
- Options passing initial sifting were then subject to the more detailed qualitative assessment

5.4.22 The assessment process is described in paragraphs 5.2.14 – 5.2.16. The outcomes of the assessment are described in more detail in:

- Report on Public Consultation (47071319-URS-02-PCF-PM-009)
- Alternative Options Assessment – Little Eaton (47071319-URS-06-RP-RD-013)

5.4.23 Table 5/2 presents the options for Little Eaton junction that passed the initial sift (see sections 5.2.14 to 5.2.18 for further details of the initial sift exercise) and which were subsequently subjected to further assessment. This further assessment entailed the analysis of the following:

- Costs estimates
- Engineering assessment (including constraints; structures; design standards; geometry; public utilities; non-motorised users; drainage; geotechnics; construction phasing and programme)
- Environmental assessment (including the qualitative consideration of 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))
- Traffic and economics assessment

5.4.24 An overview of the assessment findings for the following alternative options at Little Eaton junction is provided in Table 5/2 below

- Option 2 (as presented at the 2003 supplementary public exhibition) – see Appendix 5

- The Presented Option (modified Option 3 at the 2003 supplementary public exhibition) – see Appendix 8 (Figure 1.3).
- Option 3A (proposed by Breadsall Parish Council)
- Southern Sweep

5.4.25 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. For layouts of Option 3A and the Southern Sweep refer to Appendix 6.

5.4.26 Following the public consultation exercise and the subsequent Alternative Options Assessment, the Presented Option emerged as the preferred option.

5.4.27 Full details of the assessments are reported in Alternative Options Assessment – Little Eaton (Report: 47071319-URS-06-RP-RD-013, August 2016) and these are summarised in Appendix 9.

#### **Post-Consultation Alternative Options**

5.4.28 Local residents of Breadsall, represented by the Breadsall Action Group (which is supported by Breadsall Parish Council), were not content with the conclusions of the Alternative Options Assessment Report. Their intention, as illustrated by the Southern Sweep alternative option, was to find a solution which performed as well as the Presented Option but also reduced their perceived impacts to Breadsall village.

5.4.29 To facilitate dialogue with the Action Group and other interested parties, a Reference Group was set up for the Little Eaton junction. Through the Reference Group, the following alternative options were received:

- Option 2A received from the Breadsall Action Group. This is a development of Option 2 as presented at both the 2003 supplementary consultation and the 2015 consultation where the northbound slip roads are re-configured and the southbound slip roads reuse the existing A38 carriageway;
- Option 2B received from the Breadsall Action Group. This was a variation of Option 2A whereby the A38 southbound slip roads are adjacent to the main carriageway to form a conventional two-bridge grade-separated layout with a single roundabout. The existing roundabout and slip roads would be removed and landscaped;
- Option X received from Little Eaton Parish Council. This Option was developed with the intention of retaining the existing A38 in order to balance the alignment between Little Eaton and Breadsall. The Option retains the A38 on its existing horizontal and vertical alignment, diverts the B6179 to the north of the garden centre to pass under the A38 to a new roundabout on the A61; and
- Option X1 received from the Breadsall Action Group in response to Little Eaton's "Option X". It replaces the long looping links of Option X (needed to connect the A61 and B6179 to the A61 via a bridge under the A38 north of the garden centre) with an overbridge for the A61 thereby providing a more direct route. The notes submitted by the Action Group state the design intention as "retaining the A38 at grade, while reducing the lengthy circulation routes".

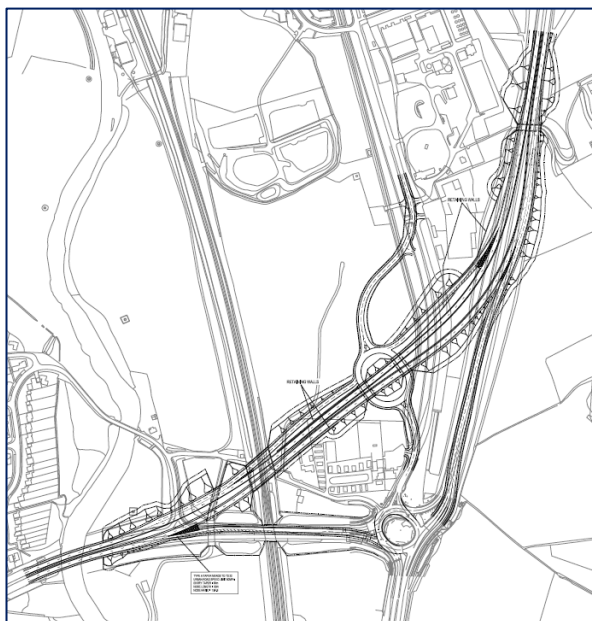
5.4.30 In assessing these post-consultation alternative options, opportunities to address deficiencies in the Options or refine the proposals further while retaining the overall intention of the original proposer were identified. This led to the following additional variants being developed and assessed:

- Development of Option 2A with a re-designed southbound entry slip road to address a safety issue;
- Development of Option 2A using a dumbbell roundabout arrangement such that only a single underbridge is needed to the A38.

5.4.31 To inform the assessment of the options, engineering plans or design sketches were developed for each of these options. This ensured the layouts complied with design standards as appropriate and the land impacts were fully understood. The layouts are shown in Figure 5/2; larger scale copies of these drawings are included in Appendix 7.

**Figure 5/2: Layouts of the Alternative Options received in 2016 in relation to A38/A61 Little Eaton Junction**

**Option 2A**



**Option 2B**



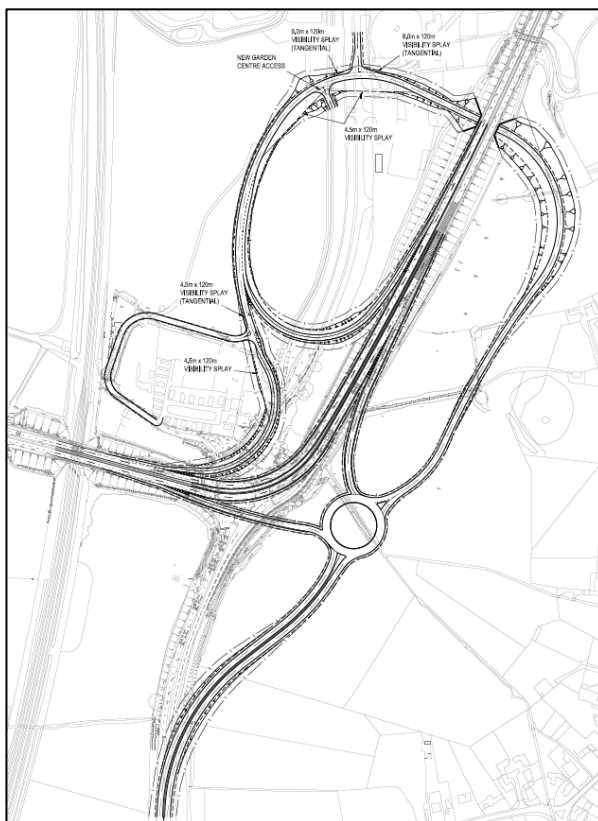
**Option 2A - variant with re-designed southbound entry slip road**



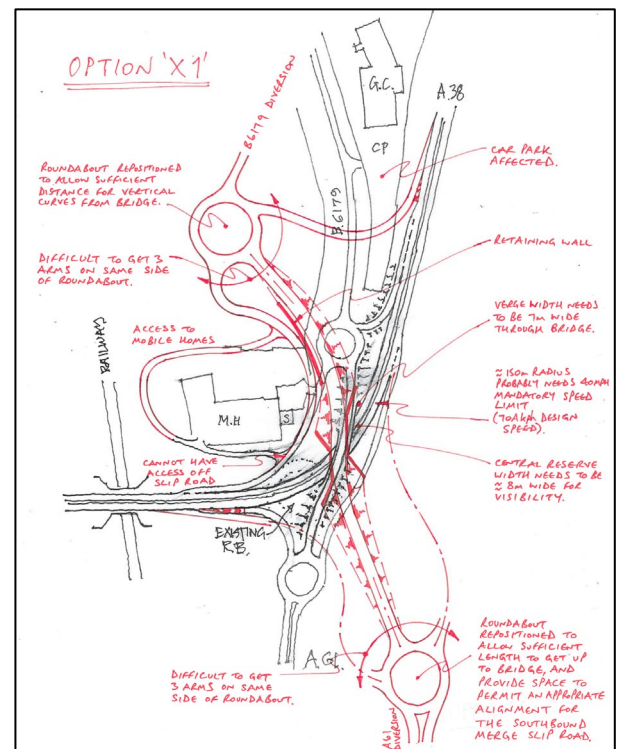
**Option 2A - variant with single overbridge**



**Option X**



**Option X1**



5.4.32 These alternative options were subjected to the initial sifting assessment as described in paragraphs 5.2.13 – 5.2.15. The results of the assessment indicated that none of these options passed initial sifting as they would not perform satisfactorily in terms of supporting the achievement of the defined scheme objectives, whilst they presented a number of technical and planning challenges affecting the option feasibility.

- 5.4.33 The Action Group's aim in developing Options 2A and 2B was to provide a route which was further from Breadsall but without excessive impacts on the communities around Little Eaton. The options also had the effect of enabling the scheme to provide a higher design speed due to the improved alignment.
- 5.4.34 However, Options 2A and 2B would require the purchase of 3<sup>rd</sup> party land in order to mitigate for the loss of parking for the garden centre. As this additional land is not an integral part of the main scheme, its purchase is not possible under Highways England's powers for Compulsory Purchase set out in the Planning Act 2008. The powers do not allow the compulsory acquisition of land for the purpose of providing replacement facilities for a local landowner and the use of compulsory acquisition powers for this purpose would be considered an abuse of Highways England's powers and as such, would be indefensible if challenged.
- 5.4.35 An alternative option to purchasing land to mitigate the garden centre's car parking loss would be the purchase of the garden centre completely. This would result in an arrangement previously considered as Option 7 (identified in the 2003 consultation as Option 2) and discounted.
- 5.4.36 The main principle of Options X and X1 was to maintain the A38 as close as possible on its existing alignment both horizontally and vertically. Option X had long link roads connecting a roundabout on the A61 to the south of the junction to the B6179 and slip roads with the northbound A38 on the north side of the junction. Option X1 replaced the long links with a more conventional 'dumbbell' type arrangement to allow all turning movements at the junction. The link between the dumbbell roundabouts was a bridge over the A38. A number of changes were required to the submitted sketch including relocating the roundabouts to ensure there was adequate distance for the road to get from the bridge level down to ground level.
- 5.4.37 Consequently, these post-consultation alternative options were not subjected to further assessment (Report No: 47071319-URS-06-RP-RDN-024-1F Highways England, 2016). The preferred option remained Option 8(b) (identified at the 2003 consultation as Option 3, and presented in the 2015 consultation).
- 5.4.38 At the Reference Group meeting held on 18 May 2016, the outcome of the assessment of Options 2A and 2B was discussed. This was confirmed by letter to the Action Group on 20 May 2016. The outcomes of assessing Options X and X1 were subsequently confirmed to the Reference Group on 10 June 2016 and 8 July 2016 respectively.

### **Design Development Post-2015 Public Consultation**

- 5.4.39 Following the completion of the 2015 public consultation, further design work was undertaken to focus on specific aspects of the junction to ensure the option was feasible and deliverable. These included:
- Reviewing the layout of the roundabout to ensure it could accommodate the latest design traffic flows;
  - Developing the outline design for facilities for non-motorised users based upon feedback received during the consultation;
  - Developing designs for maintaining access to local businesses, such as Talbot Turf, affected by the scheme;

- 
- Undertaking a flood risk assessment to determine the necessary flood alleviation measures; and
  - Conducting environmental surveys and assessments to quantify the adverse impacts and positive benefits of the scheme; and to inform the design of mitigation measures.

## **5.5 Preferred Scheme**

5.5.1 The various alternative options assessments resulted in a preferred option for each junction. These preferred options were subject to a more detailed assessment which is included in the following sections of this report.



**Table 5/2 Summary of Qualitative Alternative Options Assessment for Little Eaton Junction**

Options	Key Elements of Option	Summary of Qualitative Environmental Appraisal	Assessment Outcomes
<b>Little Eaton Junction</b>			
Presented Option (see Appendix 6)	This solution would provide full grade separation (two level) of the junction, with the A38 realigned to the south of the existing roundabout. This option would avoid any impact on "Fourways", the Ford Farm 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.	The qualitative environmental assessment indicated 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 an 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.	The assessment considered the various Little Eaton junction options in terms of cost estimates, engineering, environmental and traffic/economic considerations.  Each of the options were compared to the Presented Option. This comparison indicated that while the Presented Option may not rank highest in each category or sub-category, in overall terms, the Presented Option performed the best. However, there were areas where the Presented Option would have a potentially greater impact than the alternative options and thus detailed mitigation strategies should be developed for each of these aspects in conjunction with key stakeholders.
Option 2 (see Appendix 6)	This solution would provide 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. Extensive widening would be required both in the central reserve and the northbound verge to provide the minimum desirable stopping sight distance.	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. 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.	Based on the assessment of the options and bearing in mind the limitations of the study as described in the report, it was recommended that the Presented Option was progressed as the preferred option for grade separation of Little Eaton junction.  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.
Option 3A (see Appendix 6)	This solution would provide 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.	The environmental assessment indicated that the potential environmental effects of the Presented Option and the Southern Sweep are closely matched and the differences in the assessments were marginal.  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.	
Southern Sweep (see Appendix 6)	This solution would provide 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.		



## 6 SUMMARY OF TABLES OF TRAFFIC, ECONOMICS, COSTS

### 6.1 Introduction

6.1.1 Traffic forecasting and economics assessments were carried out for the scheme based on the preferred option at each junction.

### 6.2 Scheme Cost Estimates

6.2.1 Construction, preparation and administration costs were provided by Highways England in the form of a Stage 2 Most Likely Range Estimate (received 18/01/16). The Most Likely Range Estimate includes construction, preparation, supervision, and land costs.

6.2.2 The supplied expenditure profiles were calculated based upon cost estimates for each financial year prepared in 2014 Q1 prices and then inflated to outturn costs, using projected construction related inflation. These costs were then rebased to 2010 prices – all costs were in the factor costs unit of account (also sometimes referred to as resource costs). The costs were allocated to the calendar years of expenditure.

6.2.3 Table 6/1 shows the expenditure profile for construction, land, preparation and supervision. Note that costs incurred prior to 2016 were considered historic and were therefore not included.

**Table 6/1 Expenditure Profile for Works Costs**

Works Year	Construction	Land	Preparation	Supervision
2016		856	2,513	
2017			2,803	
2018			5,014	
2019	9,569	18,835	3,480	154
2020	57,464			1,063
2021	50,856			1,428
2022	24,888			760
2023	1,555			55
<b>Total</b>	<b>144,332</b>	<b>19,691</b>	<b>13,810</b>	<b>3,460</b>

Note: in 2010 factor cost units of account, in £ thousands, and rebased to 2010 prices.

6.2.4 Highways England also prepared an estimate of the ongoing yearly maintenance costs for the A38 Derby Junctions (received 24th June 2016).

6.2.5 Table 6/2 shows a summary of the estimated operation and maintenance cost impact over the 60-year assessment period, in undiscounted costs, and with a year 1 price advised by Highways England to be at Q2 2019 prices.

**Table 6/2 Operation and Maintenance Costs**

Item	Total before discounting @Q2 2019
Routine Operation and Maintenance	£15,151,730
Asset Renewals	£30,917,897
Betterment Savings	-£11,928,356
Structures	£11,749,286
<b>Sub-Total</b>	<b>£45,890,537</b>
Optimism Bias adjustment @ 44%	£20,191,836
<b>Total Estimate (Undiscounted Factor Cost)</b>	<b>£66,082,373</b>

### 6.3 Traffic Assessment

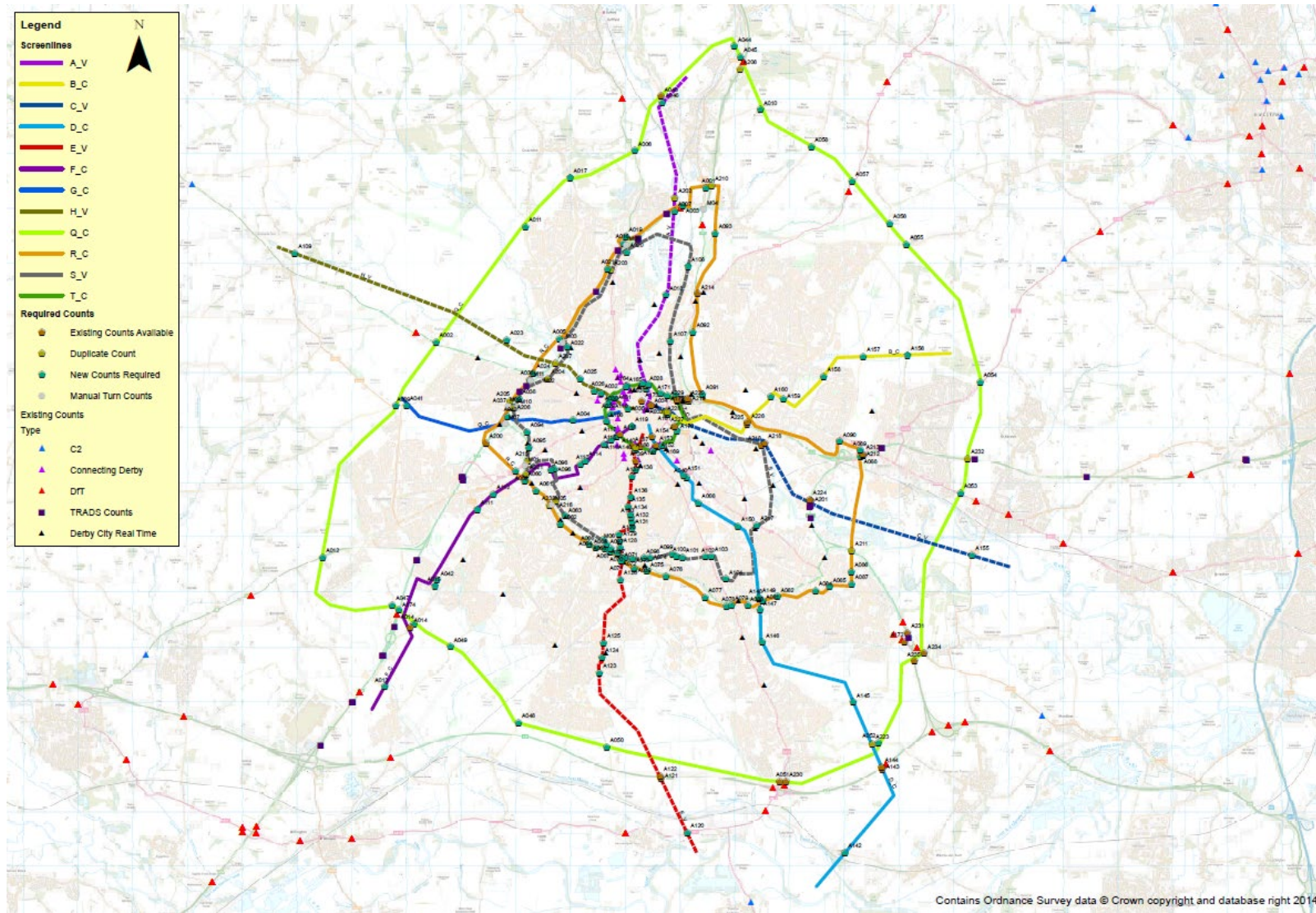
6.3.1 Volumetric traffic data was collected in February/March 2015 as a series of observed Automatic Traffic Counter, Link, Radar and Manual Classified Counts. Three supplementary counts were also undertaken in September 2015.

6.3.2 The manual classified counts were undertaken at 12 key junctions along and adjacent to the A38, and are tabulated below (Table 6/3). Figure 6/1 below shows a map of the count locations.

**Table 6/3 MCC Count Locations**

Site ID	Link Name
M01	A516 Uttoxeter New Road/A511 Manor Road
M02	A38/A52 – including access/egress to McDonalds, Petrol Station and Markeaton Park
M03	A38 Queensway/Kedleston Road
M04	A38 Abbey Hill/A61/B6179 Alfreton Road
M05	A5111 Warwick Avenue/A5250 Burton Road/Burton Road
M06	A5111 Warwick Avenue/Stenson Road
M07	A38 Kingsway/A5111
M08	A38/A6/Kings Croft
M09	Brackensdale Avenue/A38 Slip Roads/Greenwich Drive South
M10	Lyttleton Street/Cheviot Street
M11	Enfield Road/A38 Kingsway
M12	A61/A52 Pentagon Island

Figure 6/1: Count Locations





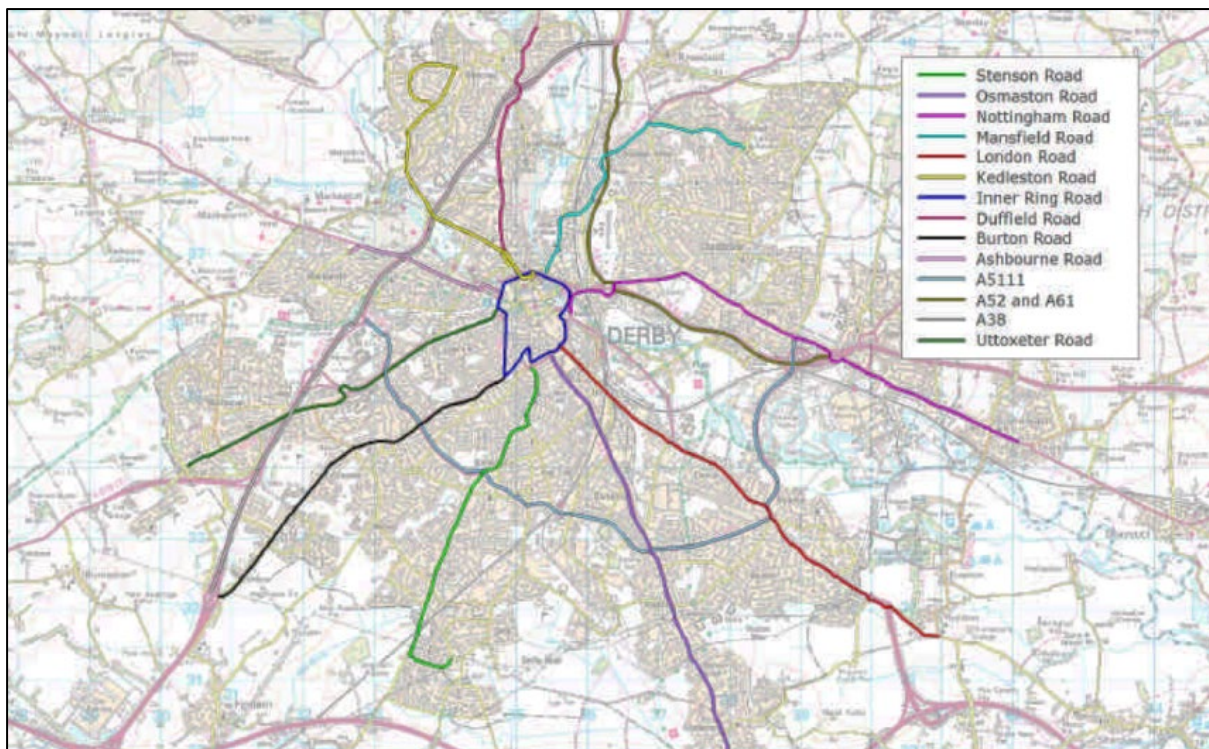
6.3.3 Further traffic counts were procured from Derby City Council, Connecting Derby, A50 Connect and Developer Data, and supplemented by mobile phone and TrafficMaster Data.

6.3.4 The volumetric data was used to calibrate and validate the local traffic model.

6.3.5 Journey time surveys were extracted and collated from the Trafficmaster GPS Database covering the period January-March 2015, along the 14 routes that were initially assessed in the Derby Area Transport Study (2005). Observed times were extracted and collated across a total of 14 routes in both directions and in all six modelled time periods (14 x 2 x 6 =168 journey times). The routes observed are listed below and also shown in Figure 6/2:

- Stenson Road;
- Osmaston Road;
- Nottingham Road;
- Mansfield Road;
- Kedleston Road;
- Inner Ring Road;
- Duffield Road;
- Duffield Road;
- Burton Road;
- Ashbourne Road;
- A5111;
- A52 and A61;
- A38;
- Uttoxeter Road

**Figure 6/2: Journey Time Routes**



6.3.6 These observed times were compared against the computed travel times extracted from each of the time-period highway assignment models.

- 6.3.7 NMU Surveys were carried out on Sunday 24th August 2014 at various locations on and around the A38 in Derby. The August bank holiday weekend was chosen in order to represent a day where a larger proportion of leisure trips could be expected. Additional NMU Surveys were carried out on Tuesday 4th November, which represented a 'typical' working weekday.
- 6.3.8 The NMU surveys covered a 12-hour period between 0700 and 1900, and were carried out on footways, cycleways, bridleways and accesses that crossed the key A38 junctions or facilitated movement between them.
- 6.3.9 The surveys were used to determine if any crossings were lightly used and could therefore be diverted to nearby crossing facilities. The count data was also used to inform the Environmental Statement.

#### **6.4 Traffic Modelling**

- 6.4.1 In developing the 2015 A38 Derby Junctions Model the existing Greater Derby Transport Model (GDTM) was used as a starting point. The A38 Scheme was developed using forecasts from the local model.
- 6.4.2 The highway network was modelled using SATURN software. This network coded speed-flow relationships for all roads within the study area.
- 6.4.3 The demand model was divided into thirteen user classes – 9 car user classes, including distance banding for employers business, 2 LGV classes and 2 HGV classes.
- 6.4.4 The main highway modelling task undertaken was the update and calibration/validation of the above mentioned model to represent average hour trip demands for the following weekday time periods:
- Weekday AM Peak 1 – the one-hour period 07:00 - 08:00;
  - Weekday AM Peak 2 – the one-hour period 08:00 - 09:00;
  - Weekday Inter-Peak – an average hour in the period 10:00 - 16:00;
  - Weekday PM Peak 1 – the one-hour period 16:00 - 17:00;
  - Weekday PM Peak 2 – the one-hour period 17:00 - 18:00;
  - Weekday Evening – an average hour in the period 19:00 - 22:00.
- 6.4.5 The conclusions formed from the calibration of the model was that the link flows within the model were in good agreement with observations during all time periods. Post Matrix Estimation (ME) the percentage of link flows that are comparable to the observed flow on calibration count sites are as follows: AM1 = 97%, AM2 = 93%, IP = 99%, PM1 = 95%, PM2 = 94%, EV = 96%. This compares favourably with the requirement for 85% of links to pass this flow test.
- 6.4.6 In terms of model validation, the screenline validation results for both a GEH of <4 (formerly a DMRB criteria) and the number of links on screenlines with a percentage flow difference of less than five percent (WebTAG criteria) are shown in Table 6/4 below. Whilst the % flow difference does not fulfil the WebTAG Unit M3-1 criteria of 'all or nearly all screenlines', half or more of the links on the screenlines pass the GEH and the percentage flow difference criteria in all time periods.

**Table 6/4: Screenline Validation Statistics**

Time Period	Total Veh % GEH Pass	Total Veh % Diff Pass
AM1	67%	67%
AM2	58%	50%
IP	79%	79%
PM1	75%	75%
PM2	67%	75%
EV	88%	71%

6.4.7 A comparison of the observed validation flow set with the assigned flows on links across the whole of the traffic model's study area concluded that the link flows within the model were generally in good agreement with observations during all time periods. After the Matrix Estimation (ME) process, the percentage of assigned all-vehicle flows on the validation links that were in agreement with the observed flow were as follows: AM1 = 73%, AM2 = 63%, IP = 73%, PM1 = 68%, PM2 = 70%, EV = 81%. Whilst these statistics do not fulfil the 85% guidance in WebTAG, this validation is met on at least 50% of links in AM2 and a larger proportion in all other time periods.

6.4.8 The purpose of the traffic model is to support the assessments of the A38 Derby Junctions scheme. Therefore it is more important for the model to be a good representation of the road-links in the vicinity of the A38 and the scheme-junctions. A more detailed examination of the traffic model showed that the validation statistics in the vicinity of the A38 is substantially better than indicated by the above screenline validation statistics across the whole of the Derby urban area.

6.4.9 Table 6/5 and Table 6/6 show the model results for all vehicles by time period for calibration and validation links (respectively) near to the A38. The tables show that in the A38 route corridor and at links closest to the A38, the level of fit is near to the validation criteria and acceptability guidelines defined by Table 2 in WebTAG unit M3.1.

**Table 6/5: Summary of GEH fit against Link Calibration Flows Adjacent to A38**

Time Period		AM1	AM2	IP	PM1	PM2	EV
Pass	GEH<5	43	41	44	43	44	41
Yellow	GEH<10	1	2	0	1	0	3
Red	GEH>10	0	1	0	0	0	0
Total		44	44	44	44	44	44
% pass		98%	93%	100%	98%	100%	93%
% (pass or yellow)		100%	98%	100%	100%	100%	100%

**Table 6/6: Summary of GEH fit against Link Validation Flows Adjacent to A38**

Time Period		AM1	AM2	IP	PM1	PM2	EV
Pass	GEH<5	16	13	18	15	15	16
Yellow	GEH<10	1	4	0	2	3	2
Red	GEH>10	1	1	0	1	0	0
Total		18	18	18	18	18	18
% pass		89%	72%	100%	83%	83%	89%
% (pass or yellow)		94%	94%	100%	94%	100%	100%

6.4.10 As well as link flow validation, the model also needs to reproduce journey times through the road network. The journey time routes validated are shown in Figure 6/2 above.

6.4.11 For journey time validation, the number of routes fulfilling the WebTAG criteria is significantly larger than 50% for all time periods, whilst not quite fulfilling the 85% threshold as set by WebTAG. However, where the criteria is not matched, whether by virtue of the model running too slowly or too quickly, it is in most cases only marginally either side of the WebTAG criteria.

6.4.12 Future traffic forecasts were required for roads within the study area to;

- Determine the layout and size of the proposed junctions so that they are in scale with the capacity of the rest of the road network.
- Provide supporting information to the environmental assessment.
- Provide traffic data to enable an assessment of accidents to be undertaken.
- Provide trip journey times and distances with which to undertake the transport efficiency assessment.

6.4.13 The A38 Derby Junctions model traffic forecasting was undertaken using the SATURN suite of transport modelling programs (v11.2.05) and uses DIADEM software provided by the Department of Transport (DfT) to represent variable demand responses to changes in travel costs.

6.4.14 Traffic forecasts were based upon the validated 2015 base year local traffic model.

6.4.15 Trip demands and transport networks were prepared for the following forecast years;

- 2024 – first full year the scheme is open to traffic
- 2031 – interim year required for economic assessment of transport user benefits;
- 2039 – the Scheme’s design year.

6.4.16 The information on development proposals within the planning authority areas of Amber Valley, Derby City and South Derbyshire was identified from the following information sources:

- South Derbyshire, Five year Housing Supply, June 2015
- Amber Valley Sustainability appraisal of the Amber Valley local plan part one
- Derby City Core Strategy 2008-2028

- South Derbyshire Draft local plan 2008-2028
- Meeting with Derby City Council- October 2015

6.4.17 A number of complementary road schemes are to be implemented within the Derby area during the next few years, and have been included in the 'Do-Minimum' transport model forecast networks. These schemes and their expected dates of completion include:

- Land North of Denby (2024)
- Chellaston Fields (2024)
- Land at Hackwood Farm- Junction at Station Road and Radbourne Lane coded as a roundabout from a priority junction.
- Land of the Mease (2024)
- Hollybrook Way- Traffic signals coded at Chain Lane, Burton Road, Pastures Hill and Hillsway junction (2024).
- Rykneld Road- traffic signals junctions coded at Rykneld Way (2024).
- Kingsway Hospital- Roundabout at access to Kingsway Retail Park recoded as a signalised roundabout (2024).
- Land West of Mickleover- Etwall Road, Hospital Lane junction (2024).
- East Midlands Intermodal Park- West bound on slip recoded to include new roundabout and junction configuration (2024).
- Wyvern Way/Derwent Parade roundabout recoded as traffic signals (2024).
- Wragley way-New point zone coded (2024).
- Lily Street Farm, Derby Road, Alfreton-New traffic signal junction (2024).
- T12 link Road- Additional link road coded in model (2024).
- South Derby Link Road (2039)
- East Midlands Gateway (Freight Interchange)-changes to junction 24 of the M1, A50 A453 link road, Kegworth Bypass (2024)

6.4.18 Diagrams showing forecasts of annual average daily traffic (AADT), 18-hour AAWT and percentage heavy goods vehicles on key roads are presented in the A38 Derby Junctions Traffic Forecasting Report (Ref 47071282/TP/05, August 2016).

6.4.19 A summary of 2024 and 2039 two-way AADT flows on the mainline A38 route for the Core Growth Scenario are provided in Tables 6/7 and 6/8 below.



**Table 6/7: 2024 Core Scenario AADT Flows**

A38 Section	DM AADT	DS AADT	Absolute Difference	% Difference
Kingsway-Markeaton	62,770	76,940	14,170	22.5
Markeaton-Kedleston Road	62,990	78,470	15,480	24.6
Kedleston Road-Palm Court	49,320	60,130	10,810	21.9
Palm Court-Little Eaton	52,850	60,480	7,630	14.4

**Table 6/8: 2039 Core Scenario AADT Flows**

A38 Section	DM AADT	DS AADT	Absolute Difference	% Difference
Kingsway-Markeaton	67,780	87,080	19,300	28.5
Markeaton-Kedleston Road	68,850	89,260	20,410	29.6
Kedleston Road-Palm Court	54,910	70,030	15,120	27.5
Palm Court-Little Eaton	59,000	69,700	10,700	18.1

6.4.20 In terms of reassignment effects within the Derby City area, the main differences in traffic flow can be summarised as follows;

- An increase in the total traffic flow between the DM and DS in all forecast years on the A38, on the A52 at Kirk Langley and the A52 at Borrowash, on the A6 at Allestree Park and on Kenilworth Avenue;
- The A61 northbound at Croft lane would increase in the daily total traffic flow between the DM and DS in all forecast years;
- The A52 westbound to the east of the Pentagon roundabout would increase in total traffic flow between the DM and DS in both 2024 and 2031, and flow would remain static in 2039;
- A decrease in total daily traffic flow between the DM and DS would be seen on Uttoxeter New Road, on the A50, on Chellaston Road and on the A6 Derby Spur in all forecast years;
- A decrease in the daily flow between the DM and DS in all forecast years would be witnessed on the A52 eastbound to the east of the Pentagon roundabout and on the A61 southbound at Croft lane.

## 6.5 Economic Assessment and Journey Time Reliability

6.5.1 An accident assessment was undertaken for the A38 Scheme using the COBALT (Cost and Benefit to Accidents – Light Touch) Accident Appraisal Program Version 2013.02.

6.5.2 The impact of the A38 Derby Junctions Scheme upon accidents was assessed over the standard 60-year appraisal period. The change in vehicle-kilometres travelled on each type of road was forecast by the traffic models and this data was used to calculate the change in the number of accidents that might be expected given fixed accident rates on each road type.

6.5.3 The numbers were evaluated in monetary terms and are presented in Table 6/9 in the standard form of 2010 market prices, discounted to a 2010 present value year.

**Table 6/9: Core Growth – Total Number of PIA and Casualties Saved**

Accident/Casualty Type	DM	DS	Savings
PIA	42,264	39,877	2,387
Fatal Casualty	426	421	5
Serious Casualty	5,252	5,093	159
Slight Casualty	51,593	48,577	3,016
Accident Cost (£millions)	£2,154.831	£2,062.085	£92.75

6.5.4 The Transport Economic Efficiency (TEE) of the scheme is calculated from TUBA assessments using only the local model for traffic flow changes.

6.5.5 The TUBA assessment assumes that the modelled periods are converted to annual benefits using the following factors in order to replicate the potential benefits to be accrued across a full year (i.e. 8760 hours):

- AM1, 253 hours
- AM2, 253 hours
- AM3, 253 hours
- PM1, 253 hours
- PM2, 253 hours
- PM3, 253 hours
- Inter-Peak, 1518 hours
- Evening, 759 hours
- Overnight, 2277 hours
- Weekend 'busy', 500 hours
- Weekend 'semi-busy', 900 hours
- Weekend 'non-busy', 1288 hours

6.5.6 The schemes core growth TEE benefits are shown in Table 6/10.

**Table 6/10: Core Growth TEE Table**

<b>Impact</b>	<b>Total</b>	<b>Personal</b>	<b>Freight</b>
Consumer – Travel Time	242,698		
Consumer – VOC	-23,694		
Consumer – During Construction	1,970		
<b>NET CONSUMER IMPACT</b>	220,974		
Business – Travel Time	132,879	51,570	81,309
Business - VOC	7,783	1,974	5,808
Business – During Construction	1,554	586	968
Subtotal			
Operating Costs			
Developer and other contributions			
<b>NET BUSINESS IMPACT</b>	142,216	54,130	88,085
<b>PRESENT VALUE OF TRANSPORT ECONOMIC EFFICIENCY BENEFITS</b>	363,190		

Note: All entries are discounted to a 2010 present value year, in 2010 market prices, in £ thousands.

6.5.7 The cost of the scheme in terms of public accounts is presented in Table 6/11. This value has been discounted to a 2010 present value year and converted to a market cost so that it may be included in the public accounts table on a comparable basis to the TEE benefits.

**Table 6/11: Public Accounts Table**

<b>Local Government Funding</b>	
Revenue	0
Operating costs	0
Investment costs	0
Developer Contributions	0
Grant/Subsidy Payments	0
<b>NET IMPACT</b>	0
<b>Central Government Funding - Transport</b>	
Revenue	0
Operating costs	18.9
Investment costs	151.9
Developer Contributions	0
Grant/Subsidy Payments	0
<b>NET IMPACT</b>	170.8
<b>Central Government Funding: Non – Transport</b>	
<b>Indirect Tax Revenues</b>	-18.126
<b>Broad Transport Budget</b>	170.8
<b>Wider Public Finances</b>	-18.126

Notes: All entries are discounted to a 2010 present value year at 2010 market prices, in £millions

- 6.5.8 The monetised evaluation of the scheme considers the TEE and Public Accounts values above alongside other monetised benefits (costs) such as road safety, carbon benefits and noise benefits.
- 6.5.9 The overall analysis of monetised costs and benefits is presented in Table 6/12.

**Table 6/12: Core Growth Analysis of Monetised Costs and Benefits (AMCB) Summary Table**

Noise	-7.024
Local Air Quality	3.44
Carbon Benefits	-14.90
Accident Benefits	92.75
Consumer User Benefits - Commuting	45.005
Consumer User Benefits - Other	175.968
Business User Benefits	142.216
Private Sector Provider Impacts	
Other Business Impacts	
Indirect Tax Benefits	18.126
Net Present Value of Benefits (PVB)	455.581
Local Government Funding	
Central Government Funding	170.8
Net Present Value of Costs (PVC)	170.8
Net Present Value (NPV)	284.6
Benefit Cost Ratio (BCR) (no units, rounded)	2.67

Notes: All entries are in market prices, at present values discounted to 2010, at 2010 market prices, in £ millions; except for the BCR figures as noted. .  
Summary does not include monetised journey time reliability benefits.

6.5.10 A supplementary economic analysis was undertaken to determine the change in economic benefit that could arise from the new economic parameter values due to be released in the November 2016 version of the DfT's TAG data book, and released as a beta version in July 2016.

6.5.11 The updates affect values of travel time savings (VTTS) both the 'starting point' values, and forecast changes, OGV fuel efficiency curves, and vehicle occupancy factors.

6.5.12 Table 6/13 shows the AMCB summary table based upon the Core Scenario assignments, but using the forthcoming November 2016 changes to VTTS in TUBA, taking the accident benefit and carbon benefits into account, and showing the PVB, PVC, NPV and BCR for the 60-year scheme analyses.

**Table 6/13: Core Growth Analysis of Monetised Costs and Benefits (AMCB) Summary Table – Using November 2016 VTTS**

Noise	-7.024
Local Air Quality	3.44
Carbon Benefits	-14.90
Accident Benefits	92.75
Consumer User Benefits - Commuting	66.084
Consumer User Benefits - Other	138.218
Business User Benefits	142.122.045
Private Sector Provider Impacts	
Other Business Impacts	
Indirect Tax Benefits	18.233
Net Present Value of Benefits (PVB)	418.846
Local Government Funding	
Central Government Funding	170.8
Net Present Value of Costs (PVC)	170.8
Net Present Value (NPV)	248.046
Benefit Cost Ratio (BCR) (no units, rounded)	2.45

Notes: All entries are in market prices, at present values discounted to 2010, at 2010 market prices, in £ millions; except for the BCR figures as noted. .  
Summary does not include monetised journey time reliability benefits.

6.5.13 Journey time reliability benefits were calculated on the basis of the method for 'Urban Roads' set out in Sections 6.3 and C3 of TAG unit A.1.3 'User and Provider Impacts', and taking into account the 'forthcoming change' version of the unit released in July 2016 and proposed to be implemented in November 2016.

6.5.14 The existing congestion at the three junctions has a detrimental impact on journey time reliability, and the Present Value of journey time reliability benefit has been

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calculated as £14 million (at 2010 market prices discounted to a 2010 present value year).. This suggests that implementation of the proposed scheme would improve journey time reliability.

## **6.6 Traffic and Economy Conclusions**

- 6.6.1 The scheme appraisal (using the Core Growth Nov 2016 VTTS) results in a BCR of 2.45. The DfT BCR benchmark is 2, which is considered high value for money. The A38 Derby Junctions scheme would therefore constitute high value for money under this forecasting scenario.

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## 7 SUMMARY OF OPERATIONAL ASSESSMENT

### 7.1 General

- 7.1.1 When the three junctions have been improved to become grade-separated, the A38 route will operate as a conventional dual two-lane all-purpose road (D2AP) with the national speed limit being in force apart from the section from just south of the Kingsway junction to just north of Markeaton junction where there will be a mandatory 50mph speed limit.
- 7.1.2 Each of the junctions has its own particular features that could impact the operation of the junction in terms of safety and driver behaviour. Not only driver safety is considered but also the safety of non-motorised users (NMUs). Each of the junctions will be looked at separately in the following sections.

### 7.2 A38/A5111 Kingsway Junction

- 7.2.1 This will be subject to a 50mph mandatory speed limit.
- 7.2.2 The northbound diverge and southbound merge slip roads have the requisite number of lanes and appropriate merge and diverge taper arrangements to comply with standards for the forecast traffic flows.
- 7.2.3 For the northbound merge slip road there will be a lane-gain arrangements. For this 2-lane slip road and the forecast traffic flows, the merge arrangement should be a 'lane gain with ghost island'. However, as ghost island arrangements are not permitted in an urban situation it is proposed to provide an urban merge (i.e. the two lanes are reduced to one before the back of the nose) with a lane gain. This arrangement is not contemplated by the standards hence a Departure from Standards will be required. It is considered that the 50mph speed limit through the junction will mitigate this Departure.
- 7.2.4 The southbound diverge slip road should be a parallel diverge with lane drop for the forecast traffic flows. This would require more widening of the Brackensdale south underbridge than originally contemplated. Analysis of the forecast traffic flows, however, show that it is only the morning peak hour flows that would require this level of slip road provision; for all other times of the day the proposed taper diverge with lane drop would be appropriate. This would still require a Departure from Standards but mitigation would be that the capacity is only exceeded for one hour per day and also the 50mph speed limit through the junction would provide further mitigation.
- 7.2.5 NMUs – it is proposed that the current level of NMU provision around the junction is maintained – all existing footways and cycleways will be retained on or close to their existing alignments and appropriate crossings provided wherever a link intersects. Investigations will be undertaken in the next design stage to determine whether there are opportunities to enhance this level of provision (e.g. by providing a footway/cycleway across the new bridge to provide a direct NMU link from Mackworth to the A5111).

### 7.3 A38/A52 Markeaton Junction

- 7.3.1 The number of lanes and the merge and diverge taper types of all of the slip roads for this junction comply with standards for the forecast traffic flows.



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- 7.3.2 The main challenge at this junction is the weaving length between the north side of the junction and the adjacent Kedleston Road junction. The minimum weaving length required by the design standards is 240m whereas we can only achieve 214m in the northbound direction and 174m in the southbound.
- 7.3.3 A GD04 Safety Risk Assessment has been carried out on this arrangement and it has been determined that the individual risk to a road user being involved in a fatal collision is less than 1 in 1.1 million – this is considered to be broadly acceptable by the GD04 standard (refer to Technical note ref. 47071319-URS-06-TN-RD-006 for details of the GD04 assessment).
- 7.3.4 NMUs – each arm of the roundabout has a high observed number of pedestrians crossing it. Currently, two of the arms have controlled crossings and two have uncontrolled crossings (one being a zebra crossing). Because of this high usage, it is proposed that all arms should have controlled NMU crossing facilities included in the scheme design to retain, and potentially enhance, the current level of usage
- 7.3.5 Because of the controlled NMU provision, it is also proposed that the vehicular movements around the Markeaton junction (for the A52 traffic and the A38 slip road traffic) should be fully signalised. This will serve to facilitate the pedestrian movements and also improve the capacity of the junction and allow the geometry to be made more compact to fit within the constrained urban location.
- 7.3.6 Further enhancements will be made to the current level of NMU provision as the existing pedestrian footbridge located some 350m to the north of the junction will be replaced under the scheme proposals. The replacement will comply with current requirements for disabled access (whereas the existing bridge doesn't). It will also have a cycleway compliant parapet that the current structure does not have (as it only has a standard pedestrian parapet).

#### **7.4 A38/A61 Little Eaton Junction**

- 7.4.1 The forecast traffic flows and the merge and diverge taper requirements suggest the northbound and southbound A38 to the north of the Little Eaton junction and the southbound A38 to the south of the junction should all have three traffic lanes. To provide for this would require the A38 to be widened over significant lengths and this is beyond the scope of the scheme – it is proposed to retain the existing 2 lane provision in each direction to the north and south of the junction.
- 7.4.2 Parallel merge and diverge tapers are proposed at each of the slip road as these are the closest to the lane gain and lane drop arrangements that would be required (if the number of lanes was increased each side of the junction). However, due to space constraints (particularly due to the River Derwent bridge to the south of the junction) it is proposed that urban standards for 85kph design speed are used (as this will reduce the taper, auxiliary lane and nose lengths). This will require the approval of a Departure from Standards and it is anticipated that the advisory 50mph speed limit through the junction will mitigate this Departure.
- 7.4.3 In order to minimise the footprint, the A38 main line through the junction has a horizontal curve with a radius of 255m. This represents 3 steps below the desirable minimum radius for a design speed of 100kph. Although this is a permitted relaxation, it has been decided that there should be an advisory 50mph speed limit through the junction (there will be no mandatory speed limit, i.e. the national speed limit will apply). Other mitigation including 7% superelevation and appropriate signing is also proposed.

- 7.4.4 To provide further assurance that there will not be a safety issue created by the proposed horizontal curve, a GD04 assessment has been carried out. This determined that the individual risk to a road user being involved in a fatal collision is less than 1 in 3 million – this is considered to be broadly acceptable by the GD04 standard (refer to Technical note ref. 47071319-URS-06-TN-RD-003 for details of the GD04 assessment).
- 7.4.5 NMUs – the north-south footway/cycleway along the west side of the A61 and B6179 will be retained through the junction. Signal controlled crossing of the south facing slip roads are proposed and the route will pass beneath the A38 using the west side of the west interchange bridge. The other footways and cycleways in the vicinity of the junction will be retained with local diversions as required.

## **7.5 Maintenance Assessment**

- 7.5.1 Discussions with the relevant highways maintainers has confirmed that there are safe means of conducting planned and unplanned maintenance on the completed scheme. Further detailed development of the maintenance requirements and operations will be undertaken in PCF Stage 3 through the Maintenance and Repair Strategy Statement (MRSS); this provides a strategy and guidance for the post implementation maintenance and repair of the highway assets related to the scheme.
- 7.5.2 Development of the MRSS commenced in PCF Stage 2 and consultation has taken place with relevant highway maintenance service providers and to appropriate standards to meet the Construction (Design and Management) Regulations 2015 (CDM).
- 7.5.3 The maintenance service providers are being updated of the design as it develops and are contributing to the final design solution.

## **7.6 Traffic Management Strategy**

- 7.6.1 The strategy for the deployment of temporary traffic management (TTM) incorporates the use of verge only TTM signs, in conjunction with safe taper positions. This will provide advance TTM signing coverage for all lane closures.

## **7.7 Meeting the Road Worker (Maintenance) Safety Objective**

- 7.7.1 To meet the road worker safety objective and Health and Safety (H&S) legislative requirements for road workers, the Scheme has incorporated a design for safe traffic management deployment (described above), rigid concrete barrier and recommends cyclical off peak lane closures to further rationalise maintenance activities
- 7.7.2 The safety assessment work that has been undertaken suggests that, provided the proposed mitigation measures are implemented, the safety objective for maintenance workers is likely to be met.

## **7.8 Further Updates**

- 7.8.1 The MRSS is a live document; it represents the current thinking at the time of writing. Any further developments that may result as the design develops will be incorporated into subsequent revisions of the document. For further details refer to the MRSS, document ref: 47071319-URS-06-RP-MS-001

## **7.9 Conclusion**

- 7.9.1 The proposed layout for the improvements to each of the three junctions will result in an arrangement that will be safe to operate in terms of motorised and non-motorised road users. The scheme will also provide an economic solution in terms of achieved benefits when compared with the cost of the scheme, this is explained in detail in Section 6 of this report. Additionally, the Maintenance and Repair Strategy will be further developed to ensure safe means of carrying out planned and unplanned maintenance are provided on the completed scheme.

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## **8 SUMMARY OF TECHNOLOGY AND MAINTENANCE ASSESSMENT**

### **8.1 Technology Assessment**

- 8.1.1 The A38 from junction 28 of the M1 to the M6 Toll near Lichfield has been identified as a possible 'expressway'. This is a length of some 63km. As the A38 Derby Junctions Improvement scheme represents two very short sections of this route (2.4km and 1.3km sections 4km apart), there would be very little benefit in providing full expressways standards on the improvements scheme if the remainder of the route is not being upgraded to expressway at the same time.
- 8.1.2 An exercise has been carried out to identify which features of the expressways standards would provide benefit if they were incorporated into the junctions scheme now so that the future aspiration of the route becoming an expressway would not be compromised, i.e. the junction improvement scheme would be future-proofed for later implementation of expressways standards. Refer to Technical Note 47071319-URS-06-TN-RD-022 for further details.
- 8.1.3 It was concluded that, due to the constraints of the urban environment (particularly in not being able to provide a scheme that could operate at the national speed limit), 'Expressway' standards would not be appropriate for the A38 Derby junctions scheme.

### **8.2 Technology**

- 8.2.1 The existing A38 around Derby has very limited communication infrastructure. A meeting was held in February 2015 attended by various members of Highways England Network Delivery Directive (NDD) and their maintenance contractors to discuss the potential for including technology in the scheme design. At this meeting it was concluded that there would be little benefit providing additional technology (such as MS4 signs) on the junction improvements in isolation without upgrading the route as a whole. There is no reason to change this conclusion at this stage.
- 8.2.2 For the communications it is assumed that the existing CCTV coverage at each junction would be retained (and potentially enhanced to ensure correct coverage); also, it is recommended a ducted network should be provided along the scheme length in both verges to facilitate future technology upgrades.

### **8.3 Maintenance of Technology Assessment**

- 8.3.1 As there is little or no new technology infrastructure required for the scheme, it is not expected that there will be any increase in the maintenance requirements for technology infrastructure.
- 8.3.2 Whatever maintenance is required (or will be required if additional technology assets are identified as being required in the future) will be addressed, along with the maintenance of the civil infrastructure, in the Maintenance and repair Strategy Statement (see Section 7 for further details).

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## 9 SUMMARY OF ENVIRONMENTAL ASSESSMENT AND ENVIRONMENTAL DESIGN

### 9.1 Introduction

9.1.1 This chapter initially summarises the environmental baseline conditions in the vicinity of the proposed scheme, followed by a summary of the environmental inputs to the selection of the proposed scheme. Thereafter, a summary of the potential environmental effects associated with proposed scheme construction and operation are detailed taking into account impact avoidance measures embedded into the proposed scheme design, and standard management activities that would be adopted.

### 9.2 Baseline Environmental Conditions

#### Air Quality

9.2.1 Derby City Council has declared two Air Quality Management Areas (AQMAs) for road traffic related pollution in the vicinity of the A38 through Derby as follows (see Figure 2.1 in Appendix 8):

- The Inner & Outer Ring-Road AQMA: declared for nitrogen dioxide (NO<sub>2</sub>), this is a large AQMA, but is restricted to properties within approximately 14m of specified parts of the city's inner and outer ring road;
- The Spondon AQMA: declared for NO<sub>2</sub>, this AQMA is limited to properties within a small area of Spondon including the A52 dual carriageway, Nottingham Road and Derby Road.

9.2.2 There are Defra National Air Quality Compliance model links within the air quality study area that are predicted to exceed EU Limit Value for NO<sub>2</sub> in 2015. However, there are no compliance links anticipated to exceed the EU Limit Value for NO<sub>2</sub> along the proposed scheme route in 2020 within the air quality study area.

9.2.3 There are numerous sensitive residential receptors located along the proposed scheme route and along adjoining routes which could be affected by the proposed scheme.

#### Cultural Heritage

9.2.4 The City of Derby has a rich and varied history, reflected in its upstanding structures and buried archaeological remains. The proposed scheme traverses an area to the north-west of the historic core of the city. The current A38 crosses the Derwent Valley Mills World Heritage Site, just south-west of the village of Little Eaton, and west of the village of Breadsall (both villages being designated as Conservation Areas and containing listed buildings) (see Figure 2.2 and 2.3 in Appendix 8). The proposed scheme passes the eastern edge of Markeaton Park with its associated listed buildings (the Grade II listed The Old School House, the Conservatory, Home Farmhouse, The Green and The Farm; the latter three listed buildings being situated within Markeaton Conservation Area). Other listed buildings close to the proposed scheme include a Grade II listed Toll House on Kedleston Road and three Grade II listed buildings on Ashbourne Road (Nos 161, 193 and 195).

9.2.5 The proposed scheme area also contains occasional prehistoric and Roman stray find spots, evidence for the industrialisation and expansion of Derby in the 19th and

20th centuries, improvements to transportation infrastructure and activity during the World Wars.

- 9.2.6 Palaeo-environmental and geoarchaeological deposits, and previously unknown buried archaeological remains, may also be preserved beneath or within alluvium deposits, close to the course of the River Derwent.

### Landscape and Visual

- 9.2.7 Baseline landscape and visual conditions at each of the junctions is summarised below:

- **A38/A5111 Kingsway junction** comprises existing highway bounded by public open space, designated as a green wedge, to the west. Kingsway junction is not well defined within the wider landscape due to the effect of topography, built form and intervening vegetation. The junction study area does not incorporate any areas of landscape value and quality at a national scale (e.g. National Park/Area of Outstanding Natural Beauty (AONB)). The landscape of the area has been included within the landscape character assessment published by Derbyshire County Council (Needwood and South Derbyshire Claylands Landscape Character Area (LCA) and the townscape character assessment published by Derby City Council. Overall, based on the factors contributing to landscape value, and given its scale and nature, Kingsway junction is assessed as being of low landscape value. Direct views of the junction are predominantly obtained from highway locations to the east. At present, the context of Kingsway junction is generally well lit as a result of the proximity of residential and highway land uses. Key sensitive visual receptors in the vicinity of Kingsway junction are: local residential properties, users or nearby NMU facilities (refer to NMU section below), and users of designated public open space located adjacent to the A38 off Greenwich Drive South and in Mackworth Park.
- **A38/A52 Markeaton junction** comprises existing highway and residential land bounded by Markeaton Park to the north and west. The junction is not well defined within the wider landscape due to the effect of topography, built form and intervening vegetation. The junction study area does not incorporate areas of landscape value and quality at a national scale (e.g. National Park/AONB). The landscape of the study area has been included within the landscape character assessment published by Derbyshire County Council (Needwood and South Derbyshire Claylands LCA) and the townscape character assessment published by Derby City Council. Overall, based on the factors contributing to landscape value, and given its scale and nature, Markeaton junction is assessed as being of low landscape value. Direct views of the junction are predominantly obtained from highway locations in the approach to the junction, as well as locations within Markeaton Park. The context of Markeaton junction is generally well lit at present as a result of the proximity of residential and highway land uses. Key sensitive visual receptors in the vicinity of Markeaton junction are: local residential properties, users or nearby NMU facilities (refer to NMU section below), and users of Markeaton Park.
- **A38/A61 Little Eaton junction** comprises existing highway, agricultural land, residential and commercial/retail premises. The junction study area does not incorporate areas of landscape value and quality at a national scale (e.g. National Park/AONB). The landscape of the study area has been included within the landscape character assessment published by Derbyshire County Council (Derbyshire Peak Fringe and Lower Derwent LCA) and the townscape character

assessment published by Derby City Council. The study area is considered to be of national and potentially international value given the inclusion of the Derwent Valley Mills World Heritage Site. Within the study area, there is a high level of conservation interests and recreational interests, as well as medium representativeness, fair landscape condition and medium scenic quality. Overall, taking these factors into account, the study area is considered to be of medium value. Direct views of Little Eaton junction are available on footpaths to the south and locations to the east of the junction. Views are restricted in places by topography and intervening vegetation. The context of Little Eaton junction is generally well lit as a result of the proximity of highway land uses. Key sensitive visual receptors in the vicinity of Little Eaton junction are: local residential properties, users or nearby NMU facilities (refer to NMU section below).

### Nature Conservation

- 9.2.8 There are no internationally designated sites, such as Special Protection Areas (SPAs) or Special Areas of Conservation (SACs) located within 2km of the proposed scheme. Additionally, there are no international sites specifically designated for bats, located within 30km of the proposed scheme. The nearest nationally important designated site is Breadsall Railway Cutting Site of Special Scientific Interest (SSSI), the western extent of which is located approximately 1.7km from the proposed scheme. The site is designated for its important grassland habitats.
- 9.2.9 There are seven Local Wildlife Sites (LWS) within 2km of Kingsway and Markeaton junctions (see Figure 2.4 in Appendix 8) - of these, five sites are considered to lie within the zone of influence and considered further for ecological assessment as follows: i) the A38 Roundabout LWS is located within the island of Kingsway junction and designated for its semi-improved neutral grassland; ii) Bramble Brook and Margins LWS is located adjacent to Kingsway junction and is designated for its secondary broad-leaved woodland; iii) Mickleover Railway Cutting LWS is located within approximately 50m of the site boundary at Kingsway junction and designated for its habitat mosaic (the LWS appears to have hydrological links to the site); iv) Markeaton Park LWS is located directly adjacent to the northern site boundary at Markeaton junction - the LWS is designated for its wood pasture and parks including veteran trees; v) the Markeaton Brook System LWS is located within 50m of the site boundary at Markeaton junction - the LWS is designated for its invertebrate assemblage (including white-clawed crayfish *Austropotamobius pallipes*). Markeaton Brook is also a Water Framework Directive (WFD) waterbody.
- 9.2.10 There are fifteen LWSs within 2km of Little Eaton junction (see Figure 2.5 in Appendix 8) - of these, four sites are considered to lie within the zone of influence and are considered further for ecological assessment as follows: i) Alfreton Road Grassland LWS is located to the south of A38 and is designated for its floodplain grassland which is semi-improved; ii) the River Derwent LWS is located adjacent to the western boundary of Little Eaton junction - the site is designated for its flowing water, river and associated streams; iii) Watermeadows Ditch LWS is located within approximately 600m, and to the south of Little Eaton junction - the site is designated for its standing open water and has hydrological links to the site through connecting watercourses; iv) Nooney's Pond LWS is located approximately 750m south of Little Eaton junction - the site is designated for its standing open water and has hydrological links to the site through connecting watercourses.
- 9.2.11 A wide range of habitats have been identified in the vicinity of the proposed scheme - this includes improved and semi-improved grassland, amenity grassland; arable

land, semi-natural broadleaved woodland, parkland, mixed/broadleaved and coniferous woodland, veteran trees, scattered trees, scattered and dense scrub; species-poor hedgerows standing and running water as well as areas of invasive non-native plant species.

9.2.12 These habitats support a wide range of legally protected species and other significant faunal species, namely amphibians, badger, potentially water vole, otter, bats, birds, white-clawed crayfish, terrestrial invertebrates and aquatic macroinvertebrates.

### **Noise and Vibration**

9.2.13 A total of six Important Areas (as defined in The Environmental Noise (England) Regulations 2006 (as amended 2008, 2009, 2010)) are located along the A38 within the 1km noise study areas, two of which extend along the A6 and A52 (Reference numbers 8006, 8005, 11628\*, 11627, 7976, 8245\* – refer to Figure 2.6 in Appendix 8). Further details of these Important Areas are provided in the PCF Stage 2 EAR, including round 2 mitigation proposals.

9.2.14 Baseline traffic noise conditions have been determined for the current baseline (2015), the future baseline in the opening year (2024) and the future baseline 15 years after opening (2039), via noise modelling of baseline traffic conditions.

9.2.15 In addition, a survey of existing baseline noise levels was completed at a selection of locations in the vicinity of the proposed scheme. The purpose of the baseline noise survey was to determine if the baseline traffic noise model was performing adequately, and to identify any other significant non-traffic related noise sources in the area. The results are also used in the construction noise assessment.

### **Road Drainage and the Water Environment**

9.2.16 Baseline water environment conditions at each of the junctions is summarised below:

- A38/A5111 Kingsway Junction
  - *Surface Water:* Bramble Brook (ordinary watercourse) and its associated tributaries are the only water features within the vicinity of Kingsway junction (see Figure 2.7 in Appendix 8). There are no records of any surface water abstractions.
  - *Groundwater:* According to the Environment Agency groundwater mapping<sup>5</sup>, bedrock is classified as a Secondary B aquifer; lower permeability layers which store and yield limited amounts of groundwater due to localised features (see Figure 2.10 in Appendix 8). The superficial deposits are considered to be unproductive strata i.e. low permeability deposits that have negligible significance for water supply or river base flow. These deposits are the Alluvium associated with Bramble Brook. Kingsway junction is not contained within a Source Protection Zone (SPZ), and there are no known groundwater abstractions.
  - *Flood Risk:* The Environment Agency Flood Map identifies Kingsway junction as being within Flood Zone 1 and is therefore classified as having a low risk of flooding from fluvial or tidal sources. However, there is a depression in the centre of the junction relative to carriageway level, which is occupied by Bramble Brook - the onward culvert of the Bramble Brook from the junction

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<sup>5</sup> Available at: <http://maps.environment-agency.gov.uk/wiyby/wiybyController?lang=e&topic=groundwater&layer=default&ep=map&layerGroups=default&scale=9&x=432737&y=335981#x=432737&y=335981&lg=3,10,&scale=7>.



has a restricted capacity resulting in the low lying areas of the junction forming an informal flood *storage* area. This provides flood risk benefits to the urbanised area of Derby downstream of the junction. The Derby City Council Level 1 Strategic Flood Risk Assessment (SFRA) Review undertaken in April 2013<sup>6</sup> identifies that Bramble Brook through Kingsway junction is located within Flood Zone 3 and is consequently at risk of fluvial flooding during a 1 in 100 year event. As such, the risk of fluvial flooding from Bramble Brook is considered to be high.

- A38/A52 Markeaton Junction
  - *Surface Water:* Surface water features within the vicinity of the junction include Markeaton Brook, Mackworth Brook, Markeaton Lake and Mill Pond (see Figure 2.8 in Appendix 8). There are no records of surface water *abstractions*.
  - *Groundwater:* According to the Environment Agency groundwater mapping, bedrock is classified as a Secondary A aquifer; permeable layers capable of supporting water supplies at a local rather than a strategic scale, and in some cases forming an important source of base flow to rivers. The superficial River Terrace Deposits are mapped as *Secondary B* aquifer; lower permeability layers which store and yield limited amounts of groundwater due to localised features (see Figure 2.10 in Appendix 8). According to the Environment Agency, Markeaton junction does not lie within a groundwater SPZ, and there are no known groundwater abstractions.
  - *Flood Risk:* The Environment Agency Flood Map indicates that Markeaton junction is located within Flood Zone 1, classified as having a 'low' risk of flooding from Main River fluvial or tidal sources, with an associated annual probability of less than the 1 in 1,000 year return period.
- A38/A61 Little Eaton Junction
  - *Surface Water:* Surface water features located within the vicinity of Little Eaton junction include the River Derwent, Dam Brook and Boosemoor Brook. The *River Derwent* is classified under the WFD as a 'main river'<sup>7</sup>. Dam Brook is a small tributary of the River Derwent and is classified as an ordinary watercourse i.e. it does not have its own WFD waterbody ID. Dam Brook is known to support a small population of white-clawed crayfish. Boosemoor Brook is classified as an ordinary watercourse and confluences with Dam Brook upstream from the junction. Records indicate that there are five surface water abstractions located less than 250m from the proposed scheme - of these two licences are held by Severn Trent Water for potable water abstractions from the River Derwent (see Figure 2.9 in Appendix 8).
  - *Groundwater:* According to Environment Agency groundwater mapping, both the bedrock and superficial deposits areas are classified as a Secondary A aquifer; permeable layers capable of supporting water supplies *at* a local rather than a strategic scale, and in some cases forming an important source of base flow to rivers. According to the Environment Agency, the majority of

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<sup>6</sup> Available online: <http://www.derby.gov.uk/environment-and-planning/planning/planning-evidence-base-9%20jan-2015/>

<sup>7</sup> Main rivers are a statutory type of watercourse in England and Wales, usually larger streams and rivers but also include some smaller watercourses. A main river is defined as a watercourse marked as such on a main river map and can include any structure or appliance for controlling or regulating the flow of water in, into or out of a main river. The Environment Agency's powers to carry out flood defence works apply to main rivers only. In England main rivers are designated by Defra.

Little Eaton junction site lies within SPZ3 (Total Catchment), although part of the proposed scheme encroaches into SPZ1 (Inner Zone) and SPZ2 (Outer Zone), associated with the River Derwent (see Figure 2.11 in Appendix 8). Records indicate there is one groundwater abstraction located less than 250m from the proposed scheme.

- *Flood Risk:* The Environment Agency Flood map data indicates that Little Eaton junction is located within the extent of the extreme flood outline, known as Flood Zone 2, with the western elements falling within or adjacent to Flood Zone 3. There are known flooding events on the Dam Brook where it flows through Breadsall.

## People and Communities

9.2.17 Baseline water environment conditions at each of the junctions is summarised below:

- **NMU Facilities:**
  - *A38/A5111 Kingsway junction:* Includes: National Cycle Route NR54 and NR68, Regional Cycle Route (RR) 66, the Brackensdale Avenue underbridge, uncontrolled pedestrian crossing of the A38 from Greenwich Drive North to Thurcroft Close, and a non-designated footway and cycle track from Brackensdale Avenue/Kingsway Park Close intersect to the A5111.
  - *A38/A52 Markeaton junction:* Includes: RR66, pedestrian crossings and cycle tracks at Markeaton junction, footpaths within Markeaton Park and shared cycle and pedestrian facilities along the A38, and Markeaton Park footbridge (over which traverses the Bonnie Prince Charlie Walk).
  - *A38/A61 Little Eaton junction:* Includes: NR54, NR 672, the Derwent Valley Heritage Way plus numerous local footpaths.
- **Community and Private Assets**
  - *A38/A5111 Kingsway junction:* Residential areas to the north-west of the junction (Mackworth housing estate), and to the north-east behind Kingsway Park Close; commercial and light industrial units to the north-east of the junction –includes commercial units on Kingsway Park Close and retail premises within the Kingsway Retail Park (including Sainsbury's, Homebase, Argos); Brackensdale Infant and Junior School located on Walthamstow Road to the west of the A38; area of designated public open space located adjacent to the A38 off Greenwich Drive South, plus public open space associated with Mackworth Park; the site of the Kingsway hospital that is being sequentially redeveloped.
  - *A38/A52 Markeaton junction:* Residential area to the south-west of the junction (located between Greenwich Drive North and the A52 Ashbourne Road), residential area to the south-west of the junction (south of the A52 Ashbourne Road), residential properties along Queensway to the north-east of the junction and properties to the north of the A52 Ashbourne Road beyond the Royal School for the Deaf; Annie Sutton Memorial Houses located at Sutton Close and Elizabeth Turner Almshouses located near to Sutton Close on Ashbourne Road; The Sanctuary Extra Care - Greenwich Gardens on Greenwich Drive North (supported retirement home); 46 Signal Squadron, a Territorial Army base is located to the south of the junction off Windmill Hill Lane; the Royal School for the Deaf is located to the east of Markeaton junction and accessed off the A52; University of Derby buildings off

Markeaton Street; McDonald's Restaurant and the Esso petrol station located off the A38 northbound carriageway to the south of the junction; Markeaton Park located immediately adjacent to the junction to the north-west (designated as public open space), connected via a footbridge to green space associated with Mill Pond located to the east of the A38.

- *A38/A61 Little Eaton junction*: Ford Farm Mobile Home Park and the property "Fourways" located to the north of the junction accessed off Ford Lane; R F Freeberne Plant Haulage Services located on Ford Lane; villages of Breadsall to the south-east of the junction, Allestree to the north-west, and Little Eaton to the north; Starbucks Coffee Shop and Subway restaurant located to the north of the junction, accessed off the B6179; garden centre accessed off the B6179 (Brantano shoe shop and the Brown and Green food store located within garden centre); former refuse tip to the west of the B6179 (Alfreton Road); STW treatment works off the B6179 to the north of the junction; David Ray Commercial (truck dealer) located to the north-west of the junction off Ford Lane; agricultural land to the south of Little Eaton junction.

### Materials, Geology and Soils

9.2.18 Potential sources of land contamination in the vicinity of the proposed scheme include the following:

- A38/A5111 Kingsway junction (Figure 2.12 in Appendix 8):
  - Rowditch Tip which is a historic landfill considered to be a former clay pit which has received inert, industrial, commercial, household, special waste and liquid sludge;
  - Dismantled railway line defined as a historic landfill site which received inert waste between 31 August 1981 and 31 March 1993.
- A38/A52 Markeaton junction (Figure 2.12 in Appendix 8):
  - Esso petrol station located adjacent to the western area of Markeaton junction;
  - Historic landfill located within the northern end of the proposed scheme extent (approximately 100m north of Markeaton junction);
  - Historic landfill located approximately 175m to the east of Markeaton junction - this was licenced to the Royal School of Deaf.
- A38/A61 Little Eaton junction (Figure 2.13 in Appendix 6):
  - Landfill located approximately 250m to the north north-west of the junction (Licensed Waste Management Facility) - licensed to take construction and demolition wastes, but not poisonous, noxious or polluting wastes;
  - Road haulage service and a commercial vehicle dealers located approximately 150m to the north-west of the junction;
  - The alignment of the former Derby Canal underlies Little Eaton junction, therefore Made Ground backfill underlies parts of the junction (see Figure 2.13 in Appendix 8).

9.2.19 The proposed scheme at Little Eaton has the potential to impact upon agricultural soils – an Agricultural Land Classification (ALC) investigation indicates that agricultural soils in the vicinity of Little Eaton junction are predominantly of ALC

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subgrades 3a and 3b (see Figure 2.14 in Appendix 8) (noting that subgrade 3a is deemed to be best and most versatile agricultural land).

### **Alternatives Considered and Environmental Effects**

- 9.2.20 Chapter 5 highlights the various alternative designs that have been evaluated during PCF Stage 2. Environmental issues and option performance against relevant environmental objectives formed a key part of the option assessment process (as detailed in Chapter 5).
- 9.2.21 The scheme-specific objectives (as confirmed within the Highways England Client Scheme Requirements) include the following environmental objectives:
- To minimise impacts on both the natural and built environment, including designated landscape/biodiversity features;
  - To seek to mitigate impacts on air quality or noise;
  - To ensure effective measures are in place to protect watercourses from pollutant spillage on the highway; and
  - To investigate and to encourage the use of environmentally friendly operations and products throughout the project life cycle.
- 9.2.22 Of the environmental objectives above, objectives 1 and 2 were taken into account during the two-stage evaluation process given that objectives 3 and 4 were considered to be business and usual objectives that would not influence option selection.
- 9.2.23 Of the options that passed the initial sifting process, the evaluation indicated that most options either had a low to reasonable fit with objectives 1 and 2. Nevertheless, the environmental implications of the various options were qualitatively evaluated and fed into the option selection process (as detailed in Chapter 5). Some of the options selected and taken forward for inclusion in the preferred scheme design were those options that would reduce environmental effects e.g. selection of Option K2 at Kingsway junction would reduce the loss of public open space as compared to the option published for consultation which includes a link road to Greenwich Drive South. However, of the alternative options considered at Little Eaton junction, the qualitative environmental assessment indicated that Option 3A and the Southern Sweep option would 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, the assessment indicated that while the Presented Option may not rank highest in each category or sub-category, in overall terms, the Presented Option performed the best, and that where the Presented Option would have a potentially greater impact than the alternative options, detailed mitigation strategies should be developed for each of these aspects in conjunction with key stakeholders.

## **9.3 Assessment of Environmental Effects**

- 9.3.1 Following the option assessment process as detailed in Chapter 5 and confirmation of the proposed scheme design, a PCF Stage 2 Environmental Assessment Report (EAR) was prepared following the guidance given in the Design Manual for Roads and Bridges (DMRB) Volume 11, Section 2, Part 6, Reporting of EIAs and supplemented by Interim Advice Note (IAN) 133/10 Environmental Assessment and the Planning Act 2008; IAN 125/09 Supplementary Guidance for Users of DMRB

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Volume 11 Environment Assessment; IAN 126/15 Environmental Assessment Screening and Determination; and IAN 125/15 Environmental Assessment Update.

9.3.2 The sections below provide a summary of the main EAR findings across the following topics which were scoped into the environmental assessment in accordance with DMRB, namely:

- Air quality;
- Cultural heritage;
- Landscape and visual impacts;
- Nature conservation;
- Geology and soils
- Materials;
- Noise and vibration;
- People and communities;
- Road drainage and the water environment; and
- Cumulative impacts.

9.3.3 The assessment of environmental effects reported in the EAR took into account impact avoidance measures embedded into the proposed scheme design, and standard management activities that would be adopted.

#### **Air Quality**

9.3.4 Proposed scheme construction activities have the potential to impact upon those sensitive receptors closest to the works – sensitive receptors are locations where members of the public may be exposed to and affected by air quality impacts (predominantly residential properties, but also schools, hospitals). Sensitive receptors identified for the construction phase dust assessment are those receptors closest to the proposed scheme route, and existing A38 sections which would be affected by construction works, up to a maximum distance of 200m away. Impacts may be generated due to dust emissions from construction activities such as earthworks and excavations; construction phase HGV movements; and additional traffic emissions due to construction phase traffic management. A range of measures are detailed herein which aim to minimise temporary effects due to fugitive emissions of dust during construction such that effects would not be considered to be significant. The quantitative assessment of emissions from construction phase HGVs and traffic management requires information that is not currently available – thus these issues have not been considered in detail, but will be assessed during the environmental assessment to support the DCO application using applicable information from a construction contractor.

9.3.5 A comparison between the results of the local operational air quality assessment and those links reported by Defra to the European Commission as non-compliant, has found that there are no affected links within the study area that is reported by Defra as non-compliant in 2020 and when projected to the proposed scheme opening year (2024). This indicates that the proposed scheme is at a no risk of non-compliance with the EU Air Quality Directive and an Air Quality Action Plan should not be required. In addition, during proposed scheme operation, as all receptors are predicted to experience annual average concentrations of nitrogen dioxide (NO<sub>2</sub>) and particulate matter (PM<sub>10</sub>) that are below the applicable objective in the proposed scheme opening year, both with and without the proposed scheme.

9.3.6 Taking into account the results of the construction phase assessments, the local operational assessment and the compliance risk assessment, it is concluded that overall the proposed scheme effects upon air quality would not be significant.

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## Cultural Heritage

9.3.7 An archaeological mitigation strategy would be adopted to facilitate proposed scheme construction. Archaeological mitigation may comprise archaeological watching brief, detailed excavation, archaeological trial trenching, test pitting, detailed geoarchaeological investigation, archaeological topographic survey, and historic building recording (photography) to Historic England standard. In addition, the proposed scheme landscape design would be developed to take account of heritage assets, whilst the proposed scheme design would be integrated with planned restoration works at Markeaton Park. With the implementation of these measures, the assessment indicates that following completion of the proposed scheme construction, there would be residual slight adverse effect on one heritage asset, namely the Derwent Valley Mills World Heritage Site. There would be neutral effects on nine other heritage assets, these being: potential archaeological and palaeo-environmental deposits along the River Derwent floodplain, Markeaton Park, the dismantled Derbyshire and North Staffordshire Extension Railway, and the Derby to Hurdlow turnpike road, Breadsall Manor, Ford Farm, Markeaton Park boundary wall, Breadsall Conservation Area, and features that contribute to the historic landscape character (field boundaries) at Little Eaton.

## Landscape and Visual Impacts

9.3.8 A Construction Environmental Management Plan (CEMP) would be prepared and implemented by the selected construction contractor which would include a range of best practice measures associated with mitigating potential environmental impacts e.g. limiting construction lighting and signage to that which is absolutely necessary to reduce additional visual clutter and minimise effects on both landscape character and visual amenity. The proposed scheme design includes an appropriate landscape design which incorporates tree and shrub planting.

9.3.9 With the implementation of these measures, the assessment indicates that the proposed scheme has the potential to generate a range of landscape and visual effects which change over time. During the proposed scheme construction, the landscape effects in the vicinity of each junction are anticipated to be of negligible to minor significance. However, visual effects upon 18 representative viewpoints (see Figure 2.15 in Appendix 8) and viewpoint locations within the study area during the construction phase have the potential to range from negligible significance to major significance, depending on the receptor sensitivity and the predicted impact magnitude. Views from viewpoint 18 (view from National Cycle Route NR54 as it passes through the public open space adjacent to Greenwich Drive South near Kingsway junction) is predicted to experience adverse effects of major significance during the construction phase, whilst viewpoint 6 (view from the Derwent Valley Heritage Way located to the south of Little Eaton junction) is predicted to experience adverse effects of moderate significance during the construction phase. All other construction phase visual effects upon selected viewpoints are predicted to be of minor or negligible significance.

9.3.10 During the proposed scheme operation, landscape effects at Kingsway junction and Markeaton junction are anticipated to be of negligible significance (Year 1 and Year 15), whilst at Little Eaton junction landscape effects are predicted to be of negligible or minor significance at proposed scheme opening (Year 1), reducing to be of negligible significance following maturation of the proposed scheme landscaping (Year 15). During the proposed scheme operation, visual amenity effects at Kingsway junction are predicted to range from negligible to major significance at

proposed scheme opening (Year 1) (depending on the receptor sensitivity and the predicted impact magnitude), reducing to be of negligible to moderate significance following maturation of the proposed scheme landscaping (Year 15). At Markeaton junction visual effects are predicted to range from negligible to minor significance at proposed scheme opening (Year 1) and following maturation of the proposed scheme landscaping (Year 15). At Little Eaton junction, visual effects are predicted to be of negligible to major significance at proposed scheme opening (Year 1), reducing to be of negligible to minor significance following maturation of the proposed scheme landscaping (Year 15).

### **Nature Conservation**

9.3.11 The construction phase would be the most disruptive period for ecology and nature conservation. Thus applicable ecological mitigation measures would be incorporated into the CEMP in order to ensure construction of the proposed scheme complies with legislation relating to ecology and protected species. Prior to commencement of construction, a Construction Ecological Management Plan (EcoCEMP) would also be produced as part of the overarching CEMP - this would identify risks of ecological and environmental harm and set out method statements, designs and protocols to minimise the risk of pollution events or other environmental harm during the construction period. It is the aim that the proposed scheme can be fully mitigated within the proposed scheme boundary to deliver no-net loss of biodiversity. This would be achieved through the implementation of mitigation measures including: the retention, protection and creation of habitats on-site; the potential creation and enhancement of habitats at off-site mitigation areas located adjacent to the proposed scheme; enhancement of new and existing habitats with regard to protected and notable species (including the provision of mammal ledges within culverts for otter, and improvement of riparian habitats for water vole, white-clawed crayfish and amphibians); and protection of fauna in the long-term, for example through the incorporation of screening and shelterbelts for barn owl, lapwing and farmland bird species as well as wildlife fencing and underpasses for otter and badger. If no net-loss, using areas within the proposed scheme boundary could not be achieved, opportunities would be explored for the creation and/or enhancement of habitats at off-site mitigation areas, which would ideally be located adjacent to the proposed scheme.

9.3.12 With implementation of defined mitigation measures in the long term, when planting and new habitats have become established and mitigation is maintained and managed, the only significant residual effects of the proposed scheme with regard to nature conservation would relate to the A38 Roundabout LWS at Kingsway junction and the Alfreton Road Grassland LWS at Little Eaton junction. The significance of the effect on both these receptors would be moderate negative at the County/Unitary Authority level. This would be due to complete loss of the A38 Roundabout LWS at Kingsway junction and the partial-loss (approximately 22%) of Alfreton Road Grassland LWS at Little Eaton junction. However, given the further mitigation and enhancement measures proposed which would improve the wildlife corridor function of the proposed scheme relative to the existing scheme, there is potential for there to be an overall slight positive effect on nature conservation at the local level in the medium to long-term.

### **Geology and Soils**

9.3.13 There are a number of locations along the proposed scheme where contaminated materials may be encountered (e.g. areas of historic landfilling in the vicinity of

Kingsway junction and Little Eaton junction), whilst agricultural soils in an area of approximately 5.74ha would be lost at Little Eaton junction. However, with appropriate design of the proposed scheme taking into account prevailing ground conditions, and adherence to appropriate construction and operational practices that accord with legal compliance and best practice guidance when working with or around contaminated materials, effects associated with soils and geology are predicted to be of no more than minor significance.

### **Materials**

9.3.14 The proposed scheme would require primary aggregates and a wide array of construction materials. In addition, the proposed scheme would generate a range of waste types, primarily inert, non-hazardous and hazardous wastes. The majority of wastes produced would be inert construction and demolition wastes. There are a wealth of mineral resources within the Derbyshire region, such that materials required for the proposed scheme could be sourced locally in order to minimise material travel distances. No material resources have been identified that are considered to be rare or scarce, whose use could result in its depletion. The types of waste expected to be generated during proposed scheme construction, and the associated volumes, are not anticipated to have a significant adverse effect upon the availability and capacity of local waste treatment and recovery operations.

### **Noise and Vibration**

9.3.15 Given the very close proximity of receptors of high sensitivity to the proposed scheme (predominantly residential properties, but also educational buildings, hospitals and places of worship), there is the potential for large adverse construction noise effects. The risk of construction vibration induced building damage is considered to be very low, whilst the risk of annoyance due to construction vibration would be limited to the very closest receptors to the proposed scheme (such receptors are estimated to potentially experience moderate adverse effects). Currently available construction traffic volumes are estimated to have a negligible impact on existing traffic noise levels along the A38, resulting in a slight adverse effect.

9.3.16 The magnitude of the impact of the proposed scheme in terms of changes in road traffic noise levels at sensitive receptors ranges from moderate beneficial to major adverse in the short term. A total of approximately 9,500 residential properties are located in the quantitative noise study area. The significance of the effect at residential receptors is, therefore, classed as ranging from moderate beneficial to large adverse. Considering the number of residential buildings affected, the significance of the noise effect in the short term is slight adverse at the majority of residential buildings (around 94% which would experience a negligible or minor noise increase in the daytime). The significance of effect is classed as moderate or large adverse at around 1% of residential buildings, although the results should be treated with caution for receptors located on roads with very low flows. A large adverse significant noise effect is predicted at the Royal School for the Deaf. A slight beneficial noise effect is anticipated at around 3% of residential properties and a neutral effect at around 2% of residential properties. The magnitude of the impact of the proposed scheme in terms of annoyance due to operational vibration at residential properties is classed as negligible adverse, thus the significance of effect is classed as slight adverse. The magnitude of the impact of the proposed scheme on traffic noise levels on affected routes beyond the 1km study area is minor adverse or minor beneficial, due to re-routing of traffic due to the proposed scheme. The



significance of the effect is classed as slight adverse on roads which would experience an increase in re-routing traffic, and slight beneficial on those that would experience a reduction.

9.3.17 During the environmental assessment to support the DCO application, the noise and vibration impact assessment as presented herein will be revisited with the aim of further reducing the significance of potential effects. In particular, the construction assessment will aim to further develop specific mitigation measures taking advice from a construction contractor, whilst the operational noise assessment will be updated (with any proposed scheme design evolutions and traffic data) in order to develop firm proposals for additional noise mitigation measures (e.g. such as noise barriers to shield specific receptors). Such mitigation measures will aim to reduce the significance of noise effects as reported herein.

### People and Communities

9.3.18 The people and communities assessment indicates the following:

- **NMUs:** Planning of the proposed scheme construction works would be undertaken in order to minimise the need to close/divert NMU facilities, and minimise closure/diversion durations. Nevertheless, the proposed scheme would potentially result in a temporary adverse effect on a number of pedestrian and cyclist facilities during the construction phase due to route diversions, inaccessibility to routes and loss of amenity. The NMU facilities included in the proposed scheme design aim to provide at least the level of NMU provision that exists at present with enhanced provisions where deemed appropriate and reasonable. The NMU facilities included in the proposed scheme design would generate a long-term moderate beneficial effect with regard to encouraging more NMU facility use due to improved amenity/convenience and/or perception of safety.
- **Vehicle travellers:** The proposed scheme would result in a slight adverse effect on drivers' view at Kingsway and Markeaton junctions due to the road being in deep cutting, while at Little Eaton junction there would be a beneficial effect as travellers on the A38 would travel over embankment with open views of the surrounding area (partially screened by highway infrastructure), whilst travellers using the slip roads and the enlarged roundabout at existing ground level would have intermittent views. With regard to driver stress, the proposed scheme construction works would be undertaken in a manner to minimise driver stress, whilst proposed scheme operation would reduce delays, with knock on benefits for driver stress.
- **Demolition of private property:** The proposed scheme would result in a large adverse effect due to building demolition at Queensway (15 detached residential properties) and on the A52 Ashbourne Road (two semi-detached properties), and a moderate adverse effect due to land-take from four residential properties to reconfigure the access to Sutton Close off Ashbourne Road. Other land-take effects upon private property (namely, loss of curtilage land from industrial premises and some land to the rear of existing retail premises due to construction of the link road from Kingsway Park Close to Kingsway junction, and land-take of managed grassland from the Territorial Army base near Markeaton junction) would be slight adverse.
- **Loss of land used by the community:** The proposed scheme would result in a slight adverse effect due to loss of approximately 1,846 m<sup>2</sup> designated public

open space (at Kingsway junction and Markeaton junction), reducing to a neutral effect with the provision of public open space exchange land at Queensway.

- **Effects on development land:** No areas covered by current planning applications would be directly impacted by the proposed scheme, although the proposed scheme design at Markeaton junction would need to be integrated with Markeaton Park restoration plans.
- **Community facilities and severance:** Closure of existing accesses to/from the A38 during proposed scheme construction would have slight adverse effects (severance), except for the Ford Lane closure which is considered to constitute a moderate adverse effect in terms of community severance. During proposed scheme operation, the proposed scheme would deliver an overall long-term moderate beneficial effect upon community severance due to the segregation of local and through traffic which would reduce severance and increase journey reliability.
- **Effects on agricultural land and individual farm units:** The proposed scheme would have potential moderate adverse effects on two land holdings at Little Eaton junction, although only one holding (turf production site) is engaged in commercial agriculture - alternative access arrangements for the turf production site are subject to further investigation which would reduce effects to non-significant levels.

### Road Drainage and the Water Environment

9.3.19 The main sensitive water bodies in the vicinity of the proposed scheme are Bramble Brook at Kingsway junction; Markeaton Lake and Mill Pond at Markeaton junction; and Dam Brook and the River Derwent at Little Eaton junction. With adherence to best practice construction procedures and with the provision of an appropriate surface water management system, effects upon surface water and groundwater resources would not be significant. The assessment indicates, however, that flood storage/compensation areas would be needed at Kingsway junction and Little Eaton junction, which have the potential to mitigate flood risk effects to non-significant levels.

### Cumulative Effects

9.3.20 An assessment has been undertaken to assess the potential for the accumulation of several different effects from the proposed scheme upon specific locations, and for the proposed scheme's effects to interact with those associated with other projects – so called "cumulative" effects.

9.3.21 Some receptors in proximity to the proposed scheme have the potential to experience combined impacts associated with air quality, noise, severance and visual intrusion during proposed scheme construction and operation. The construction phase mitigation measures to be included on the CEMP (and as detailed in this EAR) have the aim of controlling individual impacts as well as the potential for cumulative effects – any such cumulative effects would be temporary, but potentially locally significant.

9.3.22 A review of major development schemes located in close proximity to the proposed scheme has been undertaken in order to assess whether any have the potential to generate cumulative effects due to their spatial and/or temporal interaction with the proposed scheme. This review identified eight such developments where the potential for cumulative effects was worthy of consideration. The assessment undertaken indicates that significant cumulative effects as associated with these

other developments are not anticipated, although such developments would result in the potentially significant cumulative loss of local ecological habitats. It is thus recommended that opportunities for a coordinated ecological mitigation approach with the Kingsway Hospital site development and the Markeaton Park restoration works are explored where there is an overlap in the zone of influence and/or an overlap of construction works – such an approach would have the potential to reduce cumulative ecological habitat losses to non-significant levels.

## 9.4 Presentation of Key Environmental Issues

- 9.4.1 The EAR indicates that the integration of impact avoidance and mitigation features into the proposed scheme design and through adherence to good construction site practices and operational management practices, most potential environmental effects would be reduced to non-significant levels (i.e. minor or negligible effects). Where potential moderate or major/large effects have been identified, some of these would be temporary construction phase effects (e.g. noise, visual, ecological, NMU facilities and severance) that would reduce during the proposed scheme operational phase due to maturation of landscape/ecological planting and the segregation of local and through traffic which would reduce severance and increase journey reliability. During the environmental assessment to support the DCO application, further environmental mitigation requirements will be investigated with the aim of reducing identified moderate or major/large effects – this includes the development of specific noise mitigation measures such as noise barriers to shield specific sensitive receptors. Proposed scheme construction would, however, result in a potential large adverse effect due to demolition of properties at Markeaton junction and moderate negative effects (at a County/Unitary Authority level) due to habitat loss at the A38 Roundabout LWS (located within the existing Kingsway junction) and the Alfreton Road Grassland LWS (located to the south of the existing Little Eaton junction). Proposed scheme operation is anticipated to deliver long-term environmental benefits with regard to the provision of NMU facilities, reducing driver stress and community severance. In addition, the proposed approach to ecological mitigation and enhancement has the potential to improve the wildlife corridor function of the proposed scheme relative to the existing scheme, potentially resulting in an overall slight positive effect on nature conservation at the Local level in the medium to long term.
- 9.4.2 Table 9/1 provides a summary of identified key significant environmental effects as defined above as identified within the EAR, highlighting those effects that have been assessed as being moderate or major/large (includes both beneficial and adverse effects).

**Table 9/1: Summary of Environmental Effects Assessed as Moderate or Major/Large (Adverse and Beneficial)**

Stage	Ref.	Description of Effect	Summary of Proposed Mitigation	Further Mitigation Requirements	Residual Effect
<b>Air Quality</b>					
As detailed in Chapter 5: Air Quality, no air quality effects assessed as being of moderate or major/large (identified air quality effects assessed as being not significant).					
<b>Cultural Heritage</b>					
As detailed in Chapter 6: Cultural Heritage, no cultural heritage effects assessed as being of moderate or major/large (all identified effects assessed as being neutral or slight adverse – refer to Chapter 6 for details).					
<b>Landscape and Visual</b> (as detailed in Chapter 7: Landscape, effects defined as moderate or major are identified below – all other identified effects assessed as negligible or minor adverse – refer to Chapter 7 for details).					
Construction	LV01	Visual effect of construction activity (including movement and noise) on Viewpoint 18 (NR54 within Greenwich Drive South open space adjacent to Kingsway junction)	Best practice construction methods – see Section 7.7 (to be included in the CEMP)	N/A	Major adverse (temporary)
Operation	LV02	Visual effect of operational scheme on Viewpoint 18 (Year 1 and Year 15)	Landscape planting and appropriate on-going landscape maintenance	N/A (maturation of landscape planting reduces effect with time)	Major adverse at Year 1, reducing to moderate adverse by Year 15
Construction	LV03	Visual effect of construction activity (including movement and noise) on Viewpoint 6 (Derwent Valley Heritage Way at Breadsall Footpath 7 near Little Eaton junction)	Best practice construction methods – see Section 7.7 (to be included in the CEMP)	N/A	Moderate adverse (temporary)
Operation	LV04	Visual effect of operational scheme on Viewpoint 6 (Year 1)	Landscape planting and appropriate on-going landscape maintenance	N/A (maturation of landscape planting reduces effect with time)	Major adverse, reducing to minor adverse by Year 15
Operation	LV05	Visual effect of operational scheme on Viewpoint 4 (Year 1) (Breadsall Footpath 2 near Little Eaton junction)	Landscape planting and appropriate on-going landscape maintenance	N/A (maturation of landscape planting reduces effect with time)	Moderate adverse (summer), minor adverse – winter Year 1; reducing to minor adverse (summer), negligible adverse

Stage	Ref.	Description of Effect	Summary of Proposed Mitigation	Further Mitigation Requirements	Residual Effect
					(winter) by Year 15
<b>Nature Conservation</b> (as detailed in Chapter 8: Nature Conservation, effects defined as moderate or large are identified below – all other identified effects assessed as neutral or slight negative/positive – refer to Chapter 8 for details)					
Construction	NC01	Habitat loss at A38 Roundabout LWS	Appropriate environmental design and management as detailed in Section 8.7 (to be included in the CEMP)	Opportunities would be explored for the translocation of grassland habitats to off-site receptor areas, potentially located adjacent to the proposed scheme at Mackworth Park, and associated habitat enhancements.	Moderate significant negative effect at the County/Unitary Authority level
Construction	NC02	Habitat loss at Alfreton Road Grassland LWS	Appropriate environmental design and management as detailed in Section 8.7 (to be included in the CEMP)	Opportunities would be explored for the translocation of grassland habitats to off-site receptor areas, potentially located adjacent to the proposed scheme at Mackworth Park, and associated habitat enhancements.	Moderate significant negative effect at the County/Unitary Authority level
Construction and operation	NC03	Habitat loss of semi-natural broadleaved woodland	Appropriate environmental design and management as detailed in Section 8.7	Opportunities for the creation of semi-natural broadleaved woodland within and adjacent to the proposed scheme would be pursued. Opportunities for the enhancement of woodland habitats adjacent to the proposed scheme would also be explored with the aim of enhancing connectivity. More woodland would be planted than lost, and enhancement through the provision of other features e.g. dead wood piles and understorey planting with native herb species would ensure replacement woodland is of higher quality than that lost.	Moderate significant negative effect at the County/Unitary Authority level, in the short to medium term <sup>8</sup> , changing to slight significant positive effect in the long-term at the Local level <sup>9</sup> once replacement planting has established.
Construction and operation	NC04	Loss of habitats of value to foraging and commuting bats	Appropriate environmental design and management as detailed in Section 8.7	To compensate for habitat losses, provision would be made for the creation and enhancement of habitats of value to foraging and commuting bats at both on- and off-site mitigation areas associated with the proposed scheme of equivalent size and value to foraging bats. Linear habitat features including	Moderate significant negative effect at up to the County/Unitary Authority level in the short term <sup>10</sup> , changing to a slight positive significant effect in

<sup>8</sup> 'Short-term' in regards to woodland is considered to be in the region of 5 to 10 years; 'medium-term' 10 to 15 years; and 'long-term' > 15 years.

<sup>9</sup> The positive significant effect is not considered to be at the same level the resource is valued at i.e. the effect is considered to be more significant at a Local rather than County/Unitary Authority level, given the time for habitat to establish.

<sup>10</sup> 'Short-term' in regards to bats is considered to be in the region of 1 to 2 years; 'medium-term' 2 to 5 years; and 'long-term' > 5 years

Stage	Ref.	Description of Effect	Summary of Proposed Mitigation	Further Mitigation Requirements	Residual Effect
				hedgerows would also be incorporated into the landscape design to enhance ecological connectivity within and across the proposed scheme, and into the wider landscape. Opportunities for further reducing construction impacts on foraging and commuting bats through the provision of advance planting and the phasing of vegetation clearance would also be explored.  Monitoring of bat crossing points would be undertaken during and post-construction to ensure mitigation measures are adequate and effective.	the medium to long term at the Local level <sup>11</sup> once replacement planting has established.
Construction and operation	NC05	An assemblage of terrestrial invertebrates, including notable species recorded at various locations within the extent of the proposed scheme – loss of habitat	Appropriate environmental design and management as detailed in Section 8.7	Habitat creation to compensate for that lost at least on a 1:1 ratio. Opportunities for enhancing habitat e.g. road side verges; varied topography and log piles. Felled trees would be retained on site as whole boughs and trunks which would benefit invertebrates. Plant species would be beneficial for notable species. Potential translocation of grassland habitat to off-site mitigation areas from the A38 Roundabout LWS at Kingsway may also be beneficial for invertebrate species.	Moderate significant negative effect at up to County/Unitary Authority level in the short term <sup>12</sup> , changing to a slight significant positive effect at the Local level <sup>13</sup> in the medium to long term once replacement planting has established.
Construction and operation	NC06	Foraging and commuting bats - a breeding population of whiskered bats in the vicinity of Little Eaton junction. Effects due to killing/injury through collision with motor vehicles.	Appropriate environmental design and management as detailed in Section 8.7	Planting of linear features and other habitats to compensate for that lost. Careful design of landscaping to encourage bats towards the flood arch underpass would assist in minimising impacts.	Large significant negative effect in the short-term <sup>14</sup> at up to the Regional level; reducing to no significant (neutral) effect in the medium to long term once planting has established.
Construction and operation	NC07	Foraging and commuting bats - populations of common species (common pipistrelle; soprano pipistrelle) at various locations	Appropriate environmental design and management as detailed in Section 8.7	Planting, including linear features across the proposed scheme, would be undertaken to compensate for that lost. Dense and interspersed planting to facilitate bats continuing to use the flyway across the A38 at Markeaton would be incorporated into	Moderate significant negative effect in the short term <sup>15</sup> at up to the County/Unitary Authority level; reducing to not significant

<sup>11</sup> The positive significant effect is not considered to be at the same level the resource is valued at i.e. the effect is considered to be more significant at a Local rather than County/Unitary Authority level, given the time for habitat to establish.

<sup>12</sup> 'Short-term' in regards to terrestrial invertebrates is considered to be in the region of 1 to 2 years; 'medium-term' 2 to 5 years; and 'long-term' > 5 years

<sup>13</sup> The positive significant effect is not considered to be at the same level the resource is valued at i.e. the effect is considered to be more significant at a Local rather than County/Unitary Authority level, given the time for habitat to establish.

<sup>14</sup> Short-term' in regards to bats is considered to be in the region of 1 to 2 years; 'medium-term' 2 to 5 years; and 'long-term' > 5 years

<sup>15</sup> Short-term' in regards to bats is considered to be in the region of 1 to 2 years; 'medium-term' 2 to 5 years; and 'long-term' > 5 years

Stage	Ref.	Description of Effect	Summary of Proposed Mitigation	Further Mitigation Requirements	Residual Effect
		including at the River Derwent, Markeaton Park and Earl of Harington Lake. Effects due to killing/injury through collision with motor vehicles.		the landscape design.	(neutral) in the medium to long term once planting has established.
<b>Geology and Soils</b>					
As detailed in Chapter 9: Geology and Soils, no effects assessed as being of moderate or major/large (all identified effects identified assessed as being negligible to minor adverse – refer to Chapter 9 for details).					
<b>Materials</b>					
As detailed in Chapter 10: Materials, no effects assessed as being of moderate or major/large (all identified effects identified assessed as being not significant – refer to Chapter 10 for details).					
<b>Noise and Vibration</b> (as detailed in Chapter 11: Noise and Vibration, effects defined as moderate or large (adverse and beneficial) are identified below – all other identified effects assessed as slight adverse/beneficial – refer to Chapter 11 for details)					
Construction noise	NV01	Construction noise effects upon residential properties, educational and medical facilities of high sensitivity	Best practice mitigation measures – see Section 11.7	The need for specific mitigation measures to be defined during the DCO environmental assessment with advice from construction contractor – such measures have the aim of reducing the significance of potential effects.	Potential for large adverse (temporary) – may be reduced with additional mitigation
Construction vibration - annoyance	NV02	Construction vibration effects upon residential properties, educational and medical facilities of high sensitivity	Best practice mitigation measures – see Section 11.7	The need for specific mitigation measures to be defined during the DCO environmental assessment with advice from construction contractor – such measures have the aim of reducing the significance of potential effects.	Potential for moderate adverse (temporary) – may be reduced with additional mitigation
Operational road traffic noise inside the detailed noise prediction study area	NV03	Operation noise effects upon residential properties, educational and medical facilities of high sensitivity – includes the Royal School for the Deaf located east of Markeaton junction	Use of low noise surfacing across the proposed scheme. Proposed scheme design would place A38 mainline at Kingsway junction and Markeaton junction within deep cuttings	Areas of potential additional mitigation identified - to be confirmed during DCO environmental assessment. Includes noise barriers to shield specific sensitive receptors such as the Royal School for the Deaf.	Large adverse (i.e. at the Royal School for the Deaf) to moderate beneficial (permanent) – adverse effects may be reduced with additional mitigation
<b>People and Communities</b> (as detailed in Chapter 12: People and Communities, effects defined as moderate or large (adverse and beneficial) are identified below – all other identified effects assessed as neutral or low/minor/slight adverse/beneficial – refer to Chapter 12 for details)					
Construction	PC01	Markeaton Park footbridge –	Good construction site practices, minimise closure	N/A	Moderate adverse (temporary)

Stage	Ref.	Description of Effect	Summary of Proposed Mitigation	Further Mitigation Requirements	Residual Effect
		closure and diversions	requirements and temporary diversions plus appropriate community communications		
Construction	PC02	Bonnie Prince Charlie Walk (National Trail) – closure and diversions	Good construction site practices, minimise closure requirements and temporary diversions plus appropriate community communications	N/A	Moderate adverse (temporary)
Operation	PC03	Regional Cycle Route 66 (Markeaton junction); Pedestrian crossings and cycle tracks at Markeaton junction; Markeaton Park access; National Cycle Route 54 at Little Eaton junction	Incorporation of NMU facilities into the proposed scheme design	N/A	Moderate beneficial
Construction	PC04	Demolition of private property: <ul style="list-style-type: none"> <li>Demolition of 15 residential properties on Queensway and 2 semi-detached properties on A52 Ashbourne Road;</li> <li>Land-take from 4 residential properties to reconfigure access to Sutton Close off Ashbourne Road.</li> </ul>	Proposed scheme design aims to minimise land take requirements outside existing highway boundary Affected landowner compensation	N/A	Large adverse (demolition)  Moderate adverse (residential land-take)
Construction	PC05	Community severance – closure of Ford Lane	Proposed scheme design aims to segregate local and through traffic – requires some accesses to/from the A38 to be closed	N/A	Moderate adverse
Operation	PC06	Community severance	Proposed scheme design aims to segregate local and through traffic – requires some accesses to/from the A38 to be closed	N/A	Moderate beneficial



Stage	Ref.	Description of Effect	Summary of Proposed Mitigation	Further Mitigation Requirements	Residual Effect
Operation	PC07	Effects on agricultural land holdings (Little Eaton junction)	Proposed scheme design aims to minimise land take requirements outside existing highway boundary, as well as enable continued access	Further investigation of access arrangements for turf production site	Moderate adverse effect on two holdings (only turf production site is engaged in commercial agriculture) - alternative access for the turf production site would reduce effects to non-significant levels Moderate/minor effect on 1 holding
Operation	PC08	Vehicle travellers – driver stress	Appropriate design of proposed scheme and landscape planting	N/A	Large beneficial
<b>Road Drainage and the Water Environment</b>					
As detailed in Chapter 13: Road Drainage and the Water Environment, no effects assessed as being of moderate or major/large (all identified effects identified assessed as being neutral to slight adverse – refer to Chapter 13 for details).					
<b>Cumulative Effects</b>					
As detailed in Chapter 14: Assessment of Cumulative Effects, no effects assessed as being of moderate or major/large (all identified effects identified assessed as being not significant or minor adverse – refer to Chapter 14 for details)					

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## 9.5 Sources of Information

9.5.1 The information as presented herein is sourced from the PCF Stage 2 Environmental Assessment Report (EAR) and the Environmental Risk Assessment (ERA) Report.

## 9.6 Consultations

9.6.1 Consultation activities have been undertaken with statutory and non-statutory organisations throughout the development of the proposed scheme design and the assessment of options. Ad hoc consultation with statutory and non-statutory bodies by environmental disciplines includes consultation with the Environment Agency, Derby City Council, Derbyshire County Council, the Derbyshire Wildlife Trust, Natural England, Severn Trent Water, the A38 highway maintaining agent etc.

9.6.2 Of note is that the 2015 Scoping Report which highlighted the environmental topics to be considered with the EAR, and the assessment methods to be applied, was submitted to a range of statutory advisors for comment as follows:

- A38 Managing Agent Contractor (Aone+)
- Amber Valley Borough Council
- Breadsall Parish Council
- Derby City Council
- Derbyshire County Council
- Derbyshire Wildlife Trust
- Environment Agency
- Erewash Borough Council
- Historic England
- Little Eaton Parish Council
- Little Eaton and Stanley Ward
- Natural England
- South Derbyshire District Council

9.6.3 Comments as received were taken into account during the preparation of the EAR.

## 9.7 Limitations

9.7.1 The assumptions and limitations as associated with the assessment of potential environmental effects as detailed within the EAR are included within each technical chapter (refer to EAR Chapters 5 through 14). However, a number of additional land-take requirements are not considered within the EAR as the location of such areas are currently uncertain, namely areas of redundant carriageway; additional land take due to reconfiguration of Markeaton junction to facilitate signalisation; flood storage compensation areas at Kingsway junction and Little Eaton junction; construction compounds and material storage areas; borrow pits; provision of additional access provisions; and confirmation of public open space exchange land provisions. The environmental implications associated with these additional land-take requirements will be undertaken during the environmental assessment during PCF Stage 3.

9.7.2 The environmental assessment as included in the EAR assumes that the construction works would occur at all three junctions simultaneously, although the programme would be split into a number of different phases to coordinate the works at each junction in a manner that would enable effective materials re-use and minimise disruption. The phasing of the construction programme will be reconsidered and reassessed during PCF Stage 3.

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9.7.3 The noise assessment as included in the EAR assumes some sections of the existing A38 will be resurfaced with a new low noise surface before the 2024 proposed scheme opening year, whilst by 2039 (15 years after proposed scheme opening), it is assumed that Highways England will have resurfaced all the roads for which they are responsible with new low noise surfacing (i.e. the A38 and A516 throughout the detailed quantitative noise study area) (refer to the EAR Chapter 11: Noise and Vibration for details). If such areas are not resurfaced with new low noise surfaces, prevailing noise levels could be different from those as reported in the EAR, particularly in the vicinity of Little Eaton junction. The operational noise effects of the proposed scheme will be re-evaluated during PCF Stage 3.

## **9.8 Next Stages**

9.8.1 It is currently considered that the proposed scheme constitutes a Nationally Significant Infrastructure Project (NSIP). Thus following Preferred Route Announcement, it is anticipated that in order for the necessary statutory provisions to be secured and to enable the proposed scheme to proceed, it will be necessary to make a Development Consent Order (DCO) application to the Planning Inspectorate (PINS). Given the likely NSIP status of the proposed scheme, it is anticipated that the DCO application will need to be accompanied by an EIA as reported within an Environmental Statement. The assessment as presented within this EAR will be further developed and expanded in the Environmental Statement as applicable, capturing proposed scheme design evolutions as applicable.

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## 10 SUMMARY OF PUBLIC CONSULTATION

### 10.1 Consultation Arrangements

10.1.1 Prior to making an application to the Planning Inspectorate, consultation must be undertaken in accordance with the requirements of the Planning Act 2008 and associated guidance. Although consultation carried out in early 2015 was not part of the statutory process, Highways England has, as far as practicable, based the consultation process on the statutory requirements.

10.1.2 Highways England's best practice is to hold a non-statutory consultation in the early phases in scheme development, to ensure that public views are incorporated into the scheme design at an early stage.

10.1.3 The aim was to consult as widely as possible on the options and to provide those with an interest with sufficient information to form an opinion. Communications included:

- Scheme brochure
- Questionnaire (provided in the scheme brochure and also available online at Survey Monkey)
- Video of the 3d visualisation
- Presentations and briefings to local authority members, officers and resident's neighbourhood groups
- Staffed and unstaffed public exhibitions
- Posters, leaflet drops and formal letters to promote the upcoming exhibitions
- Meetings with other key stakeholders
- Press releases and media coverage (inc social media via YouTube, Facebook and Twitter)

10.1.4 The consultation period was from 2 February 2015 to 13 March 2015. The main exhibition event was held at the University of Derby on Friday 6 February 2015 and Saturday 7 February 2015. Supplementary exhibitions were held at Breadsall Memorial Hall, Little Eaton Village Hall and Mackworth Youth and Community Centre.

10.1.5 Display boards were erected and consultation questionnaires were placed in local libraries and at the Derby City Council offices.

10.1.6 The exhibition brochure and display boards showed the preferred option for each junction as well as some of the scheme options that had been discarded in the scheme development and assessment as described in Section 5 of this report.

10.1.7 The approach was consistent with good practice for consulting on major schemes, as set out by the Planning Act 2008, Guidance on the pre-application process for major infrastructure projects (2013) and the Cabinet Office's Consultation Principles Guidance (2012).

10.1.8 The main channels for consultees to provide their feedback were:

- Completing the questionnaire (either as contained in the scheme brochure or online);
- Ringing the HAIL Information Line;

- Contacting the project team via the project email address; or
- By letter to the Highways England project team.

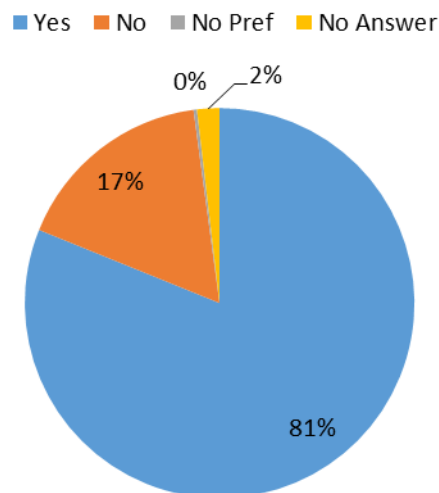
## 10.2 Overall Consultation Responses

10.2.1 The exhibitions were attended by approximately 1200 visitors. In total 739 responses were received comprising 699 questionnaires and 40 letters. 41% of questionnaires were received online via the project's Survey Monkey pages.

10.2.2 The key findings were:

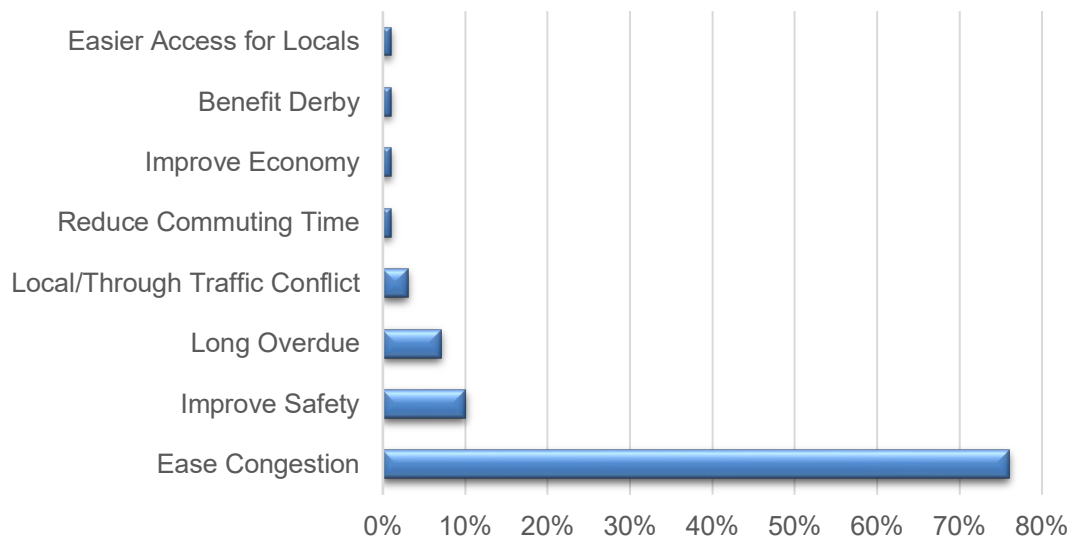
- There is generally good support for the scheme from both local residents/stakeholders and the travelling public. Overall, 81% of consultees agreed with the need for improvements to the junctions, 17% disagreed and 2% did not provide a response (Figure 10/1);
- There are concerns about the impact during the construction period in terms of noise and traffic disruption; and
- The top priorities are to ease congestion and improve safety (Figure 10/2).

**Figure 10/1: Consultation responses to the question “Do you agree with the need for improvements”?**



10.2.3 Of the 17% that disagreed with the planned improvements, the main reason cited was that the recent improvement works as part of the Pinch-Point schemes were sufficient. The Pinch-Point schemes were delivered as a short term solution to the congestion experienced at the Markeaton and Little Eaton junctions.

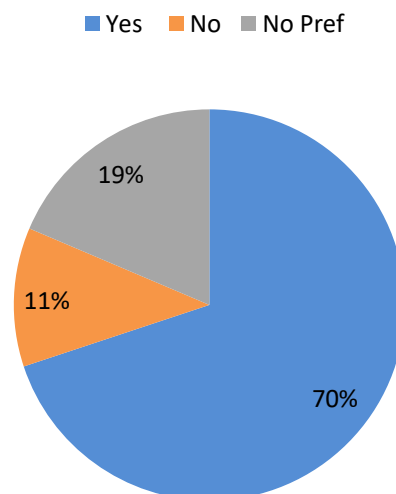
**Figure 10/2: Key Priorities for the Scheme**



### 10.3 A38/A5111 Kingsway Junction Specific Consultation Responses and Results

10.3.1 70% of responses were supportive of the Kingsway option, 11% disagreed with the proposed preferred option and the remaining 19% indicated no preference (Figure 10/3).

**Figure 10/3: Consultation responses to the question “Do you agree with the proposed preferred option in this area [at Kingsway junction]?”**



10.3.2 Mickleover and Darley Abbey are the most receptive to the need for the proposed improvements at Kingsway junction, with 100% and 85% of respondents agreeing respectively. With Mackworth, Markeaton and Littleover being the least receptive for the need for improvements, with 66%, 67% and 80% agreeing respectively.

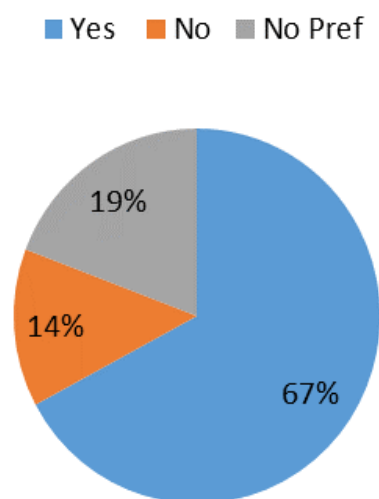
10.3.3 The main concerns raised by those opposed to the preferred Kingsway option were the closure of existing local access routes onto the A38 and safety concerns regarding the proposed dumbbell roundabout arrangement.

10.3.4 Overall 30% of respondents had no preference to which local access route was chosen, 27% preferred Option K2, which was to provide an access route via Kingsway Park Close, 27% preferred K3, which was to provide no local access, 12% preferred K1, which was to provide an access route through Greenwich Drive South, with the remaining 4% preferring a combined K1 and K2 solution. It should be noted that a combined K1 and K2 solution was not an option offered to the public.

#### 10.4 A38/A52 Markeaton Junction Specific Consultation Responses and Results

10.4.1 Overall 67% of consultees agreed with the proposed Markeaton junction layout, 14% disagreed with the proposal and 19% had no preference to the junction layout (Figure 10/4).

**Figure 10/4: Consultation responses to the question “Do you agree with the proposed preferred option in this area [at Markeaton junction]?”**



10.4.2 Mickleover, Darley Abbey and Littleover are the most receptive to the need for proposed improvements at Markeaton, with 92%, 85% and 83% of respondents agreeing respectively with the need for improvements. With Derby Centre, Markeaton (inc Queensway) and Mackworth being the least receptive for the need for improvements, with 43%, 38% and 27% disagreeing respectively.

10.4.3 The main concerns raised by those opposed to the preferred Markeaton option were:

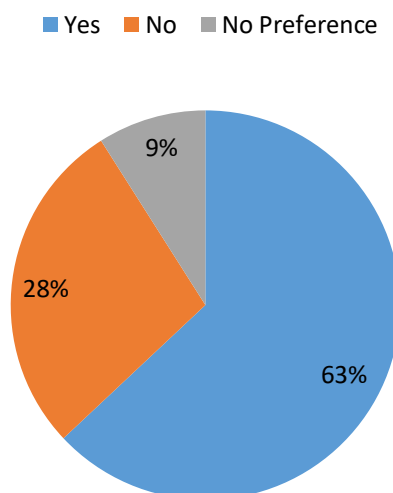
- The recent Pinch-Point improvement scheme sufficiently dealt with the congestion issues.
- The impact to local residents and business, this primarily focused around the closure of existing local access routes onto the A38.
- The highway alignment impacting on residential properties.

10.4.4 As a result of the proposed works the existing footbridge that crosses the A38 north of Markeaton junction needs to be demolished. Overall 49% of respondents were in favour of providing a new footbridge, 30% had no preference and 21% felt that there was no need to replace the pedestrian footbridge.

## 10.5 A38/A61 Little Eaton Junction Specific Consultation Responses and Results

10.5.1 Overall 63% agreed with the proposed Little Eaton junction layout, 28% disagreed with the proposal and 9% had no preference to the junction layout (Figure 10/5).

**Figure 10/5: Consultation responses to the question “Do you agree with the proposed preferred option in this area [at Little Eaton junction]?”**



10.5.2 Mickleover, Little Eaton, Darley Abbey and Allestree were the most receptive to the need for proposed improvements at Little Eaton, with 100%, 93%, 85% and 78% of respondents agreeing respectively with the need for improvements. Breadsall was the least receptive for the need for improvements, with 88% disagreeing with the preferred option.

10.5.3 Of the 28% of respondents who rejected the proposed Little Eaton option the main concerns raised were the loss of greenbelt land and the highway alignment effects on the Breadsall community, including visual, air and noise impacts.

10.5.4 It should be noted that following the supplementary exhibition in Breadsall on 26 February, Breadsall Parish Council arranged a community meeting. As a result of the meeting, the community has formed the Breadsall A38 Action Group. Highways England has engaged with the Action Group to understand the aims and concerns of the group while providing information on the consultation process and the junction proposals.

10.5.5 As a result of the proposed works the existing access from Ford Lane onto the A38 is to be closed. Overall 38% of respondents indicated their preference for providing an access road onto the B6179 to mitigate the closure of Ford Lane access, 36% had no preference and 26% felt that there is no need to provide a new local access route.

## 10.6 Consultation Responses Outside Current Scope

10.6.1 During the consultation period, Highways England also received a number of comments that were deemed to be outside the current scope of the scheme. As the majority of these comments related to matters on the local road network, the comments were provided to the local highway authorities - Derby City Council and Derbyshire County Council.



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10.6.2 Comments with regards to non-motorised users (NMUs) have been used to develop an outline design for NMU facilities including crossing points, footways, footpaths, bridleways and cycle routes. Relevant consultees have been contacted and invited to further comment on the proposals.

## 10.7 Alternative Options

10.7.1 In addition to the consultation questionnaire responses, some respondents also gave further ideas on possible options for Highways England to consider. These are referred to as 'alternative options'. Alternative options ranged from those focussing on an individual junction to those which offered different solutions for the whole scheme.

10.7.2 All alternative options were examined and assessed. The alternative options, the assessment methodology and the outcome of the assessment are described in detail in Section 5 of this report.

## 10.8 Ongoing Consultation and Engagement

10.8.1 Consultation has continued with several groups following completion of the formal non-statutory consultation period. Some of the groups were set up as a result of the scheme proposals, specifically as a result of the proposals for the Little Eaton junction. These are:

- Breadsall A38 Action Group – this is a group supported by Breadsall Parish Council with the aim of influencing the scheme so as to minimise (in the action group's opinion) the impacts of the scheme on Breadsall village. This group has made it clear that it does not support the Little Eaton proposals as they currently stand. The group would prefer the alignment to be further away from the village and, ideally, it would prefer an alignment to the north of the existing junction as the perception is that the current proposals would have adverse environmental impacts on Breadsall village.
- The Little Eaton Reference Group – this group was initiated by Highways England to create a forum with representation from all communities and businesses that could be affected by the Little Eaton junction proposals. Representation includes the Breadsall A38 Action Group and the Breadsall and Little Eaton Parish Councils.

10.8.2 For the Kingsway and Markeaton junctions meetings have taken place with representatives of the Mackworth Parish Council.

10.8.3 For the scheme as a whole, regular high level consultation takes place with Derbyshire County Council, Derby City Council and Highways England's Area 7 team by way of a 'Steering Group'. This has the aim of keeping all parties informed with the progress of the scheme and to provide an opportunity for them to be involved in key scheme decisions. Both of the local authorities are supportive of the scheme but they are keen to see that the details meet with their approval.

10.8.4 The primary concern of the local authorities, the City Council in particular, is the impact the scheme will have on the local highway network as well as on the A38 during the construction period. For this reason an outline construction programme has been developed and a Traffic Management Group has been established.

## **10.9 Next steps**

- 10.9.1 Engagement with stakeholders has continued since the formal public consultation period and will continue throughout the development of the scheme.
- 10.9.2 Having sought initial views and ideas on the proposals through a non-statutory consultation, consultation and assessment of options has continued and will continue up to preferred route announcement at the end of 2016. Following this, a statutory public consultation will be undertaken in mid 2017 prior to Development Consent Order (DCO) application.

## **11 APPRAISAL SUMMARY TABLE**

### **11.1 A38 Derby Junctions Appraisal Summary Table**

11.1.1 The traffic, economic and environmental outputs for the A38 Derby Junctions scheme are presented in the Appraisal Summary Table, document reference 47071319-URS-04-PCF-TR-001.

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## 12 CONCLUSION

### 12.1 Introduction

12.1.1 This section summarises the main findings of the Scheme Assessment Report in order to recommend an option for the Preferred Route Announcement.

### 12.2 Do-Nothing Options: Traffic and Economics

12.2.1 The A38 is a part of the strategic road network (SRN) and carries a relatively large proportion of freight trips. Where the A38 routes through the City of Derby, the road also fulfils other functions, specifically:

- An alternative route to the congested urban roads
- A high-capacity road crossing of the River Derwent
- A means of distributing the home-to-work commuting trips between the alternative radial routes
- A means of travel that is safer than on local roads, which have more frequent junctions and numerous accesses
- Road capacity to meet the additional trip demands generated by development sites identified in the Local Plans of Derby City, South Derbyshire, Amber Valley and Erewash
- A reliable route for bus trips

12.2.2 In a Do-Nothing option, it is possible that some of the development sites identified in the various Local Plans may not be permitted.

12.2.3 The national planning policy statements require an assessment of alternative travel modes. However, there are no improvements to alternative-modes of travel that would address the problems at the A38 junction or provide a similar type of solution for a similar level of cost.

### 12.3 Alternative Schemes

12.3.1 Following the extensive Options phase of the scheme from the early 2000s to the present day, many options have been investigated and there has been extensive consultation with stakeholders (which is still ongoing).

12.3.2 The investigations into the possible grade-separation of the three junctions began with the Road Based Study (and associated consultation exercise) in 2002. This was followed by the supplementary consultation for Little Eaton junction in 2003. The scheme was subsequently refined and a Technical Appraisal Report (TAR) was produced in 2009.

12.3.3 Following the scheme re-commencing in 2014, a Public Consultation was carried out in 2015 to update our understanding of the public's views on the scheme. The options that emerged as the preferred options in the TAR were presented at an exhibition along with some of the previously discounted options and it was the Presented Options for each junction that emerged from the consultation as the best options to progress.

12.3.4 A number of alternative options were identified from responses to the 2015 Public Consultation. Additional options were subsequently proposed by local stakeholders, particularly, the Breadsall A38 Action Group, for the Little Eaton junction.

12.3.5 Each of the alternative options was subjected to an initial assessment to determine the viability of the proposal; for those options which passed a further detailed assessment was carried out. In every case, the options proposed by the members of the public failed to perform as well as the Presented Options (as included in Appendix 4).

## 12.4 Traffic, Economics and Costs

12.4.1 Traffic forecasting and economics assessments were carried out for the scheme based on the preferred option at each junction. All capital investment costs of the scheme were calculated in 2014 Q1 prices in factor-cost units of accounting. These costs were converted to a 2010 prices and are summarised as follows:

- Construction = £144.3 million
- Land = £19.7 million
- Preparation = £13.8 million
- Supervision = £3.5 million

12.4.2 The extra costs required to maintain the various new elements of the scheme over a 60-year appraisal period would be £66.1 million.

12.4.3 For the purpose of comparing the scheme's costs and monetised-benefits, all costs and the monetised benefits were converted to 2010 market prices and discounted to a 2010 present value year. The annual cost-expenditure profiles from 2016 up to the horizon-year of 2083 (60-years after the open-to-traffic year) were summed to produce a present value of costs (PVC).

12.4.4 The total PVC of the scheme is forecast to be £170.8 million.

12.4.5 The transport economic efficiency (TEE) benefits of the scheme were calculated using data extracted from a SATURN-software traffic model that simulated: the main Derby City road network, the A38 route between the M1 J28 junction to the north and as far south as Burton-on-Trent, included the A50 to the south of Derby and the M1 motorway to the east of Derby. The rest of the UK highway network was also represented (in buffer) at various levels of details and thus the whole length of those road-users' trips travelling through the study area was represented.

12.4.6 The trip journey-times and travel-distances were extracted from the traffic model and used (with TUBA software) to compute a monetised value for the TEE benefits.

12.4.7 The present value of benefits (PVB) would be £418.8 million when taking account of the November 2016 Value of Travel Time Savings (VTTS).

12.4.8 The benefit to cost ratio (BCR) is 2.45 (when taking account of the November 2016 VTTS update). In transport economy terms, the A38 Derby Junctions scheme would provide value for money.

12.4.9 A monetised assessment of the likely improvements to journey time reliability has been evaluated at £14 million. Because of the uncertainty inherent within the WebTAG assessment method, the Reliability benefits are not included within the above PVB and BCR values.

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## 12.5 Operational and Maintenance Assessment

12.5.1 The proposals for the improvements to each of the three junctions would result in an arrangement that would be safe to operate in terms of motorised and non-motorised road users. The scheme would also provide an economic solution in terms of achieved benefits when compared with the cost of the scheme; this is explained in detail in section 6 of this report. Discussions with the relevant highways maintainers has confirmed that there are safe means of conducting planned and unplanned maintenance on the completed scheme. Further detailed development of the maintenance requirements and operations will be undertaken in PCF Stage 3.

## 12.6 Environmental Assessment of Options

12.6.1 The environmental implications of various options have been qualitatively evaluated and fed into the option selection process – taking into account specified environmental objectives. Some of the options selected and taken forward for inclusion in the preferred scheme design were those options that would reduce environmental effects (e.g. selection of Option K2 at Kingsway junction would reduce the loss of public open space as compared to the option published for consultation which includes a link road to Greenwich Drive South). However, of the alternative options considered at Little Eaton junction, the qualitative environmental assessment indicated that Option 3A and the Southern Sweep option would 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, the assessment indicated that while the Presented Option may not rank highest in each category or sub-category, in overall terms, the Presented Option performed the best, and that where the Presented Option would have a potentially greater impact than the alternative options, detailed mitigation strategies should be developed for each of these aspects in conjunction with key stakeholders.

## 12.7 Environmental Assessment of Proposed Scheme

12.7.1 The potential environmental effects associated with the proposed scheme have been reported in a PCF Stage 2 Environmental Assessment Report (EAR). This indicates that the integration of impact avoidance and mitigation features into the proposed scheme design, and through adherence to good construction site practices and operational management practices, most potential environmental effects would be reduced to non-significant levels (i.e. minor or negligible effects). However, the EAR indicates that some potential moderate or major/large effects have been identified. Some of these would be temporary construction phase effects (e.g. noise, visual, ecological, NMU facilities and severance) that would reduce during the proposed scheme operational phase due to maturation of landscape/ecological planting and the segregation of local and through traffic which would reduce severance and increase journey reliability.

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12.7.2 During the environmental assessment to support the DCO application, further environmental mitigation requirements will be investigation with the aim of reducing identified moderate or major/large effects – this includes the development of specific noise mitigation measures such as noise barriers to shield specific sensitive receptors (such as the large adverse significant noise effect predicted at the Royal School for the Deaf). Proposed scheme construction would, however, result in a potential large adverse effect due to demolition of properties at Markeaton junction and moderate negative effects (at a County/Unitary Authority level) due to habitat loss at the A38 Roundabout LWS (located within the existing Kingsway junction) and the Alfreton Road Grassland LWS (located to the south of the existing Little Eaton junction). Proposed scheme operation is anticipated to deliver long-term environmental benefits with regard to the provision of NMU facilities, reducing driver stress and community severance. In addition, the proposed approach to ecological mitigation and enhancement has the potential to improve the wildlife corridor function of the proposed scheme relative to the existing scheme, potentially resulting in an overall slight positive effect on nature conservation at the Local level in the medium to long term.

## **12.8 Appraisal Summary Table**

An Appraisal Summary Table (AST) has been produced; this presents, in a framework format, the appraisal results presented in this Scheme Assessment Report. Please refer to document reference 47071319-URS-04-PCF-TR-001.

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## **13 THE RECOMMENDED ROUTE (IN CONFIDENCE)**

### **13.1 Introduction**

13.1.1 The scheme assessment initially considered a single option for the improvement of each junction. These options were the result of the design development work undertaken between 2002-2008 and had been prepared for TPI entry.

13.1.2 Following the public consultation, a number of alternative options were considered for the A38/A5111 Kingsway junction and A38/A61 Little Eaton junction.

### **13.2 Process for Selecting the Preferred Route**

13.2.1 A two-stage process was implemented for assessing the original junction proposals and the alternative options comprising

- An Initial Sifting Assessment; and
- Options passing the initial sifting were then subject to a more detailed qualitative assessment.

13.2.2 The Initial Sift Assessment provided a preliminary examination of each alternative option based on the information provided by the consultation respondent. The assessment followed the Department for Transport's web-based Transport Analysis Guidance (WebTAG) - The Transport Appraisal Process<sup>16</sup> and considered the following criteria:

- How the option achieved the scheme objectives;
- Deliverability of the option (e.g. risks, stakeholder support or challenge, political issues and planning or legal considerations); and
- Feasibility of the option (e.g. compliance with design standards, technical feasibility and safety).

13.2.3 The scheme objectives used for the assessment are shown in Table 13/1.

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<sup>16</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/370529/webtag-tag-transport-appraisal-process.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/370529/webtag-tag-transport-appraisal-process.pdf)



**Table 13/1: Scheme Objectives Used in the Initial Assessment**

Category	Detailed Transport Objective
Economy	To reduce congestion and increase reliability of journey times on the strategic corridor
	To minimise traffic disruption due to construction works and incidents
	To achieve optimum whole life costs taking into account future maintenance and operation, and disruption to users
Environment	To minimise impacts on both the natural and built environment, including designated landscape/biodiversity features
	To seek to mitigate impacts on air quality and noise
Society	To improve the safety for all road users
	To seek to reduce severance by maintaining or providing appropriate facilities for crossing, and travelling along the route for non-motorised users
Public Accounts	To be affordable and represent High Value for Money according to DfT's appraisal criteria

13.2.4 Options achieving a baseline score against each of these criteria were then subjected to further, more detailed assessment. The detailed options assessment was based on TD37/93 Stage 2 Assessment Report and the WebTAG guidance<sup>17</sup>. The assessment entailed the analysis of the following:

- Costs estimates;
- Engineering assessment (including constraints; structures; design standards; geometry; public utilities; non-motorised users; drainage; geotechnics; construction phasing and programme);
- Environmental assessment (including the qualitative consideration of 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)); and
- Traffic and economics assessment.

13.2.5 The original preferred options for each junction were included in the assessments to provide a baseline for comparison and to ensure that all options were given equal consideration in the process.

<sup>17</sup> <https://www.gov.uk/transport-analysis-guidance-webtag>

### 13.3 Comparing the Options

#### Initial Sift Assessment

13.3.1 The options which were subjected to the Initial Sifting Assessment and the outcome of the assessment are described in Section 5 and summarised in Appendix 9. Table 13/2 lists those alternatives which passed the Initial Sifting Assessment and were subjected to a further detailed assessment.

**Table 13/2 Options Assessed under the Initial Sift.**

Option	Summary of Alternative Option
<b>Multi-junction options</b>	
None	
<b>A38/A5111 Kingsway junction</b>	
Presented Option published for consultation	Option presented at 2015 consultation and derived from the 2003 supplementary consultation. Included local access Option K1 – via Greenwich Drive South.
Variant of Presented Option published for consultation (K2)	As for the Presented Option but including local access Option K2 – via Kingsway Park Close
Consultee J - variant	Variant to consultee J but including local access via Kingsway Park Close.
<b>A38/A52 Markeaton junction</b>	
No alternative options received.	
<b>A38/A61 Little Eaton junction</b>	
Presented Option published for consultation	Option presented at 2015 consultation and derived from the 2003 supplementary consultation.
Option 2	Published at the 2015 consultation as a rejected option on the basis of the 2003 supplementary consultation.
Option 3A	Similar to the current preferred Little Eaton option but carriageway realigned to closely follow the existing A38 corridor.
Southern Sweep	A38 alignment retained across the existing roundabout and extended across the floodplain to the south of the existing route.

### Detailed Options Assessment

13.3.2 The alternative options were developed to 1:2500 scale to indicate the approximate dimensions of the embankment and 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 and cost estimates were developed. These, were used to evaluate and compare the options on a qualitative basis.

13.3.3 Options were assessed and ranked in order of preference across a number of sub-headings for each other the themes: Cost, Engineering, Environment and Traffic and Economics. A ranking of 1 has been assigned to the best performing option.

13.3.4 Tables 13/3 and 13/4 summarise the results for the alternatives options at A38/A5111 Kingsway junction and A38/A61 Little Eaton junction.

**Table 13/3 Summary of the Alternatives Options Assessment for A38/A5111 Kingsway Junction.**

	Presented Junction Layout with Option K1	Presented Junction Layout with Option K2	Consultee J Option (with Option K1)
Cost	1	2	1
Engineering	2	1	3
Environment	1	1	2
Traffic	2	1	3
<b>Overall Ranking</b>	<b>2</b>	<b>1</b>	<b>3</b>

**Table 13/4 Summary of the Alternatives Options Assessment for A38/A61 Little Eaton Junction.**

	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
<b>Overall Ranking</b>	<b>1</b>	<b>3</b>	<b>4</b>	<b>2</b>

### 13.4 A38/A5111 Kingsway Junction

13.4.1 The detailed assessment matrix is contained in Appendix 9.

13.4.2 Differences between the layouts of the three options assessed were confined to the local access arrangements and roundabout layout. The overall principle of the preferred option was unchanged in that the A38 passes under an interchange at or close to current ground level.

13.4.3 In comparing the options, cost variations were excluded from the assessment as the options only change a small part of the junction layout. And variations in the estimated costs were small.

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- 13.4.4 In engineering terms, all three options were closely matched as differences were small. The Presented Option with Option K2 cuts across an existing landfill site requiring additional work to manage the deposited materials safely, has a greater impact on existing public utilities thereby requiring additional diversions but offers benefits to non-motorised users through retaining an existing National Cycle Route which would be severed by the other options.
- 13.4.5 In environmental terms, the Presented Option ranked equally with both access options. Where Option K2 ranked lower than Option K1, this is caused by Option K2 crossing the landfill area. However, by comparison, Option K1 ranked lower for landscape and visual and community & private assets, and noise. This is due to the severance to public open space caused by the link and increased traffic on Greenwich Drive South.
- 13.4.6 Consultee J Option ranked the same as or worse than the Presented Junction layout with Option K1 in each sub-category.
- 13.4.7 In terms of traffic and economics, Option K2 ranked the highest in all sub-categories, providing better road safety and re-assigning traffic more efficiently. Consultee J Option ranked as the worst option.
- 13.4.8 The outcome of the assessment was that the Presented Option with Local Access Option K2 performed the best in overall terms.

### **13.5 A38/A52 Markeaton Junction**

- 13.5.1 The outcome of the design development leading up to the 2015 consultation was that the Presented Option which had developed from Option M6, best met the objectives of the scheme.
- 13.5.2 No further alternative options were proposed as part of the 2015 public consultation.

### **13.6 A38/A61 Little Eaton Junction**

- 13.6.1 The detailed assessment matrix is contained in Appendix 9.
- 13.6.2 Option 3A performed poorly across a number of the assessment headings and was consequently, least preferred. This was 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.
- 13.6.3 While Option 2 offered a number of benefits due to the improved highway alignment and that the route could be constructed with least impact upon existing A38 traffic, the cost was 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 was largely offset by the more complex slip road loops. This resulted in a net increase in daily vehicle-kilometres and potential road safety problems.
- 13.6.4 Overall the Presented Option and the Southern Sweep were closely matched and the differences between the options were 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 was preferred in environmental terms, the differences were marginal and it should be noted that the construction and use of the temporary diversion route were likely to exacerbate land take effects and construction phase effects.

13.6.5 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 would 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.

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

13.6.7 The outcome of the assessment was that the Presented Option performed marginally better than the other options, noticeably the Southern Sweep, and had advantages in terms of buildability while maintaining traffic flows during construction.

### **13.7 The Recommended Route**

13.7.1 The conclusion of this PCF Stage 2 Option Selection Phase is to recommend that the following options for each junction are taken forward into the Preliminary Design stage of the Development Phase:

- A38/A5111 Kingsway Junction – Presented Option with Local Access Option K2
- A38/A52 Markeaton Junction – Presented Option
- A38/A61 Little Eaton Junction – Presented Option

The layouts for these options are included in Appendix 8 (figures 1.1, 1.2 and 1.3). And can be briefly summarised as follows:

- Kingsway junction – A38 main line to pass beneath the level of the junction with a dumbbell arrangement at approximately the level of the existing roundabout to provide for all turning movements. A link from the east dumbbell roundabout to Kingsway Park Close would provide local access to the Mackworth residential area.
- Markeaton junction - A38 main line to pass beneath the level of the junction in a retained trough arrangement with a two-bridge roundabout at approximately the level of the existing roundabout and slip roads would provide for all turning movements.
- Little Eaton junction - A38 main line to pass to the east and south of the existing roundabout on embankment and crossing a new larger roundabout via two bridges. The new roundabout would be at approximately the level of the existing roundabout and slip roads would provide for all turning movements.

13.7.2 The benefit to cost ratio (BCR) is 2.45 (when taking account of the November 2016 VTTS update). In transport economy terms, the A38 Derby Junctions scheme would provide value for money.

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- 13.7.3 The tables in Appendix 10 provide an analysis of how the proposed scheme meets the scheme objective (see paragraph 2.1.5) and how the proposed scheme could contribute to the achievement of RIS Performance Specification key performance indicators.
- 13.7.4 Further design work will be required in PCF Stage 3 (Preliminary Design) to develop the scheme in a number of areas and define the exact scheme footprint prior to the statutory planning process. These include determining the sizes of the roundabouts at A38/A5111 Kingsway necessary to accommodate the design traffic flows; developing the roundabout layout at A38/A52 Markeaton junction to operate under signalised control; defining the mitigation works required (particularly with regards to noise and ecology mitigation); and identifying the land required for the necessary flood alleviation, surface water alleviation and public open space exchange areas.

# Appendix 1

## Constraints Plans

**Drawing HA514503-URS-06-DR-LR-25-008 – Kingsway Junction Constraints  
Plan and Section**

**Drawing HA514503-URS-06-DR-LR-25-009 – Markeaton Junction Constraints  
Plan and Section**

**Drawing HA514503-URS-06-DR-LR-25-0010 – Little Eaton Junction Constraints  
Plan and Section**

# Appendix 2

## Options Emerging from the Road Based Study

**Kingsway Junction, RBS Option 2 (titled as option K3(B))**

**Markeaton Junction, RBS Option 1 (titled as option M5)**

**Little Eaton Junction, RBS Option 2 (titled as option A6(B))**



# Appendix 3

## Kingsway Junction Options

**Kingsway Junction, Option 6 (titled as option K6a)**

**Kingsway Junction, Option 7 (titled as option K7a)**

**Kingsway Junction, Option 8 (titled as option K8a)**

# Appendix 4

## Kingsway Junction Options (post-2015 consultation)

**Kingsway Junction, Option K1**

**Kingsway Junction, Option K2**

**Kingsway Junction, Consultee J's Option**

# Appendix 5

## Little Eaton, 2003 Supplementary Consultation

### Options

- Little Eaton Junction, Option 7**
- Little Eaton Junction, Option 8**
- Little Eaton Junction, Option 8A**
- Little Eaton Junction, Option 9**

# Appendix 6

## Little Eaton, Post-2015 Consultation Options

**Little Eaton Junction, the Presented Option**

**Little Eaton Junction, Option 2**

**Little Eaton Junction, Option 3a**

**Little Eaton Junction, the Southern Sweep Option**

# Appendix 7

## Little Eaton - Further Options Considered (2016 proposals by members of the public)

<b>Little Eaton Junction</b>	<b>Option 2A</b>
	<b>Option 2B</b>
	<b>Option 2A SB Merge slip modified</b>
	<b>Option 2A Single Bridge Option</b>
	<b>Option X</b>
	<b>Option X1</b>

# Appendix 8

## Environmental Figures

- Figure 1.1 Kingsway Proposed Scheme Layout**
- Figure 1.2 Markeaton Proposed Scheme Layout**
- Figure 1.3 Little Eaton Proposed Scheme Layout**
- Figure 2.1 Derby AQMAs**
- Figure 2.2 Heritage Assets at Kingsway & Markeaton**
- Figure 2.3 Heritage Assets at Little Eaton**
- Figure 2.4 Designated Sites Kingsway & Markeaton**
- Figure 2.5 Designated Sites Litte Eaton**
- Figure 2.6 NIAs**
- Figure 2.7 Surface Water Kingsway**
- Figure 2.8 Surface Water Markeaton**
- Figure 2.9 Surface Water Litte Eaton**
- Figure 2.10 Groundwater Kingsway & Markeaton**
- Figure 2.11 Groundwater Litte Eaton**
- Figure 2.12 Contamination Kingsway & Markeaton**
- Figure 2.13 Contamination Litte Eaton**
- Figure 2.14 Agricultural Soils Litte Eaton**
- Figure 2-15 ZTV and Viewpoints**

# Appendix 9

## Assessment Summary Tables

**Initial Sift Table**

**Overall Assessment Results Tables**

**Initial Sift Table**

Option	Summary of Alternative Option	Option taken Forward to Detailed Assessment
<b>Multi-junction options</b>		
Consultee A	Tunnel from south of Kingsway to north of Markeaton	No
Consultee P	New trunk road from A38/A50 Toyota junction to north of Little Eaton.	No
<b>A38/A5111 Kingsway junction</b>		
Presented Option published for consultation	Option presented at 2015 consultation and derived from the 2003 supplementary consultation. Included local access option K1 – via Greenwich Drive South	Yes
Variant of Presented Option published for consultation (K2)	As for the Presented Option but including local access option K2 – via Kingsway Park Close	Yes
Variant of Presented Option published for consultation (K3)	As for the Presented Option but including local access option K3 – no local access provided.	No
Campaign for Better Transport	Slip road links to the existing local accesses.	No
Consultee B	A single large roundabout in place of the proposed double roundabout.	No
Consultee J	Alternative road layout in lieu of the proposed eastern roundabout.	No
Consultee J - variant	Variant to consultee J but including local access via Kingsway Park Close.	Yes
Consultee P	Local accesses to be kept open by provision of parallel service roads.	No
<b>A38/A52 Markeaton junction</b>		
No alternative options received.		n/a



Option	Summary of Alternative Option	Option taken Forward to Detailed Assessment
<b>A38/A61 Little Eaton junction</b>		
Presented Option published for consultation	Option presented at 2015 consultation and derived from the 2003 supplementary consultation.	Yes
Option 1	Published at the 2015 consultation as a rejected option on the basis of the 2003 supplementary consultation.	No
Option 2	Published at the 2015 consultation as a rejected option on the basis of the 2003 supplementary consultation.	Yes
Consultee A	A61 fly-over A38 with roundabout to north of existing junction.	No
Campaign for Better Transport	A61 flyover.	No
Southern Sweep	A38 alignment retained across the existing roundabout and extended across the floodplain to the south of the existing route.	Yes
Option 3A	Similar to the current preferred Little Eaton option but carriageway realigned to closely follow the existing A38 corridor.	Yes
Option 4	Similar to "Option 3A" but using a shallower radius for the main line.	No
Option 2A	Development of Option 2 with re-configured northbound slip roads and the southbound slip roads reuse the existing A38 carriageway.	No
Option 2B	Variant of Option 2A with the A38 southbound slip roads are adjacent to the main carriageway to form a conventional two-bridge grade-separated layout with a single roundabout.	No

Option	Summary of Alternative Option	Option taken Forward to Detailed Assessment
Option X	Retains the A38 on its existing horizontal and vertical alignment, diverts the B6179 to the north of the garden centre to pass under the A38 to a new roundabout on the A61.	No
Option X1	Development of Option X replacing the looping link roads of Option X with an overbridge for the A61	No
Option 2A (Variant 1)	Development of Option 2A with a re-designed southbound entry slip road to address a safety issue	No
Option 2A (Variant 2)	Development of Option 2A using a dumbbell roundabout arrangement such that only a single underbridge is needed to the A38	No

1.

## Kingsway Assessment results

### Overall Assessment Results (Cost)

Cost Sub-Category	Presented Junction Layout with Option K1	Presented Junction Layout with Option K2	Consultee J's Option (with Option K1)
Total Outturn Cost	1	2	1

### Overall Assessment Results (Engineering)

Engineering Sub-Category	Presented Junction Layout with Option K1	Presented Junction Layout with Option K2	Consultee J's Option (with Option K1)
Geometry	2	1	3
Public Utilities	1	2	1
NMU Provision	2	1	3
Drainage	1	1	1
Geotechnics	1	2	1
Departures from Standards	2	1	3
Construction Phasing	1	1	2

### Overall Assessment Results (Environment)

Environment Sub-Category	Presented Junction Layout with Option K1	Presented Junction Layout with Option K2	Consultee J's Option (with Option K1)
Air Quality	1	1	2
Cultural Heritage	1	1	1
Landscape and Visual	2	1	2
Nature Conservation	1	1	1
Geology & Soils	1	2	1
Materials	1	2	1
Noise	2	1	3
Effect on All Travellers	1	1	2
Community & Private Assets	2	1	2

Environment Sub-Category	Presented Junction Layout with Option K1	Presented Junction Layout with Option K2	Consultee J's Option (with Option K1)
Water Resources	1	2	1
Flood Risk	1	1	1

**Overall Assessment Results (Traffic & Economics)**

Traffic & Economics Sub-Category	Presented Junction Layout with Option K1	Presented Junction Layout with Option K2	Consultee J's Option (with Option K1)
Reassignment Effects	2	1	3
(TEE post-construction)	1	1	2
Road Safety	2	1	3
Delay during construction	1	1	2

**Overall Assessment Results (Overall Summary)**

Summary of Results	Presented Junction Layout with Option K1	Presented Junction Layout with Option K2	Consultee J's Option (with Option K1)
Cost	1	2	1
Engineering	2	1	3
Environment	1	1	2
Traffic	2	1	3
<b>Overall Ranking</b>	<b>2</b>	<b>1</b>	<b>3</b>

## Little Eaton Assessment results

### 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

### 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

### 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

Environment Sub-Category	Presented Option	Option 2	Option 3A	Southern Sweep
Community & Private Assets	2	3	1	1
Water Resources	1	2	1	1
Flood Risk	2	3	1	1

#### 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

#### 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
<b>Overall Ranking</b>	<b>1</b>	<b>3</b>	<b>4</b>	<b>2</b>

# Appendix 10

## How the Scheme Meets Its Objectives

**How the proposed scheme meets the scheme objectives**

**How the proposed scheme could contribute to the achievement of RIS**

**Performance Specification key performance indicators**

### How the Proposed Scheme Meets the Highways England Client Scheme Requirements

Criteria	Objective	Commentary
<b>Economy</b>	<ul style="list-style-type: none"> <li>To reduce delays and increase reliability of journeys on the strategic corridor.</li> <li>Assist in bringing forward development and regeneration opportunities in the surrounding area and immediately adjacent to the scheme.</li> <li>To minimise traffic disruption due to construction works and incidents.</li> <li>To achieve optimal whole-life cost taking into account future maintenance, operation and disruption to users.</li> </ul>	<ul style="list-style-type: none"> <li>The grade separation of the at-grade junctions would remove the need for strategic journeys to stop and remove conflicts between local traffic and strategic movements, thus improving capacity, journey times and journey reliability.</li> <li>The proposed scheme has the potential to unlock current development proposals by relieving roads in Derby City.</li> <li>The proposed scheme construction phase details are being developed, but would be designed in a manner that aims to minimise delays and incidents.</li> <li>The proposed scheme seeks to minimise whole-life costs as well as future maintenance and operational requirements.</li> </ul>
<b>Environment</b>	<ul style="list-style-type: none"> <li>To minimise impacts on both the natural and built environment, including designated landscape/ biodiversity features.</li> <li>To seek to mitigate impacts on air quality or noise.</li> <li>To ensure effective measures are in place to protect watercourses from pollutant spillage on the highway.</li> <li>To investigate and to encourage the use of environmentally friendly operations and products throughout the project life cycle.</li> </ul>	<ul style="list-style-type: none"> <li>The proposed scheme is being designed in accordance with the Design Manual for Roads and Bridges (DMRB) and other current relevant guidance in a manner that aims to minimise impacts on both the natural and built environment, including designated landscape/ biodiversity features. As reported within this EAR, environmental avoidance features have been incorporated into the proposed scheme design, whilst a range of impact mitigation measures are specified herein that aim to reduce environmental effects.</li> <li>The proposed scheme effects upon air quality and noise during proposed scheme construction and operation are reported within this EAR (refer to Chapter 5: Air Quality). The proposed scheme design aims to minimise air quality effects by seeking to reduce delays and smooth traffic flows, whilst the proposed scheme design may include a series of noise barriers (to be confirmed during the environmental assessment to support the DCO application).</li> <li>The proposed scheme design includes measures to control and manage surface water runoff during operation, such that local watercourses would be protected from any pollutant spillages on the highway (e.g. the surface water drainage strategy would be designed and constructed in compliance with the DMRB guidance, incorporation sustainable drainage systems (SUDs) as applicable - see Chapter 13: Road Drainage and Water Environment).</li> <li>The proposed scheme design considers measures to reduce environmental effects as associated with materials and resources, as well as the management of waste in accordance with the waste hierarchy (e.g. material excavated from Kingsway and Markeaton junctions would be reused at Little Eaton junction where possible) (refer to Chapter 10: Materials).</li> </ul>
<b>Society</b>	<ul style="list-style-type: none"> <li>To improve the safety for all road users.</li> <li>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 and Safety at Work 1974 Act to be So Far As Is Reasonably Practicable (SFAIRP).</li> <li>To improve safety for residents in the vicinity of the</li> </ul>	<ul style="list-style-type: none"> <li>The proposed scheme would improve the safety for all road users as grade separation would remove the accident clusters that occur at the existing at-grade roundabouts and rationalise NMU crossings.</li> <li>The proposed scheme design takes into account the safety of road workers e.g. proposed scheme design includes a central reserve concrete barrier which would greatly reduce the number of unplanned maintenance interventions that a steel barrier would require.</li> <li>The proposed scheme design would improve safety for residents in the vicinity of the junctions through improved NMU facilities and separating trunk road movements from local traffic movements. There</li> </ul>



Criteria	Objective	Commentary
	junctions. <ul style="list-style-type: none"> <li>• To facilitate integration with other transport modes where applicable.</li> <li>• To ensure a consistent high standard of signing relating to the junctions.</li> <li>• To reduce severance by maintaining or providing appropriate facilities for crossing, and travelling along the route for non-motorised users (NMUs).</li> </ul>	would also be large safety benefits from taking traffic off Derby City and Derbyshire county maintained roads onto the safer strategic route. <ul style="list-style-type: none"> <li>• The proposed scheme would improve the reliability and journey times of local bus services.</li> <li>• The proposed scheme design includes a consistent high standard of signing.</li> <li>• The proposed scheme design includes a range of features that aim to reduce severance by rationalising and improving NMU facilities for crossing and travelling along the route.</li> </ul>
<b>Public Accounts</b>	<ul style="list-style-type: none"> <li>• To be affordable and represent High Value for Money according to Department for Transport (DfT) appraisal criteria.</li> </ul>	<ul style="list-style-type: none"> <li>• The proposed scheme design has been developed in a manner such that it is affordable and would deliver High Value for Money according to DfT appraisal criteria.</li> </ul>
<b>Scheme Specific Objectives</b>	<ul style="list-style-type: none"> <li>• Improve integration by supporting the local transport plan.</li> <li>• Facilitate regional development and growth in Derby City and its surrounding areas and increase capacity of the strategic road network to absorb growth.</li> </ul>	<ul style="list-style-type: none"> <li>• The proposed scheme design is supported by local transport plans and sympathetic to other transportation modes.</li> <li>• The proposed scheme design takes into account planned development and growth in Derby City and its surrounding areas and would increase headroom capacity on both the strategic road network and on local roads. The proposed scheme design takes into account projected growth in traffic due to development proposals for 15 years after opening.</li> </ul>

**Summary of Road Investment Strategy (2015 - 2020) Performance Specification Key Performance Indicators and Proposed Scheme Contribution**

Key performance indicator		Highways England target	Project contribution – qualitative	Project contribution - quantitative
The number of killed or serious injuries (KSIs) on the strategic road network (SRN).	<input type="checkbox"/>	Ongoing reduction in network KSIs to support a decrease of at least 40% by the end of 2020 against the 2005–2009 average baseline.	<p>The scheme will mitigate conflicts between motorised and non-motorised movements and improve safety for pedestrians and cyclists.</p> <p>The segregation of the junctions will also mitigate conflicts between local and strategic traffic and reduce queuing at the roundabouts, which is likely to improve safety for road users.</p>	<p>A total of 10 KSI incidents and 12 KSI casualties were recorded at the three junctions over a five years period. The incident data indicates that no fatal incidents occurred over the period analysed.</p> <p>Results indicate that the scheme will reduce the number of PIA across the modelled area by 2,387, with a reduction of 3,180 casualties, including 5 fatal casualties over a 60 years period.</p>
Network availability: the percentage of the SRN available to traffic.	<input type="checkbox"/>	Maximise lane availability so that it does not fall below 97% in any one rolling year.	<p>The scheme construction strategy is under review and is aimed at minimising the impact of roadworks.</p> <p>The scheme will also improve journey time reliability and consideration will be given to the provision of enhanced traffic information features as per Expressways standards.</p> <p>The grade separated junctions will allow for free flows along the A38, which will improve Emergency Services access to incidents on the SRN.</p>	
Incident management: percentage of motorway incidents cleared within one hour.	<input checked="" type="checkbox"/>	At least 85% of all motorway lane impact closures between 06.00 and 22.00 are cleared within one hour.	N/A not a motorway	
Encouraging economic growth: average delay (time lost per vehicle per mile).	<input type="checkbox"/>	No target – act in way that should minimise delay as far as possible.	<p>Queuing occurs regularly on the A38 arms of the Kingsway, Markeaton and Little Eaton junctions in the AM and PM peaks. The delays continue frequently into the Inter peak periods and also during the lunchtime Saturday peak.</p> <p>The scheme will provide free flow traffic along the A38</p>	The proposed scheme results in time savings for Commuting and Other users of 1,051,000 person-hours in the opening year.

Key performance indicator		Highways England target	Project contribution – qualitative	Project contribution - quantitative
			<p>corridor and, through separating strategic and local traffic movements, it will also reduce queuing on the roundabouts.</p> <p>Traffic modelling results indicate that the scheme will provide journey time saving in the peak hours of up to 9 minutes.</p> <p>The scheme will also reduce delays during the inter-peak and off-peak hours.</p>	The Value of journey time changes is £226M.
Number of noise important areas mitigated.	<input type="checkbox"/>	Noise: mitigate at least 1,150 noise important areas over roads period 1.	<p>The length of the A38 affected by the scheme contains 6 noise important areas and mitigation will be considered as feasible to minimise the scheme impact on them.</p> <p>The proposed scheme includes low-noise surfacing.</p>	No residential buildings are predicted to experience daytime traffic noise levels >80 dB LAeq,16h (facade). A total of 65 residential buildings are preliminarily identified as potentially qualifying under the Noise Insulation Regulations.
The percentage of pavement asset that does not require further investigation for possible maintenance.	<input checked="" type="checkbox"/>	Percentage of the network requiring no further investigation to be maintained at 95% or above.	N/A construction due to complete 2023	
Cost savings: savings on capital expenditure.	<input type="checkbox"/>	Cost savings: total savings of at least £1.212 billion over roads period 1 on capital expenditure.		<p>£12.8m of efficiencies have been identified for the scheme so far.</p> <p>This has been fed into the cost estimate, which has reduced by around £7m.</p>
<i>Delivery Plan</i> progress: progress of work, relative to forecasts set out in the <i>Delivery Plan</i> , and annual updates to that plan, and expectations at the start of road period 1.	<input type="checkbox"/>	Meet or exceed forecasts.	Approval will help support achievement of delivery plan targets of March 2020 for SoW and March 2023 OFT	

Key performance indicator		Highways England target	Project contribution – qualitative	Project contribution - quantitative
Cyclists, walkers and other vulnerable users - the number of new or upgraded crossings.	<input type="checkbox"/>	No target set.	<p>The NMU facilities included in the proposed scheme design aim to provide at least the level of NMU provision that exists at present with enhanced provisions where deemed appropriate and reasonable. The assessment presented herein indicates that the proposed NMU facilities will generate a moderate beneficial effect with regard to encouraging more NMU</p> <p>facility use due to improved amenity/ convenience and/ or perception of safety</p>	A footbridge over the A38 is also to be replaced as part of the scheme. Safe crossings are to be provided at the three junctions. A footbridge over the A38 will also be provided to provide safe access to Markeaton Park. The crossings and the new footbridge will be Equality Act 2010 compliant.
Delivery of improved biodiversity, as set out in our 'Biodiversity action plan'.	<input type="checkbox"/>	The company should publish its <i>Biodiversity Action Plan</i> by 30 June 2015 and report annually on how it has delivered against the plan to reduce net biodiversity loss on an ongoing annual basis.	<p>Flood risk assessments have been completed to determine the need for flood compensation areas and the impact of building the scheme in the floodplain, potential compensation areas have been identified.</p> <p>Any detrimental environmental effects of the scheme shall be offset by mitigation measures where technically feasible and economic to do so.</p> <p>An application for designated funds has been completed for additional improvements to ecological mitigation; this is expected to be reviewed in October 2016.</p>	
The percentage of <i>National Road Users' Satisfaction Survey</i> respondents who are 'very' or 'fairly satisfied'.	<input checked="" type="checkbox"/>	Achieve a score of 90% by 31 March 2017 and then maintain or improve it.	N/A scheme not to start construction until 2019/20.	