

A38 Derby Junctions

Environmental Impact Assessment Scoping Report

Report No: HE514503-ACM-EGN-A38_SW_01_ZZ-RP-LW-0001 P04 S4
March 2018

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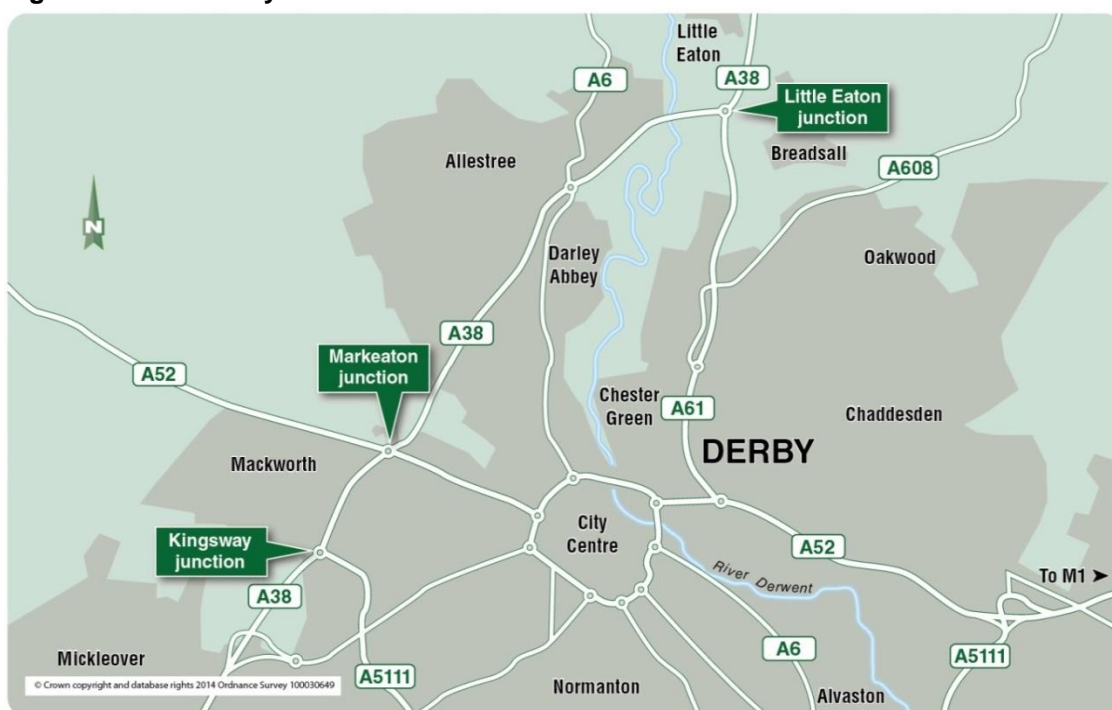
1. INTRODUCTION

1.1 Overview of the Proposed Scheme

1.1.1 The A38 is the strategic route from Birmingham, through Derby, to the M1 at junction 28 which carries significant volumes of north-south long-distance traffic. Where the A38 passes through the western and northern parts of Derby, local intra-urban trips cross the A38 on roads into the city or use the A38 to travel around Derby. The interaction between strategic and local trips results in delays at the three at-grade roundabout junctions on the A38, namely (see Figure 1.1):

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

Figure 1.1: A38 Derby Junctions – Location Plan



1.1.2 Derby and its immediate surrounding area are expected to accommodate significant housing and employment growth. As a result, the traffic demands on the A38 through Derby are forecast to grow quicker than the national average. Consequently, existing delays at the three at-grade roundabout junctions on the A38 are anticipated to worsen due to increasing levels of traffic.

1.1.3 The A38 Derby Junctions scheme (referred to herein as the proposed scheme) comprises the grade separation of Kingsway junction, Markeaton junction and Little Eaton junction which are the three remaining at-grade junctions on the A38 between the M6 Toll and the M1.

1.1.4 The UK government launched its first 'Road Investment Strategy' (RIS) in 2015 (Department for Transport (DfT), 2014) which set out an ambitious, long-term programme for motorways and major A roads with the stable funding needed to plan ahead effectively. 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 was 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".

1.2 Legislative Context and Need for Environmental Impact Assessment

- 1.2.1 The proposed scheme is defined as a Nationally Significant Infrastructure Project (NSIP) under Section 14(1)(h) and Section 22 of the Planning Act 2008 (PA 2008) (as amended by The Highway and Railway (Nationally Significant Infrastructure Project) Order 2013) by virtue of the fact that:
- It comprises the construction of a highway;
 - The highway to be constructed is wholly in England;
 - The Secretary of State is the highway authority for the highway; and
 - The speed limit for any class of vehicle on the highway is to be 50 miles per hour or greater, and the area for the construction of the highway is greater than 12.5 hectares (ha).
- 1.2.2 In accordance with the legislation, a Development Consent Order (DCO) is therefore required to allow the construction and operation of the proposed scheme.
- 1.2.3 The proposed scheme will be subject to an Environmental Impact Assessment (EIA), as reported within an Environmental Statement, on the basis that it is considered to be EIA development and listed within Schedule 2 Regulation 3(1) Part 10 (f) (construction of roads) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations), whilst it has the potential to generate significant environmental effects by virtue of its nature, scale and location.
- 1.2.4 In accordance with Regulation 8(1) (b) of the EIA Regulations, Highways England has notified the Secretary of State for Transport (Secretary of State) in a letter to the Planning Inspectorate (the Inspectorate) dated 2 March 2018 that an Environmental Statement presenting the findings of the EIA will be submitted with the DCO application.
- 1.2.5 It is the purpose of this report to identify the scope of the EIA to be reported in the Environmental Statement, which has been prepared in accordance with the requirements of the EIA Regulations.
- 1.2.6 The Localism Act 2011, appointed the Inspectorate as the agency responsible for operating the DCO process for NSIPs. In its role, the Inspectorate will examine the application for the proposed scheme and then will make a recommendation to the Secretary of State who will make the decision on whether to grant or to refuse the DCO.
- 1.2.7 In accordance with section 104(2) of the PA 2008, the Secretary of State is required to have regard to relevant National Policy Statement (NPS), amongst other matters, when deciding whether or not to grant a DCO. The relevant NPS for the proposed scheme is the National Networks National Policy Statement (NNNPS) (DfT, 2014) which was designated in January 2015 (refer to Section 5.2).
- 1.2.8 Other matters that the Secretary of State considers important and relevant include national and local planning policy. The National Planning Policy Framework (NPPF) published in March 2012 is relevant national planning policy (Department for Communities and Local Government, 2012).
- 1.2.9 The key local planning policies of relevance to the proposed scheme consists of the following:
- City of Derby Local Plan Review (2006) (Derby City Council, 2006);
 - Derby City Local Plan – Part 1 Core Strategy (2017) (Derby City Council, 2017);
 - Derby Local Transport Plan LTP3 (2011 - 2026) (Derby City Council, 2011);
 - Erewash Core Strategy (March 2014) (Erewash Borough Council, 2014), noting that there are some policies saved from the previous 2005 Local Plan (Erewash Borough Council, 2014);
 - Derbyshire Local Transport Plan (2011 - 2026) (Derbyshire Country Council, 2011).

- 1.2.10 Chapters 6 to 16 of this EIA Scoping Report describe the national and local planning policies relevant to the assessment with a summary provided for each environmental topic.
- 1.2.11 The purpose of considering the above mentioned planning policy at the EIA scoping stage of the EIA is twofold:
- To identify policy that could influence the sensitivity of receptors (and therefore the significance of effects) and any requirements for mitigation; and
 - To identify planning policy that could influence the methodology of the EIA. For example, a planning policy may require the assessment of a particular impact or the use of a particular methodology.

1.3 Purpose and Structure of the EIA Scoping Report

- 1.3.1 The EIA Regulations set out the requirements for an applicant who proposes to request a scoping opinion from the Secretary of State. Regulation 10(3) of the EIA Regulations requires a scoping report to include:
- a. A plan sufficient to identify the land;
 - b. A description of the proposed development, including its location and technical capacity;
 - c. An explanation of the likely significant effects of the development on the environment; and
 - d. Such other information or representations as the person making the request may wish to provide or make.
- 1.3.2 The purpose of this EIA Scoping Report is therefore to:
- a. Provide a summary of the proposed scheme and alternatives considered to date;
 - b. Set out the proposed scope of work and methods to be applied in carrying out the EIA; and
 - c. Set out the proposed structure and coverage of the Environmental Statement to be submitted with the DCO application.
- 1.3.3 This EIA Scoping Report is set out in accordance with guidance provided in DMRB Volume 11, and the Inspectorate's Advice Note 7 'EIA: Process, Preliminary Environmental Information and Environmental Statements' (Advice Note 7) (Planning Inspectorate, 2017).
- 1.3.4 Table 1.1 lists the suggested requirements identified in the Inspectorate's Advice Note 7 and details where they are presented in this EIA Scoping Report. The requirements of the EIA Regulations regarding the content of the Environmental Statement are also covered within the contents tabulated below.

Table 1.1: Information Provided in this EIA Scoping Report (based on Advice Note 7)

Suggested EIA Scoping Report Contents	Location in this EIA Scoping Report
An explanation of the approach to addressing uncertainty where it remains in relation to elements of the Proposed Development e.g. design parameters	Refer to para. 2.3.6
Referenced plans presented at an appropriate scale to convey clearly the information and all known features associated with the Proposed Development	Figures 1.2a/ b show the provisional DCO application boundary Also see Figures 2.1, 2.2 and 2.3 (existing junction layouts) and Figures 2.4, 2.5 and 2.6 (proposed scheme drawings)
An outline of the reasonable alternatives considered and the reasons for selecting the preferred option	Refer to Chapter 3
A summary table depicting each of the aspects and matters that are requested to be scoped out allowing for quick identification of issues	Refer to Table 17.2
A detailed description of the aspects and matters proposed to be scoped out of further assessment with justification provided	Detailed in the applicable chapters – refer to paragraph

Suggested EIA Scoping Report Contents	Location in this EIA Scoping Report
	numbers included in Table 17.2
Results of desktop and baseline studies where available and where relevant to the decision to scope in or out aspects or matters	Refer to Chapters 6 through 16 (sections on baseline conditions)
Aspects and matters to be scoped in, the report should include details of the methods to be used to assess impacts and to determine significance of effect e.g. criteria for determining sensitivity and magnitude	Refer to Chapters 6 through 16
Any avoidance or mitigation measures proposed, how they may be secured and the anticipated residual effects	Refer to Chapters 6 through 16
References to any guidance and best practice to be relied upon	Refer to Chapters 6 through 16
Evidence of agreements reached with consultation bodies (for example the statutory nature conservation bodies or local authorities)	Refer to Chapters 6 through 16
An outline of the structure of the proposed Environmental Statement.	Refer to Chapter 5 (Section 5.9 and Table 5.5)

1.3.5 A glossary and abbreviations list is presented in Appendix 1.1.

1.4 References

Derby City Council (2006) City of Derby Local Plan Review (2006).

https://www.derby.gov.uk/media/derbycitycouncil/contentassets/documents/policiesandguidance/planning/CDLPR_2017.pdf

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https://www.erewash.gov.uk/media/files/Erewash_Local_Plan_Saved_Policies_2005_amended_2014_v2.pdf

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Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (Statutory Instrument 2017/572).

http://www.legislation.gov.uk/uksi/2017/572/pdfs/uksi_20170572_en.pdf

Planning Inspectorate (2017) Advice Note 7: EIA: Process, Preliminary Environmental Information and Environmental Statements.

<https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2017/12/Advice-note-7.pdf>

2 THE PROPOSED SCHEME

2.1 Need for the Proposed Scheme

2.1.1 Interaction between strategic and local trips results in traffic delays at the three at-grade roundabout junctions at Kingsway junction, Markeaton junction and Little Eaton junction on the A38 to the west and north of Derby. The proposed scheme comprises the grade separation of these junctions, namely with the A38 passing through Kingsway junction and Markeaton junction via underpasses, and over Little Eaton junction on embankment.

2.1.2 Derby and its immediate surrounding area are expected to accommodate significant housing and employment growth. As a result, the traffic demands on the A38 through Derby are forecast to grow quicker than the national average. Consequently, existing delays at the three at-grade roundabout junctions on the A38 are anticipated to worsen due to increasing levels of traffic.

2.2 Proposed Scheme Objectives

2.2.1 In a strategic sense, the proposed scheme comprises the grade separation of the three remaining at-grade junctions on the A38 between the M6 Toll and the M1. Highways England's high-level objectives for the proposed scheme include improving economic competitiveness, the environment and quality of life by reducing congestion in the surrounding urban areas and on the A38 inter-regional road. In addition, it is considered that the proposed scheme would increase the capacity of the strategic road network and facilitate housing and employment growth within Derby City. The overarching objective is to deliver a proposed scheme that is affordable and delivers high value for money.

2.2.2 The proposed scheme objectives have been formulated both to address identified problems and to take advantage of the opportunities that new infrastructure would provide. The objectives are defined in the Client Proposed Scheme Requirements (CSRs) as detailed in Table 2.1.

Table 2.1: Proposed Scheme-specific Objectives

Economy	Environment	Society	Public Accounts	Scheme Specific
<p>To reduce delays and increase reliability of journeys on the strategic corridor.</p> <p>Assist in bringing forward development and regeneration opportunities in the surrounding area and immediately adjacent to the scheme.</p> <p>To minimise traffic disruption due to construction works and incidents.</p> <p>To achieve</p>	<p>To minimise impacts on both the natural and built environment, including designated landscape/biodiversity features.</p> <p>To seek to mitigate impacts on air quality or noise.</p> <p>To ensure effective measures are in place to protect watercourses from pollutant spillage on the highway.</p> <p>To investigate and</p>	<p>To improve the safety for all road users.</p> <p>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).</p> <p>To improve safety for residents in the vicinity of the junctions.</p> <p>To facilitate</p>	<p>To be affordable and represent High Value for Money according to Department for Transport (DfT) appraisal criteria.</p>	<p>Improve integration by supporting the local transport plan.</p> <p>Facilitate regional development and growth in Derby City and its surrounding areas and increase capacity of the strategic road network to absorb growth.</p>

Economy	Environment	Society	Public Accounts	Scheme Specific
optimal whole-life cost taking into account future maintenance, operation and disruption to users.	to encourage the use of environmentally friendly operations and products throughout the project life cycle.	<p>integration with other transport modes where applicable.</p> <p>To ensure a consistent high standard of signing relating to the junctions.</p> <p>To reduce severance by maintaining or providing appropriate facilities for crossing, and travelling along the route for NMUs.</p>		

2.3 Project Location

- 2.3.1 The proposed scheme is located on the A38 in Derby – the A38 being the principal route from Birmingham to Derby and the M1 at junction 28. The proposed scheme proposes to grade-separate the three junctions along the A38 through Derby; namely the junctions at Kingsway (NGR: SK 327 360), Markeaton (NGR: SK 334 369) and Little Eaton (NGR: SK 364 399). These three junctions span an approximate distance of 5.5km along the A38 to the west and north of Derby (see Figure 1.1).
- 2.3.2 The proposed scheme passes through the administrative areas of Derby City Council (DCiC), Erewash Borough Council (EBC) and Derbyshire County Council (DCC).
- 2.3.3 Kingsway junction and Markeaton junction are located in a predominantly urban environment, with a mixture of residential housing, commercial, retail, health care and educational establishments. There are a number of public open spaces in the vicinity of the junctions, namely Mackworth Park, open space adjacent to Greenwich Drive South and Markeaton Park.
- 2.3.4 Little Eaton junction is set in a semi-rural environment, with the Ford Farm Mobile Home Park, the property Fourways, commercial and retail facilities located to the north of the existing junction. The Derby Garden Centre occupies the space between the A38 and the B6179 to the north of the junction (accessed off the B6179). The eastern edge of Breadsall village is located approximately 400m to the south-east of the existing junction, whilst the southern edge of Little Eaton village is located approximately 900m to the north of the junction. The A38 to the west of the existing junction crosses over the River Derwent and the Sheffield to Derby railway.
- 2.3.5 The location and provisional DCO application boundary of the proposed scheme is illustrated on Figures 1.2a/ b.
- 2.3.6 The Inspectorate’s Advice Note 9: Using the ‘Rochdale Envelope’ (Advice Note 9) (Planning Inspectorate, 2012) provides guidance regarding the degree of flexibility that may be considered appropriate within an application for development consent under the PA 2008. The advice note acknowledges that there may be aspects of the proposed scheme design that are not yet fixed, and therefore, it may be necessary for the EIA to assess likely worst-case variations to ensure that all foreseeable significant environmental effects of the proposed scheme have been assessed. In accordance with the guidance provided in Advice Note 9, the provisional DCO application boundary has been drawn at this stage to allow some design flexibility. The project design process is ongoing, and as such it is not possible at this point in time to define the exact footprint of the proposed scheme. Figures 1.2a/ b are

intended to show the potential worst-case scenario, including candidate sites that may be required for site compounds, soil and material, flood storage areas and areas needed for ecological enhancement, as based on current knowledge. As such, the provisional DCO application boundary as included herein will be subject to review and revision, but will be finalised prior to the DCO application.

- 2.3.7 This EIA Scoping Report is based on the emerging preliminary design for the proposed scheme, as described in Section 2.4. The proposed scheme is to be developed further through a reference design stage which will form the basis for the DCO application.
- 2.3.8 Within the reference design there will need to be sufficient flexibility to provide scope for finalising the detailed design and construction methodology in due course. Therefore, when presenting the proposed scheme design in the Environmental Statement and the accompanying assessment, the requirements of Advice Note 9 will be complied with to ensure that the likely significant effects of the proposed scheme are assessed on a reasonable worst-case basis.

2.4 The Proposed Scheme

- 2.4.1 It is proposed to grade-separate the three junctions along the A38 through Derby; namely the junctions at Kingsway, Markeaton and Little Eaton. Refer to Figures 2.1, 2.2 and 2.3 for existing junction layouts and Figures 2.4, 2.5 and 2.6 for proposed scheme layout plans.
- 2.4.2 Details of the proposed scheme design are provided in Section 2.5, whilst Chapter 3 (Assessment of Alternatives) provides details of the various alternatives that have been considered prior to the selection of the proposed scheme design as detailed herein.
- 2.4.3 The proposed scheme would operate with a speed limit of 50mph through Kingsway and Markeaton junctions and as far northwards as Kedleston Road. Through Little Eaton junction the speed limit would be 70mph, with an advisory speed of 50mph. The existing national speed limit between Little Eaton and Kedleston Road would be retained (i.e. 70mph).
- 2.4.4 Grade separation of the three A38 Derby junctions would provide journey time benefits to all vehicles, including those travelling along this strategic route during off-peak periods. This is because vehicles travelling through on the A38 trunk road would not need to decelerate, negotiate each of the three roundabouts, stop at traffic signals (when they are at a red phase), and then accelerate back to normal cruising speeds. The time saving derived from grade separation accumulated across all three junctions, would improve the average journey time for all vehicles travelling through on the A38 trunk road. There would also be benefits to many local trips (including buses), which would result from the overall increase in the capacity of these junctions and resolve conflicts between local traffic and strategic movements using the A38. The proposed scheme also offers the potential to remove conflicts between non-motorised users (NMUs) and vehicles using the A38 to the benefit of both.
- 2.4.5 The land potentially required temporarily and/ or permanently for the construction, operation and maintenance of the proposed scheme (hereafter referred to as the provisional DCO application boundary) which includes land required for permanent and temporary purposes, is shown in Figures 1.2a/ b. It is important to note that the provisional DCO application boundary may be subject to change, but currently captures what is thought to be a reasonable worst-case land take.

2.5 Description of the Proposed Scheme

- 2.5.1 The preferred route for the proposed scheme was confirmed by the Secretary of State on 31 January 2018. A description of proposed junction improvements is provided below.

Kingsway Junction

- 2.5.2 The proposed Kingsway junction (refer to Figure 2.4) would comprise a dumb-bell roundabout arrangement and linkages at existing ground level, with the A38 passing beneath in an underpass (the low point of the proposed mainline A38 would be approximately 6.5m below the level of the existing roundabout). The existing A38 carriageways would form the northbound and southbound slip roads. The proposed improvement would be predominantly on-line with local access provided by a side road link to Kingsway Park Close from the eastern dumbbell roundabout. The proposed speed limit would be 50mph through the junction, with the national speed limit (70mph) to the south (the current speed limit through the junction is 40mph and 60mph south of the existing roundabout).
- 2.5.3 In addition to grade-separation of the existing A38/ A5111 Kingsway junction (with the A38 mainline passing beneath the bridge connecting the new roundabouts), the number of lanes on the A38 between Kingsway junction and the A38/ A52 Markeaton junction would be increased from two to three lanes in each direction. Two existing bridges over Brackensdale Avenue would be widened to cater for the provision of the additional lane on each carriageway. The existing accesses from the A38 onto Brackensdale Avenue and Raleigh Street would be closed.
- 2.5.4 The proposed Kingsway junction would be provided with appropriate lighting – including potential lighting of the mainline A38 (currently anticipated to be approximately 12m high light-emitting diode (LED) luminaires). Lighting would tie in with existing lighting outside the proposed scheme boundary as applicable.
- 2.5.5 Existing culverts on Bramble Brook would be replaced or extended as required. Drainage attenuation for the additional paved area would be provided, as would provisions for additional flood storage (refer to Chapter 13: Road Drainage and Water Environment, paras. 2.5.32/ 33 and Table 2.2).
- 2.5.6 NMU facilities would be provided at the proposed Kingsway junction.
- 2.5.7 The proposed scheme footprint at Kingsway junction would require permanent land take from an area of public open space adjacent to Greenwich Drive South (approximately 360m²). The area of public open space loss due to the proposed scheme is subject to change, but will be confirmed and reported in the Environmental Statement.
- 2.5.8 Figure 1.2a illustrates land requirements for highway improvement works to the south of Kingsway junction (where the A38 passes beneath the slip road that connects with the A516). Such works are geographically separated from the main proposed scheme works, and would comprise signage works within the existing highway verges.

Markeaton Junction

- 2.5.9 The proposed Markeaton junction (refer to Figure 2.5) would comprise an enlarged two-bridge roundabout at existing ground level with the A38 passing beneath in an underpass to the south-east of the existing roundabout (maximum depth approximately 7.6m below existing ground levels) with slip roads connecting the A38 to the new roundabout. Large retaining walls would be constructed between the A38 and the slip roads to reduce the footprint of the junction. The northbound merge slip road would be approximately on the line of the existing northbound carriageway adjacent to Markeaton Park.
- 2.5.10 In addition to grade-separation of the existing A38/ A52 Markeaton junction, additional lanes are proposed in both directions between the Markeaton and Kedleston Road junctions and through Markeaton junction on the southbound carriageway. The existing footbridge to the north of the junction would be demolished and replaced in the same location (extended to allow for the additional A38 carriageways). The existing access from the A38 onto Enfield Road would be closed.

- 2.5.11 The proposed Markeaton junction would be provided with appropriate lighting – including lighting of the mainline A38 (currently anticipated to be approximately 12m high LED luminaires). Lighting would tie in with existing lighting outside the proposed scheme boundary as applicable.
- 2.5.12 The proposed scheme would involve the demolition of 15 detached residential properties on Queensway and the demolition of two semi-detached properties on the A52 Ashbourne Road. The existing access to Sutton Close off Ashbourne Road would also be closed, and thus a revised access would be provided which would require land from a further four residential properties.
- 2.5.13 Markeaton junction would be signalised at all four ground level approaches, namely the A38 northbound off-slip; the A52 eastbound approach; the A38 southbound off-slip; and the A52 westbound approach.
- 2.5.14 A large existing culvert (Markeaton Lake Culvert) beneath the A38 connecting Markeaton Lake with Mill Pond would remain in situ and would not need to be extended. The Markeaton Lake culvert currently receives highway drainage from the A38. Pumping of surface water from the proposed A38 underpass and drainage from existing and additional paved areas would be attenuated to HD33/06 (Surface and Subsurface Drainage Systems for Highways) (Highways Agency, 2006) as a minimum. Drainage from the proposed scheme would outfall on the downstream side of Markeaton Lake culvert which subsequently discharges into Mill Pond. Drainage attenuation for the additional paved area would be provided. A pumping station is proposed adjacent to the A38 southbound off-slip.
- 2.5.15 The proposed speed limit would be 50mph through and to each side of the junction (the A38 through the existing junction is subject to a 40mph speed limit), terminating just north of the Kedleston Road slip roads from where the national speed limit would be retained.
- 2.5.16 The existing access into Markeaton Park from Markeaton junction would need to be closed (although it would be retained for emergency vehicle access) – it is thus proposed that the existing park exit onto the A52 would be reconfigured to create a new park access together with some rearrangements of the park's internal road infrastructure.
- 2.5.17 The proposed scheme would result in the loss of access to McDonald's restaurant and the Esso petrol station off the A38 northbound carriageway to the south of the junction – alternative access provisions are currently being investigated. NMU facilities would be provided at the proposed Markeaton junction.
- 2.5.18 An area of approximately 1,500m² of public open space would be permanently lost to the proposed scheme at Markeaton junction – this figure excludes areas affected by the proposed new footbridge as it is considered that this land use is consistent with the public open space designation. The area of public open space loss due to the proposed scheme is subject to change, but will be confirmed and reported in the Environmental Statement. Given the loss of public open space at Markeaton (and Kingsway junction – refer to para. 2.5.7, there would be a requirement for public open space replacement/ exchange. It is proposed that replacement public open space for the proposed scheme would be provided, using in part the area vacated by the buildings to be demolished on Queensway (refer to para. 2.5.12). Such proposals have been agreed in principle with DCiC, with the exchange public open space being integrated with NMU facilities connecting the A52 Ashbourne Road with the proposed new footbridge.
- 2.5.19 Figure 1.2a illustrates land requirements for highway improvement works to the north of Kedleston junction. Such works are geographically separated from the main proposed scheme works, and would comprise signage works within the existing highway verges, and potential works to the highway barriers.

Little Eaton Junction

- 2.5.20 The proposed Little Eaton junction (refer to Figure 2.6) would comprise an enlarged roundabout at existing ground level with the A38 passing above on two roundabout

overbridges to the east and south of the existing roundabout. The existing northbound carriageway would form the northbound slip roads. Commencing at the southern tie in, the proposed A38 would swing to the south of the existing A38 immediately after crossing the River Derwent Bridge, which would not be affected, and would pass over a Flood Relief Arch/ Accommodation Bridge which would be extended. Continuing north, the existing railway bridge would be extended to the south to carry the widened A38 cross section. The existing northbound carriageway would be retained on the railway bridge and form the northbound diverge slip road.

- 2.5.21 The A38 would then pass over the two new roundabout bridges on embankment (up to approximately 10.8m higher than existing ground level and approximately 9.2m above the existing carriageway level) before continuing to the west of the existing A38 and re-joining the existing A38 alignment immediately south of the Water Treatment Works Accommodation Bridge, which would not be affected.
- 2.5.22 The junction with Ford Lane, from the existing A38 between the Flood Relief Arch/ Accommodation Bridge and the railway bridge, would be closed for safety reasons. A short section of Dam Brook located adjacent to the east of the existing A38 would need to be diverted. Drainage attenuation for the additional paved area would be provided, as would potential provisions for additional flood storage (if indicated to be required) (refer to Chapter 13: Road Drainage and Water Environment, paras. 2.5.32/ 33 and Table 2.2).
- 2.5.23 The proposed Little Eaton junction would be provided with appropriate lighting – including lighting of the mainline A38 (currently anticipated to be approximately 12m high LED luminaires). Lighting would tie in with existing lighting outside the proposed scheme boundary as applicable.
- 2.5.24 The proposed speed limit would be 70mph, although there would be an advisory speed limit of 50mph for a length of approximately 600m through the proposed junction in both directions.
- 2.5.25 Appropriate NMU facilities would be provided at the proposed Little Eaton junction. In addition, an option being explored is whether there is a requirement to provide an area of public open space to the east of Allestree off Ford Lane (on the western bank of the River Derwent). This remains an option should it prove problematic to find adequate public open space exchange land at Markeaton junction (refer to para. 2.5.18).
- 2.5.26 Proposed scheme implementation would necessitate a reconfiguration of the Ford Lane junction with the A6 (Duffield Road) located approximately 1km to the north of the A6 junction with the A38. Here there would be a need to undertake limited kerb widening, with the works being undertaken within the existing highway boundary. Such works are required due to traffic flow changes at this junction due to the stopping up of the Ford Lane junction with the A38.
- 2.5.27 Figure 1.2b illustrates land requirements for highway improvement works to the south of Little Eaton junction (to the south of where the A38 crosses the River Derwent), as well as land requirements for works at two locations to the north of the junction. Such works are geographically separated from the main proposed scheme works, and would comprise signage works within the existing highway verges.

Areas Needed for Construction

- 2.5.28 Figures 1.2a/ b indicate that a number of sites may be required and used during the proposed scheme construction phase - these areas are detailed in Table 2.3.

Table 2.3: Candidate Sites for Potential Use during the Construction Phase

Junction	Candidate Sites
Kingsway junction	<ul style="list-style-type: none"> Area adjacent to Brackensdale Avenue access – potential satellite compound
Markeaton junction	<ul style="list-style-type: none"> Area in the Territorial Army base – potential soil storage area Utilities corridor along the edge of Markeaton Park
Little Eaton junction	<ul style="list-style-type: none"> A former landfill site located north of Little Eaton junction, bounded by the North Midland railway line to the west and the B6179 (Alfreton Road) to the east – possible main construction compound Area adjacent and east of Little Eaton junction - possible soil storage area

2.5.29 Figures 1.2a/ b also indicate that a number of areas may be needed for construction access.

2.5.30 The need for such areas during the construction phase will be confirmed and reported within the Environmental Statement.

Earthworks Design

2.5.31 The total cut volume is currently estimated to be approximately 130,000m³, whilst the estimated fill requirement totals approximately 474,900m³ (spread over an approximate 3.5 year construction programme) – such figures are subject to review and change. Whilst material generated at Kingsway junction and Markeaton junction is likely to be reused at Little Eaton junction (subject to quality characteristics), it is apparent that a net import of fill material would be required to construct the proposed scheme.

Drainage and Flood Risk Design

2.5.32 The proposed scheme would be provided with a suitable drainage design system that would include hybrid ponds i.e. flow balancing and vegetative treatment for runoff, including spillage containment at the front end wherever necessary. Outfalls would be provided to local watercourses, with flow rates limited in accordance with Environment Agency requirements.

2.5.33 The proposed scheme crosses areas that are at potential risk associated with flooding, namely at Kingsway junction and at Little Eaton junction. In order to manage such risks, flood storage areas as detailed in Table 2.2 are being investigated (also refer to Figure 1.2a/ b) – flood storage provisions will be confirmed in the Environmental Statement.

Table 2.2: Flood Risk Mitigation/ Storage Options

Junction	Proposals/ Options
Kingsway junction	<p>Bramble Brook flows through a depression in the centre of the junction relative to the existing carriageway level - the onward culvert from the junction 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, although the risk of fluvial flooding from Bramble Brook is considered to be high.</p> <p>To mitigate potential flood risks associated with Bramble Brook, options being explored include a flood storage area within the proposed scheme footprint, as well as a potential flood storage area to the south-west of the proposed scheme within the Kingsway hospital site (see Figure 1.2a) and potentially within Mackworth Park.</p>
Little Eaton junction	<p>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.</p> <p>In order to mitigate flood risks at Little Eaton junction it will be necessary to provide a suitable flood risk mitigation strategy which may take the format of the following:</p> <ul style="list-style-type: none"> Provision of flood storage area(s) – potential flood storage areas (if required) being investigated as illustrated in Figure 1.2b. This includes areas to the north and south of A38 crossing of the River Derwent.

Lighting and Signage

- 2.5.34 Lighting will be required at the three junctions, local access roads and certain sections of the proposed scheme. The lighting used would be appropriate for the proposed scheme; approximately 12m high LED luminaires are currently anticipated to be used which would tie in with existing lighting outside the proposed scheme boundary as applicable - lighting requirements will be confirmed in the Environmental Statement.
- 2.5.35 A signage strategy is being developed in consultation with DCiC and the A38 Managing Agent Contractor (Highways England). The proposed signing strategy seeks to integrate the proposed junctions into the existing road network. This would be achieved by providing consistency and continuity of signing across local authority boundaries and within the A38 trunk road. The proposed signing strategy also supports the proposed scheme's objectives of reducing accidents and congestion and relieving development pressures in the area. The achievement of these objectives would be facilitated by providing a clear routing that makes the best use of the existing highway network, eliminating conflicting signs and improving driver information.
- 2.5.36 The proposed signing strategy is based on the existing signs and existing destinations. In some cases this would result in new signs with the number of destinations. Due to limited verge widths and the requirement for large retaining walls along with complex merge/ lane drop arrangements on the proposed scheme, in some instances the most appropriate signing arrangement would be to provide gantry mounted direction signs. As such, up to seven gantries are currently proposed along the proposed section covering Kingsway junction and Markeaton junction and approaches.

Provision for Pedestrians, Cyclists and Equestrians

- 2.5.37 NMU proposals are based on the fundamental premise that the proposed scheme design aims to include at least the level of NMU provision that exists at present with enhanced provision where deemed appropriate and reasonable – refer to Chapter 12 (People and Communities). In undertaking the design of proposed NMU facilities, the requirements of the Equality Act 2010 will be considered where required in order to take appropriate account of the needs of disabled users.
- 2.5.38 There are no public bridleways in the vicinity of the proposed scheme.

Ecological Enhancement Areas

- 2.5.39 As detailed in Chapter 9: Biodiversity, the proposed scheme has the potential to impact upon a range of ecological habitats and protected species. In order to comply with Highways England policy, the proposed scheme aims to deliver no net-loss in biodiversity through mitigation and enhancement measures using areas within the proposed scheme boundary. If no net-loss using areas within the proposed scheme boundary cannot be achieved, opportunities are being explored for the creation and/ or enhancement of habitats off-site – candidate sites for ecological enhancement are detailed in Table 2.3 (also refer to Figures 1.2a/ b).

Table 2.3: Candidate Sites for Potential Ecological Enhancement (outside of the Proposed Scheme Footprint)

Junction	Candidate Sites
Kingsway junction	<ul style="list-style-type: none"> · Mackworth Park · Area around a potential flood storage area within the Kingsway Hospital site · Area to the north of a potential flood storage area within the Kingsway Hospital site
Markeaton junction	<ul style="list-style-type: none"> · Areas within Markeaton Park in the vicinity of Markeaton Lake · Area around Mill Pond
Little Eaton junction	<ul style="list-style-type: none"> · Area to the west of the River Derwent, north of the proposed scheme · Area to the east of the River Derwent, north of the proposed scheme · Areas to the east and west of the River Derwent, south of the proposed scheme

2.5.40 The need for such areas will be confirmed and reported within the Environmental Statement.

Utilities

2.5.41 It is apparent that some utilities will need to be diverted in locations outside of the provisional DCO application boundary in order to facilitate proposed scheme construction – such works would be undertaken by the applicable utilities companies. Information regarding such works is still being collated, but will be considered within the EIA.

Timescales

2.5.42 Statutory consultation for the proposed scheme is planned to take place later this year. Following assessment of the consultation feedback and appropriate design amendments and EIA, the formal DCO application is planned for 2019. Subject to successfully progression through the DCO process, it is intended to commence proposed scheme construction in 2020, with the first year of opening anticipated to be 2024¹.

2.6 References

Highways Agency (2006) Surface and Sub-surface Drainage Systems for Highways. DMRB Volume 4 Section 2, Part 3, HD 33/06.

Planning Act (2008).

http://www.legislation.gov.uk/ukpga/2008/29/pdfs/ukpga_20080029_en.pdf

Planning Inspectorate (2012) Advice Note 9: Using the 'Rochdale Envelope'.

<https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2011/02/Advice-note-9.-Rochdale-envelope-web.pdf>

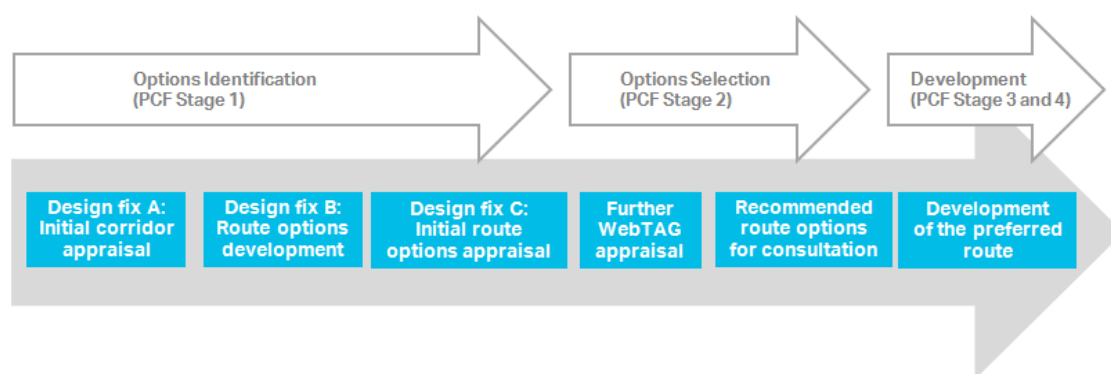
¹ Noted that junctions may be sequentially opened, with all junctions being operational in 2024 – however, the first full year during which all junctions would be fully operational would be 2025.

3 ASSESSMENT OF ALTERNATIVES

3.1 Introduction

- 3.1.1 This chapter presents a brief history of the A38 Derby Junctions scheme and the main alternatives that have been developed and considered; ultimately resulting in the definition of the proposed scheme as detailed in Chapter 2: The Proposed Scheme.
- 3.1.2 The process of option identification and selection undertaken for the proposed scheme is summarised in Section 3.3. This process has followed the Highways England Project Control Framework (PCF) stages as shown in Figure 3.1 (noting that the proposed scheme is now progressing through PCF Stage 3).

Figure 3.1: Option Identification and Selection Process



3.2 Proposed Scheme History

- 3.2.1 In April 2001 Highways Agency² undertook 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 Kingsway junction, Markeaton junction and Little Eaton junction). 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.
- 3.2.2 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 junction 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.
- 3.2.3 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 proposed scheme design, in particular at Little Eaton junction.
- 3.2.4 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 the Highways Agency carry out further design work at Little Eaton junction before making a decision on whether to include the proposed scheme in the Government's Targeted Programme of Improvements (TPI).

² Highways Agency was replaced by Highways England in April 2015. The Secretary of State appointed Highways England (the "Licence holder") as a strategic highways company by way of an Order in accordance with Section 1 of the Infrastructure Act 2015. The Licence came into force on 1 April 2015.


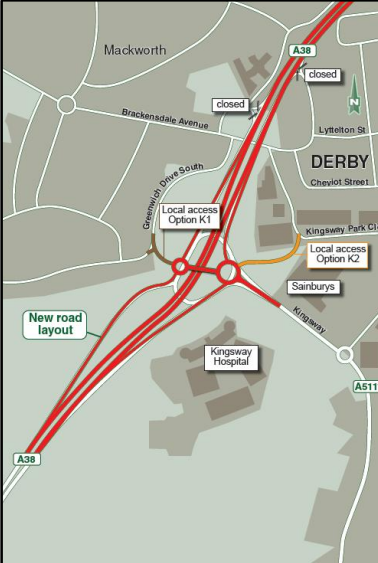

- 3.2.5 Further preliminary design work was undertaken and a supplementary public consultation on revised options for Little Eaton junction was undertaken in October 2003. During this work the need for further preliminary design to assess the A38 capacity, merge and diverge tapers and the number of weaving lanes between junctions was identified.
- 3.2.6 Following a cost challenge workshop undertaken by the Highways Agency 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 proposed scheme. Pending a decision by the RTB, work was stopped in April 2005.
- 3.2.7 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.
- 3.2.8 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, the Highways Agency commissioned a review of the proposed 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 procurement strategies. The purpose of the review was to enable the Highways Agency to consider the entry of the A38 Derby Junctions scheme into the planned programme of improvement works.
- 3.2.9 Following completion of the review, AECOM was awarded the contract by the Highways Agency on 14 July 2014 to provide design services for the A38 Derby Junctions scheme to take the scheme through PCF Stage 2 to PRA.
- 3.2.10 Since AECOM was commissioned in 2014, the government launched its first 'Road Investment Strategy' (RIS) (DfT, 2015) which sets out an ambitious, long term programme for motorways and major roads with the stable funding needed to plan ahead effectively. 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 was 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*").
- 3.2.11 Following the PRA on 31 January 2018, AECOM is now progressing the proposed scheme through PCF Stage 3 which will ultimately result in a DCO application.

3.3 Option Identification and Selection

Proposed Scheme Options (2002 - 2009) and Preferred Solutions

- 3.3.1 Given the history of the A38 Derby Junctions scheme, a wide range of alternatives have been developed, considered and assessed during the period 2002 and 2009 (covering PCF Stages 1 and 2). A summary of the main options that were presented during the 2002 and 2003 public consultation events are summarised in Table 3.1, together with details as to why some options were discounted, and which options were taken forward as the preferred options (together with associated reasons).

Table 3.1: Main A38 Derby Junctions Scheme Options Considered (2002 - 2009) and Preferred Solutions

Junction	Options Considered
<p>Kingsway Junction</p>	<p>Option 1: This option emerged as the preferred option when the scheme was taken to public consultation in 2002. With this option the A38 passed through the junction on embankment over the A5111, with roundabouts providing local access.</p> <p>However, this option was not taken forward due to:</p> <ul style="list-style-type: none"> • Difficulties with the alignment of the A5111 and the impact of the large A38 embankment; • High visual impact due to the A38 passing over the junction on an embankment; • Higher construction costs and greater environmental impacts compared to the preferred option.  <p>Option 2: This option was selected as the preferred option - key features being as follows:</p> <ul style="list-style-type: none"> • The A38 would be lowered to pass underneath the existing roundabout in a new underpass; • Construction of two new roundabouts and a new bridge at existing ground level to carry traffic across the lowered A38; • Existing A38 carriageways would generally be converted into the junction slip roads; • A38 widening to three lanes in each direction between Kingsway junction and Kedleston Road; • Speed limit increased from 40 mph to 50 mph. <p>This option essentially remains the preferred option, although the scheme design has evolved in terms of local access linkages.</p> 
<p>Markeaton Junction</p>	<p>Option 1: The plan shows the option which emerged as the preferred option when the scheme was taken to public consultation in 2002. However, further study identified that the design would not be able to accommodate predicted traffic flows. As a result, the single bridge option was rejected and replaced with a two bridge roundabout which became Option 4.</p>  <p>Option 2: This option was rejected following the 2002 public consultation. The option entailed moving the A38 westwards away from Queensway at the expense of taking a stretch of land from Markeaton Park as well as the potential loss of the filling station and land where the McDonald's restaurant is located. This option was rejected due to unacceptable impacts upon Markeaton Park.</p> <p>Option 3: This option entailed putting the A38 on an embankment with a "flyover" arrangement. This option was rejected on the grounds of the high visual impact created by the embankment and retaining walls.</p>

A38 Derby Junctions Scheme Development (post-2015)

- 3.3.2 Development of the A38 Derby Junctions scheme recommenced in July 2014 (still at PCF Stage 2), building upon the preferred options as detailed in Table 3.1.
- 3.3.3 Non-statutory public consultation was carried out in February and March 2015. This involved a two day exhibition in central Derby and supplementary exhibitions held in Breadsall, Little Eaton and Mackworth (refer to Section 4.2). The purpose of these consultation events was to illustrate how the scheme had developed since the previous public consultation events held in 2002 and 2003.
- 3.3.4 As a result of the 2015 consultation (refer to Section 4.2), members of the public and consultees were encouraged to provide suggestions for any alternative solutions to the current traffic issues associated with the A38 junctions. Several alternative options were received from consultees - these ranged from amendments to the presented junction options, to complete alternative schemes and alignments.
- 3.3.5 All alternative scheme options received were subsequently considered under a two-stage assessment process, comprising the following:
- i. An initial sifting assessment; and
 - ii. Options passing initial sifting were then subject to the more detailed qualitative assessment.
- 3.3.6 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 (DfT, 2014). The performance of the various alternatives were assessed against the following criteria:
- Scheme objectives (refer to Section 2.2³);
 - Deliverability; and
 - Feasibility.
- 3.3.7 Options had to achieve a baseline score against each of these criteria in order to pass the initial sift. The sifting assessment included the options published for the public consultation events in order to form a baseline. Alternative options were then compared to the relevant base-lined published option, combination of options or the whole scheme, as appropriate.
- 3.3.8 Table 3.2 presents the options that passed the initial sift and which were subsequently subjected to further assessment. This further assessment entailed the analysis of:
- 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.

³ Noted that the scheme objectives as detailed in Section 4 are essentially the same as those used during the option selection process

3.3.9 An overview of the assessment findings is provided in Table 3.2, which illustrates that the further assessment considered alternative options at Kingsway junction and Little Eaton junction as follows:

- Kingsway junction:
 - Presented Junction Layout with Option K1 (see Figure 3.2);
 - Presented Junction Layout with Option K2 (see Figure 2.4);
 - Mr Jennison's alternative with Option K1 (see Figure 3.3).

- Little Eaton junction:
 - Option 2 (as described in Table 3.1 and see Figure 3.4);
 - Option 3A (see Figure 3.5);
 - Southern Sweep (see Figure 3.6).

3.3.10 Whilst some alternatives for Markeaton junction were received (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 passed the initial sifting process and were thus excluded from further assessment.

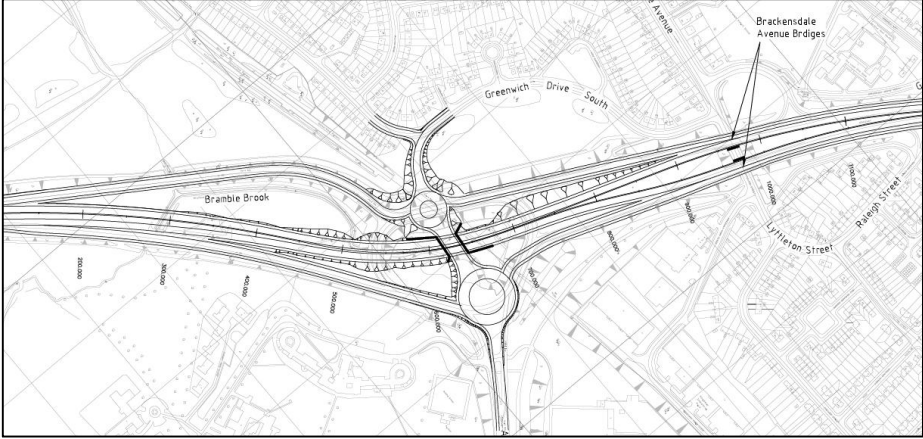
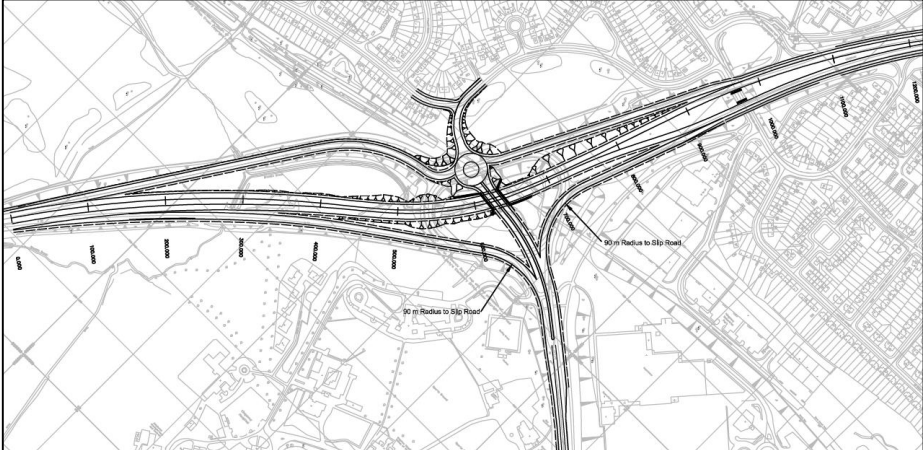
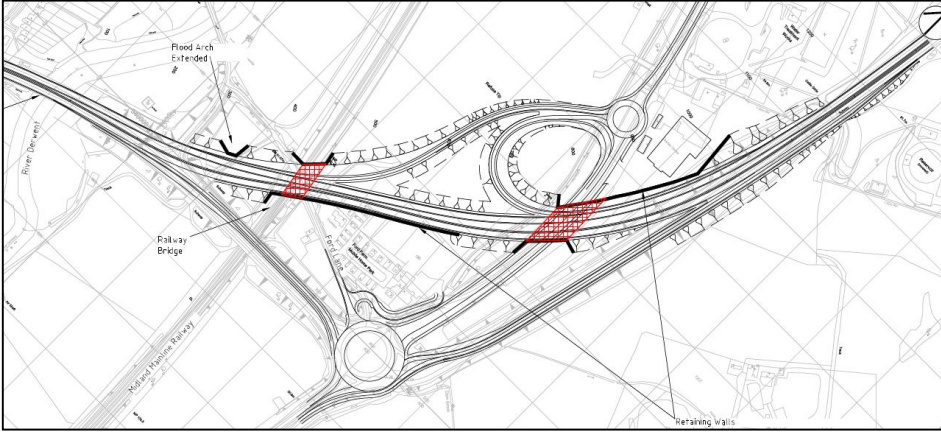
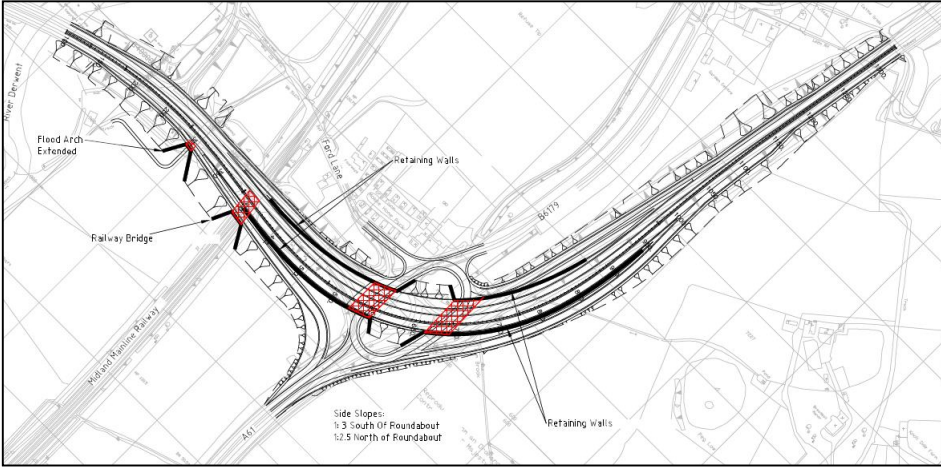
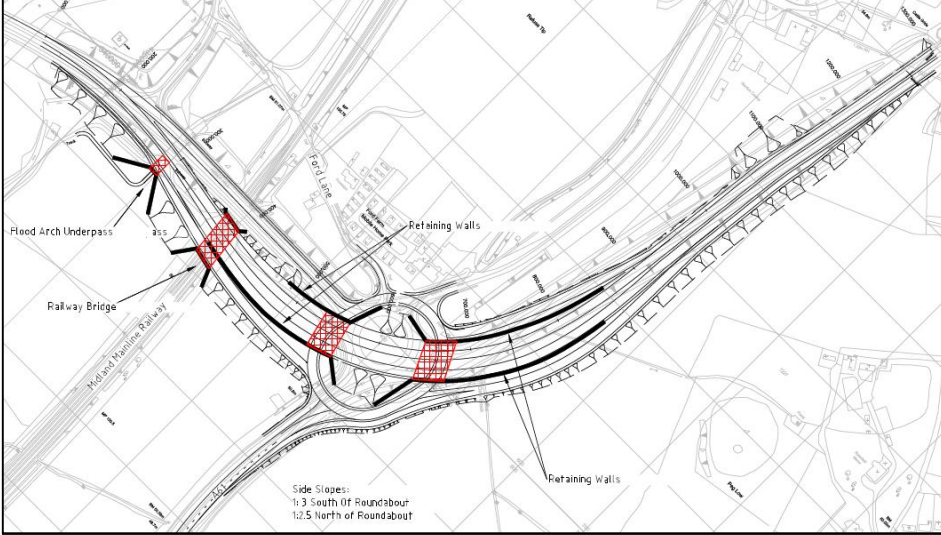
Figure No:	Options Considered by Further Assessment
<p>Figure 3.2: Presented Junction Layout with Option K1</p>	
<p>Figure 3.3: Mr Jennison's alternative with Option K1</p>	

Figure No:	Options Considered by Further Assessment
<p>Figure 3.4: Option 2</p>	
<p>Figure 3.5: Option 3a</p>	
<p>Figure 3.6: Southern Sweep</p>	

3.3.11 As indicated in Table 3.2, the assessment involved the initial appraisal of the options as presented at the 2015 public consultation events (referred to in Table 3.2 as the Presented Junction Layout for Kingsway junction (see Figure 3.2), and the Presented Option at Little Eaton junction (see Figure 2.6)), and then the absolute and relative performance of the alternative).

3.3.12 Table 3.2 indicates the outcomes of the assessment and how the option assessment influenced the proposed scheme design (as presented in Chapter 2: The Proposed Scheme).

Table 3.2: Summary of Qualitative Alternative Options Assessment⁴

Options	Key Elements of Option	Summary of Qualitative Environmental Appraisal	Assessment Outcomes
Kingsway Junction			
Presented Junction Layout with Option K1 (see Figure 3.2)	<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 m²) 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 m²), 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 Mr Jennison's Option ranked lowest in each category.</p>
Presented Junction Layout Option K2 (see Figure 2.4)	<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>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> <p>Option K2 has thus been integrated into the proposed scheme design as illustrated in Figure 2.4 and as described in Chapter 2: The Proposed Scheme.</p>
Mr Jennison's Option with Option K1 (see Figure 3.3)	<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>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>The Mr Jennison's 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>	

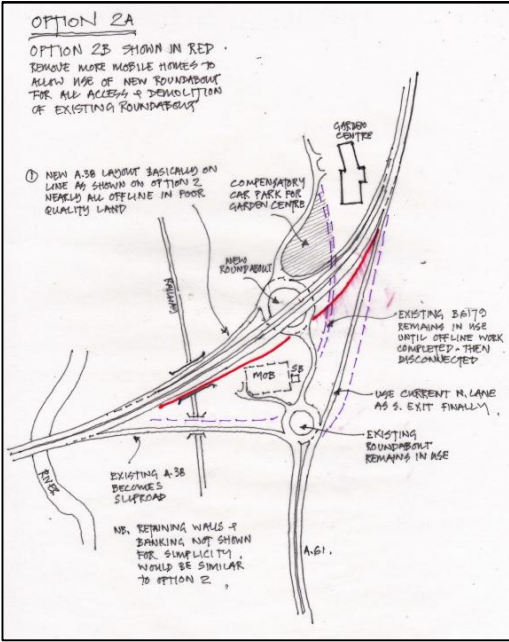


⁴ Commentary adapted from the text included in: i) Alternative Options Assessment – Kingsway, Report Number: 47071319-URS-06-RP-RD-014-3F (March 2016) and ii) Options Assessment – Little Eaton, Report Number: 47071319-URS-06-RP-RD-013-6F (January 2016).

Options	Key Elements of Option	Summary of Qualitative Environmental Appraisal	Assessment Outcomes
Little Eaton Junction			
Presented Option (see Figure 2.6)	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 Derby 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 option was 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 Figure 3.4)	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.
Option 3A (see Figure 3.5)	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.	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.
Southern Sweep (see Figure 3.6)	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.	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.	

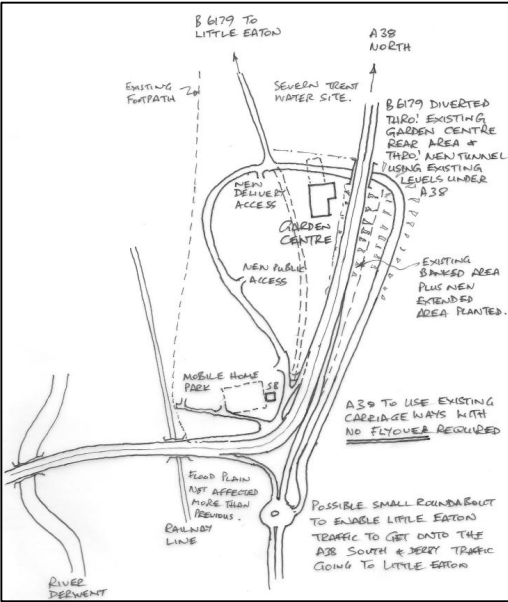
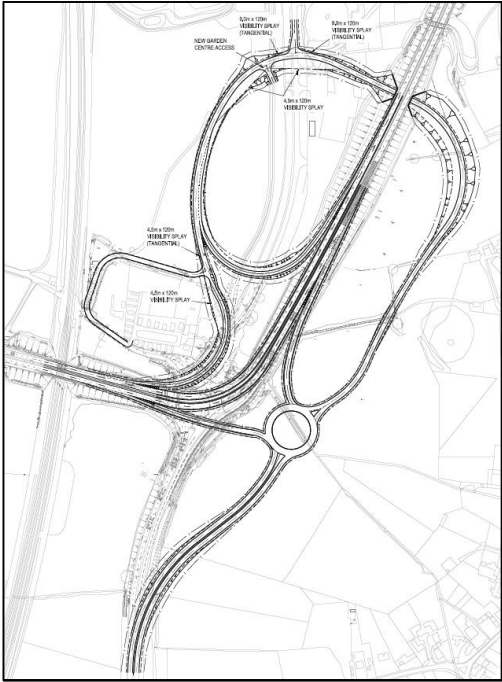
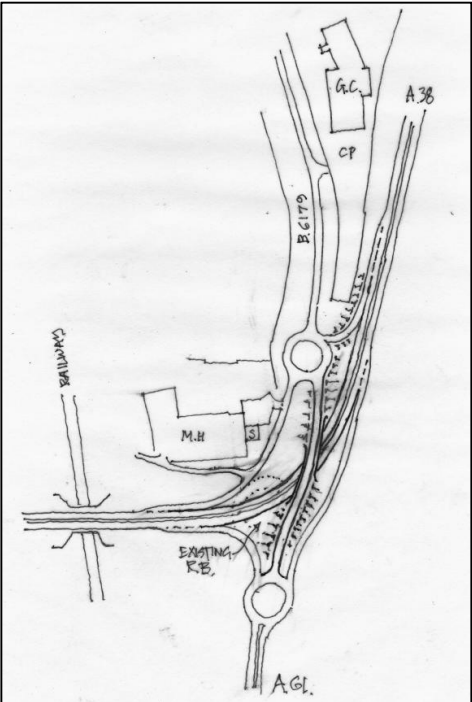
Further Options Assessments

3.3.13 Following the alternative options assessment as detailed in Table 3.2, further alternative options for Little Eaton junction were received from local residents in March 2016 (Options 2A and 2B), May 2016 (Option X) and June 2016 (Option X1) – refer to Table 3.3. These options were reviewed by the road design team who developed some of the options taking into account applicable highway design standards (also refer to Table 3.3) (note that an engineering interpretation drawing for Option X1 was not prepared as the option was not considered to support the defined scheme objectives).

Table 3.3: Alternative Little Eaton Junction Designs Received in 2016 and Engineering Interpretations subjected to Sifting Analysis

Option Received	Engineering Interpretation
<p>Options 2A and 2B (A38 embankment moved to the north of the existing Little Eaton junction)</p> 	<p>Option 2A⁵</p>  <p>Option 2B</p> 

⁵ Variants of Option 2A were developed for assessment purposes – namely a variant where the southbound entry slip was realigned for geometric reasons and a variant with a single bridge at the junction.

Option Received	Engineering Interpretation
<p>Option X (link road from B6179 to A61 in tunnel under the at grade A38)</p> 	
<p>Option X1 (link from the B6179 to A61 on a flyover above the at grade A38)⁶</p> 	

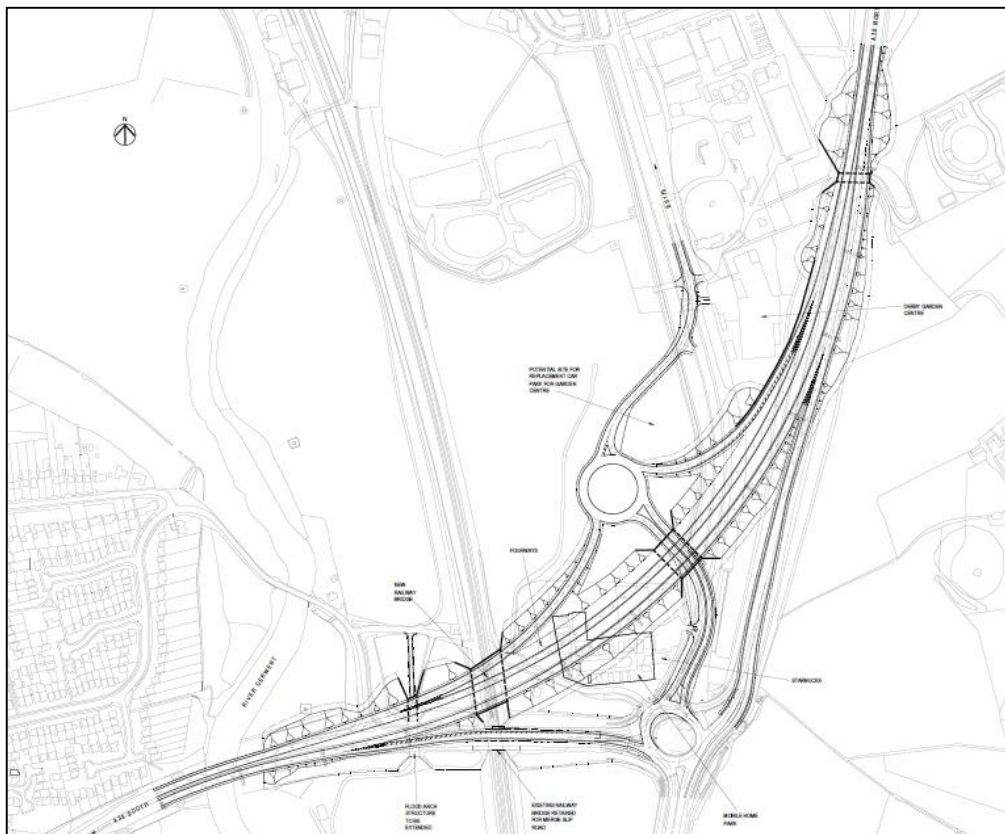
3.3.14 These options were subject to the initial sifting assessment as described in para. 3.3.6 - the results of which indicated that none of these options passed initial sifting as they would not perform satisfactorily in terms of supporting the achievement of the defined scheme objectives (refer to Section 2.2), whilst they presented a number of technical challenges

⁶ Engineering interpretation drawing for Option X1 was not prepared as the option was not considered to support defined scheme objectives

affecting the option feasibility. These options were thus not subjected to further assessment (Report No: 47071319-URS-06-RP-RDN-024-1F Highways England, 2016).

3.3.15 Subsequent to the above, a meeting took place on 19 January 2017 between the Transport Minister, the MP for Mid-Derbyshire (which includes Little Eaton and Breadsall), Highways England, Breadsall Parish Council and AECOM. The purpose of the meeting was to hear the concerns of the residents of Breadsall village in relation to the proposed improvements to the Little Eaton junction. Following the meeting, it was decided to further assess an option that would result in the A38 being re-aligned to the north side of the existing roundabout so as to reduce the perceived impact on Breadsall village. The project team considered the best alternative options as previously discounted, and defined Option 2C to be the best alternative option – see Figure 3.7.

Figure 3.7: Alternative Option 2C



3.3.16 Option 2C was developed with the assumption that the Ford Farm Mobile Home Park and its residents could be relocated; and the property Fourways and its associated businesses could be acquired, plus the provision of a replacement car park area for the Derby Garden Centre.

3.3.17 Option 2C was compared to the preferred option in terms of engineering, traffic and economics, environment, stakeholders and land.

3.3.18 The initial feasibility assessment indicated that Option 2C had a number of advantages over the preferred option in terms of engineering design and potential environmental impacts on Breadsall village (in terms of noise, air quality and visual intrusion). It would also reduce the impact on agricultural land within designated green belt. The main disadvantages of Option 2C would be the impacts on the property Fourways (and associated businesses) and the mobile home park; the societal impacts to the residents; and the increased scheme construction costs. Delivery of Option 2C could also result in a 12 month delay as compared to the preferred option.

- 3.3.19 Given the above, Option 2C was not considered to be preferable to the preferred option, such that the PRA was announced on the 31 January 2018 resulting in the preferred option becoming the proposed scheme.

Further Scheme Development

- 3.3.20 Following the PRA, the proposed scheme is now progressing through the DCO application stage (PCF Stage 3) (refer to Figure 3.1). There is the potential that the proposed scheme design as presented herein will be further developed and refined. Any such, design evolutions will be reported in the Environmental Statement which will be prepared to support the DCO application. The Environmental Statement will also include details of alternatives considered and the reasoning for the selection of the chosen option (as detailed above).

3.4 References

Department for Transport (2014) Transport Analysis Guidance. The Transport Appraisal Process.

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/431185/webtag-tag-transport-appraisal-process.pdf

Department for Transport (2014) Road Investment Strategy: 2015 to 2020.

<https://www.gov.uk/government/collections/road-investment-strategy>

Highways England (2015) Public Consultation Assessment Methodology. Technical Note 47071319-HE-02-TN-PM-001.

Highways England (2016) A38 Derby Junctions Report on Public Consultation. Report Number: 47071319-URS-02-PCF-PM-009-6F (January 2016).

Highways England (2016) Options Assessment – Little Eaton. Report Number: 47071319-URS-06-RP-RD-013-6F (January 2016).

Highways England (2016) Alternative Options Assessment – Kingsway. Report Number: 47071319-URS-06-RP-RD-014-3F (March 2016).

Highways England (2016) Options Assessment – Little Eaton Options 2A, 2B and X. Report No: 47071319-URS-06-RP-RDN-024-1F (June 2016).

4 CONSULTATION

4.1 Introduction

4.1.1 Effective stakeholder engagement and consultation is intrinsic to the PA 2008 and fundamental to the success of the proposed scheme.

4.1.2 The proposed scheme has a wide range of stakeholders (including landowners, statutory consultees, local communities and specialist interest groups) with differing interests that require varied levels of information. Specific communication activities, therefore, need to be focussed to meet the needs of particular individuals and groups. This requires an understanding of the stakeholders and their interest in the proposed scheme.

4.1.3 Stakeholder engagement for the proposed scheme is based on the following principles:

- Early and ongoing engagement to inform and influence the proposed scheme development process;
- Seeking an appropriate level of feedback at each stage in the iterative design process and ensuring that comments received are taken into consideration;
- Building of long term relationships with key stakeholders throughout the different stages of the proposed scheme to help better understand their views;
- Where possible and practicable ensuring concerns are addressed; and
- Ensuring appropriate statutory consultation is undertaken in compliance with requirements of the PA 2008 and associated guidance.

4.2 Consultation Undertaken to Date

4.2.1 Stakeholders have long been involved in proposed improvements to the A38 corridor as illustrated in Chapter 3: Assessment of Alternatives.

4.2.2 The following consultees have been contacted during the options identification and selection process (PCF Stages 1 and 2) and/ or during preparation of this EIA Scoping Report:

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

4.2.3 Whilst such informal consultation activities are on-going with the bodies as detailed in para. 4.2.2, no formal agreements have been reached regarding the scope of the environmental assessment leading to the publication of the Environmental Statement. A summary of consultation activities undertaken are detailed in Table 4.1.

Table 4.1: Consultation Activities Undertaken as Related to the EIA

Aspect or Topic	Consultation (Completed, On-going, Planned)
Air quality	Scope of the technical assessment and supporting air quality monitoring database has been discussed with Highways England air quality specialists.
Cultural heritage	Consultation with Historic England, DCC and DCiC was undertaken during PCF Stage 2 regarding assessment methodologies for the three cultural heritage elements (i.e. archaeological remains, historic buildings and historic landscape), potential scheme impacts on heritage resources, and archaeological survey requirements. Similar consultation is planned during PCF Stage 3.
Landscape and visual effects	Landscape officers at DCC and DCiC were consulted regarding the scope of the PCF Stage 2 assessment and the choice of viewpoint locations prior to the assessment being undertaken. Further consultation on assessment methods and selection of receptors is planned for PCF Stage 3.
Biodiversity	Key ecological stakeholders were consulted during the PCF Stage 2 ecological impact assessment, namely: Derbyshire Wildlife Trust; Natural England; Environment Agency; DCiC; DCC; Highways England; and other local protected species groups. These stakeholders are being consulted with regard to ecological survey requirements and methods, and ecological mitigation/enhancement opportunities.
Geology and soils	Consultation with Natural England in 2015 confirmed that there are no areas of geomorphological importance or regional geological importance within the vicinity of Kingsway junction, Markeaton junction or Little Eaton junction.
Materials	The environmental team are consulting with the proposed scheme highway design team in order to gain an understanding of the types and quantities of materials that would likely be used during construction and the potential types and volumes of waste that would be generated. A construction contractor will also be available for providing construction advice during PCF Stage 3.
Noise and vibration	Environmental Health Departments at both DCiC (Kingsway and Markeaton junctions) and EBC (Little Eaton junction) were consulted during PCF Stage 2 with regard to the noise assessment and monitoring. These bodies will be consulted further during PCF Stage 3. The scope of the technical assessment and noise mitigation proposals has been discussed with Highways England noise specialists and which will be further developed during PCF Stage 3.
People and communities	A range of organisations have been consulted during PCF Stage 2 regarding the proposed scheme NMU facilities, namely DCiC, DCC, Derby Cycling Group, Sustrans Derby Area, Ramblers Association, Peak and North Footpaths Society, Highways England, and Little Eaton Reference Group (see para. 4.2.4). Further consultation is planned during PCF Stage 3.
Road drainage and the water environment	Issues related to water resources and flooding risks have been discussed during PCF Stage 2 with Highways England, DCiC, DCC, Severn Trent Water and the Environment Agency. We are currently in consultation with DCiC and the Environment Agency regarding flood mitigation and storage provisions at Kingsway junction and Little Eaton junction, respectively.
Combined and cumulative effects	The planning departments of South Derbyshire District Council, DCiC, EBC and Amber Valley Borough Council were consulted during PCF Stage 2 in order to identify potential major land developments in the vicinity of the proposed scheme with the potential to generate cumulative effects in association with the proposed scheme. Similar consultation will be undertaken during PCF Stage 3.

4.2.4 Consultation activities as follows have been undertaken with statutory and non-statutory organisations during PCF Stage 2 during the development of the proposed scheme design and the option assessment process:

- Public consultation exhibitions at the University of Derby Exhibition Centre on 5 – 7 February 2015; Breadsall Village Hall on 26 February 2015; Little Eaton Village Hall on 2 March 2015;
- Informal consultation exhibition at the Mackworth Youth and Community Centre on 26 March 2015;
- Unmanned consultation boards at DCiC offices (12th February – 24th March 2015), Derby Central Library (12 – 23 February 2015), Allestree Library (24 February – 30

- March 2015), Mickleover Library (17– 28 February 2015) and Mackworth Library (2 – 30 March 2015);
- Steering Group meetings held with DCiC and DCC (December 2014; February/ June/ October/ December 2015; March/ June 2016);
- Little Eaton Reference Group meetings (meetings in September 2015; March/ May 2016; October 2016). The Reference Group included local authorities; local businesses; the A38 Breadsall Action Group; and Ford Farm Mobile Home residents and owner representative;
- Meetings with potentially affected landowners;
- Ad hoc consultation with statutory and non-statutory bodies by environmental disciplines (includes consultation with the Environment Agency, DCiC, DCC, the Derbyshire Wildlife Trust, Natural England, Severn Trent Water, A38 Managing Agent Contractor etc.).

4.3 DCO Consultation Requirements

- 4.3.1 The DCO process has a number of statutory requirements regarding consultation – consultation requirements are detailed in the Inspectorate’s Advice Note 3 (Planning Inspectorate, 2017). These requirements stipulate that certain stakeholder groups and the community must be consulted as part of the pre-application process, as set out in Sections 42 and 47 of PA 2008. Further requirements set out how the proposed scheme must be publicised and specific documents produced, including a Statement of Community Consultation (SoCC) and a Consultation Report.
- 4.3.2 It is proposed that the SoCC for the proposed scheme will be published prior to consultation. The SoCC will outline how Highways England intends to formally consult with the local community about the proposed scheme. Highways England is required to first consult the relevant local authorities on the draft SoCC and they will have a period of at least 28 days following receipt of the draft SoCC to respond, prior to its publication for inspection by the public.

4.4 Statutory Consultation

- 4.4.1 The Inspectorate will consult on this EIA Scoping Report under the EIA Regulations. Views from consultees will be considered and used to inform the scoping opinion to be issued by the Inspectorate.
- 4.4.2 Under Section 42 of the PA 2008, Highways England will conduct its own consultation with statutory environment bodies (Natural England, the Environment Agency and Historic England), relevant planning authorities, landowners, and other key consultees.
- 4.4.3 The local community and wider public will be consulted on the proposed scheme via a statutory consultation programme in accordance with Section 47 of the PA 2008. The statutory consultation programme is expected to run later this year and will be carried out in accordance with the SoCC which is currently being developed.
- 4.4.4 The approach to Section 47 consultation is currently being finalised, but is likely to include (without being limited to):
- Exchanges of correspondence, meetings and workshops with local community groups and businesses;
 - Publication of leaflets, reports and other information made available in the local area and online; and
 - Public exhibitions at which members of the community can meet with members of the project team.
- 4.4.5 The purpose of this consultation will be to seek comments from the local community and statutory and technical consultees on the proposed scheme. The consultation will include the provision of environmental information contained within a Preliminary Environmental Information Report (PEI Report).

- 4.4.6 Feedback received during the consultation will be taken into consideration by the project team and summarised in the Consultation Report which will be submitted as part of the DCO application. The Consultation Report will demonstrate how Highways England has complied with the consultation requirements of the PA 2008 and will be considered by the Inspectorate, both when determining whether to accept the application, and then in examining the application.

4.5 References

Planning Act (2008).

http://www.legislation.gov.uk/ukpga/2008/29/pdfs/ukpga_20080029_en.pdf

Planning Inspectorate (2017) Advice Note 3: EIA Notification and Consultation.

https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2013/07/advice_note_3_v5.pdf

5 APPROACH TO THE ASSESSMENT

5.1 The Design Manual for Roads and Bridges

- 5.1.1 Guidance published by the Government for the preparation of environmental assessments of proposed road schemes is contained in the Design Manual for Roads and Bridges (DMRB) Volume 11 (Highways Agency, 2007). This sets out both the general process and the methods for assessing individual environmental topics. This EIA Scoping Report also adheres to Interim Advice Note (IAN) 125/15 Environmental Assessment Update (Highways England, 2015), which provides a new structure of DMRB Volume 11.
- 5.1.2 DMRB Volume 11 advises on the environmental topics to be included in an EIA for highway schemes, and the methods to be used in the assessment for each of those topics. The topics identified in Chapters 6 to 16 of this EIA Scoping Report are those required by DMRB and by the EIA Regulations.
- 5.1.3 The EIA will adhere to the most up-to-date, relevant guidance contained in DMRB and Highways England IANs. More details of the methods to be used for each individual topic are provided in Chapters 6 to 16 of this EIA Scoping Report. Should any revisions to IANs or DMRB be issued between scoping and reporting of the EIA, they will be adopted where appropriate, provided that it is reasonable to do so within the programme and governance for the project. Any changes in environmental legislation, such as for example the EIA Regulations, will be mandatory, and therefore accommodated.
- 5.1.4 For each topic, the EIA Scoping Report and Environmental Statement will consider the aspects outlined below in Sections 5.2 – 5.8.

5.2 The National Networks National Policy Statement (NNNPS)

- 5.2.1 Strategic roads have their own policy framework, with relevant policy objectives set out in the NNNPS. The NNNPS is framed in the context of wider Government policies on environment, safety, technology, sustainable transport and accessibility. It provides planning guidance for promoters of NSIPs on the road network, and the basis for the examination by the Examining Authority and decisions by the Secretary of State. The Secretary of State will use the NNNPS as the primary basis for making decisions on development consent applications for national networks NSIPs in England. Given the importance of the NNNPS, the EIA approach adopted for the proposed scheme takes account of this key policy document. The EIA will have regard to the methodological advice within Chapter 5 of the NNNPS.

5.3 Existing, Baseline and Future Conditions

- 5.3.1 In order to identify the effects of the proposed scheme on the environment, it is important to understand the environment that would be affected by the proposed scheme (the 'baseline conditions'). Understanding the baseline allows the measurement of changes that would be caused by the proposed scheme.
- 5.3.2 The baseline conditions are not necessarily the same as those that exist at the current time; they are the conditions that would exist in the absence of the proposed scheme either (a) at the time that construction is expected to start, for impacts arising from construction or, (b) at the time that the proposed scheme is expected to open to traffic, for impacts arising from the operation of the proposed scheme. Therefore, the identification of the baseline conditions involves predicting changes that are likely to happen in the intervening period, for reasons unrelated to the proposed scheme. This will entail taking current conditions and committed development into consideration and using experience and professional judgment to predict what the baseline conditions might look like prior to the start of proposed scheme construction and operation.

5.4 Potential Significant Effects and Mitigation

Defining Assessment Years and Scenarios

- 5.4.1 The assessment of effects involves comparing a scenario with the proposed scheme against one without the proposed scheme over time. The absence and presence of a proposed scheme are referred to as the 'Do Minimum' and 'Do Something' scenarios respectively. The 'Do Minimum' scenario represents the future baseline with minimal interventions and without new infrastructure.
- 5.4.2 Depending on the topic, the effects can be assessed for the 'Do Minimum' and 'Do Something' scenarios in the baseline year (assumed to be 2024 for the purposes of the Environmental Statement) and the future assessment year (assumed to be 15 years after proposed scheme opening).
- 5.4.3 In summary, it is proposed that the EIA address the defined timescales as follows (all of which are subject to potential review):
- **Current Baseline Conditions (2017/ 2018):** this scenario describes the existing conditions in the vicinity of the proposed scheme;
 - **Future Baseline Conditions (2020):** this scenario considers the future conditions prior to the start of proposed scheme construction activities. Other future baseline scenario years can be used if appropriate, and where specified as they are predicted to be in the period immediately prior to the start of construction;
 - **Construction (2020 - 2024):** this scenario describes the conditions during the construction phase (construction phase duration is subject to review);
 - **Operation (2024):** this scenario describes the conditions predicted to be associated with the full operation of the proposed scheme⁷; and
 - **Future Baseline Conditions (2039):** this scenario considers the future conditions with and without the proposed scheme, and facilitates a comparison between the two. Other future baseline scenario years can be used if appropriate, and where specified.

Demolition/ Decommissioning After Design Life

- 5.4.4 It is considered highly unlikely that the proposed scheme would be demolished/ decommissioned after its design life as the road is likely to have become an integral part of the infrastructure in the area. In the unlikely event of proposed scheme demolition/ decommissioned, this would be part of the relevant statutory process at that time, including EIA as appropriate. It is therefore proposed that demolition/ decommissioned of the proposed scheme is scoped out of the EIA.
- 5.4.5 It is considered that the principal components that make up the proposed scheme are appropriate for its design life. Thus no major components are anticipated to require dismantling or replacement (e.g. lighting columns). During proposed scheme operation, should any components require replacement/ repair, such works would be undertaken by the A38 Managing Agent Contractor (Highways England) in accordance with their standard maintenance practices. Such practices require the investigation, assessment and appropriate management of potential environmental effects associated with such works in accordance with their environmental management planning systems. As such, the assessment of potential environmental effects associated with the replacement of proposed scheme components during its operational phase has been scoped out of the EIA, given that these will be appropriately managed such that significant environmental effects would be avoided.

⁷ Noted that junctions may be sequentially opened, with all junctions being operational in 2024 – however, the first full year during which all junctions would be fully operational would be 2025.

Identifying Potential Effects

- 5.4.6 The EIA Regulations require: “*The description of the likely significant effects*” of the proposed scheme on the environment, covering “*the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development*”.
- 5.4.7 The technical scope of the Environmental Statement is identified in Section 5.6, whilst Chapters 6 to 16 presents the details of our proposed topic-specific approaches.

Assessing Significance

- 5.4.8 The significance of an environmental effect is typically a function of the ‘value’ or ‘sensitivity’ of the receptor and the ‘magnitude’ or ‘scale’ of the impact.
- 5.4.9 DMRB Volume 11, Section 2, Part 5 HA 205/08 ‘Assessment and Management of Environmental Effects’ provides advice on typical descriptors of environmental value, magnitude of change and significance of effects. Tables 5.1 to 5.4 reproduce these descriptors and demonstrate how the significance of effect category can be derived. Assessments against these criteria will be made on the basis of professional judgement.

Table 5.1: Environmental Value (or Sensitivity) and Typical Descriptors

Value	Typical Descriptors
Very high	Very high importance and rarity, international scale and very limited potential for substitution.
High	High importance and rarity, national scale, and limited potential for substitution.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution.
Low (or lower)	Low or medium importance and rarity, local scale.
Negligible	Very low importance and rarity, local scale.

Table 5.2: Magnitude of Change and Typical Descriptors

Magnitude of Change	Typical Descriptors
Major	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse).
	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Moderate	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse).
	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Minor	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse).
	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Low or medium importance and rarity, local scale.
	Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).
No Change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

5.4.10 Table 5.3 demonstrates how combining the environmental value of the resource or receptor with the magnitude of change produces a significance of effect category.

Table 5.3: Significance of Effects Matrix

Magnitude of Change	Value/ Sensitivity of Receptor				
	Very High	High	Medium	Low	Negligible
Major	Very Large	Large/ Very Large	Moderate /Large	Moderate	Slight
Moderate	Large/ Very Large	Moderate/ Large	Moderate	Slight	Neutral
Minor	Moderate/ Large	Moderate	Slight	Neutral	Neutral
Negligible	Slight	Slight	Neutral	Neutral	Neutral
No Change	Neutral	Neutral	Neutral	Neutral	Neutral

5.4.11 The DMRB recognises “*the approach to assigning significance of effect relies on reasoned argument, professional judgement and taking on board the advice and views of appropriate organisations. For some disciplines, predicted effects may be compared with quantitative thresholds and scales in determining significance. Assigning each effect to one of the five significance categories enables different topic issues to be placed upon the same scale, in order to assist the decision-making process at whatever stage the project is at within that process*”.

5.4.12 Table 5.4 illustrates how DMRB describes the significance of effect categories. In arriving at the significance of effect, the assessor will also consider whether effects are direct, indirect, secondary, cumulative, short, medium or long-term, permanent or temporary, positive or negative.

Table 5.4: Descriptors of the Significance of Effect Categories

Significance Category	Typical Descriptors of Effect
Very large	Only adverse effects are normally assigned this level of significance. They represent key factors in the decision making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change (e.g. loss or severe damage to key characteristics) in a site or feature of local importance may also enter this category.
Large	These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.
Moderate	These beneficial or adverse effects may be important, but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision making if they lead to an increase in the overall adverse effect on a particular resource or receptor.
Slight	These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision making process, but are important in enhancing the subsequent design of the project.
Neutral	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

5.4.13 Effects determined to be slight or neutral are not deemed to be significant, and as such will not be reported in detail in the Environmental Statement and do not require specific

mitigation. The exception to this is where the combination of multiple slight effects has the potential to lead to a significant (i.e. moderate or above) cumulative effect. Effects that are determined to be moderate or large are deemed to be significant and require specific attention to assess whether mitigation and/ or enhancement measures are required to reduce the effect.

- 5.4.14 Not all of the environmental topics use the above criteria or approach. For example, some topics do not use a matrix based approach, but instead use numerical values to identify impacts (e.g. noise and vibration) whilst some topics do not have agreed methods of assessment or scales of measurement for either value or sensitivity (e.g. geology and soils). Therefore, each environmental topic specialist will use the information provided above, their topic specific guidance as well as their professional judgement to assess the significance of effects. However, irrespective of the criteria or approach that a topic requires, the descriptors of significance listed in Table 5.4 will be used.
- 5.4.15 Further details of the topic specific significance criteria that will be used in the Environmental Statement are discussed in Chapters 6 to 16.

Mitigation Measures, Enhancements and Residual Effects

- 5.4.16 The EIA will take into account any design measures that have been incorporated into the proposed scheme design, as well as any standard management activities that the proposed scheme will implement.
- 5.4.17 Mitigation of potentially significant adverse environmental effects will be an iterative part of the proposed scheme design development following the hierarchy below:
- **Avoidance:** incorporate measures to avoid the effect, for example, alternative design options or modifying the proposed scheme programme to avoid environmentally sensitive periods.
 - **Reduction:** incorporate measures to lessen the effect, for example, fencing off sensitive areas during construction and implementing a Construction Environmental Management Plan (CEMP) to reduce the potential impacts from construction activities.
 - **Compensation/ Remediation:** where it is not possible to avoid or reduce a significant effect then offsetting measures should be considered, for example the provision of replacement of habitat to replace that lost to the proposed scheme or remediation such as the clean-up of contaminated soils.
 - **Enhancement:** where possible enhancement measures will be incorporated into the proposed scheme. Enhancement measures are considered to be over and above any avoidance, mitigation and compensation measures required to neutralise the impacts of the proposed scheme.
- 5.4.18 Impacts that remain after mitigation are referred to as residual impacts. The assessment of the significance of the residual effects after mitigation/ enhancement is therefore the key outcome of the assessment.

Assessment of Cumulative Effects

- 5.4.19 Cumulative effects are the result of multiple impacts on environmental receptors or resources. There are principally two types of cumulative impact:
- i. The combined action of a number of different environmental topic specific impacts upon a single resource/ receptor (in combination); and
 - ii. The combined action of a number of different projects, cumulatively with the project being assessed, on a single resource/ receptor (cumulative).
- 5.4.20 Further details on the scope of the cumulative effects assessment is provided in Chapter 16.

5.5 Proposed Level and Scope of the Assessment

5.5.1 This section addresses the level at which environmental topics are to be examined i.e. a 'Simple' or 'Detailed assessment', and establishes which topics can be 'scoped out' of the EIA (basic assessment) in accordance with the guidance set out in Annex A of IAN125/15.

5.5.2 Study areas are defined individually for each environmental topic, according to the guidance in DMRB and the geographic scope of the potential impacts or of the information required to assess those impacts.

5.6 Technical Scope

5.6.1 The environmental topic areas to be considered, the extent of the assessment work proposed and the methodology for each are referred to as the technical scope. The EIA Regulations require the Environmental Statement to describe the likely significant effects of the proposed scheme on the environment resulting from:

- a) *“the construction and existence of the development, including, where relevant, demolition works;*
- b) *the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources;*
- c) *the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste;*
- d) *the risks to human health, cultural heritage or the environment (for example due to accidents or disasters);*
- e) *the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources;*
- f) *the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change;*
- g) *the technologies and the substances used.”*

5.6.2 The environmental topic areas proposed for inclusion in the Environmental Statement are as follows:

- Air quality;
- Cultural heritage;
- Landscape and visual;
- Biodiversity;
- Geology and soils;
- Materials;
- Noise and vibration;
- People and communities;
- Road drainage and the water environment;
- Climate; and
- Combined and cumulative effects.

5.6.3 The assessment of impacts of the proposed scheme on human health is a function of the following topics: air quality, noise and vibration, people and communities, and road drainage and the water environment. As such, human health impacts are “in combination” impacts and are considered under the cumulative effects heading.

5.6.4 As detailed above, the EIA Regulations require the assessment of likely significant effects of the proposed scheme on the *“emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste”*. As detailed in Highways England Major Project Instructions (version number MPI-57-052017) (Highways England,

2017), heat and radiation are unlikely to be of relevance to the scope of most highways projects. The proposed scheme characteristics have been reviewed, which indicates that neither heat nor radiation are of relevance to the proposed scheme and thus these aspects will be scoped out of the EIA.

- 5.6.5 Regulation 32 of the EIA Regulations 2017 requires the consideration of any likely significant effects on the environment of another European Economic Association (EEA) State. Guidance upon the consideration of transboundary effects is provided in the Inspectorate's Advice Note 12: Transboundary Impacts (Planning Inspectorate, 2015). A transboundary screening matrix is provided in Appendix 1.2 which indicates that the proposed scheme is not anticipated to generate any significant potential transboundary effects. Transboundary effects are thus proposed to be scoped out of the EIA.

5.7 Major Events

Legislative Requirements

- 5.7.1 The EIA Regulations have introduced a requirement to consider major accidents and disasters. It is considered likely that the original changes to the EIA Directive to consider major events were made in order to bring certain other statutory requirements, mainly other EU Directives, within the overall 'wrapper' of EIA and the Environmental Statement. The Directive and domestic Regulations cite two specific directives as examples of risk assessments to be brought within EIA, these are Directive 2012/18/EU of the European Parliament and of the European Council (which deals with major accident hazard registered sites) and Council Directive 09/71/Euratom (which deals with nuclear sites). Neither of these Directives is of relevance to the proposed scheme.

Highways England Guidance

- 5.7.2 MPI-57-052017 (Highways England, 2017) sets out how the changes brought about by the 2017 EIA Regulations are to be implemented for Highways England projects. As such, these instructions set out the proposed scope of assessment in relation to major events ('events' being the collective term used in the instructions for both accidents and disasters). This general scope should cover:

- Vulnerability of the project to risks of major accidents and/ or disasters; and
- Any consequential changes in the predicted effects of that project on environmental topics.

- 5.7.3 To achieve this, the instructions identify that projects should:

- Apply professional judgement in consultation with the Overseeing Organisation to develop project specific definitions of major events;
- Identify any major events that are relevant to and can affect a project;
- Where major events are identified, describe the potential for any change in the assessed significance of the project on relevant environmental topics in qualitative terms. Report the conclusions of this assessment within the individual environmental topics; and
- Clearly describe any assumed mitigation measures, to provide an evidence base to support the conclusions and demonstrate that likely effects have been mitigated/ managed to an acceptable level.

- 5.7.4 The potential receptors of effects resulting from major events are all reported in the relevant topic chapters, and as such major events is not a topic in itself. The Highways England instruction confirms that a separate chapter is not required. Relevant major events will, therefore, be reported in the project description section of the Environmental Statement, whilst any consequences for receptors will be reported in the applicable topic chapters.

Methodology

5.7.5 The assessment will assess the potential for significant effects (during construction and operation) of major accidents and disasters that:

- a) Could result in impacts upon the proposed scheme (e.g. fires, flooding); or
- b) Could occur as a consequence of the proposed scheme (e.g. structure failure/ collapse).

5.7.6 The methodology adopted includes three main stages, as follows:

- **Stage 1:** a long list of possible major events will be developed. This list will draw upon a variety of sources, including the UK National Risk Register of Civil Emergencies (Cabinet Office, 2017), the proposed scheme risk register and the proposed scheme design hazard assessment log;
- **Stage 2:** a screening exercise will be undertaken to review the long list of major events and to give consideration to their relevance to the proposed scheme, and therefore whether they should be included on the project specific short list of events requiring further consideration, including by topic specialists;
- **Stage 3:** where further design mitigation is unable to remove the potential interaction between a major event and a particular topic, the relevant Environmental Statement chapter will identify the potential consequence for receptors covered by the topic, and give a qualitative evaluation of the potential for the significance of the reported effect to be increased as a result of a major event.

5.8 Human Health

5.8.1 There is no consolidated methodology or practice for this topic, however the scope of the assessment is considered to be covered by existing Highways England Guidance as set out below. This recognises the specific requirements of the NNNPS for consideration of health, specifically within paragraphs 4.79 - 4.82. This will address health by utilising the following guidance (refer to applicable chapters for reference details):

- Air Quality: HA 207/07 (Highways Agency, 2007), IAN 185/15 (Highways Agency, 2015), IAN 175/13 (Highways Agency, 2013), IAN 174/13 (Highways Agency, 2013), IAN 170/12 (Highways Agency, 2012);
- Noise and Vibration: HD213/11 (Highways Agency, 2011), IAN 185/15 (Highways Agency, 2015);
- Road Drainage & The Water Environment HD 45/09 (Highways Agency, 2009); and
- Equestrians, Cyclists, and Community Effects: DMRB Volume 11 Section 3 Part 8 (Highways Agency, 1993).

5.8.2 It is considered that these assessments, conducted principally in isolation as is required by their methodologies, will not provide a sufficient analysis of the effects of the proposed scheme. To enable such conclusions to be drawn, a qualitative assessment of information collated via the topic assessments listed above will be undertaken and presented within the cumulative effects section of the Environmental Statement (refer to Section 16.4). Potential health effects of specific issues will also be reported within the relevant Environmental Statement topic chapters, if applicable.

5.9 Structure of the Environmental Statement

5.9.1 Table 5.5 presents an indicative structure of the Environmental Statement for the proposed scheme. While this represents the currently envisaged structure of the Environmental Statement, it should be recognised that the final structure may vary as a result of decisions made or needs recognised in the course of implementing the work.

Table 5.5: Indicative Structure of the Environmental Statement

Non-Technical Summary	Summary of the Environmental Statement using non-technical language.
Volume 1: Main Document	
Chapter 1: Introduction	Introducing the proposed scheme, the applicant, purpose of the Environmental Statement and an outline of previous related documents.
Chapter 2: The Proposed Scheme	<p>The description will clearly define:</p> <ul style="list-style-type: none"> · The elements of the proposed scheme which are integral to the NSIP; · The 'associated development' under the PA 2008; and · The ancillary matters. <p>The description will include, where appropriate, land use requirements; site preparation; construction processes and methods; transport routes; gantries, signage and lighting; operational requirements; maintenance activities; emissions (water, air and soil pollution, noise, vibration and light).</p> <p>The description will include an outline of the likely construction phasing and processes, including plans of temporary works, site compounds and permanent and temporary changes to local roads.</p>
Chapter 3: Scheme History and Alternatives	An outline of the main alternatives considered will be presented as a separate chapter.
Chapter 4: EIA Methodology and Consultation	A summary of the EIA methodology applied.
Chapter 5: Consultation	Details of consultation undertaken.
Chapter 6: Air Quality Chapter 7: Cultural Heritage Chapter 8: Landscape Chapter 9: Biodiversity Chapter 10: Geology and Soils Chapter 11: Materials Chapter 12: Noise and Vibration Chapter 13: People and Communities Chapter 14: Road Drainage and the Water Environment Chapter 15: Climate	<p>Chapters 6 - 15: will assess and explain the possible effects of the proposed scheme in relation to a series of specialist topics that will cover specific aspects of the environment. Each of the specialists' chapters will describe the following:</p> <ul style="list-style-type: none"> · An executive summary; · An introduction to the subject (including legislation, policy and regulatory framework to the subject); · Baseline environmental conditions; · The likely significant adverse or beneficial changes in environmental conditions that could arise from the proposed scheme; · The proposed mitigation measures; · An assessment of the residual effects; and · Limitations and difficulties encountered during the assessment.
Chapter 16: Assessment of Cumulative Effects	This chapter will present the inter-relationships and cumulative effects between the subjects covered in Chapters 6 -15, and between the proposed scheme and other potential developments in the adjacent areas.
Chapter 17: Summary	A summary of potentially significant residual effects will be presented in a table.
Volume 2: Figures and Drawings	
Volume 3: Technical Appendices	

Supporting Information

5.9.2 The following will be prepared as standalone documents submitted with the DCO application:

- Water Framework Directive Report;
- Flood Risk Assessment (FRA);
- Heritage Impact Assessment for the World Heritage Site undertaken in accordance with ICOMOS guidance; and
- Habitat Regulations Assessment (HRA) Screening.

5.9.3 The above documents will be co-ordinated with the EIA and Environmental Statement chapters to minimise duplication of information between assessments.

5.10 The EIA Team

5.10.1 The EIA Regulations require that the Environmental Statement is prepared by 'competent experts'. The EIA is being undertaken by AECOM on behalf of Highways England. AECOM has been awarded the EIA Quality Mark from the Institute of Environmental Management and Assessment (IEMA), demonstrating competency in Environmental Statement preparation. At the individual level, the AECOM Environment Lead is a full member of IEMA, a Chartered Environmentalist (CEnv) and IEMA Principal EIA Practitioner, whilst each technical discipline lead has relevant and appropriate experience in their respective topics.

5.11 Assumptions and Limitations

5.11.1 In undertaking this scoping exercise, the following generic assumptions have been made:

- The EIA Scoping Report has been prepared based on the environmental baseline information available at the time of writing and the proposed scheme design as described in Chapter 2: The Proposed Scheme and the proposed draft DCO site boundary as presented in Figures 1.2a/ b. Further information will become available as the iterative design and assessment process proceeds, thus the scope of the assessment will be kept under review in light of this;
- Construction methodologies are currently subject to further review and assessment. It is noted that the proposed draft DCO site boundary presented in Figures 1.2a/ b incorporates the currently anticipated areas required for construction.

5.12 References

Cabinet Office (2017) National Risk Register of Civil Emergencies.

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/644968/UK_National_Risk_Register_2017.pdf

Highways Agency (1993) DMRB Volume 11 Section 3 Part 8 Equestrians, Cyclists, and Community Effects.

Highways Agency (2007) Design Manual for Roads and Bridges: Volume 11.

<http://www.standardsforhighways.co.uk/ha/standards/dmr/vol11/index.htm>

Highways Agency (2007) Design Manual for Roads and Bridges, Volume II Section 3 Part 1: HA 207/07 Air Quality London.

Highways Agency (2011) DMRB Volume 11 Section 3 Part 7 (HD213/11) Revision 1. Noise and Vibration.

Highways Agency (2012) Interim Advice Note 170/12, Updated air quality advice on the assessment of future NOx and NO2 projections for users of DMRB Volume 11 Section 3 Part 1 Air Quality.

Highways Agency (2013) Interim Advice Note 175/13. Updated air quality advice on risk assessment related to compliance with the EU Directive on ambient air quality and on the production of Scheme Air Quality Action Plans for user of DMRB Volume 11 Section 3 Part 1 Air Quality.

Highways Agency (2013) Interim Advice Note 174/13. Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11 Section 3 Part 1 Air Quality (HA207/07).

Highways Agency (2015) Interim Advice Note 185/15. Updated traffic, air quality and noise advice on the assessment of link speeds and generation of vehicle data into 'speed-bands' for users of DMRB Volume 11 Section 3 Part 1 Air Quality and Volume 11, Section 3. Part 7 Noise.

Highways England (2015) Interim Advice Note 125/15. Environmental Assessment Update.

Highways England (2017) Environmental Impact Assessment: Implementing the Requirements of 2011/92/EU as amended by 2014/52/EU (EIA Directive) MPI-57-052017.

Planning Inspectorate (2015) Advice Note 12: Transboundary Impacts.
<https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2013/04/Advice-note-12v2.pdf>

6 AIR QUALITY

6.1 Introduction

6.1.1 The proposed scheme has the potential to affect local air quality, both during construction and once the road is operational. This section provides an overview of the potential impacts of the proposed scheme on air quality and describes the proposed assessment methodology that will be used for the Environmental Statement.

6.2 Summary of Relevant Policy

6.2.1 The following planning policies are relevant to air quality:

- National Policy Statement for National Networks (NNNPS) designated January 2015); 5.6 - 5.9 and 5.14 - 5.15 (air quality); 5.84 - 5.85 and 5.89 (dust) (DfT, 2014);
- National Planning Policy Framework (NPPF) published March 2012; section 11, paragraphs 109, 120 and 124 (conserving and enhancing the natural environment) (Department for Communities and Local Government, 2012); and
- Derby City Council Local Plan Core Strategy adopted January 2017 (DCiC, 2017); Policy CP2 (responding to climate change), CP23 (delivering a sustainable transport network) and AC4 (city centre transport and accessibility).

6.2.2 The Planning Policy and Guidance (PPG) provides a summary of the air quality issues set out in the NPPF. The assessment will include information on the following, in accordance with the PPG:

- The existing air quality in the study area (existing baseline);
- The future air quality without the proposed scheme in place (future baseline); and
- The future air quality with the proposed scheme in place (with mitigation).

6.2.3 The assessment will subsequently summarise the predicted changes in air pollution to ascertain whether the proposed scheme would lead to an unacceptable risk from air pollution, prevent sustained compliance with EU limit values or fail to comply with the requirements of the Conservation of Habitats and Species Regulations (H.M. Government, 2010), in line with the PPG. This means that the assessment will also be in accordance with the NNNPS.

6.2.4 By taking account of mitigation measures in order to minimise the impact of the proposed scheme on air quality, the assessment is in accordance with DCiC's Core Strategy (DCiC, 2017).

Defra National Air Quality Action Plan

6.2.5 In July 2017, The Department for Environment, Food and Rural Affairs (Defra) released the 'UK plan for tackling roadside nitrogen dioxide concentrations' (Defra, 2017). The plan principally focuses on empowering local councils to make major changes to their road systems. The plan requires local authorities to set out initial plans by the end of March 2018, followed by final plans by the end of December 2018. Alongside these plans a dataset of Defra's predicted pollutant concentrations along specific roads was published. This dataset is called the Pollution Climate Mapping (PCM) dataset and this will be used to inform the assessment of compliance of the proposed scheme with EU Limit Values.

6.3 The Study Area

6.3.1 For the assessment of operational phase air quality, study areas will be defined on the basis of anticipated changes in traffic conditions (flow, speed and composition) as a result of the proposed scheme i.e. Do-Something (DS), compared to road conditions without the proposed scheme i.e. Do-Minimum (DM).

- 6.3.2 In the case of the local air quality assessment, the study area will be based on predicted changes to traffic conditions in the expected proposed scheme opening year (2024⁸). The assessment will be based on the full opening year as this is expected to be the worst case year of operation. This is because the influence of improving vehicle exhaust emission standards is likely to be greater than any additional growth in traffic in subsequent operational assessment years.
- 6.3.3 The traffic change criteria set out in DMRB Air Quality guidance (HA207/07) (Highways England, 2013) will be used to define the 'affected road network' (ARN) for the local air quality assessment. The DMRB local air quality traffic change criteria are as follows:
- Road alignment will change by 5m or more, or;
 - Daily traffic flows will change by 1,000 Annual Average Daily Traffic (AADT) or more, or;
 - Heavy Duty Vehicle (HDV) flows will change by 200 AADT or more, or;
 - Daily average speed will change by 10km/hr or more, or;
 - Peak hour speed will change by 20km/hr or more.
- 6.3.4 The local air quality study area will be defined, based on the above criteria, for those links within the ARN which have relevant receptors within 200m of either side of road carriageways (specified in DMRB HA207/07). All road links within 200m of these relevant receptors will then be included in the air quality assessment and this area forms the overall study area. A distance of 200m from roads is used because at these distances pollutant contributions from roads are difficult to distinguish from background pollutant concentrations.
- 6.3.5 In addition to the local air quality study area, the air quality assessment will also include a regional assessment of air quality and will report the findings of a Transport Analysis Guidance (WebTAG) plan level appraisal.
- 6.3.6 The study area for the assessment of regional pollutant emissions will be defined using the regional air quality study area in DMRB HA207/07 (paragraph 3.20), as follows:
- Daily traffic flows will change by 10% AADT or more;
 - HDV flows will change by 10% AADT or more; and
 - Daily average speed will change by 20km/hr or more.
- 6.3.7 The WebTAG plan level appraisal provides an overall measure of improvement or deterioration in air quality due to the proposed scheme. The WebTAG plan level appraisal uses the same study area as the local air quality assessment described in para. 6.3.4. The study area for the assessment will be based on the extent of the identified ARN, with a buffer of 200m around this extent.
- 6.3.8 The air quality assessment will also consider construction air quality impacts with a study area of 200m around the construction boundary (including construction compounds and soil storage areas).

6.4 Baseline Conditions

- 6.4.1 Baseline air quality data for the area around the proposed scheme have been gathered from the following sources:
- Boundaries of Air Quality Management Areas (AQMA) (Defra, 2017);
 - Local Authority monitoring data (DCiC, 2017 and EBC, 2015);
 - Highways England monitoring data;
 - Defra Pollution Climate Mapping (PCM) Model GIS data for the latest available year (Defra, 2017);

⁸ Noted that junctions may be sequentially opened, with all junctions being operational in 2024 – however, the first full year during which all junctions would be fully operational would be 2025.

- Defra air pollution background concentration maps (Defra, 2016);
 - Locations of human health receptors (residential properties, schools, hospitals and elderly care homes) from Ordnance Survey (OS) base mapping; and
 - Boundaries of relevant designated ecological sites (Natural England, 2017 – also refer to Chapter 9: Biodiversity).
- 6.4.2 DCiC has declared two Air Quality Management Areas (AQMA) for road traffic related pollution as follows (see Figure 6.1):
- **The Inner & Outer Ring-Road Air Quality Management Area:** declared for nitrogen dioxide (NO₂), 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 Air Quality Management Area:** declared for NO₂, this AQMA is limited to properties within a small area of Spondon that contains an elevated section of the A52 dual carriageway.
- 6.4.3 EBC has declared two AQMA for exceedances of annual mean NO₂ close to the M1, over 10km from the proposed scheme.
- 6.4.4 Information on areas exceeding EU limit value thresholds is available from Defra's PCM Model. This model provides 'road contributed' concentrations of pollutants. Based on 2015 roadside NO₂ concentrations modelled by the Defra PCM model, there are no model links exceeding 40µg/m³ within the anticipated air quality study area for the proposed scheme, with the nearest link more than 50km from the proposed scheme, in Birmingham.
- 6.4.5 Estimates of background pollutant concentrations in the UK are available for 0.6 mile (1km) grid squares throughout the UK up to the year 2030, based on baseline data available for 2013. The projected 2017 background concentrations for NO₂ and PM₁₀ for the grid squares through which the proposed scheme corridors would pass show that concentrations are within the relevant air quality objectives.
- 6.4.6 A Highways England scheme-specific monitoring programme took place between mid-August 2013 (at 33 locations, with an additional six added in June 2014) until February 2016. The results of the scheme-specific monitoring suggest that there may be some areas of poor air quality close to the proposed scheme route and on some surrounding roads. Results from the monitoring programme will be summarised within the Environmental Statement.
- 6.4.7 Continuous air quality monitoring and passive diffusion tube monitoring for NO₂ is ongoing in the area administered by DCiC. Roadside monitoring data is also available for particulates (PM₁₀) at one location on Warwick Avenue (until August 2014). Air quality monitoring locations are shown in Figure 6.1.
- 6.4.8 There are no monitoring sites operated by EBC within 10km of the proposed scheme.
- 6.4.9 Considering the relevant pollutants and comparing these against Air Quality Strategy (AQS) objectives for the areas considered at the scoping stage, the following is concluded:
- National assessments have demonstrated that there is no risk of carbon monoxide, 1,3-butadiene, benzene, lead and sulphur dioxide concentrations exceeding the relevant UK AQS objectives due to emissions from traffic anywhere in the UK. It is, therefore, proposed that these pollutants will not be considered further as they are very unlikely to be present at levels which would represent potential significant impacts due to the proposed scheme;
 - For PM₁₀, local authorities within the air quality study area have not identified a risk of exceedances for PM₁₀ due to road traffic. Hence it is proposed that this pollutant is not considered likely to result in potential significant impacts due to the proposed scheme; and

- For the hourly mean NO₂ UK AQS objective, local authorities within the air quality study area have not identified a risk of exceedance, so it is not likely that there will be potential for significant impacts due to the proposed scheme.

6.4.10 On this basis, it is considered that changes to the annual average NO₂ concentrations should be the main focus of the air quality assessment for public exposure (i.e. residential properties). Predicted changes to the concentrations of PM₁₀ will also be reported and discussed, but in reduced level of detail compared to NO₂. Baseline conditions will be updated in the later stages of assessment to reflect the ARN and any updates to third party data sources (e.g. local authority monitoring).

6.4.11 There are no designated ecological sites within Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Sites of Special Scientific Interest (SSSIs) and sites listed under the Convention on Wetlands and Wildfowl (Ramsar), within 200m of the proposed scheme route (refer to Chapter 9: Biodiversity). However, the extent of the ARN has not yet been identified so the locations of designated ecological sites will be reviewed once this information is available.

6.5 Additional Survey Requirements

6.5.1 Baseline diffusion tube monitoring as identified above has been collected. No additional surveys are required to support the air quality assessment to be reported in the Environmental Statement.

6.6 Value of the Environmental and Resource Receptors

6.6.1 There are essentially two types of constraint for local air quality as follows:

- Nationally and internationally designated ecological sites (e.g. SSSIs, SACs, SPAs and Ramsar sites); and
- Public Exposure Receptors – these are sensitive locations where relevant exposure for the air quality criteria being assessed could occur e.g. residential properties or schools (defined Defra Local Air Quality Management, Technical Guidance 2016 (LAQM.TG(16)) (Defra, 2016).

6.6.2 For the construction phase of the proposed scheme, sensitive receptors that may be affected include those outlined above and other receptors that may be sensitive to the deposition of dust (e.g. parks, allotments).

6.7 Potential Impacts and Effects

6.7.1 The proposed scheme has the potential to affect local air quality, both during construction and once in operation, in the following ways:

- There could be increased emissions of dust during construction of the proposed scheme from dust-raising activities on site that could affect a large number of sensitive receptors within 200m of the proposed construction works;
- There will be emissions associated with non-road mobile machinery (NRMM) undertaking construction works;
- Air quality could be affected by changes in traffic flows during construction, as a result of temporary traffic management measures and/ or additional vehicles travelling to and from the construction site transporting materials, plant and labour;
- Once operational, air quality could be affected (positively or negatively) by changes in vehicle activity (flows, speeds and composition) as a result of the proposed scheme; and
- Air quality could also be affected by any changes in the distances between sources of emissions and air quality sensitive receptors.

6.7.2 The criterion for a potentially affected route in relation to construction Heavy Goods Vehicle (HGV) traffic is a change of more than 200 HGVs per day. Where HGV movements are below

this threshold, significant changes in air quality are not likely. Further work would be required to characterise potential air quality impacts from this source during the environmental assessment to support the DCO application, if construction phase estimated HGV numbers (based on advice from a construction contractor) are above the DMRB criteria for an extended period (i.e. more than 6 months).

- 6.7.3 The air quality assessment at PCF Stage 2 identified that due to the proposed scheme requiring significant works to the A38, traffic management would be in place to minimise traffic re-routing throughout the construction phase. However, it is not currently known to what extent of traffic re-routing may take place during this period. As such, further air quality work may be required during the environmental assessment depending upon traffic re-routing estimates (based on advice from a construction contractor and traffic modellers).
- 6.7.4 There is some potential for adverse effects during the construction of the proposed scheme in relation to construction dust and NRMM and vehicle emissions. However, any impacts on human health related to air quality would be temporary (i.e. during the period of the construction works only) and could be suitably minimised by the application of industry standard mitigation measures. The need for any additional mitigation measures will be identified in addition to standard dust mitigation measures as part of the assessment.
- 6.7.5 On the basis of the available information, including existing monitored levels in the wider study area, exceedances of the annual mean NO₂ UK AQS objective have the potential to occur near busy roads in Derby.
- 6.7.6 Operational impacts on air quality may be difficult to avoid, but in some circumstances it is possible to reduce impacts on air quality with appropriate mitigation measures, particularly if impacts are focused in a small geographic area rather than spread across the extent of the air quality study area. However, the proposed scheme design to date does not include specific air quality mitigation measures for the operational phase.

6.8 Proposed Scope of Assessment

- 6.8.1 The air quality impact assessment will include:
- An assessment of local air quality effects;
 - Changes in regional emissions of carbon dioxide (CO₂) and other regional pollutants; and
 - Construction impacts.
- 6.8.2 On the basis of the likely effects of the proposed scheme and due to the presence of monitoring indicating there may be areas of poor air quality, together with nearby AQMAs, it is proposed that a detailed level of air quality assessment (local air quality only) is undertaken and reported in the Environmental Statement.
- 6.8.3 The proposed scheme construction and operational maintenance phases would be undertaken in a manner that appropriately protects the health and safety of workers. As such, construction/ operational/ maintenance workers have been scoped out of the assessment.

6.9 Proposed Assessment Methodology including Significance

- 6.9.1 Potential impacts on local air quality resulting from both the construction and operation of the proposed scheme will be assessed following the principles in relevant guidance outlined in DMRB HA207/07 (Highways Agency, 2007), associated Interim Advice Notes (IANs), Major Project instructions (MPI) and Defra's Local Air Quality Management Technical Guidance (LAQM.TG(16)) (Defra, 2016) as listed below:
- HA207/07 Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 1, Air Quality, May 2007 (Highways Agency, 2007);

- IAN 170/12 v3 Updated air quality advice on the assessment of future NO_x and NO₂ projections for users of DMRB Volume 11, Section 3, Part 1 'Air Quality (Highways Agency, 2012);
- IAN 174/13 Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 Air Quality (HA207/07) (Highways Agency, 2007);
- IAN 175/13 Updated advice on risk assessment related to compliance with the EU Directive on ambient air quality and on the production of Scheme Air Quality Action Plans for users of DMRB Volume 11, Section 3, Part 1 Air Quality (HA207/07) (Highways Agency, 2013);
- IAN 185/15 Updated traffic, air quality and noise advice on the assessment of link speeds and generation of vehicle data into 'speed-bands' for users of DMRB Volume 11, Section 3, Part 1 'Air Quality and Volume 11, Section 3 (Highways Agency, 2015);
- MPI-28-082014: Highways England Major Projects' Instructions – Determining the correct base year traffic model to support air quality assessments (Highways Agency, 2014); and
- Defra's Local Air Quality Management Technical Guidance (LAQM.TG(16)) (Defra, 2016), where appropriate.

Air Quality Criteria

- 6.9.2 For NO₂ and PM₁₀, there are two sets of ambient air quality criteria for the protection of public health, namely those set by the EU and transposed in to UK law by The Air Quality Standards Regulations 2010 and those implementing the UK National Air Quality Strategy (AQS) (Defra, 2010).
- 6.9.3 The criteria set out in the AQS include standards and objectives for local authorities to work towards achieving. These apply in locations with relevant public exposure which are defined in the Department for Environment, Food and Rural Affairs' (Defra) technical guidance LAQM.TG(16) (Defra, 2016).
- 6.9.4 The standards set by the EU are legally binding, mandatory limit values (LV) requiring national government compliance at the agglomeration scale.
- 6.9.5 Local air quality criteria relevant to the air quality assessment for the proposed scheme are summarised in Table 6.1.

Table 6.1: Relevant Air Quality Criteria (Human Health)

Pollutant	Criteria	Compliance Date	
		AQS Objective	EU Limit Value
NO ₂	Hourly average concentration should not exceed 200µg/m ³ more than 18 times a year	31 December 2005	1 January 2010
	Annual mean concentration should not exceed 40µg/m ³	31 December 2005	1 January 2010
PM ₁₀	24 hour concentration should not exceed 50µg/m ³ more than 35 times a year	31 December 2005	1 January 2010
	Annual mean concentration should not exceed 40µg/m ³	31 December 2005	1 January 2010

Receptors

- 6.9.6 Receptors that are potentially sensitive to changes in air quality are defined in DMRB HA207/07 (Highways Agency, 2007) as housing, schools, hospitals and designated species and/ or habitats within a relevant designated ecological site located within 200m of those roads or construction sites which will be affected by a proposed scheme.

6.9.7 Information on sensitive receptors in the study area will be gathered from the following sources:

- Locations of human health receptors (residential properties, schools, hospitals and elderly care homes) from OS base mapping; and
- Boundaries of relevant designated ecological sites (as per Chapter 9: Biodiversity).

6.9.8 The air quality assessment will consider the proposed scheme impacts at representative sensitive human health receptors (e.g. housing, schools and hospitals) where these are located within 200m of the ARN and the proposed scheme route alignment. The focus of this assessment will be the change in exposure of the inhabitants of these properties to concentrations of NO₂.

6.9.9 Proposed scheme impacts will also be considered at receptors representing designated ecological sites where these are located within 200m of the ARN of the proposed scheme. The focus of this assessment will be the change in annual mean NO_x concentrations and rates of nitrogen deposition affecting sensitive ecosystems.

Construction Effects

6.9.10 Construction impacts will be assessed qualitatively, taking into account the nature of any proposed construction activities that have the potential to generate dust and the location of any sensitive receptors situated within 200m of the proposed scheme construction works. Suitable mitigation measures to control/ minimise construction dust emissions and NRMM plant emissions will be recommended.

6.9.11 The level of any construction traffic air quality assessment will depend upon the information available on traffic management and construction vehicles available during the EIA together with the risk of likely significant temporary air quality impacts.

Operational Impacts – Local Air Quality Assessment

6.9.12 Operational impacts will be assessed using an updated traffic model and where relevant further developed proposed scheme design details.

6.9.13 The local air quality methodology for the Environmental Statement will be based on a detailed level of air quality assessment. The simple assessment method is not proposed. Earlier air quality work for the proposed scheme has not suggested a risk of significant air quality impacts at locations with exceedances of AQS objectives, however, there are likely to be locations which will be better described using a detailed air quality modelling approach. This includes locations of congestion and this approach will allow peak periods of congestion to be captured if required.

6.9.14 Assessment of operational impacts adjacent to the ARN will be undertaken in accordance with DMRB HA207/07 (and associated IANs) using the latest version of the ADMS Roads to determine the impact of the proposed scheme at identified representative sensitive receptor locations.

6.9.15 The key scenarios to be considered for local air quality are:

- The existing base situation which, based on guidance given in MPI-28-082014, is the year 2015 for air quality;
- Do-Minimum and Do-Something for the proposed scheme in the first year of opening (expected to be the year 2024).

6.9.16 Road sources included in the traffic model will be explicitly modelled using ADMS-Roads. The model requires input of traffic flow, composition and speed data as well as the road width and type and hourly sequential meteorological data.

- 6.9.17 Traffic data can be input to ADMS-Roads for AM, Inter Peak (IP), PM and off peak periods. Period flows will be used where possible and the following parameters adopted:
- Composition will be input in terms of a percentage of HDV;
 - Speeds are input as a speed category. This category will be determined in accordance with IAN 185/15 (Highways England, 2015) on speed banding;
 - Corresponding NO_x and PM₁₀ rates based on the speed category will be used; and
 - Road to receptor distances will be determined in GIS software.
- 6.9.18 Representative sensitive receptors will be selected for assessment within the local air quality ARN. These will generally include those sensitive receptors placed closest to the ARN.
- 6.9.19 Local air quality modelling predictions using the ADMS-Roads will provide estimates of the contribution from road traffic emissions to annual mean concentrations of nitrogen oxides (NO_x) at discrete receptors; these concentrations will be combined with estimates of background concentrations, to derive totals for annual mean NO₂. NO_x to NO₂ conversion will be carried out according to Defra guidance (Defra, 2016).
- 6.9.20 Base year (2016) modelled estimates will be verified, with comparison against available ratified monitoring data wherever possible and with reference to Defra's Technical Guidance LAQM.TG(16) (Defra, 2016). Where systematic bias is clearly evident in the base year verification, adjustment will be applied to bring modelled concentrations more into line with monitored concentrations.
- 6.9.21 A key element of the local air quality impact assessment is the rate of improvement in air quality over time as cleaner vehicles enter the national vehicle fleet. The methodology outlined within IAN 170/12 v3 (Highways Agency, 2012) on the assessment of future NO_x and NO₂ projections will be used in this assessment. The method considers Defra's advice on long term trends related to roadside NO₂ concentrations, which suggests that there is a gap between current projected vehicle emission reductions and projections on the annual rate of improvements in ambient air quality as previously published in Defra's technical guidance and observed trends.
- 6.9.22 The methodology, known as 'Gap Analysis', involves the completion of air quality modelling and verification to correct verified modelled total NO₂ concentrations. Following verification of the modelled results, the predictions are then adjusted to represent the observed long term trend. The adjusted results from this Gap Analysis will be presented.
- 6.9.23 Previous air quality assessments have suggested that the projection factors presented in IAN 170/12 (Highways Agency, 2012) rather than the Long Term Trend E6 (LTT_{E6}) factors were most appropriate for the air quality assessment for the proposed scheme. This is because the previous assessment demonstrated that monitoring data trend analysis justifies the selection of the IAN 170/12 projections over other options. However, additional LTT_{E6} gap analysis will also be presented in the air quality assessment because the proposed scheme opening is still a further six years into the future. By this time, further improvements would be expected in air quality beyond those described by the trend analysis previously undertaken on recent years of data.
- 6.9.24 An evaluation of the significance of the local air quality assessment findings at sensitive receptors for health and designated ecological sites will be undertaken in accordance with IAN 174/13 guidance (Highways Agency, 2013). This guidance evaluates the significance of air quality impacts using the total estimated pollutant concentrations at sensitive receptors and the magnitude of change estimated to occur as a result of the proposed scheme, and recommends that the following key criteria for air quality are considered:
- Is there a risk that environmental standards will be breached?
 - Is there a high probability of the effect occurring?
 - Will there be a large change in environmental conditions?
 - Will the effect continue for a long time?

- Will many people be affected?
- Is there a risk that protected sites, areas or features will be affected?
- Will it be difficult to avoid, or reduce or repair or compensate for the effect?

6.9.25 Following the collation of information to address these questions, an informed professional judgement on the significance of local air quality impacts for public exposure and designated ecological sites will be established. Of the above questions, 'will many people be affected?' will be addressed in terms of the number of receptors predicted to have small, medium and large changes in air quality. The change focuses only on those receptors that exceed the air quality objective and in cases where the numbers of affected properties are above the upper thresholds listed in IAN 174/13, which may suggest likely significant air quality effects.

6.9.26 The significance of the effects on European and nationally designated habitat sites, including the magnitude of change in NO_x and/ or nitrogen deposition, will be considered as part of the biodiversity assessment (see Chapter 9: Biodiversity).

6.9.27 The predicted air quality impacts of the proposed scheme will also be evaluated against relevant national, regional and local air quality planning policy.

Operational Impacts – Local Air Quality Compliance Risk Assessment

6.9.28 A compliance risk assessment for the proposed scheme against the EU Directive in accordance with IAN 175/13 will be provided in the air quality assessment. This assessment enables proposed scheme assessors to undertake and report on the risk of a proposed scheme being non-compliant with the EU Directive. The compliance risk assessment is undertaken using the results of the local air quality assessment and the PCM Model. The overall evaluation of significance will also include information on compliance risks in relation to the Directive.

Operational Impacts – WebTAG Plan Level Local Air Quality Assessment

6.9.29 The local plan level methodology within the WebTAG guidance aims to quantify the change in exposure at receptors in the opening year as a result of proposed scheme, through the quantification of exposure for all DMRB local affected roads. The methodology follows a number of steps comprising:

- Identification of the affected road network, which is the same as the DMRB local air quality affected road network;
- Quantification of the number of properties within 0 – 50 m, 50 – 100 m, 100 – 150 m and 150 – 200 m bands, from the affected roads;
- The calculation of concentrations within each band at 20m, 70m, 115m and 175m from the road centreline using the DMRB spreadsheet model;
- Calculation of property-weighted NO₂ and PM₁₀ concentrations;
- Calculation of the total numbers of properties where air quality improves, worsens or stays the same for each pollutant; and
- Calculation of an overall assessment score for NO₂ and PM₁₀.

6.9.30 An overall positive score indicates an overall worsening in air quality, and an overall negative score indicates an overall improvement in air quality.

6.9.31 The WebTAG plan level appraisal is a reporting requirement of DMRB. WebTAG plan level appraisal outcomes do not have defined significance criteria, but will be presented and described to inform the assessment of overall change.

Operational Impacts – Regional Air Quality Assessment

6.9.32 An assessment of regional emissions of NO_x, PM₁₀ and carbon dioxide will be undertaken in accordance with DMRB HA207/07 (Highways Agency, 2017) using vehicle emission factors from the emission factor toolkit. The key scenarios to be modelled are:

- The existing base situation (2015);
- Do-Minimum and Do-Something for the proposed scheme in the first year of opening (expected to be 2024); and
- Do-Minimum and Do-Something for the proposed scheme in a future year (expected to be 2039).

6.9.33 The results of the regional assessment (annual emissions, change in emissions with the proposed scheme and distance travelled) will be presented in tabular format, together with interpretive text. The regional assessment is a reporting requirement of DMRB. The regional assessment outcomes do not have defined significance criteria, but will be presented and described to inform the assessment of overall change.

6.10 Assumptions and Limitations

6.10.1 The scope of the proposed air quality assessment has been informed by the most recent information available at the time of writing. Monitoring data have been obtained from local authorities and previous proposed scheme-specific studies. The local operational air quality assessment will use a comprehensive traffic dataset, the latest Defra local air quality management tools and guidance, Highways England tools and guidance, a detailed air quality model (ADMS-Roads) and predictions will be checked against the most recently available local air quality monitoring data. This approach will minimise the assumptions and limitations of the local operational air quality assessment as far as practicable.

6.10.2 Defra announced plans to potentially implement a new programme of Clean Air Zones. Under the plan, by 2020 the most polluting diesel vehicles - buses, coaches and taxis - will be discouraged from entering the centres of Birmingham, Leeds, Southampton, Nottingham and Derby. DCiC is in discussion with Defra as to what the proposed Clean Air Zone for Derby would entail. This could change the mix of vehicles on the roads in and around Derby and could increase the risk of air quality pollution for the proposed scheme. This is likely to be known during the commission, but what may not be known are the details of implementation. Given that the Clean Air Zone details are still in development, it may not be possible for the traffic modelling undertaken to support the Environmental Statement to consider the potential changes a Clean Air Zone may have on traffic flows and vehicle types. Highways England will maintain close communication with DCiC regarding Clean Air Zone developments and take this into account as applicable during the preparation of the environmental assessment to support the DCO application. This will be managed with ongoing dialogue with DCiC and discuss risk with Highways England air quality and traffic teams to agree potential approaches.

6.11 References

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Highways Agency (2012) Interim Advice Note 170/12. Updated air quality advice on the assessment of future NOx and NO2 projections for users of DMRB Volume 11 Section 3 Part 1 Air Quality.

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H.M. Government (2010) The Conservation of Habitats and Species Regulations. Statutory Instrument No. 490. The Stationery Office.

Natural England (2017) Available at:
http://www.gis.naturalengland.org.uk/pubs/gis/GIS_register.asp

7 CULTURAL HERITAGE

7.1 Introduction

7.1.1 This chapter sets out the proposed approach to the assessment of the proposed scheme's impacts on cultural heritage (comprising historic buildings, archaeological remains and the historic landscape). The purpose of the assessment will be to identify and characterise any relevant cultural heritage resources, to consider the nature and scale of potential impacts due to the proposed scheme, and to assess the significance of any likely effects and the requirements for mitigation.

7.1.2 A separate Heritage Impact Assessment (HIA) scoping report will also be prepared to specifically address the scope of works for the Heritage Impact Assessment on the Outstanding Universal Value (OUV) of the Derwent Valley Mills World Heritage Site. This assessment will be undertaken in accordance with ICOMOS Guidance on Heritage Impact Assessments for Cultural World Heritage Properties (ICOMOS 2011). The HIA will be framed in the context of the Derwent Valley Mills World Heritage Site Management Plan 2014 - 2019, whilst the results of the HIA will be incorporated into the Environmental Statement cultural heritage chapter (the HIA report will be included as an Appendix to the Environmental Statement). The Environmental Statement will explain the relationship between the Environmental Statement and the HIA methodology and its findings.

7.2 Summary of Relevant Policy

7.2.1 National policy of relevance to the cultural heritage impact assessment comprises:

- Ancient Monuments and Archaeological Areas Act 1979 (amended by the National Heritage Act 1983 and 2002);
- Planning (Listed Buildings and Conservation Areas) Act 1990, Hedgerows Regulations 1997, amended 2003, (while Hedgerow Regulations do not apply to Highways England works, the requirements of the Regulations would be applied to the assessment of significance of hedgerows within the study area);
- National Planning Policy Framework (NPPF) 2012 (Department for Communities and Local Government, 2012) – with particular reference to Section 12 Conserving and Enhancing the Historic Environment;
- National Networks National Policy Statement (NNNPS) (DfT, 2014). Statements 5.120 – 5.142 of the NNNPS specifically apply to cultural heritage. When considering the impact of a proposed development, the NNNPS states: “*Substantial harm to or loss of a grade II Listed Building or a grade II Registered Park or Garden should be exceptional. Substantial harm to or loss of designated assets of the highest significance, including World Heritage Sites, Scheduled Monuments, grade I and II* Listed Buildings, Registered Battlefields, and grade I and II* Registered Parks and Gardens should be wholly exceptional*”. Where a proposed development will lead to substantial harm to or total loss of significance of a designated heritage asset, the Secretary of State should refuse consent unless it can be demonstrated that the substantial harm or loss of significance is necessary in order to deliver substantial public benefits; and
- National Planning Practice Guidance, DCLG, Historic Environment Good Practice Advice in Planning Note 2 (Managing Significance in Decision Taking in the Historic Environment) (Historic England 2015) and Historic Environment Good Practice Advice in Planning Note 3 (Historic England 2017).

7.2.2 Key local policies relating to cultural heritage are:

- City of Derby Local Plan: Policies E18, E19, E21, E22 and E29 (DCiC, 2017);
- Erewash Borough Council Core Strategy: Policy E11 (EBC, 2014);
- Erewash Borough Council Local Plan: Policy EV5, EV6, EV7, EV8 and EV9 (EBC, 2014).

7.2.3 International guidance and good practice relating to World Heritage Sites includes:

- Guidance on Heritage Impact Assessments for Cultural World Heritage Properties (ICOMOS, 2011);
- Principles of the Xi'an Declaration on the Conservation of the Setting of Heritage Structures, Sites and Areas (ICOMOS, 2005);
- The Convention Concerning the Protection of the World Cultural and Natural Heritage (UNESCO, 1972);
- The Operational Guidelines for the Implementation of the World Heritage Convention (UNESCO, 2012); and
- Managing Cultural World Heritage (UNESCO, 2013).

7.3 The Study Area

7.3.1 The study area for cultural heritage features extends to incorporate the Zone of Visual Influence (ZVI) of the proposed scheme,⁹ up to a maximum of 1km from the proposed scheme; in order to assess the potential effects of the proposed scheme on designated heritage assets. For non-designated heritage assets the study area will extend to 500m from the proposed scheme boundary. All elements of a heritage asset which fall inside the 1km study area will be considered where they convey the attributes of OUV of Derwent Valley Mills World Heritage Site to ensure a comprehensive assessment of effects. Additional heritage assets beyond the study area may also be included for assessment. Identification of additional heritage assets will draw on Zone of Theoretical Visibility (ZTV), professional judgement and consultation with Historic England, County/ City and Borough Council heritage experts to identify those assets to consider beyond the defined study area.

7.4 Baseline Conditions

7.4.1 The City of Derby has a rich and varied history, reflected in its upstanding structures and buried archaeological remains. The Derwent Valley Mills and the surrounding landscape were designated as a World Heritage Site in 2001 and a Statement of OUV was agreed in 2001. The reason for this international recognition is that the valley saw the birth of the factory system, when new types of buildings were erected to house new technology for spinning cotton. The need to provide housing and other facilities resulted in the creation of the first modern industrial settlements.

7.4.2 The Derwent Valley Mills World Heritage Site and its buffer zone stretch 15 miles (24km) along the river valley from Matlock Bath to Derby.

7.4.3 The proposed scheme traverses an area to the north-west of the historic core of Derby. 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). 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). A number of Registered Parks and Gardens are located within a few kilometres of the proposed scheme, including Grade I Kedleston Hall, which is located approximately 4km to the north-west.

7.4.4 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 Refer to Chapter 8: Landscape and Visual Effects

- 7.4.5 Palaeo-environmental and geoarchaeological deposits, and previously unknown buried archaeological remains, may also be preserved beneath or within alluvium deposits, close to existing watercourses, including the course of the River Derwent.
- 7.4.6 A programme of reconnaissance (archaeological geophysical survey) and archaeological evaluation (geoarchaeological borehole assessment and trial trenching) was carried out in mid-2016 to assess the archaeological potential within the undeveloped farmland in the vicinity of Little Eaton junction, required for the proposed scheme footprint.

7.5 Additional Survey Requirements

- 7.5.1 A walkover survey of the areas within the DCO application boundary will be undertaken including a visit to known archaeological and heritage assets within the study area and those identified through consultation with the relevant heritage experts to record their survival, extent, condition, setting and significance.
- 7.5.2 To illustrate and aid the assessment on the setting, drawings and techniques such as photomontages, in collaboration with the LVIA team, will be considered. Consultation with Historic England and external heritage consultees will be undertaken to establish suitable viewpoints that will aid the assessment of impacts on the setting of heritage assets. This may include long views and any specific designed views and vistas within historic designed landscapes e.g. Kedleston Hall.
- 7.5.3 Further archaeological geophysical survey and archaeological evaluation (geoarchaeological borehole assessment and trial trenching) surveys will be needed in selected areas identified for construction compounds, soil storage areas, flood storage areas, ecology mitigation areas and utility diversions. In addition to these surveys, archaeological topographic survey will be carried out where earthwork remains are present to inform the trenching layout and to record their form prior to trenching. The requirement for such archaeological evaluation work is currently being determined and will be discussed with the Development Control Archaeologist for DCC (DCADCC) and Historic England as necessary. Details of archaeological surveys undertaken and the results will be reported in the Environmental Statement.

7.6 Value of the Environmental and Resource Receptors

- 7.6.1 The value of a structure, area, site or landscape reflects its significance as a historic asset and, therefore, its sensitivity to change. For the purposes of this assessment, value equates to the term 'significance' as defined in Annex 2 of the NPPF.
- 7.6.2 DMRB Volume 11.3.2 Annex 6 Historic Buildings, Annex 5 Archaeological Remains and Annex 7 Historic Landscape (Highways Agency, 2007) set out guidance on the criteria used for establishing the value of heritage assets comprising historic buildings, archaeological remains and historic landscape features. The criteria have been combined and each heritage asset has been assigned a value as indicated in Table 7.1.

Table 7.1: Guide for Assessing the Value of Historic Building Assets, Archaeology and Historic Landscape (HA 208/2007)

Asset Value	Description
Very High	<ul style="list-style-type: none"> • Assets inscribed as being of universal international importance, such as World Heritage Sites • Assets that contribute significantly to acknowledged international research objectives • Buildings of recognised international importance • Historic landscapes of international value, whether designated or not • Extremely well preserved historic landscapes with exceptional coherence, time-depth or other critical factor(s)

Asset Value	Description
High	<ul style="list-style-type: none"> Scheduled Monuments with extant remains, or sites and remains of comparable quality Assets that contribute significantly to acknowledged national research objectives Grade I and Grade II* Listed Buildings Other listed buildings that can be shown to have exceptional qualities in their fabric or historical association not adequately reflected in their listing grade, including non-designated structures of clear national importance Conservation areas containing very important buildings Designated and non-designated historic landscapes of outstanding interest of high quality and importance, and of demonstrable national value
Medium	<ul style="list-style-type: none"> Designated or undesignated assets that contribute to regional research objectives Grade II Listed Buildings Historic (unlisted) buildings that can be shown to have exceptional qualities in their fabric or historic association Conservation areas containing important buildings Historic Townscape or built-up areas with historic integrity in their buildings, or built settings (e.g. including street furniture and other structures) Designated special historic landscapes and non-designated landscapes that would justify special historic landscape designation, landscapes of regional value
Low	<ul style="list-style-type: none"> Sites of low importance Assets compromised by poor preservation and/ or poor survival of contextual associations Locally listed buildings Historic (unlisted) buildings of modest quality in their fabric or historical association Historic Townscape or built-up areas of limited historic integrity in their buildings, or built settings (e.g. including street furniture and other structures) Undesignated historic landscapes Historic landscapes with importance to local interest group
Negligible	<ul style="list-style-type: none"> Assets with very little or no surviving archaeological interest Buildings of no architectural or historical note; buildings of an intrusive character Landscapes with little or no significant historical interest
Unknown	<ul style="list-style-type: none"> Assets the importance of which has not been ascertained

7.6.3 Identified cultural heritage resources that are present within the study area are included in Appendix 7.1 and shown on Figures 7.1 and 7.2 (in areas of permanent land take) (the study area shown on the figures relates only to the proposed scheme main works and will be amended as applicable for the Environmental Statement).

7.6.4 There is one asset of very high value in the study area, namely the Derwent Valley Mills World Heritage Site (A41). A total of 11 assets in the study area have been assessed to be of medium value. The majority of these are listed buildings within the City of Derby or in the historic cores of the villages surrounding the city:

- Archaeological and palaeo-environmental deposits along the River Derwent floodplain (A4);
- Listed building at 161 Ashbourne Road (A30);
- Listed building at 193 and 195 Ashbourne Road (A31);
- Listed building, Conservatory in Markeaton Park (A32);
- Listed building at 23 Rectory Lane (A35);
- Listed building, Rose Cottage Shamrock Cottage (A36);
- Listed building, Breadsall Manor (A37);
- Possible ring ditch, c.400 m east of Holme Nook, Breadsall (A59);
- Breadsall Conservation Area (A61);
- Friar Gate Conservation Area (A62); and

- Leylands Estate Conservation Area (A63).

7.6.5 A total of 27 assets have been assessed to be of low value (A5, A9 to A15, A26 to A29, A33, A34, A38, A40, A43 to A47, A49, A50, A52 to A55), whilst a total of 24 assets have been assessed to be of negligible value (A1 to A3, A6 to A8, A16 to A25, A39, A42, A48, A51, A56 to A58 and A60).

7.6.6 The historic landscape character at Kingsway and Markeaton junctions is considered to be of negligible value as it has little or no historic time depth and/ or it has already been impacted by the existing A38 road. The historic landscape character at Little Eaton junction has also been impacted by the existing A38 and recent development (including industrial activity), however, the proposed scheme would impact two historic landscape character types containing features of post-medieval date that are considered to be of low value ('Small Regular fields' and 'Planned Enclosure containing ridge and furrow'), resulting in some loss of boundary features.

7.7 Potential Impacts and Effects

Summary of Mitigation Proposals

7.7.1 The Environmental Statement will describe both embedded mitigation and any specific measures designed to address potentially significant cultural heritage effects.

7.7.2 The results of the archaeological reconnaissance and evaluation surveys will be used during the environmental assessment to inform an appropriate archaeological mitigation strategy.

7.7.3 Appropriate cross referencing will be made between specific impacts on heritage assets identified in the Environmental Statement and the accompanying mitigation strategies, including a presentation of the effects and residual effects.

7.7.4 The archaeological mitigation strategy may comprise preservation in situ (where appropriate and feasible), archaeological watching brief, detailed excavation, archaeological trial trenching, test pitting, detailed geo-archaeological investigation, archaeological topographic survey, and historic building recording (photography) to Historic England standards (Historic England 2016). Such archaeological mitigation and recording works would be undertaken prior to the start of the proposed scheme main construction phase (early works), and during the construction phase. An overarching Written Scheme of Investigation (WSI) would be prepared that sets out the area specific WSIs as part of the overall archaeological mitigation strategy.

7.7.5 The archaeological strategy would also be applied to historic landscape features, such as field boundaries and cultivation earthworks, which contribute to historic landscape character types. Surviving elements of historic landscape features (field boundaries and earthworks) would be investigated, and if appropriate, recorded as part of the archaeological recording works.

7.7.6 Given that the proposed scheme would impact upon the Markeaton Park entrance/ exit, as well as the parts of the boundary wall, the proposed scheme design will need to be defined in consultation with DCiC.

7.7.7 The proposed scheme design includes an appropriate landscape design incorporating tree and shrub planting (refer to Chapter 8: Landscape and Visual Effects). The proposed landscape design will be further developed to take particular account of key heritage assets in the vicinity of the proposed scheme – namely: Markeaton Park, Breadsall Manor, the Derwent Valley Mills World Heritage Site and Breadsall Conservation Area.

Summary of PCF Stage 2 Assessment

Construction Effects

7.7.8 Construction of the proposed scheme has the potential to affect heritage assets in the following ways:

- Partial or total removal of heritage assets;
- Damage to building fabric;
- Vibration damage to historic structures;
- Visual and aural intrusion on setting;
- Removal/ severance of setting from historic structure;
- Compaction of archaeological deposits by construction traffic and structures;
- Changes in groundwater levels leading to the desiccation of waterlogged archaeological deposits;
- Changes to access or the viability of heritage assets;
- Effects on the setting of heritage assets including visual and noise intrusion, severance and adverse impacts on amenity as a result of construction works.

7.7.9 The proposed scheme would be constructed both within and close to the existing A38 highway boundary – such areas consist largely of previously disturbed ground, although undeveloped farmland would be impacted at the proposed Little Eaton junction.

7.7.10 At Kingsway junction the construction of the proposed scheme has the potential to physically impact potential unknown archaeological remains that may be present in buried palaeo-channels or deeply stratified alluvial deposits within the floodplain of Bramble Brook (A4). There is also a potential that the proposed scheme would impact the remains of the dismantled 19th century Great Northern Railway line (Derbyshire and North Staffordshire Extension) (A16).

7.7.11 At Markeaton junction the construction of the proposed scheme has the potential to physically impact potential unknown archaeological remains that may be present in buried palaeo-channels or deeply stratified alluvial deposits within the floodplain of Markeaton Brook (A4). The proposed scheme also has the potential to impact the Derby to Hurdlow turnpike road (A19). There is also potential that the proposed scheme would impact Markeaton Park boundary wall (A40). The requirement to close the existing park entrance and reconfigure the existing park exit would alter the approach to Markeaton Park (A10), a key element of its setting.

7.7.12 At Little Eaton junction the construction of the proposed scheme has the potential to physically impact potential unknown archaeological remains that may be present in buried palaeo-channels or deeply stratified alluvial deposits within the River Derwent floodplain (A4). There is also a potential for physical impacts on historic landscape character types at Breadsall. The proposed scheme has the potential to impact on the OUV and setting of the Derwent Valley Mills World Heritage Site (A41) and the designated Breadsall Conservation Area (A61) and Breadsall Manor (A37); and the undesignated former Ford Farm (A38).

Operation Effects

7.7.13 Operational impacts will arise once the proposed scheme has been built. Sources of impacts could include new lighting, noise, dust, vibration and visual intrusion by traffic, whilst positive impact could be the removal of any of these from the setting of heritage assets.

7.7.14 Operation of the proposed scheme has the potential to result in impacts on the setting of heritage assets. In the majority of cases, these would be long-term in nature. These impacts would commence during construction of the proposed scheme and continue during operation; however, the degree of impact may vary between phases. Such impacts could result in:

- Impact on setting of heritage assets;

- Damage to heritage assets by pollution;
- Visual and aural intrusion on setting;
- Vibration causing damage to foundations;
- Change of perception and experience of historic landscapes;
- Small scale repairs and consolidation or alteration of historic landscape elements – cumulative impact;
- Re-establishment of historic landscape elements (positive).

7.7.15 It is unlikely that there would be any operational impacts to the setting of identified heritage assets at Kingsway junction or Markeaton junction. However, at Little Eaton junction there are potential operational impacts on a number of designated assets including the Derwent Valley Mills World Heritage Site (A41) and the undesignated former Ford Farm (A38).

7.8 Proposed Scope of Assessment

7.8.1 It is the responsibility of the local planning authority to ensure the protection, preservation and enhancement of World Heritage Sites. As such, DCC and Historic England will be consulted including for the preparation of the HIA to establish the requirements and scope of the report, and prior to undertaking a DMRB detailed assessment which will be reported in the Environmental Statement.

7.8.2 Sources of information that will be consulted include:

- DCC's Historic Environment Record (HER);
- Derbyshire Record Office;
- Derby Local Studies and Family History Library;
- Regional research agendas;
- The East Midlands Regional Landscape Character Assessment;
- The Landscape Character Assessment of Derbyshire;
- The National Heritage List and Heritage Gateway; and
- Heritage web resources.

7.8.3 All assets identified by these searches, within the confines of the proposed study area, will be compiled into an inventory/ database and accurately located in relation to the proposed scheme on a map at an appropriate scale. Key view points within the World Heritage Site area will also be considered and will be agreed between the landscape and visual consultant (refer to Chapter 8), DCC, and Historic England.

7.8.4 The HIA will be prepared in order to evaluate the potential impact of the proposed scheme upon the OUV, integrity and authenticity of the World Heritage Site, and to inform the proposed scheme design and mitigation. The HIA will focus on the impact of the proposed scheme on the OUV of the World Heritage Site at the proposed Little Eaton junction and the attributes that convey the OUV.

7.8.5 A DMRB detailed assessment baseline will be prepared which will identify all designated and non-designated heritage assets within the defined study area. This will involve the collation of information from the data gathering exercise, alongside a map regression and walkover survey.

7.8.6 The known archaeological and heritage assets will be visited to record their survival, extent, condition, setting and significance and confirm their location and relationships to other sites, alongside the identification of any previously unrecorded heritage assets. The site's ground conditions and evidence for previous disturbance will also be assessed utilising available geotechnical investigation reports and information. The results of the geotechnical review, and archaeological monitoring of preliminary geotechnical investigations for the proposed scheme and results from archaeological reconnaissance and evaluation work (archaeological geophysical survey, geo-archaeological borehole assessment, trial trenching and archaeological topographic survey) in the vicinity of the proposed Little Eaton junction, will be

incorporated within the historic environment baseline and an assessment of the likely survival of archaeological remains will be made.

- 7.8.7 Consultation will be undertaken with the relevant Local Planning Authority Conservation Officers (LPACOs), the DCADCC and Historic England as necessary, with regards to the results of the HIA and DMRB detailed assessment baseline.

7.9 Proposed Assessment Methodology including Significance

- 7.9.1 The DMRB detailed assessment baseline will be undertaken in accordance with national legislation and guidance as detailed in Section 7.2.

- 7.9.2 The assessment will be carried out in accordance with the published 'Standards and Guidance' and 'Code of Conduct' of the Institute for Archaeologists and in accordance with policy and guidance with specific reference to:

- Historic England: Good Practice Advice Note in Planning 2 – Managing Significance in Decision-Taking in the Historic Environment (GPA2) (Historic England, 2015);
- Historic England: Historic Environment Good Practice Advice in Planning Note 3. The Setting of Heritage Assets (GPA3) (Historic England, 2017);
- The Chartered Institute for Archaeologists: Code of Conduct (Chartered Institute for Archaeologists, 2014); and
- The Chartered Institute for Archaeologist: Standard and Guidance for Historic Environment Desk-based Assessment (Chartered Institute for Archaeologists, 2017).

- 7.9.3 Consultation will be undertaken with the relevant LPACOs, the DCADCC and Historic England as necessary, with regards to the likely impacts on heritage assets from the construction and operation of the proposed scheme. Mitigation measures will be agreed as necessary and appropriate.

- 7.9.4 Following the DMRB detailed assessment, the potential impacts of the proposed scheme on the significance and setting of the identified heritage assets will be assessed and reported within the Environmental Statement. This assessment will involve establishing the significance (importance) of the heritage asset and the magnitude of the impact upon it. The potential resultant effects of the proposed scheme on the cultural heritage resource will be assessed on the basis of their type (direct, indirect, and cumulative), nature (beneficial, neutral or adverse) and longevity (reversible, short-term or long-term; irreversible, permanent). The assessment will take into account the sensitivity of the receptor and the magnitude of impact.

- 7.9.5 Mitigation measures designed to prevent, reduce or offset significant adverse effects will be proposed, and residual effects will be assessed taking into account the likely effectiveness of the mitigation proposed.

- 7.9.6 The cultural heritage impact assessment will be undertaken following the guidance in DMRB Volume 11, Section 3, Part 2 (Highways Agency, 2007) including the method for the establishment of the significance of the heritage resource, the method for understanding the level of impact upon the resource and the method for understanding the resultant significance of effects. Mitigation measures will be put forward as set out in DMRB Volume 10, Section 6, Part 1 (Highways Agency, 2001).

7.10 Assumptions and Limitations

- 7.10.1 The methodology as detailed above assumes that land access will be available to undertake both intrusive and non-intrusive archaeological surveys, plus potential access to private properties to undertake setting assessment (listed buildings located in the vicinity of Little Eaton junction).

7.10.2 The PCF Stage 2 heritage assessment did not consider the candidate sites identified for potential flood storage, construction compounds and/ or ecological mitigation. As such the heritage assessment to be reported in the Environmental Statement will consider the heritage assets in such areas and the associated impacts and effects.

7.11 References

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8 LANDSCAPE AND VISUAL

8.1 Introduction

8.1.1 IAN 135/10, Landscape and Visual Impacts Assessment (LVIA) (Highways England, 2010) provides Highways England guidance on LVIA. It states that the main objectives of the scoping exercise are to determine whether or not the project is likely to give rise to any landscape or visual effects, and to define the level of detail required for any further study. For the purposes of this section of the EIA Scoping Report, the term 'landscape' is synonymous with both rural landscapes and urban landscapes or townscapes.

8.1.2 For the purposes of the LVIA, a clear distinction is drawn between landscape and visual impacts as follows:

- **Landscape Impacts:** These relate to direct impacts of the proposed scheme upon the physical characteristics or components of the landscape which form its character (e.g. landform, vegetation, and buildings) and indirect impacts arising from changed perception of the landscape or its value;
- **Visual Impacts:** These relate to the potential changes in the composition, quality and amenity value of existing views as a result of the change or loss of existing landscape elements, and/ or the introduction of new elements, taking into account the extent to which the proposed scheme would be visible from visual receptors. The nature and quality (or visual amenity value) of available views in a landscape as experienced by people can be a key influence on their quality of life.

8.1.3 The LVIA will be undertaken using standard methodologies in accordance with good practice procedures. In addition to conforming to IAN 135/10, the methodology will draw upon the more recent Guidelines for Landscape and Visual Impact Assessment (GLVIA3) jointly published by the Landscape Institute and Institute of Environmental Management and Assessment in 2013. In particular the assessment of sensitivity and magnitude will rely on the more recent terminology of GLVIA3 to determine nature of receptor and nature of effect.

8.1.4 Both documents cited above state that the main objectives of the scoping exercise are to determine whether or not a proposed scheme is likely to give rise to any landscape or visual effects, and to define the level of detail required for any further Landscape and Visual Impact Assessment (LVIA) study within the Environmental Statement.

8.1.5 It is proposed to carry out a detailed assessment as defined in IAN135/10, on the basis that although the proposed scheme is a modification of an existing highway which currently generates significant effects, there is potential for new or different significant effects.

8.1.6 There are likely to be some overlaps between effects associated with landscape and visual and cultural heritage, ecology and noise. Constraints relevant to other topics will be assessed in detail within the relevant sections, but are also referenced in this section in terms of landscape and visual effects where appropriate.

8.1.7 Mitigation required for cultural heritage, ecology and noise effects will be incorporated into the overall environmental design along with the landscape mitigation proposals.

8.1.8 This section should be read in conjunction with the following figures:

- Figure 8.1: Zone of Theoretical Visibility and Viewpoints;
- Figure 8.2: Topography and Hydrology;
- Figure 8.3: Landscape Character Areas; and
- Figure 8.4: Landscape Designations.

8.2 Summary of Relevant Planning Policy

8.2.1 The following NPPF (Department for Communities and Local Government, 2012) policies are broadly relevant to the LVIA:

- Policy 7 Requiring good design;
- Policy 9 Protecting Green Belt land; and
- Policy 11 Conserving and Enhancing the Natural Environment.

8.2.2 Within the NNNPS (DfT, 2014) there is a section on landscape and visual impacts of proposed projects which covers an applicant's assessment, decision making and mitigation requirements. When an EIA is required, the applicant's submission needs to contain '*an assessment of any likely significant landscape and visual impacts*'. This assessment needs to refer to any relevant landscape character assessments or related studies, as well as taking account of any relevant policies from local development documents. The NNNPS states that significant effects on landscape and visual amenity need to be considered during construction and operation of projects, and needs to include an appreciation of historic landscape character as well as noise and light pollution and its effects on local amenity, tranquillity and nature conservation. The aim of any project should be to '*avoid or minimise harm to the landscape, providing reasonable mitigation where possible and appropriate*'.

8.2.3 The following policies relevant to the LVIA have been identified in the Derby City Core Strategy (DCiC, 2017), as well as the Erewash Core Strategy (March 2014) (EBC, 2014).

Table 8.1: Planning Policy Context Relevant to the LVIA

Local Policies - Derby City Core Strategy (January 2017)	
Policy CP16: Green Infrastructure	<p><i>'The Council will seek to maintain, enhance and manage Derby's green infrastructure to ensure that everyone has access to high quality natural and semi-natural habitats, green space and sport and recreation facilities.'</i> ...</p> <p><i>'The Council will:</i></p> <p><i>(a) minimise and mitigate impacts and overall decline of biodiversity and, where possible, provide net gains</i></p> <p><i>(b) ensure that green infrastructure is an integral part of all development, contributing to the wider green infrastructure network, including the strategic network outside of the City'</i></p> <p>...</p> <p><i>'(d) identify Green Wedges as areas of land that define the City's neighbourhoods and seek improvements to enhance the wider green infrastructure network'</i></p> <p>...</p> <p><i>'(g) seek to avoid the fragmentation of habitats and, where unavoidable, provide appropriate compensation on a like-for-like basis</i></p> <p><i>(h) seek to enhance linkages to the green infrastructure network to improve access for residents, workers and visitors'</i></p> <p>...</p> <p><i>'(m) ensure that where new development has an adverse impact on a recognised important element of green infrastructure, that impact should be clearly understood, minimised and any residual adverse impacts mitigated for. As a last resort, the impact should be compensated for, either on-site or off-site. Any opportunities for enhancement and better management of the asset through development should be sought. In assessing the impact of the development, its need and benefit will be weighed against the harm caused to the green infrastructure</i></p> <p><i>(n) resist the non-essential culverting of watercourses and encourage existing culverts to be removed and natural watercourses reinstated, thereby contributing to the expansion of the City's green infrastructure and delivering Water Framework Directive objectives '</i></p>
CP17 – Public Green Space	<p><i>'The Council will:'</i></p> <p>...</p> <p><i>'(d) only permit the loss or change of use of green space or playing pitches in circumstances where:</i></p> <p><i>1. an assessment has been undertaken which has clearly shown the public green space, buildings or land to be surplus to requirements; or</i></p>

	<p>2. the loss resulting from the proposed development would be replaced by equivalent or better provision in terms of quantity and quality in a suitable location; or</p> <p>3. the development is for alternative sports and recreational provision, the needs for which clearly outweigh the loss; or</p> <p>4. the development will be ancillary and in scale to the public green space, sport or recreation facility and complement the use or character of the space'</p>
CP18 – Green Wedges	<p>'The Council will continue to identify Green Wedges as areas of land that define and enhance the City's urban structure, maintain the identity of the different residential neighbourhoods, provide an uninterrupted link to the countryside, form part of the wider green infrastructure network and play an important role in climate change adaptation.</p> <p>The Council will:</p> <p>(a) ensure that development in the Green Wedge is limited to the following:'</p> <p>...</p> <p>2. Green space, outdoor sport, recreation and community uses providing the character of the Green Wedge and it's amenity is not adversely affected</p> <p>3. Nature conservation, including improvements which provide multiple benefits to Derby's green infrastructure or which link the Green Wedge to the wider Green Infrastructure network'</p> <p>...</p> <p>'6. Public utilities where it can be shown that a suitable site outside the Green Wedge is not available'</p> <p>...</p> <p>'(b) ensure that development does not endanger the open and undeveloped character of the Wedge, its links and green infrastructure value; taking into account scale, siting, design, materials and landscape treatment and would not lead to an excessive increase in numbers of people, traffic or noise'</p> <p>...</p> <p>'(h) ensure that development adjacent to a Green Wedge does not endanger the character and function of the wedge, taking into account scale, siting, design, materials and landscape treatment and would not lead to an excessive increase in numbers of people, traffic or noise</p> <p>(i) seek opportunities to link Green Wedges to the wider green infrastructure and ecological networks</p> <p>(j) ensure that development in or adjacent to a Green Wedge provides opportunities to improve the remaining Green Wedge'</p> <p>...</p>
Policy CP20 – Historic Environment	<p>'The Council recognises the historic environment as one of Derby's greatest resources and will protect it through the preservation, enhancement, restoration and repair of heritage assets.' ...</p> <p>'Development proposals that would detrimentally impact upon the character, significance and / or setting of a heritage asset will be resisted.'</p>
Local Policies - Erewash Core Strategy (March 2014)	
Policy 16 - Green Infrastructure, Parks and Open Space	<p>'existing and potential Green Infrastructure corridors and assets are protected and enhanced ... where new development has an adverse impact on Green Infrastructure corridors or assets, alternative scheme designs that have no or little impact should be considered before mitigation is considered. The need for and benefit of the development will be weighed against the harm caused ... Landscape Character is protected, conserved or enhanced where appropriate in line with the recommendations of the Derbyshire Landscape Character Assessment.'</p>

8.3 The Study Area

8.3.1 Guidance given in DMRB Volume 11 Section 3 Part 5 (Annex III) (Highways Agency, 1993), although superseded by IAN 135/10, suggests a 1km study area corridor, broadening to capture areas within the Zone of Theoretical Visibility (ZTV) sitting outside of the 1km with capacity to experience significant effects as a result of a proposed scheme. This approach is commonly adopted for highways projects and will be adopted in this LVIA.

8.3.2 In the case of the proposed scheme, the study area of the assessment has been defined by a combination of IAN 135/10 guidance, the ZTV, professional judgement, and field survey verification.

8.3.3 The ZTV will be generated by placing points along the proposed scheme at intervals not exceeding 50m and assigning levels of 1.5m, 4.5m and 12.5m high to represent visibility of cars, HGVs and lighting columns within a digital terrain model (DTM) based on the OS Terrain 5 dataset. Built form and vegetation from the Forestry Commission's National Woodland dataset will be incorporated into the terrain model at heights of 7.5m and 12.5m respectively.

8.4 Baseline Conditions

Baseline Visual Context

8.4.1 Key viewpoints will be illustrated with panoramic photography, and agreed with DCiC and DCC. Representative viewpoints will be used to assess the views available to visual receptors or groups of receptors at a given location. These viewpoints will be selected to represent receptors with high sensitivity, which are most likely to experience significant effects. A total of 18 initial viewpoint locations have been identified within the study area for this EIA Scoping Report and are focussed on the three junctions. As the proposed scheme design develops, these viewpoint locations will be reviewed and updated to account for proposed scheme design changes.

8.4.2 For Kingsway junction and Markeaton junction, views are predominantly in close proximity to the proposed scheme, including from the residential areas of Mackworth and Markeaton and Markeaton Park. The majority of views are within 1km of the proposed scheme and include a baseline which is heavily influenced by the existing A38 highway corridor.

8.4.3 At Little Eaton junction, views are obtained from a wider area, including locations at up to 2km distant. There are views from the edge of Allestree, from the residential mobile home park at Ford Lane to the west of the existing junction and from the western edge of Breadsall village. Views are also obtained from public rights of way (PRoW) within the Derwent Valley floor including from the Derwent Valley Heritage Trail and from the PRoW on the Breadsall Moor/Little Eaton hillside.

Baseline Landscape and Townscape Context

8.4.4 The three junctions encompass urban areas of Derby and rural landscape adjacent to the urban edge. At a national level Natural England has defined a series of National Character Areas (NCAs) for England. The study area encompasses, from south to north:

- NCA Profile: 68 Needwood & South Derbyshire Claylands;
- NCA Profile: 50 Derbyshire Peak Fringe and Lower Derwent.

8.4.5 Landscape Character assessment is a hierarchical process descending from national to regional to local scale and ultimately to scheme-specific studies. It is unlikely that the alterations to the A38 junctions will have any significant effects on the character of these NCAs. This is because the key landscape characteristics are regional, and small-scale local alterations would not likely result in a significant effect over the entire NCA. Therefore, the LVIA will provide a high level overview of them.

8.4.6 At a county level DCC has published a 2013 update to 'The Landscape Character of Derbyshire' (DCC, 2013). The assessment was undertaken to underpin landscape planning, policy and decision making within the county and assist in the delivery of the specific measures established in the European Landscape Convention (ELC). The landscape of Derbyshire has been refined into 39 Landscape Character Types (LCTs), defined as broad tracts of landscape that convey a unity of character derived from their inclusion within specific NCAs.

- 8.4.7 Landscape Character Areas (LCAs) plus the Derby City ward boundaries are shown on Figure 8.3 (Landscape Context).
- 8.4.8 The land surrounding Kingsway junction is classed entirely as an Urban LCA and Urban landscape type, with the closest area of residential housing lying to the north-west of the junction in Mackworth. There is, however, an extensive area of open land to the south-west of the junction, with further open land to the south. There is also a small area of open amenity grassland to the immediate west of the A38, north of the junction.
- 8.4.9 Markeaton junction is surrounded to the south and east by an urban landscape, the urban area to the south of the junction being dominated by residential development. Land to the west of the A38 at Markeaton junction, includes Markeaton Park and falls within the Needwood and South Derbyshire Claylands LCA incorporating the Estate Farmlands LCT, with the Riverside Meadows LCT further to the north.
- 8.4.10 The landscape surrounding Little Eaton junction falls within the Peak Fringe and Lower Derwent LCA incorporating the Riverside Meadows LCT, with the Wooded Valleys LCT to the east and, where the A38 approaches Allestree, an urban landscape area to the west. The River Derwent valley lies to the west of the junction, and lies within an area designated as the Derwent Valley Mills World Heritage Site which is an international designation. A buffer zone for the Derwent Valley Mills Heritage Site, which appears on the EBC Local Plan, is located on the River Derwent floodplain, close to the Little Eaton junction. The village of Breadsall, part of which is a Conservation area, lies to the south and east of the junction.
- 8.4.11 In summary, within the 'The Landscape Character of Derbyshire' 2013, the study area encompasses, from south to north:
- Needwood & South Derbyshire Claylands: Riverside Meadows LCT;
 - Needwood & South Derbyshire Claylands: Settled Farmlands LCT;
 - Needwood & South Derbyshire Claylands: Estate Farmlands LCT;
 - Peak Fringe and Lower Derwent: Wooded Slopes and Valleys LCT; and
 - Peak Fringe and Lower Derwent: Riverside Meadows LCT.
- 8.4.12 At a Derby City level, DCiC has undertaken a townscape assessment of each ward within the city which adds detail to those areas referred to as urban in the 'The Landscape Character of Derbyshire' (2013). These present information about the built environment and about what makes up an area's identity. The study area encompasses, from south to north: Mickleover, Littleover, Mackworth, Derwent, Allestree, Darley and Oakwood.
- 8.4.13 Part of the study area west of Little Eaton junction lies within the Derwent Valley Mills World Heritage Site. Whilst this area will be considered within the cultural heritage assessment, it is identified as part of the landscape section, as it has a wider setting in the landscape and contains important elements in determining the landscape character baseline of the surrounding landscape.

8.5 Additional Survey Requirements

- 8.5.1 No survey requirements have been identified at this stage other than site visits to defined ZTV viewpoints (summer and winter). The summer and winter viewpoints will establish the visual baseline from which the anticipated proposed scheme effects can be assessed. The viewpoints are considered over two seasons so that where vegetation differs between the seasons and views change, these can be recorded and taken into account during the assessment.

8.6 Value of the Environmental and Resource Receptors

- 8.6.1 Under GLVIA3, value of landscape resources is a function of the factors listed below, which may be encompassed within a designation of landscape value:

- Landscape quality;
- Scenic quality;
- Rarity;
- Representativeness;
- Conservation interest;
- Recreation value;
- Perceptual aspects; and
- Associations.

8.6.2 The LVIA will assess landscape value based on these criteria and by reference to landscape designations within the study area. An overview of landscape designations is provided below.

International and National Designations

8.6.3 The study area includes part of the Derwent Valley Mills World Heritage Site - the World Heritage Site designation is primarily cultural heritage based, relating to the industrial revolution, rather than landscape focused. Kedleston Hall registered park and garden lies in the west of the study area. There are no other international or national designations of landscape quality or value within the study area.

Local Landscape Designation

8.6.4 Conservation Areas, whilst not specific landscape designations, reflect landscape and architectural quality and are relevant to development proposals which may impact upon them. The study area encompasses a number of Derby City Conservation Areas, based on former village centres:

- Darley Abbey;
- Mickleover Conservation Area;
- Spondon Conservation Area;
- Allestree Conservation Area;
- Markeaton Conservation Area.

8.6.5 EBC has designated conservation areas at Breadsall which is located within the study area.

8.6.6 There are no other local landscape designations within the study area.

8.6.7 DCC has identified Areas of Multiple Environmental Sensitivity (AMES) across the county based on various environmental input indicators. These are areas where two or more of the environmental input indicators (historic, ecological or visual unity) within the landscape were determined as significant. Just to the north to the Markeaton junction is an area of Primary Sensitivity, which means that all three of the environmental input indicators are determined as significant. The majority of the study area around Little Eaton junction falls within an area of Secondary Sensitivity which means that two of the environmental input indicators are determined as significant (i.e. ecological and visual sensitivity).

8.6.8 Land adjacent to Little Eaton junction is designated as green belt. Green belt is a designation of landscape value related primarily to openness between settlements rather than an indication of landscape quality. Kingsway junction sits within the Mickleover/ Mackworth Green Wedge. Green wedges are a DCiC designation that indicates landscape value based on open space between suburbs. It does not necessarily indicate landscape quality.

8.6.9 Assessment of value of views will form a component of the LVIA required to establish sensitivity. Value of views is typically more subjective and may vary from viewer to viewer, however, factors to be considered will include views of or from heritage assets, designated landscapes/ views, or named or promoted views found in guidebooks or tourist literature.

8.7 Potential Impacts and Effects

Summary of Mitigation Proposals

- 8.7.1 Environmental considerations will be taken into account during the further development of the proposed scheme design.
- 8.7.2 A CEMP would be prepared and implemented by the selected construction contractor – this 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.
- 8.7.3 The proposed scheme design will include an appropriate landscape design which will incorporate tree and shrub planting. During PCF Stage 2 an indicative landscape design was prepared – this landscape design will be further developed during PCF Stage 3. In particular the future development of the landscape design will take account of ecological mitigation requirements and heritage features as well as the opinions of applicable local resident groups.

Summary of PCF Stage 2 Assessment

- 8.7.4 The PCF Stage 2 assessment indicated that the proposed scheme has the potential to generate a range of landscape and visual effects which change over time.
- 8.7.5 During proposed scheme construction, the landscape effects in the vicinity of each junction are anticipated to be negligible to minor adverse. However, effects upon some viewpoints during proposed scheme construction have the potential to range from negligible to major adverse, depending on the receptor sensitivity and the predicted impact magnitude.
- 8.7.6 During proposed scheme operation, landscape effects at Kingsway junction and Markeaton junction are anticipated to be negligible (Year 1 and Year 15), whilst at Little Eaton junction landscape effects are predicted to be negligible or minor adverse at proposed scheme opening (Year 1), reducing to be negligible following maturation of the proposed scheme landscape mitigation (Year 15).
- 8.7.7 During proposed scheme operation, visual amenity effects at Kingsway junction are predicted to range from negligible to major adverse at proposed scheme opening (Year 1) (depending on the receptor sensitivity and the predicted impact magnitude), reducing to be negligible to moderate adverse following maturation of the proposed scheme landscaping (Year 15). At Markeaton junction visual effects are predicted to range from negligible to minor adverse 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 negligible to major at proposed scheme opening (Year 1), reducing to be negligible to minor adverse following maturation of the proposed scheme landscaping (Year 15).

8.8 Proposed Scope of Assessment

- 8.8.1 The ZTV has allowed identification of representative viewpoint locations which will be visited and form the basis of the assessment of effects on visual amenity within the LVIA. In total, 18 viewpoint locations have been identified as set out on Figure 8.1 (Zone of Theoretical Visibility and Viewpoint Locations).
- 8.8.2 The viewpoints are drawn from publically accessible locations chosen to cover the range of effects on visual amenity from receptors such as residential areas, PRoW, highways, commercial and leisure locations, although not all categories may be present. The viewpoints will represent grouped effects of multiple receptors from settlements, but will take the GLVIA3 approach to representative viewpoints rather than listing all locations.

- 8.8.3 The LVIA will assess likely effects of the proposed scheme on each of these representative viewpoints and, by extension, the additional similar viewpoints which may also be similarly impacted by the proposed scheme.
- 8.8.4 The LVIA will assess likely effects of the proposed scheme on the landscape character of the LCTs and on the townscape character of each of the wards within the study area.
- 8.8.5 The landscape and visual effects of the proposed scheme will be assessed at the following stages of the development:
- During proposed scheme construction period;
 - At year 1 of proposed scheme opening; and
 - At 15 years after proposed scheme opening, allowing time for the contribution of planting or other landscape mitigation to take effect and taking into account future planned development.
- 8.8.6 The LVIA will comprise, but not be limited to, the following:
- Desktop study of existing landscape character assessments both at national and local level. Reference will be made to Natural England National Character Area Profiles relevant to the area and the DCiC townscape assessments by electoral ward;
 - Identification of the baseline character, value and quality of the site and surrounding landscape as well as its susceptibility to the specific change arising from the proposed scheme;
 - Identification of the ZTV - this will help identify receptors and public viewpoints that should be assessed (see Figure 8.1). Assessment locations were proposed to DCiC and DCC in early 2015. Photographs will be taken at representative viewpoints along with a record of the key landscape and visual characteristics;
 - The assessment of impacts from the agreed viewpoints, using photography and where appropriate, photomontages. The nature of existing views will be described for each viewpoint. An assessment of sensitivity of receptor, derived from susceptibility to the specific change and value of view combined with magnitude of effect derived from the scale/ extent, duration and reversibility of change in the view, will be used to determine likely overall significance of effect;
 - The results of the LVIA will be integrated with the cultural heritage, ecological and an arboriculture assessment as far is necessary given the degree of overlap;
 - Identification of appropriate review mitigation and enhancement proposals to be illustrated on a landscape master plan to minimise or reduce impacts.

8.9 Proposed Assessment Methodology including Significance

Landscape Value, Susceptibility and Sensitivity

- 8.9.1 GLVIA3 notes that the value attached to the receptor and its susceptibility to change arising from the specific proposal, should be considered separately and then combined using professional judgement to determine sensitivity (paragraph 3.24).
- 8.9.2 Paragraph 2.16 in Annex 1 of IAN 135/10 states that a professional judgement should be made as to the value of the landscape based on the results of the desk study and field surveys. This is supported by paragraphs 5.19 to 5.31 of GLVIA3. Both documents are clear that a landscape does not need to be designated to have a value. Box 5.1 of GLVIA3 sets out a range of factors that can help in the identification of landscape value, as follows:
- Landscape quality;
 - Scenic quality;
 - Rarity;
 - Representativeness;
 - Conservation interests;
 - Recreation value;

- Perceptual aspects; and
- Associations.

8.9.3 The assessment of the value of each LCA will be informed by the information set out in the baseline and the factors set out above and will be judged with reference to Table 8.2.

Table 8.2: Landscape Value Criteria

Classification	Value of LCA
National	Landscape with elements of national importance, e.g. protected by legislation.
Regional	Landscape with elements of regional importance, designated regional leisure routes and conservation areas.
Local	Landscape with elements which are protected or valued through local or neighbourhood planning policies, such as protected open space or groups of listed buildings or buildings of townscape merit.
Community	Landscape with relatively common elements which are likely to be valued by the community living and working in the area.
Limited	Landscape with weak or discordant elements and characteristics which detract from the quality of the area.

8.9.4 Susceptibility to change will be considered at the assessment stage and is defined in GLVIA3 as “the ability of the landscape receptor (whether it be the overall character or quality/condition of a particular landscape type or area, or an individual element and/or feature, or a particular aesthetic and perceptual aspect) to accommodate the proposed development without undue consequences for the maintenance of the baseline situation...” (paragraph 5.40). In paragraph 5.43 it states that “Judgements about susceptibility of landscape receptors to change should be recorded on a verbal scale (for example high, medium or low)...” and this will be applied as follows:

- **High:** the receptor has a low capacity to accommodate the proposed scheme without effects upon its overall integrity. The landscape is likely to have a strong pattern/ texture or is a simple, but distinctive landscape and/ or with high value features and essentially intact;
- **Medium:** the receptor has some capacity to accommodate the proposed scheme without effects upon its overall integrity. The pattern of the landscape is mostly intact and/ or with a degree of complexity and with features mostly in reasonable condition;
- **Low:** the receptor is robust; it can accommodate the proposed scheme without effects upon its overall integrity. The landscape is likely to be simple, monotonous and/ or partially degraded with common/ indistinct features and minimal variation in landscape pattern.

8.9.5 Paragraph 3.9 of Annex 1 of IAN 135/10 states that “the outputs from the landscape character assessment (i.e. landscape characteristics, their condition and value) should be considered to assess their sensitivity to changes arising from the proposed scheme”. The identification of sensitivity, therefore, needs to consider the value of the landscape alongside the susceptibility to the nature of the change i.e. the type and scale of development proposed within a particular area or type of landscape and the association and tolerance of the identified landscape or individual contributing elements thereof, to that change.

8.9.6 The criteria in Table 8.3 developed from those set out in Table 2 of Annex 1 of IAN 135/10 and in consideration of the later guidance within GLVIA3, will be applied when combining judgements to determine landscape sensitivity.

Table 8.3: Landscape Sensitivity

Classification	Description
High	Landscape of national or regional value with distinctive elements and characteristics, highly susceptible to small changes of the type of development proposed without unacceptable consequences for the maintenance of the baseline situation. Typically these landscapes would be: <ul style="list-style-type: none"> · Of high quality with distinctive elements and features making a positive contribution to character and sense of place. · Likely to be designated, but the aspects which underpin such value may also be

Classification	Description
	<p>present outside designated areas, especially at the local scale.</p> <ul style="list-style-type: none"> Areas of special recognised value through use, perception or historic and cultural associations. Likely to contain features and elements that are rare and could not be replaced.
Medium	<p>Landscape of local or community value, with mostly common elements and characteristics, which by nature of their character would be able to partly accommodate change of the type proposed without undue consequences for the maintenance of the baseline situation. Typically these would be:</p> <ul style="list-style-type: none"> Comprised of mostly commonplace elements and features creating generally unremarkable character but may include some rarer elements and with some sense of place. Locally designated, or value may be expressed through non-statutory local publications. Containing some features of value through use, perception or historic and cultural associations. Likely to contain some features and elements that could not be replaced.
Low	<p>Landscape of community or limited value and relatively inconsequential elements and characteristics, the nature of which is potentially tolerant of substantial change of the type proposed. Typically these would be:</p> <ul style="list-style-type: none"> Comprised of some features and elements that are discordant, derelict or in decline, resulting in indistinct character with little or no sense of place. Not designated. Containing few, if any, features of value through use, perception or historic and cultural associations. Likely to contain few, if any, features and elements that could not be replaced.
Limited	<p>Despoiled or degraded landscape with little or no evidence of being valued by the community.</p>

Magnitude of Landscape Impact

8.9.7 The magnitude of impact will be determined by considering the size, scale, duration and intensity of the proposed change, the geographical extent of the area influenced, the type of development, the level of integration of new features with existing elements, and its duration and reversibility. Magnitude of impact will be classified as set out in Table 1 in Annex 1 of IAN 135/10 and as defined in Table 8.4.

Table 8.4: Magnitude of Landscape Impact Criteria

Magnitude of Impact	Typical Criteria Descriptors
Major	<p>Total loss or large scale damage to existing character or distinctive features and elements, and/ or the addition of new but uncharacteristic conspicuous features and elements. (Adverse)</p> <p>Large scale improvement of character by the restoration of features and elements, and/or the removal of uncharacteristic and conspicuous features and elements, or by the addition of new distinctive features. (Beneficial)</p>
Moderate	<p>Partial loss or noticeable damage to existing character or distinctive features and elements, and/ or the addition of new but uncharacteristic noticeable features and elements. (Adverse)</p> <p>Partial or noticeable improvement of character by the restoration of existing features and elements, and/or the removal of uncharacteristic and noticeable features and elements, or by the addition of new characteristic features. (Beneficial)</p>
Minor	<p>Slight loss or damage to existing character or features and elements, and/or the addition of new but uncharacteristic features and elements. (Adverse)</p> <p>Slight improvement of character by the restoration of existing features and elements, and/ or the removal of uncharacteristic features and elements, or by the addition of new characteristic elements. (Beneficial)</p>
Negligible	<p>Barely noticeable loss or damage to existing character or features and elements, and/or the addition of new but uncharacteristic features and elements. (Adverse)</p> <p>Barely noticeable improvement of character by the restoration of existing features and elements, and/ or the removal of uncharacteristic features and elements, or by the addition of new characteristic elements. (Beneficial)</p>
No change	<p>No noticeable loss, damage or alteration to character or features or elements.</p>

Visual Value, Susceptibility and Sensitivity

8.9.8 Annex 3 of IAN 135/10 defines visual amenity as the value of a particular area or view in terms of what is seen. GLVIA3 also stresses the importance of considering the value of views, for example in relation to heritage assets, or through planning designations and provides a list of indicators of the value attached to views in paragraph 6.37, including:

- Appearance in guidebooks or tourist maps;
- Provision of facilities, such as parking places, sign boards and interpretive materials; and
- References in literature or art.

8.9.9 The assessment of the value of views will be informed by the location of the viewing place and the quality or designation of the existing elements in the view, as shown in Table 8.5.

Table 8.5: Value of Views

Classification	Value of View
National	Recognised or iconic views within nationally/ internationally designated landscapes, such as National Parks, AONB or World Heritage Site and/ or national/ international landmarks with views recognised in planning policy and/ or management plans.
Regional	Views or viewing places identified in landscape frameworks or regional strategies.
Local	Views across high quality landscape which might include features of interest, such as landmarks, which may be identified in the Local Plan.
Community	Views of relatively common landscape elements, likely to be valued by the communities which experience the view.
Limited	Views across poor quality landscape with a high degree of detracting or common elements.

8.9.10 IAN 135/10 states that all residential properties, PRoW and recreational facilities should be regarded as being of 'high' sensitivity, where the purpose of that recreation is for the enjoyment of the countryside.

8.9.11 GLVIA 3 supports this, but also notes that visual sensitivity of receptors is dependent upon "*their susceptibility to change in views and visual amenity*" (paragraph 6.31) they experience at particular locations. It includes a combination of parameters, such as the activity/ occupation/ pastime of the receptors at particular locations; the extent to which their attention or interest may be focused on the views and the visual amenity they experience. It will comprise the location, relative focus and orientation of particular views, the quality or importance of the existing view and its attractiveness or scenic quality; the principal or secondary interest in that particular view; the static or sequential nature of views; the ability of the view to accommodate the type of development and the frequency and duration of the view. These are detailed further in Table 8.6.

8.9.12 GLVIA 3 notes that the divisions between categories are not always clear cut and "*in reality there will be a gradation in susceptibility to change*", (paragraph 6.35). On this matter GLVIA3 advises that each project should consider the nature of the landscape and groups of people who will be affected and for visual receptors "*the extent to which their attention is likely to be focused on views and visual amenity*" (paragraph 6.35). For the purposes of this assessment therefore, susceptibility of visual receptors to change will be defined as set out in Table 8.6.

Table 8.6: Susceptibility to Change of Views

Nature of Visual Receptor	Susceptibility to Change		
	High	Medium	Low
Occupation or activity	People living in the area or visiting areas because of their high landscape value.	People passing through the area on designated routes.	People working inside or passing through the area on public roads or railway lines.
Degree of attention on the view	Views are an important part of the experience of the landscape.	Views are relevant to the experience or activity but not central to it.	Views are likely to be focused on the activity of the receptor, rather than the view.

Nature of Visual Receptor	Susceptibility to Change		
	High	Medium	Low
Degree of exposure to the view	Views are likely to be open.	Views may be framed, partially screened or filtered.	Views are likely to be limited to glimpses or are heavily screened.
Length of exposure to the view	Views are likely to be experienced daily or for long periods of time.	Views may be fleeting or experienced as a sequence of views moving through the area.	Views are likely to be short.

8.9.13 Paragraphs 2.15 and 2.16 in Annex 2 of IAN 135/10 provide advice on determining the sensitivity of visual receptors. This is supported by GLVIA3 which states that each visual receptor “*should be assessed in terms of both their susceptibility to change in views and visual amenity and also the value attached to particular views*” (paragraph 6.31). The criteria set out in Table 8.7, which draws reference from Table 2 in Annex 2 of IAN 135/10, will be applied in determining the sensitivity of visual receptors.

Table 8.7: Sensitivity of Visual Receptors

Classification	Activity of Visual Receptor
High	Activity resulting in a particular interest or appreciation of the view (e.g. residents or people engaged in outdoor recreation whose attention is focused on the landscape and where people might visit purely to experience the view, such as promoted viewpoints) and/ or a view of national value (e.g. within/towards a designated landscape).
Medium	Activity resulting in a general interest or appreciation of the view (e.g. visitors staying within an area such as a caravan or camping site, people in schools or other institutional buildings and hotels and people passing through the landscape on cycle routes or identified scenic road routes) and/or a view of local or limited value (e.g. agricultural land or urban areas).
Low	Activity where interest, appreciation or period of exposure to the view is limited (e.g. people at work, motorists travelling through the area or people engaged in outdoor recreation that does not focus on an appreciation of the landscape) and/or a view of limited value (e.g. industrial areas or derelict land).

Magnitude of Visual Impact

8.9.14 The magnitude and type of visual impact will relate to the scale, duration and reversibility of change which the proposed scheme would potentially bring to existing views and visual receptors. The proposed criteria for assessment of the magnitude of visual impact will be classified using Table 2 in Annex 2 of IAN 135/10 and as defined in Table 8.8.

Table 8.8: Magnitude of Visual Impact Criteria

Magnitude of Impact	Typical Criteria Descriptors
Major	The proposed scheme, or a part of it, would become the dominant feature or focal point of the view.
Moderate	The proposed scheme, or a part of it, would form a noticeable feature or element of the view which is readily apparent to the receptor.
Minor	The proposed scheme, or a part of it, would be perceptible but not alter the overall balance of features and elements that comprise the existing view.
Negligible	Only a very small part of the proposed scheme would be discernible, or it is at such a distance that it would form a barely noticeable feature or element of the view.
No change	No part of the proposed scheme, or work or activity associated with it, is discernible.

Significance of Visual Effects

- 8.9.15 As set out above, the GLVIA3 methodology will be used to determine sensitivity and magnitude of effects which will then be combined using the terminology in Table 8.9, derived from IAN 135/10. In accordance with GLVIA3 methodology, the matrix will be used as a guideline to define landscape and visual effect significance rather than a prescriptive or inflexible process, and professional judgement will be used to arrive at conclusions of significance.
- 8.9.16 The assessment will set out the likely significant effects both prior to mitigation and post mitigation. Where landscape or visual mitigation measures are inherent as part of the design, these will be set out in the description of the proposed scheme and cross-referenced within the LVIA.

Table 8.9: Matrix for the Definition of Landscape and Visual Significance of Effects (derived from IAN 135/10)

Landscape Sensitivity	Magnitude of Impact				
	No Change	Negligible	Minor	Moderate	Major
High	Neutral	Slight	Slight/ Moderate	Moderate/ Large	Large/ Very Large
Moderate	Neutral	Neutral/ Slight	Slight	Moderate	Moderate/ Large
Low	Neutral	Neutral/ Slight	Neutral/ Slight	Slight	Slight/ Moderate

Preparation and Use of Landscape Figures and Visuals

- 8.9.17 The ZTV described in this section will be verified and mapped in line with the approaches recommended in GLVIA 3, paragraphs 6.6 to 6.12.
- 8.9.18 GLVIA3 is the industry standard guidance for LVIA. Landscape Institute Guidance Note 02/17 Visual Representation (Landscape Institute, 2017) of development proposals (also sometimes known as “Proportionality” guidance) supports GLVIA3 by directing clients, regulators and practitioners towards an appropriate choice of technique when seeking visual representations of developments.
- 8.9.19 Site photography work will be carried out in line with ‘Photography and photomontage in landscape and visual impact assessment’ (Landscape Institute Advice Note 01/11) (Landscape Institute, 2011). Photographs will, as far as practicable, be captured during summer and winter months.

8.10 Assumptions and Limitations

- 8.10.1 The LVIA will be based on, and limited to, the baseline conditions observed at the time of the ZTV survey. Surveys will cover the summer and winter, but will not include other seasons.
- 8.10.2 The PCF Stage 2 LVIA did not consider the candidate sites identified for potential flood storage, construction compounds, and/ or ecological mitigation. As such the LVIA to be reported in the Environmental Statement will consider the landscape and visual assets in such areas and the associated impacts and effects.
- 8.10.3 Access to viewpoints may be restricted to publicly accessible areas and sections of private land where access had been agreed. Where access is limited, site work will be undertaken from the nearest publicly accessible location and noted within the assessment. The consequential evaluation for impacts on some private and/ or inaccessible viewpoints will be made, therefore, based upon the professional judgement of suitably qualified and experienced specialists.

- 8.10.4 Where appropriate, visual receptors will be grouped together as 'clusters' within the same receptor group at points where they are likely to experience the same level of effect.
- 8.10.5 Impacts on views from existing and slightly realigned PRoW will be assessed.
- 8.10.6 Impacts on forthcoming visual receptors including those subject to planning permission will be assessed where developments are known and are completed before the proposed scheme is under construction, or otherwise they will be treated as part of the cumulative assessment. These will be clarified at the detailed assessment stage.
- 8.10.7 Only visual receptors within the ZTV that would experience a potentially significant adverse or beneficial effect will be assessed in full. Whilst there are likely to be a number of other receptors that would experience views of parts of the proposed scheme, these will not be recorded in detail where the significance of effect would be neutral or slight at all timescales.
- 8.10.8 Existing vegetation outside the proposed DCO application boundary would screen or filter views from some locations and will be taken into account within the assessment of visual impacts in accordance with IAN 135/10. Changes to this vegetation would potentially affect the visual impacts caused by the proposed scheme, but the management and retention of such vegetation is outside the control of Highways England.

8.11 References

Department for Transport (DfT) (2014) National Policy Statement for National Networks (NPSNN). The Statutory Office.

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Department for Communities and Local Government (2012) National Planning Policy Framework 2012.

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https://www.derby.gov.uk/media/derbycitycouncil/contentassets/documents/policiesandguidance/planning/Core%20Strategy_ADOPTED_DEC%202016_V3_WEB.pdf

Derbyshire County Council (2013) The Landscape Character of Derbyshire.

https://www.derbyshire.gov.uk/images/Introduction_tcm44-245607.pdf

Erewash Borough Council (2014) Erewash Core Strategy (March 2014).

<https://www.erewash.gov.uk/local-development-framework/adopted-erewash-core-strategy.html>

Highways Agency (1993) DMRB Volume 11 Section 3 Part 5 Landscape Effects.

Highways England (2010) IAN 135/10, Landscape and Visual Impacts Assessment (LVIA).

Landscape Institute (2017) Visual Representation of Development Proposals. Landscape Institute Technical Guidance Note 02/17 (31 March 2017).

Landscape Institute (2011) Photography and Photomontage in Landscape and Visual Impact Assessment. Landscape Institute Advice Note 01/11.

Landscape Institute and Institute of Environmental Management and Assessment (2013) Guidelines for Landscape and Visual Impact Assessment (GLVIA3).

9 BIODIVERSITY

9.1 Introduction

9.1.1 The ecology, biodiversity and nature conservation chapter in the Environmental Statement will identify and evaluate relevant ecological features (i.e. receptors including nature conservation designations, priority habitats and protected/ notable species) associated with the proposed scheme, and consider the effects that the proposed scheme is likely to have on their conservation status, inter-relationships, and contribution to local and if appropriate, national biodiversity.

9.1.2 The chapter will identify avoidance/ reduction/ mitigation and compensation measures that may be required to enable the proposed scheme to proceed in compliance with relevant nature conservation legislation and planning policy, and will demonstrate that due consideration has been given to ecological features and that the works have been planned accordingly.

9.2 Summary of Relevant Policy

9.2.1 Key legislation and policy relevant to protected nature conservation sites, significant habitats and protected/ notable species includes:

- The Wildlife and Countryside Act 1981 (as amended) (WCA 1981);
- The Countryside and Rights of Way Act 2000 (CROW Act 2000);
- The Conservation of Habitats and Species Regulations 2017;
- The Natural Environment and Rural Communities Act 2006 (NERC Act 2006);
- The Protection of Badgers Act 1992;
- The Hedgerows Regulations 1997;
- The Water Environment (WFD) (England and Wales) Regulations 2003;
- The National Planning Policy Framework (NPPF) (Department for Communities and Local Government, 2012);
- The National Planning Practice Guidance (NPPG);
- National Networks National Policy Statement (NNNPS) (DfT, 2014);
- Derby City Council Core Strategy (DCiC, 2017);
- Erewash Local Plan Saved Policies 2005 (amended 2014) (EBC, 2014);
- Lowland Derbyshire Local Biodiversity Action Plan (LBAP) (Lowland Derbyshire Biodiversity Partnership, 2011);
- Highways England Biodiversity Plan 2015 (Highways England, 2015).

9.2.2 The ecology, biodiversity and nature conservation chapter in the Environmental Statement will make reference to the Highways England Biodiversity Plan as published on 29th June 2015. It provides a framework for identifying how Highways England intends to take biodiversity initiatives forward within the current RIS period. The Biodiversity Plan contains these key biodiversity commitments:

- Contribute to the Government's National Pollinator Strategy by developing an additional 3,500 hectares of species rich grassland by 2021;
- Work with external partners to undertake habitat improvement works within the Government's 'Nature Improvement Areas';
- Improve 50% of the Sites of Special Scientific Interests within the soft estate to favourable condition; and
- Development of landscape scale features (such as green bridges) that will reduce the fragmentation effects of the strategic road network.

9.3 The Study Area

- 9.3.1 The ecology, biodiversity and nature conservation study area reflects standard best practice and the scoping distances that statutory consultees would typically expect to be considered for identification of features external to the proposed scheme boundary that could be affected. This is informed by published guidance and professional judgement.
- 9.3.2 The indicative extent of the development footprint is presented in Figures 1.2a/ b. This includes the proposed scheme plus candidate sites identified for potential flood storage, construction compounds and/ or ecological mitigation areas.
- 9.3.3 Defining the 'zone of influence'¹⁰ with regards to potential ecology and nature conservation impacts is an iterative process and the extent varies depending on the receptors. The potential zones of potential influence representing the areas within which effects could occur as a result of proposed scheme operation and associated activities are described below.
- 9.3.4 The desk-study area has included a search for European Sites within 30km of the proposed scheme to identify sites where bats are a primary reason for designation. It also identified other international and national statutory and non-statutory nature conservation designations within 2km of the proposed scheme boundary, and protected or notable species up to 2km from the proposed scheme (refer to Figure 9.1 and 9.2).
- 9.3.5 The desk study encompasses the maximum likely zone of influence and allowed for determination of an appropriate study area, within which all important ecological features¹¹ requiring assessment as well as ecological features that could be directly or indirectly affected by the proposed scheme would be subject to field survey.
- 9.3.6 Air quality modelling on other schemes has indicated that most of the nitrogen oxides (NOx) which have the potential to affect the composition of vegetation occur within 200m of the highway.
- 9.3.7 The zone of influence for watercourses extends further downstream due to the potential for greater pollution dispersal and the sensitivity of the species and habitats present. Therefore, up to 2km downstream will be considered.
- 9.3.8 The zone of influence for protected and priority species and priority habitats (habitats and species of principal importance in England) as listed under the Natural Environment and Rural Communities (NERC) Act 2006 Section 41,¹² considers the direct effects of habitat loss due to the construction of the proposed scheme and potential indirect impacts, such as severance of territories or routes of dispersal. As such, the extent varies according to species.
- 9.3.9 As there are two discrete road sections where construction works are proposed - to aid contextualisation of the data in this chapter geographically, the two areas of works are referred to as Kingsway and Markeaton junctions, and Little Eaton junction.

¹⁰ The 'zone of influence' for a project is the area over which ecological features may be subject to significant effects as a result of the proposed scheme and associated activities. This is likely to extend beyond the project site, for example where there are ecological or hydrological links beyond the site boundaries. Determining the zone of influence of the proposed scheme and which important ecological features could be significantly affected is a key activity of the Scoping process (taken from CIEEM, 2016 - Chartered Institute of Ecology and Environmental Management (2016) Guidelines for Ecological Impact Assessment in the UK and Ireland Terrestrial, Freshwater and Coastal (Second edition January 2016).

¹¹ Important ecological features are ecological features (i.e. habitats, species or ecosystems) requiring specific assessment. Ecological features can be important for a variety of reasons (e.g. quality and extent of designated sites or habitats, habitat / species rarity) (Chartered Institute for Ecology & Environmental Management, 2016). Important ecological features are otherwise referred to / known as 'ecological receptors'.

¹² Section 41 (S41) of the Natural Environment and Rural Communities (NERC) Act 2006 requires the Secretary of State to publish a list of habitats and species which are of principle importance for the conservation of biodiversity in England. The S41 list is used to guide decision-makers such as public bodies, including local and regional authorities, in implementing their duty under section 40 of the NERC act, to have regard to the conservation of biodiversity in England, when carrying out their normal functions.

9.3.10 As the proposed scheme design develops, the study areas proposed will be reviewed and will be confirmed and reported in the Environmental Statement.

9.4 Baseline Conditions

9.4.1 To date the assessment of the proposed scheme has comprised a detailed desk study, extended Phase 1 habitat survey, river habitat and river corridor survey and a number of protected and/ or notable fauna and flora surveys undertaken over the period 2015 to 2017. Desk study information was updated in 2016 for the proposed scheme and candidate sites identified for potential flood storage, construction compounds, soil storage areas and ecological mitigation areas.

9.4.2 The surveys completed for protected and notable fauna are listed below. Unless indicated otherwise, all faunal surveys have been completed in suitable habitat up to 50m from the boundary of the proposed scheme:

- Badger survey, including bait marking for territory analysis (2015 & 2017) – up to 500m from proposed scheme where access permitted;
- Great crested newt (and other amphibians) survey (2015 & 2017) – up to 500m from proposed scheme;
- Bat activity surveys (2015 & 2017);
- Bat roost surveys of trees and buildings (2015 & 2017);
- Bat trapping and tracking to roosts (2017);
- Aquatic invertebrates (2015 & Bottle Brook only in 2017);
- Terrestrial invertebrates (2015);
- Riparian mammal (water vole & otter) (2015 & 2017) – up to 250m from the proposed scheme;
- Reptile survey (2015 & 2017*);
- White-clawed crayfish (2015 & 2017) – where necessary extended to account for 100 – 200m sampling location within each 500m section of watercourse surveyed; and
- Breeding bird surveys (2015 & 2017*) – up to 500m from proposed scheme;
- Wintering birds survey (2015/6 and 2017/8*)

* The 2017 surveys for these groups (reptiles & birds) were only carried out on candidate flood storage, construction compounds/ soils storage or ecological mitigation areas.

9.4.3 Designated sites in proximity to the proposed scheme are shown in Figures 9.1 and 9.2 and are summarised in Table 9.1. Records of protected and notable species within proximity to the proposed scheme are shown in Figure 9.3 and 9.4.

9.4.4 There are no international designated sites (i.e. Special Areas of Conservation (SAC)) within 30km of the proposed scheme cited for bat interest; and there are no other international designated sites within 2km of the proposed scheme. It is, therefore, considered unlikely that the proposed scheme would have an adverse effect upon the integrity of any European sites of International importance, and therefore a Habitat Regulations Assessment (HRA) is not required to support the DCO application for the proposed scheme.

9.4.5 There are eight national statutory designated sites (i.e. SSSI and Local Nature Reserves (LNRs)) identified within 2km of the proposed scheme (refer to Figure 9.1 and 9.2). Seven of these were assessed during PCF Stage 2 and are not considered to be significantly affected by the proposed scheme. Where habitat and/ or hydrological links do exist to any of these sites, pollution control measures are expected to be put in place to remove or otherwise minimise any risks. Duffield Millennium LNR was highlighted in the updated 2016 desk study, and was not previously assessed during PCF Stage 2. The site is located >1km to the north-west of the proposed scheme at Little Eaton junction, with potential hydrological links noted. This site will be included in the assessment to be reported in the Environmental Statement.

9.4.6 A total of 27 local designated sites (i.e. Local Wildlife Sites (LWS)) were identified within 2km of the proposed scheme (refer to Table 9.1). The A38 Roundabout LWS at Kingsway junction

and the Alfreton Road Grassland LWS at Little Eaton junction are considered likely to experience significant negative effects due to permanent habitat loss. As detailed in Table 9.1, there is potential for impacts to a number of non-statutory sites as a consequence of hydrological and/ or habitat links to the proposed scheme; and these sites will be included in the assessment to be reported in the Environmental Statement.

- 9.4.7 There are nine non-designated ecological sites of interest (e.g. Potential Local Wildlife Sites (PLWS)) within 2km of the proposed scheme. One of these (Land off Kingsway PLWS) is not considered to be significantly affected by the proposed scheme. However, the other eight sites will be assessed given potential hydrological and habitat links to the proposed scheme.

Table 9.1: Designated Sites of Nature Conservation Importance within the Study Area

Features Identified	Findings (Scoped into or out of the Assessment)
Statutory Designated Sites	
Kedleston Park SSSI	Located approximately 2.6km to the north of Markeaton junction. The site is designated for its rich and diverse deadwood invertebrate fauna. (Scoped into the assessment).
Breadsall Railway Cutting SSSI	The western extent of which is located approximately 1.7km from the proposed scheme. The site is designated for its important grassland habitats. (Scoped into the assessment).
Mickleover Meadows LNR	Located within 2km of Kingsway junction. The LNR site is located just over 500 m from the proposed scheme and is designated for its diverse habitat mosaic. (Scoped into the assessment).
Allestree Park LNR, Darley and Nutwood LNR, Breadsall Railway Cutting LNR and Chaddesden Woods and Lime Lane Wood LNR	Located within 2km of Little Eaton junction. All are designated for the types of habitats present and are located greater than 500m from the junction. (Scoped into the assessment).
Duffield Millennium Meadows LNR	Recently identified LNR from the updated desk study in 2016, including the candidate sites. Located >1km north-west of the proposed scheme; however, appears to have hydrological links. (Scoped into assessment)
Non-statutory Designated Sites	
A38 Roundabout LWS	Located within the island of Kingsway junction and designated for its semi-improved neutral grassland. (Scoped into the assessment).
Bramble Brook and Margins LWS	Located adjacent to Kingsway junction and is designated for its secondary broad-leaved woodland. (Scoped into the assessment)
Mickleover Railway Cutting LWS	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. (Scoped into the assessment)
Markeaton Park LWS	Located directly adjacent to the northern site boundary at Markeaton junction. The LWS is designated for its wood pasture and parks including veteran trees. (Scoped into the assessment)
Markeaton Brook System LWS	Located within 50m of the site boundary at Markeaton junction. The LWS is designated for its invertebrate assemblage (including white-clawed crayfish). Markeaton Brook is also a Water Framework Directive (WFD) waterbody. (Scoped into the assessment)
Osierbed and Gravelpit Woods LWS and Friar Gate Station LWS	Not considered further in this assessment due to their distance away from the proposed scheme (>1km), with intervening housing developments or roads, and the absence of hydrological or habitat links to the proposed scheme. (Scoped out of the assessment).
Kedleston Road Hedge LWS;	Identified LWSs from the updated desk study in 2016,

Features Identified	Findings (Scoped into or out of the Assessment)
Kedleston Road Marsh LWS; and Markeaton Lane Meadow LWS	including candidate sites. Located >1km from the proposed scheme, however, they appear to have potential habitat links. (Currently scoped into the assessment – to be reviewed)
Beech Wood LWS; Bunkers Wood LWS; Micklover Egginton Greenway LWS; Inglewood Avenue Meadow LWS; and Redbourn Lane Hedge LWS	Identified LWSs from the updated desk study in 2016, including the candidate sites. Located >1km from the proposed scheme, with intervening housing developments or roads, and the absence of hydrological or habitat links to the proposed scheme. (Scoped out of the assessment)
Alfreton Road Grassland LWS	Located to the south of A38 at Little Eaton junction. The site is designated for its floodplain grassland which is semi-improved. (Scoped into the assessment)
The River Derwent LWS	Located adjacent to the western boundary of Little Eaton junction and some of the candidate sites. The site is designated for its flowing water, river and associated streams. (Scoped into the assessment)
Watermeadows Ditch LWS	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. Additional candidate sites cross Watermeadows Ditch LWS. (Scoped into the assessment)
Nooney's Pond LWS	Located approximately 750m south of Little Eaton junction and directly adjacent to candidate sites. The site is designated for its standing open water and has hydrological links to the site through connecting watercourses. (Scoped into the assessment)
Camp Wood LWS; Breadsall Disused Railway Cutting LWS; Breadsall Railway Cutting LWS; Darley Park LWS; Porter's Lane Pond LWS; High View South Community School Nature Reserve LWS; Porter's Lane Hedge LWS; Moor Road Fields LWS; Burley Hill Farm Scrub and Grassland LWS; Breadsall Priory Golf Course LWS; and Ferriby Brook and Dam Brook Ferry Brook.	Not considered further in this ecological assessment due to their distance away from the proposed scheme (>500m), with intervening housing developments or roads, and the absence of hydrological or habitat links to the proposed scheme. (Scoped out of the assessment).
Burley Hill Farm Scrub and Grassland LWS and Peckwash Mills LWS	Identified LWSs from the updated desk study in 2016, including the candidate sites. Located >250m from the proposed scheme, however, they appear to have potential habitat and/or hydrological links. (Currently scoped into the assessment – to be reviewed)
Hatherings Wood LWS; Botany Stream Margin Complex LWS; Burley Wood LWS; Drum Hill Fields Breadsall Moor LWS; Eaton Parkwood LWS; Whitaker Lane Woodland LWS; Moor Plantation and Drumhill LWS; Great Farley's Wood LWS; Horsley Carr LWS; and Woodlands School Hedge LWS.	Identified LWSs from the updated desk study in 2016, including the candidate sites. Located >1km from the proposed scheme, with intervening housing developments or roads, and the absence of hydrological or habitat links to the proposed scheme. (Scoped out of the assessment)
Land off Kingsway PLWS	Located 400m east of Kingsway junction, and is designated for its running water and small pond, with potential hydrological links to the site. (Scoped into the assessment)
Plantation site of interest; Boosemoor Brook; A38 Scrub; Ford Lane PLWS; Old Derby Canal; Marsh Area	Located within 2km of Little Eaton junction with potential hydrological and/ or habitat links to the site. (Scoped into the assessment; however, note that the updated

Features Identified	Findings (Scoped into or out of the Assessment)
Breadsall PLWS; and Holme Nook Ponds	desk study in 2016 highlighted that Ford Lane PLWS had been downgraded and is no longer a PLWS and may be scoped out of assessment)
Two unknown sites of interest at two candidate sites	Identified sites of interest from the updated desk study, including the candidate sites. Located within or adjacent to the proposed scheme with habitat and/or hydrological links. (Scoped into the assessment)

9.4.8 Notable habitats recorded across the proposed scheme over the period 2015 – 2017 are (refer to Figure 9.6 and 9.7):

- Species-rich semi-improved grassland e.g. within the A38 Roundabout;
- Poor semi-improved grassland;
- Veteran trees at Markeaton Park;
- Semi-natural broadleaved woodland;
- Mixed plantation woodland, broadleaved plantation and/or coniferous plantation;
- Standing water;
- Running water;
- Arable field margins;
- Species-poor hedgerows; and
- Invasive plant species.

9.4.9 Survey completed in 2015 - 2017 of ponds located within 500m of the proposed scheme did not record great crested newts.

9.4.10 Reptile surveys carried out at locations across the proposed scheme in 2015 and/ or 2017, with no species recorded from this group.

9.4.11 The following protected and/ or notable species were recorded across the proposed scheme during field surveys conducted over the period 2015 - 2017:

- Toads – at ponds located within Markeaton Park;
- Badgers – active setts noted at various locations;
- Water vole – in the vicinity of Little Eaton junction;
- Otter – varied activity on watercourses across the proposed scheme;
- Bats – roosting, foraging and commuting;
- Breeding and wintering birds – typical assemblages of farmland and urban fringe species, including barn owl, little-ringed plover and lapwing;
- White-clawed crayfish– recorded in Dam Brook (1 individual) (the invasive American signal crayfish was noted at two locations);
- Terrestrial and aquatic invertebrates (data from 2015 only) – moderate assemblages recorded at sample locations, including localised records of Nationally Scarce hoverfly species; and
- Invasive plant species, including Japanese knotweed, Himalayan balsam and New Zealand pigmy weed.

9.4.12 A habitat conditions assessment has been carried out across the proposed scheme in order to perform a biodiversity no-net loss assessment. The baseline information gathered from this, and other surveys, will be used to develop an appropriate strategy that aligns with the sustainability objectives as set out in the Highways England Biodiversity Plan (Highways England, 2015).

9.5 Additional Survey Requirements

9.5.1 The following baseline survey data will be updated in 2018 to support the ecology, biodiversity and nature conservation impact assessment:

- Phase 1 Habitat survey, including River Habitat and River Corridor ground-truthing;
- Badger survey to re-affirm sett status;
- Bat surveys at previously confirmed roost sites;
- Bat survey of trees that have been scoped in and buildings that were previously inaccessible;
- Assessment of aquatic and terrestrial invertebrates;
- Riparian mammals to confirm status of features, including potential holt locations; and
- Survey of white-clawed crayfish in short sections of watercourse that were previously inaccessible.

9.5.2 No reptiles were recorded during in 2015 or the areas covered by survey in 2017. As the suitability of potential reptile habitat has not altered over 2015 -2017, it is considered reasonable to conclude that reptiles are absent. However, due to the age of selected data, the need for update surveys will be reviewed with relevant nature conservation consultees.

9.5.3 Based on either the age of existing data and/ or the absence of any significant alteration in the nature or extent of habitats over the period 2015 to 2017, it is considered that the baseline information for other habitats and fauna is sufficient to evaluate impacts and to recommend appropriate mitigation. Therefore, no further ecological surveys (other than those outlined above) are considered necessary.

9.5.4 The scope of further survey will be discussed and agreed in consultation with the relevant nature conservation consultees.

9.6 Value of the Environmental and Resource Receptors

9.6.1 Based on the analysis of the baseline surveys and desk studies to date, a list of important ecological features has been identified as being potentially affected by the proposed scheme. These features have been selected for preliminary evaluation and are summarised in Table 9.2.

9.6.2 A hierarchical geographical approach has been used to assign nature conservation resource importance (or value) as based upon Highways England IAN 130/10 (Highways England 2010), and Guidelines of Ecological Impact Assessment in the UK and Ireland (Chartered Institute of Ecology and Environmental Management, Second Edition 2016), hereafter referred to as the CIEEM guidelines, and professional judgement.

9.6.3 The following geographic frames of reference have been used to assign the importance to ecological features:

- International or European;
- UK or National;
- Regional;
- County or Unitary Authority; and
- Local;

9.6.4 The importance (or values) presented reflects the currently known distribution within the study area and the preliminary evaluation may be subject to change as further surveys are conducted in 2018 and through further consultation with relevant statutory and non-statutory consultees. Importance (or values) assigned are provisional and pending further study. Features of less than Local or Negligible significance are not considered further. Importance (values) will re-affirmed in the Environmental Statement.

9.6.5 As well as assigning importance (or value), there is also a need to identify all legally protected species that could be affected by the proposed scheme in order that measures can be taken to ensure that adherence to the relevant legislation is observed. This may include the adoption of mitigation and appropriate licensing which is acceptable to Natural England.

Table 9.2: Preliminary Evaluation of the Importance (or Value) of Ecological Features

Designated/ Non-Designated Site/ Habitat/ Species	Important Ecological Feature	Provisional Ecological Value	Reasoning	Legal Protection
Statutory designated site	Kedleston Park SSSI; Breadsall Railway Cutting	UK or National	SSSI denoting a protected area in the United Kingdom which is legally protected.	Protected by UK law (WCA 1981 as amended)
	Mickleover Meadows LNR, Allestree Park LNR; Darley and Nutwood LNR; Breadsall Railway Cutting LNR; Chaddesden Woods and Lime Lane Wood LNR; and Duffield Millennium LNR.	County or Unitary Authority	Local Nature reserve(s) designated by Derbyshire and/ or the local authority.	Protected by UK law (under section 21 of the National Parks and Access to the Countryside Act 1949, as amended by NERC Act 2006).
Non-Statutory Designated Sites	A38 Roundabout LWS; Bramble Brook and Margins LWS; Markeaton Park LWS; Markeaton Brook System LWS; Mickleover Railway Cutting LWS; Kedleston Road Hedge LWS; Kedleston Road Marsh LWS; and Markeaton Lane Meadow LWS; Alfreton Road Grassland LWS; The River Derwent LWS; Watermeadows Ditch LWS; Nooney's Pond LWS; Burley Hill Farm Scrub and Grassland LWS and Peckwash Mills LWS	County or Unitary Authority	LWS designated in Derbyshire and may include LBAP or HABAP 2002 features.	None, but may contain habitats/ species of principal importance under NERC Act 2006.
Non-designated Sites	Land off Kingsway PLWS; Plantation site of interest; Boosemoor Brook; A38 Scrub; Ford Lane PLWS; Old Derby Canal; Marsh Area Breadsall PLWS; Holme Nook Ponds	Up to County or Unitary Authority	PLWS in Derbyshire; local areas of ecological interest (some yet to be fully assessed).	None, but may contain habitats/ species of principal importance under NERC Act 2006.
Habitats	Species-rich grassland Veteran trees (i.e. at Markeaton Park) Semi-natural broadleaved woodland Standing water Running water Hedgerows	Up to County or Unitary Authority	LBAP habitats and habitats of principal importance; HABP 2002 and National Character Area profile.	None; but may contain habitats of principal importance under NERC Act 2006.
	Poor semi-improved grassland Mixed plantation woodland Broadleaved plantation woodland Coniferous woodland Arable	Local	Some LBAP habitats and habitats of principal importance; however, have low ecological value.	None; but may contain habitats of principal importance under NERC Act 2006.
Species	Great crested newts	Up to County or Unitary Authority	LBAP species and a species of principal importance. No great crested newts were found across the proposed scheme during surveys in 2015 and 2017. It is therefore	Protected by European and UK Law (Conservation of Habitats and Species Regulations 2010 as amended and WCA 1981 as

Designated/ Non-Designated Site/ Habitat/ Species	Important Ecological Feature	Provisional Ecological Value	Reasoning	Legal Protection
			considered that GCN are absent and do not represent a constraint to the proposed scheme.	amended)
	Toads	Local	LBAP species and a species of principal importance.	None; but listed as species of principal importance under NERC Act 2006.
	Badger	Local	Listed on HABAP 2002, but not rare.	Protected by UK Law (Protection of Badgers Act 1992).
	Water vole	Up to Regional	HABAP 2002 species. Water Vole Species Action Plan 2005 - 2010.	Protected by UK Law (WCA 1981 as amended).
	Otter	Regional	LBAP species; species of principal importance; and HABAP 2002 species.	Protected by European and UK Law (Conservation of Habitats and Species Regulations 2010 as amended and WCA 1981 as amended).
	Bats	Up to Regional	Rarer species nationally (Wray, 2010), present foraging and commuting and roosting i.e. Daubenton's at the River Derwent. Common species also present foraging and commuting and roosting and are listed on LBAP, HABAP 2002 and are species of principal importance i.e. Soprano pipistrelles within trees at Markeaton.	Protected by European and UK Law (Conservation of Habitats and Species Regulations 2010 as amended and WCA 1981 as amended).
	Birds	Up to Regional	Presence of Barn owls, a Schedule 1 species, and lapwing at Little Eaton. Notable farmland birds and lapwing also at Little Eaton.	Protected by UK Law (WCA 1981 as amended).
	White-clawed crayfish	Regional	Remnant local population at Dam Brook likely to represent critical component of the wider population. LBAP species.	Protected by UK Law (WCA 1981 as amended).
	Terrestrial Invertebrates	County or Unitary Authority	An assemblage of notable terrestrial invertebrate species was recorded in selective grassland areas.	None identified; but a number recorded are listed as species of principal importance under NERC Act 2006.
	Aquatic Macro-invertebrates	County or Unitary Authority	Some regionally notable species recorded.	None

9.7 Potential Impacts and Effects

Construction

9.7.1 The following construction impacts as associated with the proposed scheme may result in potentially significant effects on important ecological features:

- **Habitat loss:** direct loss and severance of wildlife habitats through land take in various locations with potential to affect various species including white-clawed crayfish, bats, badgers, breeding and wintering birds, otters, and terrestrial invertebrates; and
- **Indirect impacts:** noise; watercourse pollution/ sedimentation; dust; lighting; increased human disturbance; potential for invasive non-native species introductions from site works.

9.7.2 The proposed scheme has the potential to generate significant negative effects upon the following ecological features during construction (based upon existing baseline information) in the absence of mitigation:

- **Non-statutory designated sites:** A38 Roundabout LWS and Alfreton Road Grassland LWS (due to habitat loss);
- **Habitats:** Species-rich semi-improved grassland, poor semi-improved grassland, semi-natural broadleaved, mixed plantation, broadleaved plantation and coniferous plantation woodland, running water, arable and hedgerows (due to habitat loss);
- **Species:** Toads, badger, otter, bats, birds, white-clawed crayfish and terrestrial invertebrates (due to habitat loss and/ or killing/ injury/ disturbance from construction).

Operation

9.7.3 The following operational impacts as associated with the proposed scheme may result in significant effects on important ecological features:

- Mortality of wildlife due to collision with traffic;
- Noise disturbance to wildlife from traffic;
- Lighting impacts on nocturnal species;
- Polluted surface water run-off; and
- Disturbance from salt spray/ changes in air quality (emissions).

9.7.4 The proposed scheme has the potential to generate significant negative effects upon the following ecological features during operation (based upon existing baseline information) in the absence of mitigation:

- **Non-statutory designated sites:** Markeaton Brook System LWS (due to surface water run-off and damage/ disturbance from salt spray/ emissions on retained habitats adjacent to the proposed scheme boundary);
- **Species:** Badgers (due to killing/ injury through collision with motor vehicles); bats (due to killing/ injury through collision with motor vehicles and light impacts on foraging and commuting corridors); otters (due to killing/ injury through collision with motor vehicles or becoming trapped in drain outfalls); and birds (due to killing/ injury through collision with motor vehicles and reduced population size and breeding success due to traffic noise and visual disturbance).

Summary of Mitigation Proposals

9.7.5 Additional scheme-specific mitigation and potential enhancement measures would be proposed where potential significant ecological effects are identified. Based upon existing baseline information, the following mitigation and potential enhancement measures may be implemented in relation to designated and non-designated sites, habitats and species to

reduce the effect of potentially significant construction impacts upon biodiversity (subject to review and confirmation):

- Retention of habitats and on-site soft-landscaping to contribute to the replacement of those habitats lost to construction;
- Translocation of habitats, for example from the A38 roundabout LWS;
- Biosecurity measures to minimise spread of crayfish plague;
- Re-instatement of in-channel habitat/ vegetation with species specific considerations implemented in regards to white-clawed crayfish habitat;
- Pre-construction checks of potential barn owl nesting sites with appropriate mitigation measures implements (where applicable);
- Compensatory planting to minimise impact on notable farmland birds at Little Eaton;
- Alternative nesting sites for lapwing and habitat for wintering birds (including lapwing and teal) at Little Eaton to mitigate for the habitat lost;
- Bird screening and monitoring surveys at Little Eaton during construction to minimise disturbance;
- Creation of replacement habitat suitable for little ringed plover nesting;
- Bird foraging and nesting habitat to compensate for the loss of habitat;
- Provision of suitable habitat for water vole;
- Terrestrial invertebrate habitat mitigation through suitable habitat creation (e.g. blocks of grassland habitat, varied topography (such as slopes, banks and ditches and log piles);
- Toad protection through careful destructive hand searches (where applicable);
- A means of escape from trenches left open overnight provided for badger and other mammals;
- Appropriate habitat creation for foraging and commuting badger to mitigate for that lost;
- On-going monitoring throughout construction and operation to allow for positive intervention where mitigation measures are not meeting objectives.

9.7.6 Based upon existing baseline information, the following additional mitigation measures could be implemented to further reduce the effect of potentially significant operational impacts (subject to review and confirmation):

- Suitable otter fencing and drainage design;
- Potential barn owl nesting structures provided at locations >1.5km from the proposed scheme and suitable fencing to reduce risk of road traffic collision;
- Appropriate lighting design to minimise effects on bats;
- Planting of linear features to replace/ reinstate navigational cues for bats and minimise risk of killing and injury of bats through collision with motor vehicles;
- New potential amphibian habitat creation careful considered to ensure risks associated with amphibians being killed by road traffic, or being impacted by road treatments are minimised;
- Appropriate fencing, tunnels and underpasses installed/ maintained for badger; and
- Opportunities for the inclusion of wildlife tunnels and underpasses would be considered at appropriate locations to enhance connectivity and improve the wildlife corridor function of the proposed scheme.

9.7.7 In addition to the above, the proposed scheme also offers the opportunity to achieve enhancements for biodiversity through the potential implementation of the following (subject to review and confirmation):

- Habitat creation and enhancement of watercourses to maximise gains to the water environment (and aim to meet objectives of the WFD);
- Planting of field margins and species-rich hedgerows;
- Enhancing the wildlife corridor and ecosystem function of the proposed scheme;
- Incorporation of mammal ledges into culvert designs and underpasses to enhance and facilitate otter movement;
- A mixture of habitats and features (including bat boxes) incorporated into the landscape design to benefit foraging, commuting and roosting bats;

- Habitat creation to benefit amphibians.

9.7.8 Consistent with this, and in line with the assessment of existing habitats, the proposed scheme will aim to deliver no-net-loss in biodiversity.

Summary of PCF Stage 2 Assessment

9.7.9 The PCF Stage 2 assessment indicated that the proposed scheme has the potential to generate a range of effects upon non-statutory designated sites, habitats and protected species. A number of additional mitigation measures would be needed in order to manage potential ecological effects and reduce their significance.

9.7.10 With implementation of suggested 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 noted in the PCF Stage 2 assessment was in relation to the A38 Roundabout LWS at Kingsway junction and the Alfreton Road Grassland LWS at Little Eaton junction. This would be due to complete loss of the A38 Roundabout LWS at Kingsway junction and the partial-loss of Alfreton Road Grassland LWS at Little Eaton junction during construction. However, with further mitigation and enhancement measures to improve the wildlife corridor function of the proposed scheme relative to the existing scheme, there is potential for there to be an overall positive effect on nature conservation at the Local level or greater in the medium to long term.

9.7.11 It should be noted that the PCF Stage 2 assessment, however, did not include the candidate sites identified for potential flood storage, construction compounds, soils storage and/ or ecological mitigations areas. However, based on survey and assessment of these areas in 2017, it is considered that the above assessment remains valid.

9.8 Proposed Scope of Assessment

9.8.1 Impacts on potential important ecological features (i.e. habitats, species or ecosystems) within the zone of influence of the proposed scheme will be considered within the Environmental Statement. The assessment will also determine the importance (i.e. value) of, and impacts upon, each ecological feature with regard to the associated geographical scale of reference.

9.8.2 Impacts of the proposed scheme upon European Sites and their associated features have been scoped out from further assessment owing to there being no reasonable impact pathways (noting that an HRA screening report will be prepared to confirm the absence of effects).

9.9 Proposed Assessment Methodology including Significance

9.9.1 The method used for the ecological impact assessment will be based upon the following guidance:

- DMRB Volume 11, Section 2 (General Principles and Guidance of Environmental Impact Assessment (HA 201/08)) (Highways Agency, 2008);
- DMRB Volume 11 Section 2 (Assessment and Management of Environmental Effects (HA 205/08)) (Highways Agency, 2008);
- IAN 125/15 (Environmental Assessment Update) (Highways England, 2015);
- IAN 130/10 (Ecology and Nature Conservation: Criteria for Impact Assessment) (Highways Agency, 2010);
- Guidelines of Ecological Impact Assessment in the UK and Ireland (Chartered Institute of Ecology and Environmental Management, Second Edition, 2016); and
- Professional judgement.

9.9.2 The scope of the ecological impact assessment will cover the following:

- Re-affirming importance (or value) to nature conservation resources present within the applicable study area, following completion of field surveys in 2018. The importance of the identified features will be assigned to their relevant geographic scale, namely: international or European; UK or national; regional; county or unitary authority area, or local;
- Characterisation of ecological impacts on specific features (taking into account impact avoidance design measures and standard management activities); and
- Determination of the significance of effects by the importance of the ecological feature and the characterisation of the ecological impact on each specific feature.

9.9.3 Options to avoid/ reduce/ mitigate/ compensate for any identified significant potential effects will be considered in line with the Highways England 2015 Biodiversity Plan and to the point where any residual effects are not considered to be significant. In addition, opportunities will be sought for the enhancement of biodiversity at both on and off-site locations as associated with the proposed scheme (taking into account the sustainability objectives as set out in the Highways England 2015 Biodiversity Plan).

9.10 Assumptions and Limitations

9.10.1 The following assumptions and limitations have been noted during the scoping of the assessment:

- Further baseline surveys will be carried out in 2018 for bats. Additionally, selective updated surveys are being carried out across the proposed scheme in order to ensure data is in date to support the DCO application (subject to agreement with consultees). These surveys may recommend further surveys (where applicable) depending on findings. Additionally, the surveys may highlight new important ecological features with potential to be significantly affected, which were not identified (or considered not to be significant) at PCF Stage 2;
- A precautionary approach is assumed that all habitats within the proposed scheme footprint are likely to be lost during construction;
- There are a number of candidate sites for potential ecological measures. For some of these sites the potential ecological measures would be selective/ localised/ targeted, and non-licensable.

9.11 References

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10 GEOLOGY AND SOILS

10.1 Introduction

10.1.1 This section sets out the proposed approach to the assessment of the proposed scheme potential impacts and effects upon geology and soils. As detailed in the DMRB (Volume 11, Section 3, Part 11 – Geology and Soils) (Highways England, 1993a), road schemes can have an impact on both geology and soils and on land use (DMRB Volume 11, Section 3, Part 6 – Land Use Amendment No 1) (Highways England, 1993b) of an area. It is therefore important that the potential impacts of development on both the soil and the underlying rocks are considered. The converse also applies in that existing soil conditions of a site can impose constraints on a proposed development for example, where land which has been contaminated by previous industrial land uses.

10.2 Summary of Relevant Policy

10.2.1 National and local planning policies of most relevance to the soils and geology assessment are summarised in Table 10.1.

Table 10.1: Summary of Planning Policy of Relevance to Soils and Geology Assessment

National Planning Policy Framework (NPPF) (2012) (Department for Communities and Local Government, 2012) and associated Planning Practice Guidance (PPG) (2014) (Ministry of Housing, Communities and Local Government, 2014)	<ul style="list-style-type: none"> • NPPF Paragraphs 109 -110, PPG ID34: Water Supply, Wastewater and Water Quality and NPPG ID33: Land affected by Contamination • NPPF Paragraph 111 and PPG ID8: Natural Environment (Brownfield Land, Soils and Agricultural Land) • NPPF Paragraphs 120 – 121 and PPD ID33: Land affected by Contamination • NPPF Paragraph 112 and PPG ID8: Natural Environment (Brownfield Land, Soils and Agricultural Land)
National Networks National Policy Statement (NNNPS) (DfT, 2014)	<ul style="list-style-type: none"> • NNNPS Paragraph 5.168 • NNNPS Paragraph 11.112
Planning Policy Statement 7 – Sustainable Development in Rural Areas (2004) (Office of the Deputy Prime Minister, 2004)	<ul style="list-style-type: none"> • Paragraph 28: Best and Most Versatile Agricultural Land
Derby City Local Plan – Part 1 Core Strategy (2017) (DCiC, 2017) and saved Policies contained in the City of Derby Local Plan Review: Chapter 9 Environment (2006) (DCiC, 2006)	<ul style="list-style-type: none"> • Policy E12: Pollution • Policy E13: Contaminated Land

10.3 The Study Area

10.3.1 A desk based study of readily available sources has been undertaken in order to identify potential impacts of the proposed scheme on geology and geomorphology, soils and contaminated land, as required by DMRB (Volume 11, Section 3, Part 11 – Geology and Soils) (Highways England, 1993a). The review of information has been confined to the following distances from the proposed scheme:

- Geography and topography: description of the route of the proposed scheme;
- Geology: along the route of the proposed scheme;
- Geological designated sites: within 250m of the proposed scheme boundary;

- Historical land uses and potential sources of contamination: within 250m of the proposed scheme boundary;
- Controlled waters: within 250m of the proposed scheme boundary;
- Agricultural land: immediately adjacent to the existing highway and within the proposed scheme boundary;
- Other land designations e.g. LNRs: immediately adjacent to the existing highway boundary.

10.4 Baseline Conditions

Published Geology

10.4.1 The 1:50,000 scale geological maps (Derby Sheet 125) (British Geological Survey, 1972 and 2014) and associated Memoir (British Geological Survey, 1979), and the 1:10,560 geological map sheets (SK33NW (British Geological Survey, 1969a) – Kingsway & Markeaton and SK33NE (British Geological Survey, 1969a) & SK34SE (British Geological Survey, 1969c) – 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 (British Geological Survey, 2014) along with their relative locations and positions of faults. Superficial deposit names have been revised, but remain relatively unchanged in location. In addition, a number of ground investigation works and reports have previously been carried out in the vicinity of the junctions (full details and references will be provided in the Environmental Statement):

- **Kingsway Junction:** Mapping (British Geological Survey, 1972 and 2014) indicates that 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 associated with the Rowditch Tip Landfill are shown approximately 100m to the east of the junction. 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. The Sidmouth Mudstone Formation - Gunthorpe Member is shown to the north of the fault. Siltstone and sandstone beds (skerries) are indicated within both formations. The bedrock geology 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. Weathered skerry bands may have been identified in the exploratory holes.
- **Markeaton Junction:** Mapping (British Geological Survey, 1972 and 2014) indicates River Terrace Deposits (Allenton Sand and Gravel Member), previously indicated to be 1st Terrace Deposits (British Geological Survey, 1979), 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. 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. Sandstone and siltstone beds (skerries) are indicated on geological mapping to the south-east of the junction. The bedrock geology 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.
- **Little Eaton Junction:** 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. The thickness of alluvial deposits and consequently the depth to rock is not proven towards the River Derwent in the west. The bedrock geology beneath the junction is shown to comprise Millstone Grit Group - Morridge Formation potentially with a transition into the Marsden Formation and Ashover Grit towards the north. 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. The bedrock geology

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.

Ground Conditions

10.4.2 An intrusive investigation was undertaken by ESG Consulting and supervised by AECOM in 2016 at the Kingsway, Markeaton and Little Eaton junctions. The following sections present the summary of the ground conditions encountered at each junction during the investigation – refer to Table 10.2. This information is based on data contained within the draft Ground Investigation Factual Report prepared by ESG (ESG, 2016).

Table 10.2: Summary of Encountered Strata

Strata	Top of Strata (m bgl)		Depth to Base (m bgl)		Thickness (m)	
	Min	Max	Min	Max	Min	Max
Kingsway junction						
Topsoil	0.00	0.00	0.20	0.40	0.20	0.40
Made Ground	0.20	0.40	0.50	>20.50	0.30	>20.30
Alluvium (Clay and Silt)	0.20	5.20	1.20	6.80	0.50	5.15
Bedrock (Siltstone, Mudstone and Sandstone)	1.20	9.00	>5.45	>35.00	>0.95	>30.80
Markeaton junction						
Topsoil	0.00	0.00	0.20	0.40	0.20	0.40
Made Ground	0.00	0.40	0.50	4.50	0.50	4.50
Alluvium (Clay, Silt, Sand & Gravel)	0.00	2.50	1.40	12.00	0.90	11.80
Bedrock (Siltstone, Mudstone and Sandstone)	1.00	12.00	>3.00	>30.20	>1.00	>26.56
Little Eaton junction						
Topsoil	0.00	0.00	0.20	0.50	0.20	0.40
Made Ground	0.00	0.50	0.30	2.45	0.10	2.25
Alluvium (Clay, Silt, Sand & Gravel)	0.20	2.45	0.60	11.20	0.40	9.50
Bedrock (Siltstone, Mudstone and Sandstone)	3.10	11.20	>3.20	>30.15	>0.10	>22.15

Geologically Designated Sites

10.4.3 There are no Local Geological Sites (formerly Regionally Important Geological Sites (RIGS)) within the defined study area. Therefore, these features are scoped out of the assessment.

Historical Land Uses and Potential Sources of Contamination

Kingsway Junction

10.4.4 The Envirocheck report (Landmark Envirocheck Report - Kingsway Junction) shows a historic landfill site to the east of the junction called 'Rowditch Tip' – refer to Figure 10.1. 'Rowditch Tip' is stated to have been operated between 31 December 1900 and 2 September 1991. However, a 'Refuse Tip' is first shown at this location on Ordnance Survey maps dated 1967 and 1972. The landfill is reported to have accepted the following wastes: inert; industrial; commercial; household; special waste and liquid sludge. The route of a dismantled railway line is also noted as a historic landfill (refer to Figure 10.1). This site received inert waste between 31 August 1981 and 31 March 1993.

Markeaton Junction

- 10.4.5 Mackworth Service Station (Esso) is located adjacent to the western area of the junction. This service station is also noted as having 'Permitted' status under Local Authority Pollution and Prevention Controls. A car painters and sprayers was located (identified as inactive) on Queensway adjacent to the northern part of the proposed works to the junction.
- 10.4.6 The site of a historic landfill is located within the northern end of the proposed scheme extent (approximately 100m north of Markeaton junction) (see Figure 10.1). This was operated between 1982 and 1984 and was licenced to accept inert waste. A second historic landfill is located approximately 175m to the east of the junction (see Figure 10.1). This was licenced to the Royal School of Deaf and was operated between 1978 and 1982 and was licenced to accept inert, industrial and commercial waste.

Little Eaton Junction

- 10.4.7 The Envirocheck Report (Landmark Envirocheck Report - Little Eaton Junction) identifies the Little Eaton junction to be located within an area of unadopted green belt, and in a nitrate-vulnerable zone (NVZ). An NVZ indicates the possibility that the groundwater may contain elevated concentrations of nitrates, typically due to farming activities in the wider area.
- 10.4.8 Located approximately 250m to the north north-west of the junction is a Licensed Waste Management Facility (Landfill) (see Figure 10.2). This has been operational since 1977, and is licensed to take construction and demolition wastes, but not poisonous, noxious or polluting wastes. A 'Water Reclamation Works' is located approximately 300m to the west of the northern end of the junction. Severn Trent Water has a Planning Hazardous Substance Consent for the use of chlorine at Little Eaton Water Treatment Works, located approximately 300m to the north of the northern extent of the proposed scheme. The contemporary trade directory entries indicate that a Road Haulage Service and a Commercial Vehicle Dealers are 'Active' approximately 150m to the north-west of the junction. The alignment of the former Derby Canal underlies Little Eaton junction.

Hydrological and Hydrogeological Information

- 10.4.9 Surface water and groundwater features/ abstractions are discussed in Chapter 14: Road Drainage and Water Environment.

Agricultural Land and Other Land Designations

- 10.4.10 As detailed in the Natural England Technical Information Note TIN049 (Natural England, 2012), the Agricultural Land Classifications (ALC) system classifies land into five soil grades, with Grade 3 soils being subdivided into Subgrades 3a (good) and 3b (moderate). The best and most versatile land is defined as ALC Grades 1, 2 and 3a by policy guidance (e.g. Annex 2 of NPPF). This is the land that is most flexible, productive and efficient in response to inputs and which can best deliver future crops. Grade 4 soils are defined as being poor, and Grade 5 soils described as very poor. The ALC system is used by Natural England and others to provide advice to planning authorities if development is proposed on agricultural land that could potentially grow crops. NPPF (paragraph 112) states that "*Where significant development of agricultural land is demonstrated to be necessary, local planning authorities should seek to use areas of poorer quality land in preference to that of a higher quality*".
- 10.4.11 Information on ALC can be obtained from Natural England. ALC information of relevance to the proposed scheme (obtained 17 February 2017) indicates the following:
- There are no agricultural soils in the vicinity of the Kingsway junction as the area is in urban use;
 - There are no agricultural soils to the south of the Markeaton junction. The land to the immediate north of the junction is classed as Grade 3 (Good to moderate), although such areas are not used for agricultural purposes;

- Agricultural soils adjacent to the Little Eaton junction are generally of Grade 4 (Poor), although there are some areas of Grade 3 to the east of the junction. In 2015, Reading Agricultural Consultants (RAC) Limited (RAC, 2015) completed an agricultural land quality investigation in the vicinity of the Little Eaton junction in order to confirm agricultural soil types and ALC soil grades. This investigation confirmed that agricultural soils in the vicinity of Little Eaton junction are predominantly of ALC subgrades 3a and 3b (see Figure 10.3).

Geotechnical and Land Contamination Investigation

10.4.12 An intrusive ground investigation has been undertaken along the alignment of the proposed scheme in order to obtain details of prevailing ground conditions. As part of this investigation, soil and groundwater samples were collected and analysed for a range potential contaminants taking into account previous historic land uses and to determine geotechnical soil and rock parameters. No further ground investigations are currently planned.

10.4.13 Following the completion of the ground investigation in 2016 at the A38 Kingsway, Markeaton and Little Eaton junctions, the test results and monitoring data were assessed. The following conclusions were made in the A38 Derby Junctions Ground Investigation Report (AECOM, 2018), based on the assessment undertaken with respect to geo-environmental issues:

- Asbestos containing materials were recorded within samples from the landfill area at Kingsway junction. A few fibres of asbestos were also identified at the Markeaton junction and none detected at Little Eaton junction. If disturbed, asbestos can pose significant risk to human receptors especially construction workers and visitors at the site. Therefore, works within the landfill area at Kingsway junction will be subjected to Control of Asbestos Regulations (CAR 2012) (Health and Safety Executive, 2012) and are likely to be licensed work;
- In the context of the proposed scheme, no other risks to human health were identified from the metal, inorganic and organic contaminants identified in the soil samples at the site. Based on the assessment results, there are potential risks to controlled water receptors from metals and inorganic contaminants at the junctions. No organic contaminants are considered to present significant risk to controlled waters. Further Detailed Quantitative Risk Assessment will be required to assess the potential risks identified due to metal and inorganic determinands in leachate and groundwater and to determine whether remedial works will be required to mitigate the potential risks;
- The ground gas risk assessment undertaken identified potential risks to construction workers in confined spaces and/ or excavations from at least one ground gas or from oxygen depletion at each of the junctions. Therefore, it is recommended that site-specific and task-specific risk assessment should be undertaken prior to the commencement of any works in excavations and confined spaces;
- Elevated leachate concentrations recorded within materials obtained from all three junctions may pose risks to controlled waters. Therefore, risk assessment must be undertaken to determine where such materials may be re-used within the works;
- Waste materials from the former landfill at Kingsway junction are not suitable for re-use within the works. Clay capping type materials may be re-used subject to passing re-use acceptability criteria.

10.5 Additional Survey Requirements

Agricultural Soil Quality

10.5.1 ALC soil surveys of some candidate sites identified for potential flood storage, construction compounds, soils storage and/ or ecological mitigation will be required. Such survey requirements are currently being reviewed.

Land Contamination and Ground Stability

10.5.1 A Geotechnical Design Report will be prepared based on the findings of the A38 Derby Junctions Ground Investigation Report (AECOM, 2018).

10.6 Value of the Environmental and Resource Receptors

- 10.6.1 No locally or nationally geological designated sites have been identified within the vicinity of the proposed scheme (thus this aspect will be scoped out of the assessment).
- 10.6.2 Section 10.4 indicates that some locations in the vicinity of the proposed scheme have the potential to be contaminated. The principal receptors which could be affected by either contamination on- or off-site which is created or affected by construction and/ or operation of the proposed scheme comprise and/ or ground stability hazards:
- **Human health:** Construction and maintenance workers, off-site receptors and future site users;
 - **Controlled waters:** Including Secondary 'A' (superficial deposits) and Secondary 'B' (bedrock) aquifers underlying Kingsway and Markeaton junctions and Secondary 'A' (superficial deposits and bedrock) underlying Little Eaton junction and adjoining surface water courses (Bramble Brook at Kingsway junction; Markeaton Brook and Lake at Markeaton junction; and the River Derwent at Little Eaton junction);
 - **Construction materials:** Existing and new concrete and structures associated with the highway.
- 10.6.3 It is considered that the proposed scheme construction and operational maintenance phases will be undertaken in a manner that appropriately protects the health and safety of workers, whilst the proposed scheme will use materials that are appropriate for the identified ground conditions. As such, construction/ operational/ maintenance workers and construction materials have been scoped out of the assessment and are not considered further herein.
- 10.6.4 As indicated in Section 10.4, agricultural soils in the vicinity of Little Eaton junction are predominantly subgrades 3a and 3b. Subgrade 3a is included in the definition of the best and most versatile agricultural land. No land in the vicinity of Kingsway junction and Markeaton junction are used for agricultural purposes and thus impacts upon agricultural soils at these junctions will be scoped out of the EIA.
- 10.6.5 Table 10.3 presents the importance/ sensitivity of potential receptors or soil/ geological resources to ground conditions impacts according to the categories detailed in Table 10.4.

Table 10.3: Critical Receptors and their Importance/ Sensitivity

Receptor	Phase		Importance / Sensitivity	
	C	O	Kingsway and Markeaton Junctions	Little Eaton Junction
Human Health – Off-site receptors	ü	ü	High	High
Human Health – Future site users	-	ü	Low	Low
Controlled Waters – Groundwater	ü	ü	Medium	Medium
Controlled Waters – Surface Waters	ü	ü	Medium to High	Medium to High
Surrounding Land Uses – (Residential)	ü	ü	High	High
Surrounding Land Uses – (Agricultural Land)	ü	ü	Low to Medium	Low to Medium
Soil Quality	ü	ü	Low to Medium	Low to Medium

C – Construction; O - Operation

10.7 Potential Impacts and Effects

10.7.1 Road schemes have the potential to impact on both the geology and soils of an area. The following are the possible categories of environmental effect:

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

Summary of Mitigation Proposals

Construction Phase Mitigation Measures

10.7.2 A CEMP would be prepared and implemented by the construction contractor which would include a range of measures associated with mitigating potential impacts as associated with land contamination. Such measures would accord with legal compliance and best practice guidance when working with or around contaminated materials. Potential impacts on off-site receptors would be addressed through the adoption of the following measures (subject to review and confirmation):

- Damping of ground with water to minimise dust;
- Sheeting of lorries transporting spoil off site and the use of dust suppression equipment on plant;
- Groundwater level controls (as required);
- Adequate fuel/ chemical storage facilities e.g. bunded tanks, hard standing and associated emergency response/ spillage control procedures;
- Well maintained plant and associated emergency response/ spillage control procedures; and
- Any temporary onsite storage of contaminated material would be stored on sheeting and covered to minimise the potential for leachate and run off from the stockpile being generated;
- A Geotechnical Design Report will be prepared which will assess the requirements for design mitigation measures for ground stability and land contamination which will be undertaken as part of the construction phase of works.

10.7.3 The prevention of pollution would be achieved via the mitigation measures as detailed in Chapter 14: Road Drainage and Water Environment. Mitigation measures to protect controlled waters would take into account the results of the 2016 ground investigation and prepare an appropriate strategy to remediate areas posing risks to controlled waters. The mitigation measures would also aim to ensure that the surface water run-off from the construction site (site preparation, earthworks and construction activities) do not have a detrimental effect on any receiving watercourses in the area. Construction involving piling and/ or penetrative ground improvement would require a location-specific risk assessment to establish the means of mitigating the risks of causing new pollutant linkages and/ or worsening existing ones with respect to risks to controlled waters at the construction stage.

Operational Phase Mitigation Measures

10.7.4 The proposed scheme operation would not include any activities that are likely to generate contaminants that could pose significant risk to controlled waters and surrounding soil resources. However, there would be potential for environmental risks as associated with spillages due to road accidents or faulty vehicles. To mitigate such impacts during the proposed scheme operation stage, the highway drainage system (refer to Chapter 14: Road Drainage and Water Environment) would incorporate appropriate measures to minimise impacts associated with accidents and spillages. In addition, any spillages following road accidents would be routinely managed by Highways England who is responsible for the maintenance of Highways England assets with the Area 7 East Midlands Region.

Summary of PCF Stage 2 Assessment

10.7.5 The PCF Stage 2 environmental assessment evaluated the potential effects of the proposed scheme on ground conditions, land quality and soil resources. The assessment indicated that there are a number of locations along the proposed scheme where contaminated materials may be encountered (e.g. areas of historic landfilling) whilst agricultural soils would be impacted at Little Eaton junction. However, given appropriate design of the proposed scheme, 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.

10.8 Proposed Scope of Assessment

10.8.1 The proposed scope of the assessment would focus upon those receptors as identified in Table 10.5, namely human health - off-site receptors, human health - future site users, controlled waters – groundwater, controlled waters - surface waters, surrounding land uses - (residential), surrounding land uses - (agricultural land) and soil quality. As detailed in para. 10.6.3, construction/ operational/ maintenance workers and construction materials have been scoped out of the assessment.

10.8.2 The geology and soils assessment will be undertaken in accordance with the advice in DMRB Volume 11, Section 3, Part 11 Geology and Soils (Highways England, 1993a). The objective of this stage is to undertake sufficient assessment of the proposed scheme to identify any significant impact on geology and soil and where appropriate any particular environmental issues associated with contaminated land. The assessment of agricultural soils will be undertaken in accordance with the guidance within DMRB Volume 11, Section 3, Part 6 – Land Use – Amendment No 1 (Highways England, 1993b).

10.9 Proposed Assessment Methodology including Significance

Data Sources

10.9.1 Baseline information will be collated by reference to the following data sources:

- Information available in 'Envirocheck' Reports (Landmark Information Group);
- Data from British Geological Survey Solid and Drift Geology Sheets;
- British Geological Survey borehole logs, where appropriate;
- Available site investigation factual and interpretative reports, including A38 Derby Junctions Preliminary Sources Study Report and Ground Investigation Report;
- Natural England;
- Environment Agency;
- DEFRA;
- Local authorities.

10.9.2 Consultations with Natural England and the local authorities will be needed in order to reconfirm whether there are any statutory or non-statutory designated sites of geological or geomorphological importance in the area.

10.9.3 Factual and interpretative geotechnical and geo-environmental reports relating to site investigations, soil surveys and agricultural land classification surveys will be reviewed and reported as applicable in the Environmental Statement. This will include the results of risk assessments undertaken where land contamination is identified and geotechnical assessment of ground stability. Design mitigation measures identified for land contamination, ground stability identified in the Geotechnical Design Report will also be reviewed and reported as applicable in the Environmental Statement.

Assessment Criteria

10.9.4 The geology and soils assessment will be undertaken in accordance with the advice in DMRB Volume 11, Section 3, Part 11 Geology and Soils (Highways England (1993a)). This guidance defines the scope of the topic, but does not provide formal guidance on the assessment of impacts and effects. The impact assessment methodology applied will take account of technical guidance that has been produced in the UK for the assessment of ground conditions and water resources by the government (i.e. DEFRA and its predecessor and successor departments); agencies such as the Environment Agency and Contaminated Land: Applications in Real Environments (CL:AIRE); and British Standards.

10.9.5 With regard to impacts upon agricultural soils, the assessment methodology will take into account the consultation procedures in which Natural England (Natural England, 2012) has to consider proposals which individually or cumulatively that involve the loss of more than 20ha of best and most versatile land.

10.9.6 The importance/ sensitivity of potential receptors or soil/ geological resources to ground condition impacts will be described qualitatively according to the categories in Table 10.4.

Table 10.4: Descriptive Scale for Importance/ Sensitivity of Receptors (Geology and Soils)

Importance	Criteria	Receptors Susceptible to Land Contamination and Ground Hazard Impacts	Soil and Geological Resources	Agricultural Soil Resources
High	Attribute has a high quality and rarity on regional or national scale or high sensitivity	<ul style="list-style-type: none"> Future site users – residential development Residential areas or schools within 50 m of construction works Water features deemed to be of high value Ecological features deemed to be of high value Allotments, arable farmland, livestock or market gardens on or adjacent to the site 	<ul style="list-style-type: none"> Internationally and nationally designated sites Regionally important sites with limited potential for substitution Soils of high nature conservation or landscape importance Presence of significant mineral reserves and within a Mineral Consultation Area Soil/ materials disposal required following earthworks resulting in a significant increase in demand on waste management infrastructure 	<ul style="list-style-type: none"> High quality agricultural soils (Grade 1)
Medium	Attribute has a high quality and rarity on local scale or high sensitivity	<ul style="list-style-type: none"> Future site users - commercial development Residential areas or schools within 50 to 250m of construction works Commercial areas within 50m of construction works Water features deemed to be of medium value Ecological features deemed to be of medium value The built environment including buildings and infrastructure 	<ul style="list-style-type: none"> Regionally important sites with potential for substitution Locally designated sites with limited potential for substitution Soils of medium conservation or landscape importance Site within a Mineral Consultation Area Soils/ materials disposal required following earthworks resulting in a moderate increase in demand on waste management infrastructure 	<ul style="list-style-type: none"> Good quality agricultural soils (Grade 2 and 3a)

Importance	Criteria	Receptors Susceptible to Land Contamination and Ground Hazard Impacts	Soil and Geological Resources	Agricultural Soil Resources
Low	Attribute has a medium quality and rarity on local scale or medium sensitivity	<ul style="list-style-type: none"> Future site users - car park, highways and railway related development Residential areas >250m from construction works Commercial areas within 50 to 250m of construction works Water features deemed to be of low value Ecological features deemed to be of low value 	<ul style="list-style-type: none"> Undesignated sites of some local earth heritage interest Soils of low nature conservation or landscape importance Limited potential for mineral reserves and site not within a Mineral Consultation Area Soil/materials disposal required following earthworks resulting in a limited increase in a minor increase in demand on waste management infrastructure 	<ul style="list-style-type: none"> Moderate or poor quality agricultural soils (Grade 3b and 4)
Very Low	Attribute has a low quality and rarity on local scale or medium sensitivity	<ul style="list-style-type: none"> Areas where there are no built structures, crops, or livestock Commercial areas within >250 m of construction works Water features deemed to be of low value Ecological features deemed to be of negligible value 	<ul style="list-style-type: none"> Other sites with little or no local earth heritage interest Soils of negligible nature conservation or landscape importance. Negligible potential for mineral reserves to exist 	<ul style="list-style-type: none"> Very poor quality agricultural soils (Grade 5)

10.9.7 The magnitude of the geology and soils impact of the proposed scheme will be determined using the 4 point scale shown in Table 10.5.

Table 10.5: Criteria for Assessing the Magnitude of Impact upon Features/ Attributes – Geology and Soils

Magnitude	Criteria	Receptors Susceptible to Land Contamination and Ground Hazard Impacts	Soil and Geological Resources	Agricultural Soil Resources
High	Results in loss of attribute and/ or quality and integrity of the attribute	<ul style="list-style-type: none"> Human Health: Acute risk to human health Surface waters and/ or groundwater: Substantial acute pollution or long term degradation of sensitive water resources (Principal Aquifer, groundwater source protection zone, surface waters of good or very good quality) Ecology: Significant change to the number of one or more species or ecosystems Built Environment: Catastrophic damage to buildings, structures or the environment Landscaping/ Agriculture: Loss in value of livestock or crops as a result of death, disease, or physical damage. 	<ul style="list-style-type: none"> Loss of feature or attribute Earthworks resulting in high volume of surplus soil for off-site disposal Classification of surplus soil as Hazardous Waste where the intention is to discard 	<ul style="list-style-type: none"> Loss of over 50 ha of 'best and most versatile agricultural land' Grades 1, 2 and 3a. Damage to/ or loss of all topsoil resource. Soil sealing >75%.
Medium	Results in effect on integrity of attribute, or loss of part of attribute	<ul style="list-style-type: none"> Human Health: Chronic risk to human health Surface water and/ or groundwater: Pollution of non-sensitive water resources or small scale pollution of sensitive water resources (Principal or Secondary Aquifers of water courses of fair quality or below) Ecology: Change to population densities of non-sensitive species Built Environment: Damage to buildings, structures or the environment Landscaping/ Agriculture: Non-permanent health effects to vegetation/ crops from disease or physical damage, which results in a reduction in value. 	<ul style="list-style-type: none"> Impact on integrity of or partial loss of feature or attribute Earthworks resulting in moderate volume of surplus soil for off-site disposal 	<ul style="list-style-type: none"> Loss of between 20 and 50 ha of 'best and most versatile agricultural land' Grades 1, 2 and 3a. Damage to/ or loss of half of topsoil resource Soil sealing >50%

Magnitude	Criteria	Receptors Susceptible to Land Contamination and Ground Hazard Impacts	Soil and Geological Resources	Agricultural Soil Resources
Low	Results in some measurable change in attributes quality or vulnerability	<ul style="list-style-type: none"> Human Health: Slight reversible short-term effects to human health Surface waters and/ or groundwater: Slight pollution of non-sensitive water resources Ecology: Some change to population densities of non-sensitive species with no negative effects on the function of the ecosystem Built Environment: Easily repairable effects of damage to buildings or structures Landscaping/ Agriculture: Slight or short term health effects which result in slight reduction in value 	<ul style="list-style-type: none"> Minor impact on feature or attribute Earthworks resulting in low volume of surplus soil for off-site disposal 	<ul style="list-style-type: none"> Loss of less than 20 ha of 'best and most versatile agricultural land' Grades 1, 2 and 3a or the loss of any quantity of land not considered 'best and most versatile agricultural land' Grades 3b, 4 or 5. Re-use of all topsoil resource within the development. Soil sealing <50%
Very Low	Results in effect on attribute, but of insufficient magnitude to affect the use or integrity	<ul style="list-style-type: none"> Human Health: No measurable effects on humans Surface waters and/ or groundwater: Insubstantial pollution to non-sensitive water resource Ecology: No significant changes to population densities in the environment or in any ecosystem Built Environment: Very slight non-structural damage or cosmetic harm to buildings or structures Landscaping/ Agriculture: No significant reduction in landscape value. 	<ul style="list-style-type: none"> Impact of insufficient magnitude to affect use or integrity of feature or attribute No off-site disposal of surplus soil required 	<ul style="list-style-type: none"> No loss of agricultural land. Minor disturbance to soils. Soil sealing unlikely to occur.

10.9.8 For each of the potential impacts identified, an assessment will be made of the likely level of significance of the resulting effects. The definition of effect significance will be made by taking into account both the importance/ sensitivity of the receptor (refer to Table 10.4) and the magnitude of the predicted impact (refer to Table 10.5), using the matrix as presented in Table 10.6, in conjunction with professional judgement of the site-specific factors that may be of relevance.

Table 10.6: Criteria for Assessing the Significance of Effects upon Geology and Soils

		Magnitude of Impact			
		High	Medium	Low	Very Low
Sensitivity of Resource/ Receptor	High	Major	Major	Moderate	Minor
	Medium	Major	Moderate	Minor	Negligible
	Low	Moderate	Minor	Negligible	Negligible
	Very Low	Minor	Negligible	Negligible	Negligible

10.10 Assumptions and Limitations

10.10.1 Data from the Factual Report (ESG, 2016) and assessment information from the Ground Investigation Report (AECOM, 2018) will be utilised to refine assessments of risks to human health, controlled waters, and off-site receptors, reuse of ground materials, whilst design mitigation measures will be developed in the Geotechnical Design Report. The results from the ground investigation will be reviewed to support the environmental assessment and will be taken into account to develop the outline mitigation proposals discussed in the Ground Investigation Report (AECOM, 2018).

10.10.2 The PCF Stage 2 geology and soils assessment did not include the candidate sites identified for potential flood storage, construction compounds, soil storage areas and/ or ecological

mitigation areas. Further studies and surveys are proposed in 2018 which may identify new soils and geology features with the potential to be affected. As such, the soils and geology assessment as reported in the Environmental Statement (PCF Stage 3) may be different to that reported during PCF Stage 2.

10.11 References

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Landmark Envirocheck Report - Kingsway Junction - Report Ref. No. 60387304.

Landmark Envirocheck Report - Markeaton Junction - Report Ref. No. 60387091.

Landmark Envirocheck Report - Little Eaton Junction - Report Ref. No. 60386902.

Ministry of Housing, Communities and Local Government (2014) Planning Practice Guidance.

Natural England (2012) Technical Information Note TIN049.

Office of the Deputy Prime Minister (2004) Communities and Local Government Planning Policy Statement 7 – Sustainable Development in Rural Areas.

Reading Agricultural Consultants (2015) Highways Agency A38 Improvements – Derby Junctions – Little Eaton Roundabout.

11 MATERIALS

11.1 Introduction

11.1.1 This section describes the scope of the proposed materials resources and waste arisings assessment for the proposed scheme. For the purpose of this EIA Scoping Report, materials are defined as comprising:

- The use of material resources; and
- The generation and management of waste.

11.1.2 Material resources are defined by IAN 153/11 Guidance on the Environmental Assessment of Material Resources (Highways Agency, 2011) as "*the materials and construction products required for the construction, improvement and maintenance of the trunk road network. Material resources include primary raw materials such as aggregates and minerals, and manufactured construction products*".

11.1.3 Waste is defined as per the Waste Framework Directive (2008/98/EC) as "*any substance or object which the holder discards or intends or is required to discard.*"

11.1.4 The proposed scheme would aim to prioritise waste prevention, followed by preparing for re-use, recycling and recovery and lastly disposal to landfill as per the internationally recognised waste hierarchy (see Figure 11.1).



Figure 11.1: Waste Hierarchy

11.1.5 This EIA Scoping Report has been written in accordance with IAN 153/11 which is intended for the "*identification of impacts associated with materials resource use and waste arisings*" for construction, improvement and maintenance projects and is relevant guidance for the proposed scheme. In addition to this, guidance provided in DMRB HA204/08 (Highways Agency, 2008), HA200/08 (Highways Agency, 2008), and Annex A of IAN 125/15 (Highways England, 2015) have also been taken into account.

11.2 Summary of Relevant Policy

11.2.1 The following national planning policy documents and regulations are relevant to the assessment of materials and waste:

- Waste Framework Directive 2008/98/EC;
- Waste (England and Wales) Regulations 2011 (as amended);
- The Environmental Permitting (England and Wales) Regulations 2016;
- Hazardous Waste (England and Wales) Regulations 2005 (as amended);
- Environmental Protection Act 1990 (as amended);
- Waste Management Plan for England (Department for Environment, Food & Rural Affairs, 2013);

- National Planning Policy for Waste (2014) (Department for Communities and Local Government, October 2014); and
- National Policy Statement for National Networks (NNNPS) (2014) (DfT, 2014).

11.2.2 At the local level, the Derby and Derbyshire Local Waste Plan (2005) (DCiC and DCC, 2005) cover the management of waste in the administrative areas of Derby and Derbyshire. This Plan guides local authority decisions on any planning applications for developments associated with the management of waste. Local planning policies relevant to waste management are also directed by the NPPF (2012) (Department for Communities and Local Government, 2012). Local authorities have yet to update and publish their relevant local level guidance in accordance with the NPPF. A new Waste Plan is being jointly prepared by DCC and DCiC which will replace the existing Local Waste Plan (2005).

11.2.3 Also of note are the Big Choices Report and Background Paper 1 (2010) (DCiC and DCC, 2010), both jointly prepared by DCC and DCiC for the Derby and Derbyshire Waste Core Strategy Development Plan Document (DPD). This Plan will guide the decisions on any planning applications for developments associated with the management of waste produced up to 2030 and will supersede the Local Waste Plan. Background Paper 1 includes an assessment of waste treatment and disposal capacity needs in Derbyshire 2009/ 2010 – 2029/ 30.

11.2.4 With regard to the availability of local/ regional material sources, the administrative areas of Derby and Derbyshire are currently preparing a Minerals Local Plan. Reference will be made to the Local Aggregate Assessment (2014) and other consultation documents generated during the on-going preparation of the Minerals Local Plan.

11.3 The Study Area

11.3.1 The study area will comprise the proposed scheme construction site and the wider region within which waste management facilities are located and from where construction materials may be sourced.

11.4 Baseline Conditions

11.4.1 The baseline waste conditions in terms of the locations of facilities and the existing quantities of waste generated will be established. Baseline information will consist of the current capacity of the waste infrastructure and waste arisings in Derby and Derbyshire, and in the wider East Midlands planning region.

11.4.2 Detailed information on baseline waste conditions will be collected from sources including local planning documents published by DCiC and DCC, and data on waste facility capacity published by the Environment Agency.

11.4.3 Baseline information on material resources will focus on nationwide demand data on the key raw materials: aggregates, concrete, asphalt and steel.

11.5 Value of the Environmental and Resource Receptors

11.5.1 There are no accepted criteria for determining the value (sensitivity) of material resources and waste (including waste infrastructure).

11.6 Potential Impacts and Effects

11.6.1 The potential impacts with regards to material resources and waste arisings include the following:

- Temporary reduction in material resources available within the relevant markets; and
- Effects on-site generated materials (e.g. soils) and waste arisings have on the existing capacity of waste management facilities.

11.6.2 Table 11.1 summarises the types of materials used and wastes that may potentially be generated by the proposed scheme.

Table 11.1: Types of Material Use and Waste Generation

Project Activity	Material Use	Potential Waste Arisings
Site remediation/ preparation/ earthworks	<ul style="list-style-type: none"> Fill material for construction purposes. Primary and secondary/ recycled aggregates for ground stabilisation. 	<ul style="list-style-type: none"> Surplus excavated materials. Stripped topsoil and subsoil. Contaminated soils.
Demolition	<ul style="list-style-type: none"> Materials are not required for demolition works. 	<ul style="list-style-type: none"> Waste arisings from the demolition of existing buildings or structures.
Site construction	Construction materials including: <ul style="list-style-type: none"> Concrete; Asphalt and bituminous material; Cement bound granular material; Well graded granular material; Precast concrete kerb; Timber; Plywood; Cementitious grout; Reinforcing steel; Reinforcing fabric; Geotextile; Geo-composite drainage system; Pipe bedding aggregate; Filter drain material. 	<ul style="list-style-type: none"> Packaging from materials delivered to site. Excess and broken/ damaged construction materials. Existing highway infrastructure and technology as removed by excavation works. Waste oils from construction vehicles. Construction worker wastes.
Operation and maintenance	<ul style="list-style-type: none"> Routine maintenance of infrastructure and technology including surfacing asphalt and servicing of electronic equipment. 	<ul style="list-style-type: none"> Waste arising during operation and maintenance expected to be minimal.

11.7 Summary of Mitigation Proposals

11.7.1 The following mitigation measures would be considered and implemented during the proposed scheme design phase and subsequent construction work (subject to review and confirmation):

- Waste arisings would be prevented and designed out where possible;
- Opportunities to re-use material resources would be sought where practicable;
- Opportunities to support the circular economy would be considered during the design phase; and
- Where re-use and prevention are not possible, waste arisings would be managed in line with the waste hierarchy.

11.7.2 During the construction phase, effects associated with waste and materials would be managed via the preparation and implementation of a Site Waste Management Plan (SWMP) and the CEMP.

11.7.3 Material use and waste generation is expected to be very small during operation of the proposed scheme, whilst any wastes would be appropriately managed by the A38 Managing Agent Contractor (Highways England).

11.8 Summary of PCF Stage 2 Assessment

11.8.1 The PCF Stage 2 assessment concluded that through adherence to the mitigation measures to be implemented via the selected contractor's SWMP and CEMP, significant environmental effects associated with material resources and waste management are not anticipated during proposed scheme construction.

11.8.2 The PCF Stage 2 assessment indicated that significant effects as related to materials resources and waste are not anticipated during proposed scheme operation/ maintenance as materials and waste would be routinely managed throughout the Area 7 network by the Managing Agent Contractor (Highways England).

11.9 Proposed Scope of Assessment

11.9.1 A detailed assessment, as defined in IAN 153/11, will be undertaken to assess the impacts of the material resources and waste arisings from the proposed scheme. As part of this detailed assessment, the following tasks will be carried out:

- Relevant waste legislation, policies and guidance will be reviewed to identify material use and waste management objectives and targets;
- The likely types of material resources and waste arisings will be identified and quantities estimated for the proposed scheme;
- Impacts will be evaluated against the national materials markets and the capacity of the regional waste infrastructure;
- Opportunities to reduce, re-use, recover and/ or recycle material resources and waste arisings will be identified through a review of the proposed scheme (including proposed building materials, construction methods and design, where available) and in accordance with industry best practices; and
- Coordinated and documented consideration and identification of circular economy opportunities during the proposed scheme's early design stage.

11.9.2 The main outputs from the detailed assessment will be:

- The identification of the environmental impacts associated with material resources and waste arisings; and
- The measures which would be implemented to mitigate the impacts.

11.9.3 There are potential sources of contamination within the study area that may impact the characterisation and management of the material resources and waste arisings. The extent of any soil contamination and any associated impacts are discussed in Chapter 10 (Geology and Soils). Intrusive ground investigation data and existing information will provide an indication on the physical and chemical properties of excavated arisings within the route alignment which will help identify the suitability for re-use of the excavated arisings and the facilities that could manage any arisings removed from site.

11.9.4 Waste management and materials impacts during operation of the proposed scheme will be scoped out of assessment, given that material use and waste generation is expected to be very small during proposed scheme operation, whilst materials and waste will be appropriately managed by the A38 Managing Agent Contractor (Highways England).

11.10 Assumptions and Limitations

11.10.1 It is assumed that information regarding the types and quantities of materials used and waste generated will be available during the proposed scheme design development process.

11.11 References

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Department for Communities and Local Government (October 2014) National Planning Policy for Waste.

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The Environmental Permitting (England and Wales) Regulations 2016.

Waste (England and Wales) Regulations 2011 (as amended).

12 NOISE AND VIBRATION

12.1 Introduction

- 12.1.1 The noise and vibration chapter will identify the receptors in the surrounding area which could be affected by the proposed scheme, and will quantify the predicted noise and vibration impacts from the construction and operational phases of the proposed scheme. It will then assess the significance of any identified effects.
- 12.1.2 The assessment and mitigation of road traffic noise and vibration will be carried out according to established prediction and assessment methodologies that are governed or guided by the following key documents: DMRB Volume 11 Section 3 Part 7 (HD213/11) Revision 1, Noise and Vibration (Highways Agency, 2011); and the Calculation of Road Traffic Noise (CRTN) (Department of Transport, 1988).
- 12.1.3 The assessment of construction noise and vibration will also be carried out according to assessment methodologies that are guided by the following key documents: DMRB Volume 11 Section 3 Part 7 (HD213/11) Revision 1 (Highways Agency, 2011); and BS 5228: 2009+A1:2014 Code of practice for noise and vibration control on construction and open sites 2014 – Part 1: Noise and Part 2: Vibration (BSI, 2014).
- 12.1.4 Impacts on ecologically sensitive receptors will be considered as part of the biodiversity assessment based on data produced as part of the noise and vibration assessment.

12.2 Summary of Relevant Policy

- 12.2.1 Policy of relevance to the noise and vibration assessment is summarised in Table 12.1.

Table 12.1: Relevant Noise and Vibration Policy Summary

Policy	Summary
National Networks National Policy Statement (NNNPS) (DfT, 2014)	<p>The NNNPS states that both construction and operational noise and vibration, with respect to human receptors, should be assessed using the principles of the relevant British Standards and other guidance. The NNNPS also states that the applicant should consult Natural England with regard to the assessment of noise on designated nature conservation sites, protected landscapes, protected species or other wildlife. With respect to decision making, the NNNPS states that developments must be undertaken in accordance with statutory requirements for noise and that due regard must have been given to the relevant sections of the Noise Policy Statement for England (NPSE), the NPPF and the Government's associated planning guidance on noise.</p> <p>It states that the Secretary of State should not grant development consent unless satisfied that the proposals will meet the following aims, within the context of Government policy on sustainable development:</p> <ul style="list-style-type: none"> • Avoid significant adverse impacts on health and quality of life from noise as a result of the new development; • Minimise and mitigate other adverse impacts on health and quality of life from noise from the new development; and • Contribute to improvements to health and quality of life through the effective management and control of noise, where possible.
The National Planning Policy Framework 2012 (NPPF) (Department for Communities and Local Government, 2012)	<p>The NPPF states that planning policies and decisions should aim to:</p> <ul style="list-style-type: none"> • Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development; • Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions; • Recognise that development will often create some noise, and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established subject to the provisions of the Environmental Protection Act 1990 and other relevant law; and

	<ul style="list-style-type: none"> Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.
Noise Policy Statement for England 2010 (NPSE) (DEFRA, 2010)	<p>The NPSE statement sets out the long-term vision of the government's noise policy, which is to <i>"promote good health and a good quality of life through the effective management of noise within the context of policy on sustainable development"</i>. This long-term vision is supported by three aims:</p> <ul style="list-style-type: none"> Avoid significant adverse impacts on health and quality of life; Mitigate and minimise adverse impacts on health and quality of life; and Where possible, contribute to the improvements of health and quality of life. <p>The long-term policy vision and aims are designed to enable decisions to be made regarding what is an acceptable noise burden to place on society. It uses the following concepts:</p> <ul style="list-style-type: none"> No Observed Effect Level (NOEL): the level below which no effect can be detected. Below this level no detectable effect on health and quality of life due to noise can be established; Lowest Observable Adverse Effect Level (LOAEL): the level above which adverse effects on health and quality of life can be detected; and Significant Observed Adverse Effect Level (SOAEL): the level above which significant adverse effects on health and quality of life occur. <p>The NPSE recognises that <i>"it is not possible to have a single objective noise-based measure that is mandatory and applicable to all sources of noise in all situations"</i>. The levels are likely to be different for different noise sources, for different receptors and at different times of the day.</p>
Planning Practice Guidance 2014 (PPG)	<p>The guidance advises that local planning authorities should consider:</p> <ul style="list-style-type: none"> Whether or not a significant adverse effect is occurring or likely to occur; Whether or not an adverse effect is occurring or likely to occur; and Whether or not a good standard of amenity can be achieved.
The Environmental Noise (England) Regulations 2006 (as amended 2008, 2009, 2010)	<p>The regulations implement the Assessment and Management of Noise Directive 2002/49/EC (known as the Environmental Noise Directive - END). Under the END, strategic noise mapping of major roads, railways, airports and agglomerations has been completed across the UK, including the A38. The results of round 2 of the noise mapping process were released to Highways England in 2014. A number of 'Important Areas' (those areas most exposed to noise) were identified in round 2 in the vicinity of the A38 through Derby.</p> <p>Highways England is responsible for assessing the potential for cost effective noise mitigation measures to be implemented in the Important Areas on the A38 identified in round 2 of the noise mapping process. Important Areas on other major roads in the vicinity of the proposed scheme, such as the A6 and A52, are the responsibility of the local highways authority (i.e. DCiC and DCC).</p>
Derby City Local Plan Part 1 2017 (DCiC, 2017)	No specific policies relevant to the proposed scheme have been identified.
City of Derby Local Plan Review 2006 (CDLPR) (DCiC, 2006)	Policy E12 – Pollution is retained by the 2017 Derby City Local Plan Part 1 and states that <i>"Planning permission will not be granted for development which would generate pollutants that would be unacceptably detrimental to the health and amenity of users of the development, users of adjoining land or the environment; or where the level of existing pollutants would be unacceptably detrimental to the health and amenity of users of the proposed development."</i>
Erewash Core Strategy adopted March 2014 (EBC, 2014)	Policy 14: Managing Travel Demand is the only policy relating to noise and vibration within the Core Strategy relevant to this assessment. Noise and vibration is not explicitly mentioned within the policy, however, the reduction of noise and vibration in the area is used as justification for the policy. The justification states: <i>"A combination of these factors is aimed at achieving benefits in terms of reduced car use and associated savings in carbon emissions, noise and pollution."</i>

12.3 The Study Area

12.3.1 The study area for the assessment of construction phase noise impacts focusses on a selection of the closest identified potentially sensitive receptors to each of the three junctions and any other areas affected by construction, such as construction compounds, soil storage areas, haulage routes. These receptors will be identified based on proximity to the works and the nature of the proposed works, and will be discussed with the relevant Local Authority. They will be used to represent the impacts on larger groups of sensitive receptors, and the likely extent of any identified significant effects.

12.3.2 The study area for the assessment of operational phase noise impacts comprises an area extending to 1km from the proposed scheme and the existing A38 which would be replaced by the proposed scheme. Within this 1km area, a 600m zone will be subject to detailed traffic noise modelling. Outside this 1km area, a 50m zone along identified 'affected routes' will be considered. This is explained further below:

- The study area comprises the proposed scheme and all surrounding existing roads that are predicted to be subject to a change in traffic noise level as a result of the proposed scheme of:
 - 1 dB(A) or more in the short term (DM 2024 vs DS 2024¹³); or
 - 3 dB or more in the long term (DM 2024 vs DS 2039), subject to a minimum change of 1 dB between DM 2039 and DS 2039.
- These roads are defined as 'affected routes' and are identified by analysis of the provided traffic data. The identification of affected routes considers all roads with flows above the 1,000 lower cut off of the CRTN prediction methodology;
- The study area for the detailed quantitative assessment of noise impacts comprises a corridor 600m either side of the proposed scheme, 600m either side of the extent of the A38 replaced by the proposed scheme, and a set of corridors 600m either side of all affected routes within 1km of the proposed scheme and extent of the A38 replaced by the proposed scheme;
- For dwellings and other sensitive receptors that are within 1km of the proposed scheme and the extent of the A38 replaced by the proposed scheme, but more than 600m from an affected route, the proposed scheme or the existing A38 replaced by the proposed scheme, a qualitative assessment of the traffic noise impacts will be carried out; and
- For affected routes which are outside the 1km boundary from the proposed scheme and extent of the A38 replaced by the proposed scheme, an assessment will be undertaken by estimating the CRTN Basic Noise Level for these routes with and without the proposed scheme. A count of the number of dwellings and other sensitive receptors within 5m of these routes is undertaken.

12.3.3 The operational traffic vibration annoyance study area is defined as 40m from the existing A38 replaced by the proposed scheme, the proposed scheme and other affected routes within the 1km area.

12.4 Baseline Conditions

12.4.1 Details of existing noise barriers obtained from the maintenance contractor and the Highways England Highways Agency Pavement Management System (HAPMS) database (owned and managed by Highways England) for the A38 through Derby at PCF Stage 2 will be updated as required. No changes to these existing noise barriers are planned as part of the proposed scheme as they are all located beyond the scheme extents.

12.4.2 Details of the information on existing road surfacing on Highways England roads in the study area (A38 and A516) in the HAPMS database obtained during PCF Stage 2 will also be updated as required. The aim is to identify areas of existing 'thin surfacing' which is designated as a 'low noise' surface. In addition, information from the maintenance contractor provided at PCF Stage 2 on future plans for resurfacing with a new low noise surface before the 2024 proposed scheme opening year, and the 2039 future assessment year, will be updated as required.

12.4.3 A noise monitoring survey was undertaken in 2015 at the locations as detailed on Figures 12.1a and 12.1b – these locations were chosen to focus on some of the very closest receptors to the proposed scheme. In addition, a number of residential properties in Breadsall village were also included, located between approximately 200m and 425m from the existing A38. A mixture of long-term (LT) unattended monitoring over a number of weeks, and short-term (ST) daytime 3 hour monitoring was completed. The monitoring procedures conformed

¹³ Noted that junctions may be sequentially opened, with all junctions being operational in 2024 – however, the first full year during which all junctions would be fully operational would be 2025.

to BS 7445: 2003 'Description and Measurement of Environmental Noise' (BSI, 2003). The short-term 3 hour measurements conformed to the CRTN 'shortened measurement procedure'. A summary of the noise monitoring results is provided in Table 12.2, which details the range of measured noise levels for the long-term monitoring sites and a comparison with predicted 2015 traffic noise levels at PCF Stage 2.

Table 12.2: Baseline Noise Monitoring 2015

Ref.	Description	ST/ LT	Measured		Predicted	
			Day Range	Night Range	Day	Night
			L _{A10,18h} dB	L _{Aeq,8h} dB	L _{A10,18h} dB	L _{Aeq,8h} dB
M1	Kingsway Hospital	ST	63.5	-	63.6	57.7
M2	Greenwich Drive South	LT	59.8 - 61.0	52.3 - 55.3	63.3	56.7
M3	Lyttleton Street	LT	53.9 - 55.0	50.2 - 51.4	60.1	54.8
M4	Greenwich Drive North	LT	65.5 - 70.0	58.4 - 65.4	71.6	64.9
M5	Radbourne Road	LT	62.0 - 65.3	56.5 - 60.7	64.5	58.7
M6	Territorial Army Site (rear of Windmill Hill Lane)	LT	58.9 - 63.6	52.5 - 59.0	63.1	57.7
M7	Queensway	LT	52.3 - 57.1	49.1 - 53.7	58.7	53.3
M8	Markeaton Park	ST	71.4	-	71.2	64.5
M9	Mobile Home Park	ST	56.5	-	63.0	56.6
M10	Breadsall north	LT	51.5 - 61.5	50.2 - 56.2	63.5	56.7
M11	Breadsall centre	LT	47.9 - 58.3	48.8 - 54.1	58.4	52.4
M12	Breadsall south	LT	48.6 - 58.6	46.4 - 52.1	58.4	52.4
M13	Footpath Breadsall	ST	47.9	-	61.8	55.6

12.4.4 The purpose of the baseline noise survey was to assist with developing an understanding of the general noise climate along the proposed scheme. For example, to identify if any other local noise sources (other than road traffic) are present and contribute significantly to the local noise climate.

12.4.5 The results of the baseline noise survey were used as part of a verification exercise for the traffic noise prediction modelling completed at PCF Stage 2. The traffic noise model was used to predict traffic noise levels at the monitoring locations, with the predicted and measured levels being compared (refer to Table 12.2). Overall, the comparisons provide confidence that the noise model developed at PCF Stage 2 to estimate the noise impacts of the proposed scheme was robust.

12.4.6 Baseline traffic noise conditions at all receptors will be determined using the latest traffic model results for the baseline, the future baseline in the opening year (2024) and the future baseline 15 years after opening (2039), via noise modelling of traffic conditions.

12.4.7 In line with the methodology in DMRB, a baseline traffic vibration survey is not proposed.

12.5 Additional Survey Requirements

12.5.1 No further noise surveys are proposed at PCF Stage 3.

12.6 Value of the Environmental and Resource Receptors

12.6.1 Figures 12.1a and 12.1b illustrate the receptors within the noise study area identified at PCF Stage 2. The vast majority of potentially sensitive receptors in the study area are residential properties, which are classed as being of high sensitivity to road traffic noise. A total of over 12,000 residential properties were identified within the PCF Stage 2 1km study area based on OS address base data.

12.6.2 Within 1km of Kingsway junction and Markeaton junction are various residential suburbs of Derby including Mackworth to the west and New Zealand to the east. A new development of

predominantly housing is currently being constructed to the south-east of the Kingsway junction on the Kingsway Hospital site. This development would be completed by the proposed scheme opening year - detailed layout plans are available for the development and these will be included in the assessment. A number of residential properties would be demolished to the north-east of Markeaton junction as part of the proposed scheme – as such these will not be included in the noise assessment.

- 12.6.3 The eastern edge of the suburb of Allestree falls within the 1km study area of Little Eaton junction, whilst the Ford Farm Mobile Home Park is located directly off the junction and the villages of Breadsall and Little Eaton are located to the south-east and north respectively.
- 12.6.4 A number of developments, in addition to development on the Kingsway Hospital site, are proposed in the vicinity of the junctions, some of which would introduce new potentially sensitive residential receptors within the 1km study areas.
- 12.6.5 With regard to non-residential receptors, a total of 23 educational buildings were identified within the 1km Kingsway junction and Markeaton junction study area, the closest of which is the Royal School for the Deaf located immediately to the east of Markeaton junction (beyond the residential properties on Queensway that would be demolished by the proposed scheme). A number of the buildings within the Royal School for the Deaf are also understood to be used for residential purposes. A total of two schools have been identified in the Little Eaton 1km study area, though these are both remote from the proposed scheme. Educational buildings are classed as being of high sensitivity to road traffic noise.
- 12.6.6 A total of three hospitals were identified within 1km of Kingsway junction and Markeaton junction. No hospitals have been identified within 1km of the Little Eaton junction. Hospitals are classed as being of high sensitivity to road traffic noise.
- 12.6.7 A total of four places of worship were identified within 1km of Kingsway and Markeaton junctions, none of which are in close proximity to the proposed scheme. Four places of worship were identified within the 1km study area of Little Eaton junction. Places of Worship are classed as being of medium sensitivity to road traffic noise.
- 12.6.8 No designated areas (AONB, National Park, SAC, SPA, SSSI, SAM) were identified within the 1km study areas. However, the Derwent Valley Mills World Heritage Site runs in a north-south direction to the west of Little Eaton junction, which is classed as medium sensitivity. A number of PRoW fall within the 1km study areas, mainly in the vicinity of Little Eaton junction. These areas are classed as being of low sensitivity to road traffic noise.
- 12.6.9 A number of public open spaces, as designated by DCiC fall within the 1km study areas. The closest of which to the proposed scheme is an area immediately west of Kingsway junction to the east and south of Greenwich Drive South in Mackworth, and Markeaton Park located immediately adjacent to Markeaton junction. These areas are classed as being of medium sensitivity to road traffic noise.
- 12.6.10 Ecological receptors are specifically referenced in the NNNPS which states that noise from a proposed development can have adverse impacts on wildlife and biodiversity and that noise effects of a proposed development on ecological receptors should be assessed in accordance with the Biodiversity and Geological Conservation section of the NPS. Although there are no nationally designated ecological sites within the 1km study areas, there are a number of ecologically sensitive areas in the vicinity of the proposed scheme (refer to Chapter 9: Biodiversity). Traffic noise level changes from the operational noise assessment will be fed into the assessment presented in the Biodiversity chapter of the Environmental Statement.
- 12.6.11 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 1km study areas, two of which extend along the A6 and A52 respectively (refer to Figures 12.1a/ b and Table 12.3). In the absence of the proposed scheme, Highways England has made an initial assessment of the feasibility of mitigation for these Important Areas which considers resurfacing with low noise surfacing and noise barriers.

12.6.12 DCiC and DCC are the relevant local highway authorities for the other Important Areas which are not on the A38 or A516. There are no current proposals for noise mitigation at these Important Areas.

12.6.13 Table 12.3 details the Important Areas in the 1km study area (refer to Figures 12.1a/ b).

Table 12.3: Noise Important Areas in the Vicinity of the Proposed Scheme

Ref.	Road	Relevant Authority
8006	A38	Highways England
8004	A516	Highways England
8003	A516/ A5111	DCiC
8002	A5111	DCiC
8005	A38	Highways England
11628*	A38/ A52	Highways England/DCiC
11627	A38	Highways England
7976	A38	Highways England
8245*	A38/ A6	Highways England/ DCiC

12.7 Potential Impacts and Effects

Summary of Mitigation Proposals

Construction

12.7.1 A CEMP would be prepared and implemented by the selected construction contractor which would include a range of best practice measures associated with mitigating potential noise and vibration impacts - such as (subject to review and confirmation):

- Selection of quiet and low vibration equipment;
- Review of construction programme and methodology to consider low noise/ low vibration methods (including non-vibratory compaction plant and low vibration piling methods, where required);
- Optimal location of equipment on site to minimise noise disturbance;
- The provision of acoustic enclosures to static plant, where necessary;
- Use of less intrusive alarms, such as broadband vehicle reversing warnings; and
- Local screening of equipment and employment of perimeter hoarding.

12.7.2 During the proposed scheme construction phase appropriate mechanisms to communicate with local residents would be set up to highlight potential periods of disruption (e.g. web-based, newsletters, newspapers, radio announcements etc.) – an appropriate communication strategy will be developed during the DCO application stage. An information web-page would be provided and kept up-to-date on the Highways England website to reflect construction and community liaison requirements. It is envisaged that the web-page would provide up-to-date information on the progress of the construction works, areas affected by construction, mitigation in place to reduce adverse effects, information regarding planned construction works (including any proposed works outside normal hours) and works recently completed. Based on the current programme night-time and weekend working is not anticipated. Standard working hours as recommended by DCiC and EBC would be adhered to. The communication strategy would minimise the likelihood of complaints. Residents would be provided with a point of contact for any queries or complaints.

12.7.3 The construction noise assessment will be updated at PCF Stage 3 and reported in the Environmental Statement, identifying any further mitigation measures as applicable.

Operation

12.7.4 Noise mitigation has been incorporated into the proposed scheme design in the form of low-noise surfacing across the extent of proposed scheme. Current guidance in DMRB advises that an additional benefit from low noise surfacing should only be assumed in the noise

predictions where speeds are 75 km/hr or above. For the majority of the proposed scheme extents, the anticipated traffic speed on the A38 would be less than 75 km/hr, therefore, no benefit from the low noise surfacing will be assumed on these sections. In reality, there is not a sharp cut off in the effectiveness of low noise surfacing at 75 km/hr and some benefit is likely to be realised at lower speeds.

12.7.5 During PCF Stage 3 recommendations for noise barriers will be proposed.

12.7.6 At PCF Stage 3 the operational noise assessment will be updated with any proposed scheme design evolutions and updated traffic data and firm proposals for additional noise mitigation developed and reported in the Environmental Statement.

Summary of PCF Stage 2 Assessment

12.7.7 Key findings of the PCF Stage 2 noise and vibration impact assessment are summarised below.

Construction

- Given the very close proximity of receptors of high sensitivity to the proposed scheme, there is the potential for large adverse construction noise effects;
- The risk of construction vibration induced building damage is considered to be very low. 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;
- 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.

Operation

- 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. 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.

12.8 Proposed Scope of Assessment

12.8.1 The assessment of noise and vibration for the proposed scheme will be completed in accordance with the relevant guidance in the DMRB – namely Volume 11, Section 3, Part 7 (HD213/11) (Highways Agency, 2011). A detailed level assessment is proposed. The aim of the DMRB detailed level assessment is to determine baseline and operational traffic noise levels, and the significance of changes in traffic noise at affected receptors. Appropriate traffic noise mitigation measures will be recommended. The potential for traffic vibration effects will

also be considered at receptors within 40m of the proposed scheme, the existing A38 replaced by the proposed scheme and other affected routes within the 1km area. Temporary construction noise and vibration effects will be included in the scope of the assessment. The level of assessment will depend on the information available at the time of the assessment regarding the proposed construction works, however, it is anticipated that detailed information to enable a quantitative assessment will be available from a construction contractor.

12.9 Proposed Assessment Methodology Including Significance

Construction Noise

12.9.1 The noise levels generated by construction activities and experienced by nearby sensitive receptors, such as the occupants of residential properties, schools etc., depend upon a number of variables, the most significant of which are:

- The noise generated by plant or equipment used on site, generally expressed as a sound power level;
- The periods of operation of the plant on the site, known as its 'on-time';
- The distance between the noise source and the receptor; and
- The attenuation due to ground absorption and barrier effects.

12.9.2 BS 5228-1: 2009+A1: 2014 'Code of Practice for Noise and Vibration Control on Construction and Open Sites - Noise' (BSI, 2014) provides a methodology for the estimation of likely construction noise levels as an equivalent continuous noise level averaged over a suitable assessment period, for example a one-hour period ($L_{Aeq,1h}$). BS 5228-1 contains a database of the noise emission from individual items of equipment and routines which can be used to predict noise from construction activities at identified receptors. The prediction method gives guidance on the effects of different types of ground, barrier attenuation and how to assess the impact of fixed and mobile plant.

12.9.3 BS 5228 (BSI, 2014) contains a number of example methodologies for identifying significant construction noise effects based on fixed thresholds or noise level changes. Taking into account this guidance, the threshold values detailed in Table 12.4 have been adopted for this assessment to define the SOAEL (the 'significant observed adverse effect level'), and the LOAEL (the 'lowest observable adverse effect level') for residential receptors.

Table 12.4: Construction Noise SOAEL and LOAEL for Residential Receptors

Time of Day	SOAEL $L_{Aeq,T}$ dB (façade)	LOAEL $L_{Aeq,T}$ dB (façade)
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	75	65
Evenings (19:00 – 23:00 weekdays) and Weekends (13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays)	65	55
Night-time (23:00 – 07:00)	55	45

12.9.4 The criterion for the SOAEL at residential receptors corresponds to the threshold values for Category C in the BS 5228 (BSI, 2014) example ABC method. Similarly, the criterion for the LOAEL corresponds to the threshold values for Category A in the BS 5228 example ABC method. In accordance with the NPPF and NPSE, it is important to consider receptors that exceed the LOAEL and ensure that adverse effects are mitigated and minimised.

12.9.5 Based upon the above, the magnitude of the impact of construction noise on residential receptors will be classified in accordance with the descriptors in Table 12.5.

Table 12.5: Construction Noise Magnitude of Impact Criteria for Residential Receptors

Magnitude of Impact	Daytime $L_{Aeq,T}$ dB (façade)	Evening / Weekend $L_{Aeq,T}$ dB (façade)	Night-time $L_{Aeq,T}$ dB (façade)
Major	>80	>70	>60
Moderate	>75 - 80	>65 - 70	>55 - 60
Minor	>65 - 75	>55 - 65	>45 - 55
Negligible	≤65	≤55	≤45

12.9.6 When considering exceedances of the SOAEL and LOAEL, other project-specific factors should also be taken into account, such as the existing ambient noise levels, number of receptors affected and the frequency and duration of the impact.

12.9.7 In order to quantify the likely noise from construction works in accordance with the methods and guidance in BS 5228-1 (BSI, 2014), it is necessary to define the various activities to be undertaken and the equipment to be used, based upon the anticipated construction works programme. It is anticipated that at PCF Stage 3 details regarding construction activities and plant requirements will be available, therefore, a quantitative assessment of potential construction noise is proposed.

12.9.8 Information on the likely timing and volume of HGV movements required for material haulage during the construction of each junction is anticipated to be available at PCF Stage 3. These will be considered in the context of existing traffic flows to enable an indication to be provided of the potential magnitude of impact on existing traffic noise levels due to the addition of construction traffic. The magnitude of impact of construction traffic uses the same scale and descriptors as for short-term changes in operational traffic noise, as detailed in Table 12.9.

Construction Vibration

12.9.9 A number of proposed scheme construction activities were identified at PCF Stage 2 which could be potentially significant sources of vibration, namely:

- Piling of structure foundations (e.g. retaining walls/ bridges). Bored piling or continuous flight auger (CFA) piling;
- Piling of temporary works at the bridges, including sheet piling; and
- Ground improvement works at areas of earthworks at the junctions. For example, the use of vibratory rollers or vibro stone columns. The need for ground improvement works, and the proposed method, depends on ground type and conditions.

12.9.10 The passage of vibration through the ground is highly dependent on site-specific ground conditions. However, BS 5228-2: 2009+A1: 2014 'Code of Practice for Noise and Vibration Control on Construction and Open Sites - Vibration' (BSI, 2014) provides a range of measured historical data for a variety of different piling methods and ground improvement works.

12.9.11 Guidance on the effects of construction vibration in terms of building damage is provided in BS 7385: 1993 'Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from ground borne vibration' (BSI, 1993). It provides guidance on vibration levels likely to result in cosmetic damage, and is referenced in BS 5228-2 (BSI, 2014). Limits for transient vibration, above which cosmetic building damage could occur, are given in Table 12.6.

Table 12.6: Transient Vibration Guide Values for Cosmetic Damage

Building Type	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures Industrial and heavy commercial buildings	50 mms ⁻¹ at 4 Hz and above	50 mms ⁻¹ at 4 Hz and above
Unreinforced or light framed structure Residential or light commercial buildings	15 mms ⁻¹ at 4 Hz increasing to 20 mms ⁻¹ at 15 Hz	20 mms ⁻¹ at 15 Hz increasing to 50 mms ⁻¹ at 40 Hz and above
Note 1: Values referred to are at the base of the building. Note 2: For unreinforced or light framed structures and residential or light commercial buildings, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded.		

12.9.12 BS 7385-2 (BSI, 1993) states that the probability of building damage tends to be zero for transient vibration levels less than 12.5mms⁻¹ ppv. For continuous vibration the threshold is around half this value. It is also noted that these values refer to the likelihood of cosmetic damage. ISO 4866:2010 (ISO, 2010) defines three different categories of building damage:

- Cosmetic: formation of hairline cracks in plaster or drywall surfaces and in mortar joints of brick/ concrete block constructions;
- Minor: formation of large cracks or loosening and falling of plaster or drywall surfaces or cracks through brick/ block; and
- Major: damage to structural elements, cracks in support columns, loosening of joints, spalling of masonry cracks.

12.9.13 BS 7385-2 (BSI, 1993) indicates that minor damage occurs at a vibration level twice that of cosmetic damage, and that major damage occurs at a vibration level twice that of minor damage. This guidance can be used to define the magnitude of vibration damage impact as shown in Table 12.7.

Table 12.7: Magnitude of Impact for Vibration Damage

Magnitude of Impact	Damage Risk	Continuous Vibration Level ppv mms ⁻¹
Major	Major	30
Moderate	Minor	15
Minor	Cosmetic	7.5
Negligible	Negligible	6

12.9.14 BS 5228-2 (BSI, 2014) provides guidance on the impact of construction vibration in terms of annoyance, focussing on residential properties. The vibration levels and associated effects stated in BS 5228-2 are provided in Table 12.8.

Table 12.8: Magnitude of Impact for Vibration Annoyance

Magnitude of Impact	Annoyance	Continuous Vibration Level ppv mms ⁻¹
Major	Vibration is likely to be intolerable for any more than a very brief exposure to this level.	10
Moderate	It is likely that vibration of this level in residential environments will cause complaints, but can be tolerated if prior warning and explanation has been given to residents.	1.0
Minor	Vibration might be just perceptible in residential environments.	0.3
Negligible	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.	0.14

12.9.15 For construction vibration annoyance, the LOAEL is set at 0.3mms^{-1} and the SOAEL at 1.0mms^{-1} .

12.9.16 In order to quantify the likely vibration impact from construction works in accordance with the methods and guidance in BS 5228-2 (BSI, 2014), it is necessary to define the various activities to be undertaken and the equipment to be used, based upon the anticipated construction works programme. It is anticipated that at PCF Stage 3 details regarding construction activities and plant requirements will be available, therefore, a quantitative assessment of potential construction vibration is proposed.

Operational Traffic Noise

12.9.17 The general principle of DMRB HD213/11 (Highways Agency, 2011) is to allocate an assessment method according to risk - this process uses three levels of assessment:

- Scoping;
- Simple; and
- Detailed.

12.9.18 The proposed assessment presented here follows the most comprehensive detailed assessment approach.

12.9.19 Noise from a flow of road traffic is generated by both the vehicle engines and the interaction of tyres with the road surface. The traffic noise level at a receptor, such as an observer at the roadside or residents within a property, is influenced by a number of factors including traffic flow, speed, composition (percentage of HGVs), road gradient, type of road surface, distance from the road and the presence of any obstructions between the road and the receptor.

12.9.20 Noise from a stream of traffic is not constant, but to assess the noise impact a single figure estimate of the overall noise level is necessary. The index adopted by the Government in 'The Calculation of Road Traffic Noise' (CRTN) to assess traffic noise is $L_{A10,18h}$. This value is determined by taking the highest 10% of noise readings in each of the 18 one-hour periods between 06:00 and 00:00, and then calculating the arithmetic mean. As recorded in DMRB, a reasonably good correlation has been shown to exist between this index and the perception of traffic noise by residents over a wide range of noise exposures.

12.9.21 CRTN provides the standard methodology for predicting the $L_{A10,18h}$ road traffic noise level. Noise levels are predicted at a point measured 1m horizontally from the external façade of buildings.

12.9.22 Of relevance to a traffic noise model of a dense urban area such as Derby is the CRTN low flow correction, which applies between 18 hour flows of 1,000 and 4,000, and the low flow cut off of 1,000. The low flow correction procedure enhances the impact of changes in traffic flows which are already low, in particular at receptors very close to the road. The 1,000 18 hour flow cut off is the lower limit of the CRTN prediction methodology; at flows below this the results must be treated with caution. Due to the urban nature of Kingsway junction and Markeaton junction in particular, a number of the surrounding minor side roads have flows well below this cut off. However, at PCF Stage 2 they were retained in the traffic noise prediction. The assessment of roads below the 1,000 cut-off will be reconsidered during PCF Stage 3 in conjunction with the traffic team.

12.9.23 DMRB also requires an assessment of night-time (i.e. between 23:00 and 07:00) traffic noise levels ($L_{\text{night, outside}}$). However, this parameter is not predicted by the standard CRTN methodology. DMRB refers to three methods for calculating night-time traffic noise levels developed by the Transport Research Laboratory (TRL, 2002). The most widely used is 'Method 3' which simply factors the L_{night} from the $L_{A10,18h}$, based on the typical diurnal pattern of traffic flows in the UK. This method is not proposed as the purpose of the proposed scheme is to alleviate congestion during the day. At night, congestion is not a problem,

therefore, the noise impacts due to the proposed scheme during the day in terms of re-routing of traffic would not necessarily occur at night.

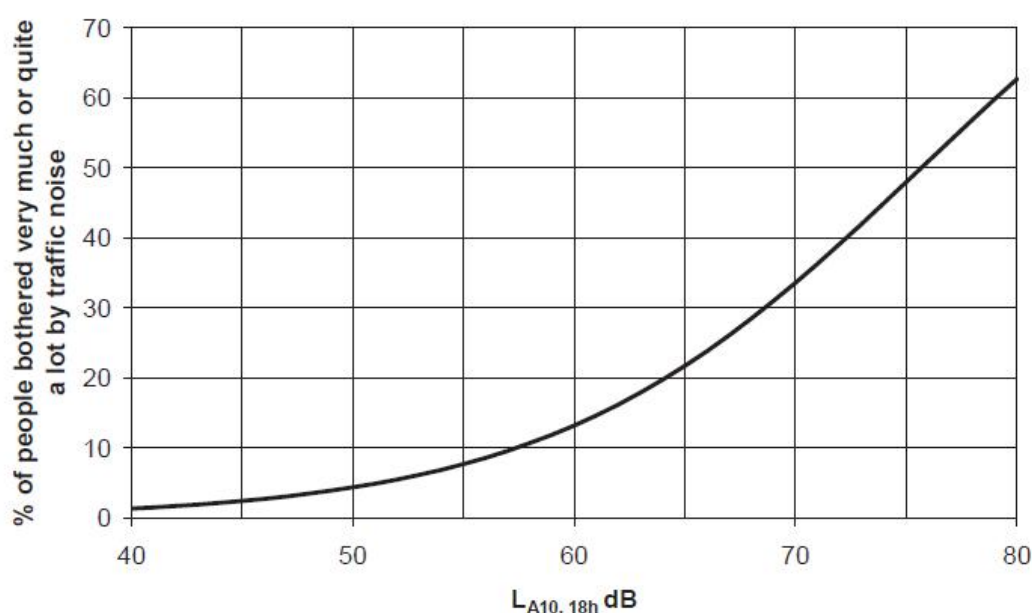
12.9.24 DMRB 'Method 1' requires hourly traffic data for all roads in the noise study area. This level of detailed traffic data is not available for the proposed scheme. 'Method 2' uses the 8 hour night-time traffic flow. Whilst this level of traffic data is available for the proposed scheme, there are known issues with the method when used on roads with a low proportion of HGVs. Many of the local roads around the A38 within the noise study area have a low proportion of HGVs, and therefore this method is not considered to be suitable.

12.9.25 Given the above, a hybrid of Method 1 and 2, as used at PCF Stage 2, is proposed to assess potential night-time noise impacts. The 8 hour night-time traffic flow will be used to determine a typical 1 hour flow during the night and the Method 1 prediction method applied. A -2.5 dB correction is applied to the night-time predicted traffic noise levels, to convert from façade to free-field levels i.e. noise levels which are unaffected by reflecting surfaces other than the ground (as advised in CRTN).

12.9.26 The traffic noise predictions generated by modelling will be based on traffic data provided by a traffic model of the proposed scheme and surrounding area. The traffic flow and % HGV data are taken directly from the model. However, the traffic speeds are subject to a process called 'speed banding' which assigns one of four speeds to all non-motorway roads. This will be completed through an automated process, with some manual adjustments where the modelled speeds are close to the boundary of a speed band.

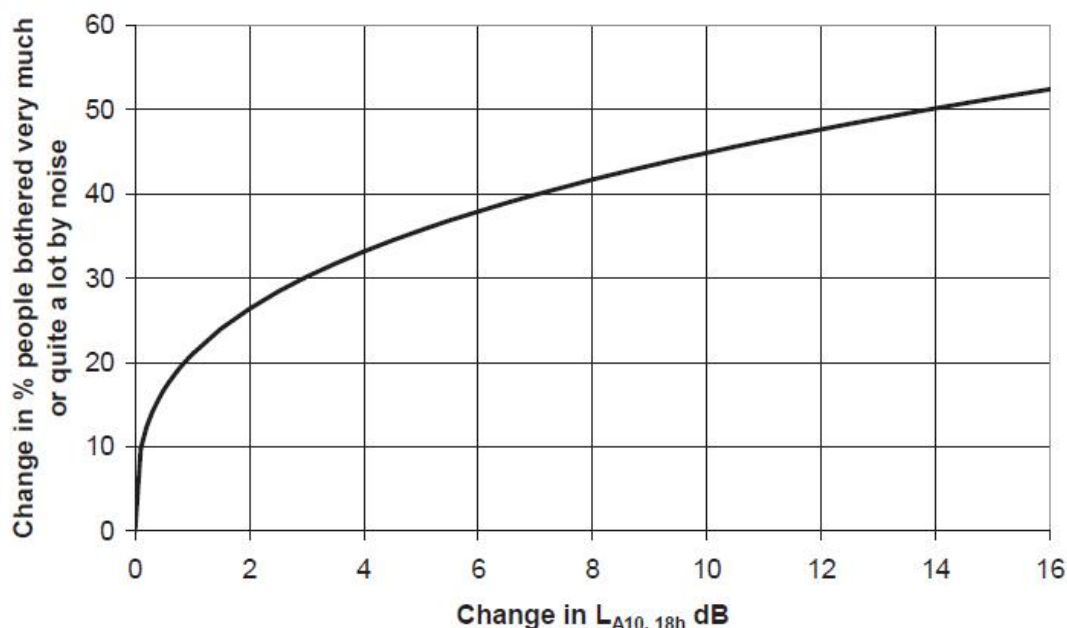
12.9.27 Once the traffic noise levels have been predicted, they can be used to provide an indication of the likely annoyance to residents caused by traffic noise. Individuals vary widely in their response to the same level of traffic noise. However, the average or community response from a large number of people to the same level of traffic noise is fairly stable and, therefore, a community average degree of annoyance caused by traffic noise can be related to the long-term steady state noise level. The relationship between the steady-state traffic noise level and the estimated annoyance experienced, expressed as the percentage of people 'bothered very much or quite a lot', is illustrated in Figure 12.2 (taken from DMRB). This shows, for example, that approximately 13% of all residents would be 'bothered very much or quite a lot' at a façade road traffic noise level of 60 dB $L_{A10,18h}$.

Figure 12.2: Estimation of Traffic Noise Annoyance – Steady State (taken from DMRB Volume 11 Section 3 Part 7 HD213/11 Revision 1) (Highways Agency, 2011)



12.9.28 In addition, research recorded in DMRB has shown that people are more sensitive to abrupt changes in traffic noise, for example, following the opening of a new road, than would be predicted from the steady state relationship between traffic noise and annoyance (as described above). These effects last for a number of years. However, in the longer term, the perceived noise annoyance tends towards the steady-state level due to familiarisation. The percentage change in the traffic noise annoyance due to an abrupt change in traffic noise is illustrated in Figure 12.3 (as taken from DMRB).

Figure 12.3: Estimation of Traffic Noise Annoyance – Immediate Change (taken from DMRB Volume 11 Section 3 Part 7 HD213/11 Revision 1) (Highways Agency, 2011)



12.9.29 Figure 12.3 shows, for example, that with an abrupt (and permanent) increase of 10 dB(A) there would be a net change of 45% residents 'bothered very much or quite a lot' by road traffic noise. If the initial noise level was 60 dB $L_{A10,18h}$ (with 13% people already bothered – refer to Figure 12.2), then there would be a total of 58% bothered immediately after an increase to 70 dB $L_{A10,18h}$. This would eventually diminish in the long term because of familiarisation to become approximately 34% subject to annoyance (see Figure 12.3).

12.9.30 The objective of the assessment, as set out in DMRB, is to gain an overall appreciation of the noise and vibration climate, both with (Do-Something) and without (Do-Minimum) the proposed scheme, to identify where noise impacts occur and to determine where mitigation to reduce these impacts is required. These conditions are assessed for the baseline year (the year of proposed scheme opening) and the future assessment year (15 years after proposed scheme opening). DMRB outlines the steps to be carried out at the detailed assessment stage:

- Identify the study area and predict 18-hour (06:00 - 00:00) and night-time (23:00 - 07:00) traffic noise levels at all residential properties within 600m of the proposed scheme, the existing routes bypassed/ improved by the scheme, and affected routes within 1km of the proposed scheme (affected routes are defined as existing roads which would experience a potentially significant change in traffic noise level as a result of the proposed scheme). Predictions are required for the Do-Minimum and Do-Something scenarios in the year of proposed scheme opening and 15 years after proposed scheme opening. The computer noise modelling software SoundPLAN or Cadna A which implement the CRTN methodology to predicted $L_{A10,18h}$ noise levels and the TRL 'Method 1' (TRL, 2002) to predict $L_{night,outside}$ levels, will be used to complete the traffic noise predictions;

- Carry out the following comparisons for each property in order to identify the number of properties where residents may experience an increase or decrease in traffic noise levels and annoyance:
 - The Do-Minimum scenario in the baseline year against the Do-Minimum scenario in the future assessment year (long-term) (DM 2024 to DM 2039);
 - The Do-Minimum scenario in the baseline year against the Do-Something scenario in the baseline year (short-term) (DM 2024 to DS 2024); and
 - The Do-Minimum scenario in the baseline year against the Do-Something scenario in the future assessment year (long-term) (DM 2024 to DS 2039).
- DMRB also states in paragraph A1.19 (ix) *“If any other comparisons are identified that would further demonstrate the noise and vibration impact of the project, these should also be calculated and reported. For example, although the comparison between Do-Minimum and Do-Something in the future assessment year is not required in the decision making process of whether to move from a Simple to a Detailed Assessment, this comparison may be useful when comparing options or explaining potential impacts to stakeholders”*;
- For night-time traffic noise levels, comparisons are only required for the two long-term scenarios and for properties where the $L_{\text{night, outside}}$ level is 55 dB(A) or more in the relevant scenarios;
- Assess the impact on sensitive receptors, other than residential properties, within the 600m study area. This is based on 18 hour (06:00 - 00:00) traffic noise levels and considers the same three comparisons as outlined above for residential properties. Other sensitive receptors include hospitals, schools, community facilities (such as places of worship, educational buildings and hospitals), designated ecological areas such as Areas of Outstanding Natural Beauty (AONB), National Parks, Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Sites of Special Scientific Interest (SSSI), public open spaces, designated scheduled monuments and public rights of way (PRoW);
- Complete a qualitative assessment of sensitive receptors which are within 1km of the proposed scheme, but more than 600m from the proposed scheme, the existing route bypassed/improved by the scheme, and affected routes; and
- For affected routes which are outside the 1km boundary from the proposed scheme, complete an assessment by estimating the CRTN Basic Noise Level on these roads (the traffic noise level at 10m) with and without the proposed scheme. Count the number of dwellings and other sensitive receptors within 50m of these routes.

12.9.31 Different façades of the same property can experience different changes in traffic noise level depending on their orientation to the noise source. DMRB requires that each of the above comparisons of traffic noise levels is based on the façade which experiences the worst-case change i.e. the largest increase, or, if all façades undergo a decrease, the smallest decrease. Additionally, DMRB requires that the above comparisons of annoyance use the highest levels of annoyance in the first 15 years. For properties which experience an increase in noise due to the proposed scheme, the greatest annoyance is likely to be immediately after proposed scheme opening (see Figure 12.3). For properties which experience a decrease in noise (and also in the Do-Minimum comparison), the greatest annoyance is the steady-state level of annoyance in the long term (see Figure 12.2).

12.9.32 DMRB provides two classifications for the magnitude of the noise impact of a proposed road scheme, as shown in Tables 12.8 and 12.9 (taken from DMRB). These relate to short-term changes in noise levels and long-term changes in noise levels. Paragraph 3.36 of DMRB HD213/11 (Highways Agency, 2011) states HA 205/08 *“provides a method for the classification of the magnitude of impact and the significance of an effect, in order to arrive at an overall level of significance. In terms of road traffic noise, a methodology has not yet been developed to assign significance according to both the value of the resource and the magnitude of an impact. However, the magnitude of traffic noise impact from a road project should be classified into levels of impact in order to assist with the interpretation of the road project. Therefore for the assessment of traffic noise that is covered by [DMRB] a classification is provided for the magnitude of impact.”*

12.9.33 In light of the advice in DMRB set out above, Tables 12.9 and 12.10 will be used to assess changes in operational traffic noise.

Table 12.9: Classification of Magnitude of Noise Impacts – Short-term

Noise change $L_{A10,18h}$ dB	Magnitude of Impact
0	No change
0.1 - 0.9	Negligible
1.0 - 2.9	Minor
3.0 - 4.9	Moderate
≥ 5.0	Major

Table 12.10: Classification of Magnitude of Noise Impacts – Long-term

Noise change $L_{A10,18h}$ dB	Magnitude of Impact
0	No change
0.1 - 2.9	Negligible
3.0 - 4.9	Minor
5.0 - 9.9	Moderate
≥ 10.0	Major

12.9.34 The introduction of the NPPF, NNNPS and NPSE has increased the focus on consideration of absolute noise levels as well as the change in noise levels due to a road scheme. The current version of DMRB HD213/11 (Highways Agency, 2011) only considers the change in noise level when determining the magnitude of impact of a road scheme. In light of the introduction of the NPPF, NNNPS and NPSE a greater consideration of absolute noise levels is considered appropriate, including an acknowledgement that where existing traffic noise levels are high (above the SOAEL as defined below), even small changes in traffic noise in the short term, on road scheme opening (1dB or more), may be significant.

12.9.35 For daytime, the SOAEL is set at 63dB $L_{Aeq,16h}$ (free field) for residential properties based on advice from Highways England. This is broadly equivalent to 68dB $L_{A10,18h}$ (façade) as predicted by CRTN, which is consistent with the daytime trigger level in the Noise Insulation (Amendment) Regulations 1988 (NIR). The LOAEL is set at 50 dB $L_{Aeq,16h}$ (free field), based on the information provided in the Guidelines for Community Noise (WHO, 1999). This is broadly equivalent to 55dB $L_{A10,18h}$ (façade) as predicted by CRTN.

12.9.36 For night-time, the SOAEL is set at 55dB $L_{Aeq,8h}$ (free field) for residential properties. This aligns with the interim night-time outdoor target level provided in the Night Noise Guidelines for Europe. The LOAEL is set at 40dB $L_{Aeq,8h}$ (free field), which is explicitly defined as the LOAEL in the Night Noise Guidelines for Europe (WHO, 2009).

12.9.37 The number of residential properties above the SOAEL will be reported for each assessment scenario, based on the façade with the highest noise level in each scenario. In addition, the discussion of the changes in traffic noise levels between scenarios will take into account the absolute traffic noise levels relative to the SOAEL.

12.9.38 The predicted noise levels at each façade of each residential property will also be used to carry out an initial assessment of the likelihood of any properties qualifying under the NIR for noise mitigation. A complete assessment under the NIR is beyond the scope of the assessment at PCF Stage 3, however, the results presented will provide a useful initial indication of the number of potentially qualifying buildings.

Operational Traffic Vibration

12.9.39 Vibration from traffic can be transmitted through the air or through the ground. Airborne vibration is produced by the engines and exhausts of road vehicles, with dominant frequencies typically in the range of 50 - 100 Hz. Ground borne vibration is produced by the interaction of the vehicle tyres and the road surface with dominant frequencies typically in the range of 8 - 20 Hz. The passage of vehicles over irregularities in the road surface can also be a source of ground borne vibration.

- 12.9.40 Traffic vibration can potentially affect buildings and disturb occupiers. DMRB reports that extensive research on a wide range of buildings has found no evidence of traffic induced ground borne vibration being a source of significant damage to buildings and no evidence that exposure to airborne vibration has caused even minor damage.
- 12.9.41 Airborne vibration is noticed by occupiers more often than ground borne vibration, as it may result in detectable vibrations in building elements such as windows and doors.
- 12.9.42 On the basis of a subjective assessment carried out during the 2015 baseline noise survey, ground borne vibration in the study area has not been identified as a potential issue. DMRB states that perceptible vibration only occurs in rare cases and identifies that the normal use of a building, such as closing doors and operating domestic appliances, can generate similar levels of vibration to that from traffic in most circumstances.
- 12.9.43 It is a requirement of new highway constructions that the highway surface be smooth and free from any discontinuities. Paragraph A5.26 of DMRB HD213/11 (Highways Agency, 2011) states, in relation to ground borne vibration: "*Such vibrations are unlikely to be important when considering disturbance from new roads and an assessment will only be necessary in exceptional circumstances*". Hence, no impacts or effects from traffic induced ground borne vibration due to the passage of vehicles over irregularities in the road are anticipated as associated with the proposed scheme.
- 12.9.44 To assess the magnitude of the impact of traffic induced airborne vibration on residents, a parameter is needed which reflects a person's subjective rating of vibration disturbance. DMRB recommends the use of the $L_{A10,18h}$. The relationship between the $L_{A10,18h}$ and annoyance due to vibration is similar to that for annoyance due to steady state traffic noise, as shown in Figure 12.2, except that the percentage of people bothered by vibration is lower. For a given level of noise exposure, the percentage of people bothered very much or quite a lot by vibration is 10% lower than the corresponding figure for annoyance due to traffic noise. Below 58 dB(A) the percentage of people bothered by traffic induced vibration is assumed to be zero.
- 12.9.45 The potential for vibration impacts is limited to the immediate vicinity of a road, and the relationship between annoyance due to vibration and traffic noise level is based on properties located within 40m of a road. Therefore, at each property within 40m of the existing A38, the proposed scheme and other affected routes within the 1km area, and at which traffic noise levels are predicted to be 58dB, $L_{A10,18h}$ or more, the percentage of people likely to be bothered very much or quite a lot by vibration will be calculated, based on the annoyance levels in Figure 12.2, with a reduction of 10%.

Significance of Effect

- 12.9.46 The significance of effect is a function of the value or sensitivity of the receptor and the magnitude of the impact, combined with professional judgement which takes into account a range of other factors including:
- The absolute noise levels e.g. are existing ambient levels already very high or very low;
 - The characteristics of the existing noise environment;
 - The number of affected receptors;
 - The duration of the impact; and
 - For non-residential receptors' the nature, times of use and design of the receptor.
- 12.9.47 Table 12.11 details the sensitivity of receptors, whilst Table 12.12 presents the initial significance of effect, based on the magnitude of impact (as detailed in the sections above) and the sensitivity of receptors (as per Table 12.11), after which the additional factors detailed above are applied to reach a conclusion on the significance of effect.

Table 12.11: Sensitivity of Receptors

Sensitivity/ Value of Receptor	Description
Very High	Concert halls/ theatres, specialist vibration sensitive equipment
High	Residential properties, educational buildings, medical facilities
Medium	Places of worship, public open spaces
Low	Public rights of way, commercial and industrial premises

Table 12.12: Significance of Effect

Magnitude of Impact	Value/ Sensitivity of Receptor			
	Very High	High	Medium	Low
Major	Very Large	Large	Large	Moderate
Moderate	Large	Moderate	Moderate	Slight
Minor	Moderate	Slight	Slight	Neutral
Negligible	Slight	Slight	Neutral	Neutral
No Change	Neutral	Neutral	Neutral	Neutral

12.9.48 With respect to the significance of effect outcomes from Table 12.12, neutral and slight adverse (or beneficial) effects are generally considered to be not significant, whereas moderate, large and very large adverse (or beneficial) effects are generally considered to be significant.

12.10 Assumptions and Limitations

12.10.1 The following assumptions and/ or limitations are anticipated with regard to the noise and vibration impact assessment:

- As detailed in Section 6.10, Highways England will maintain close communication with DCiC regarding Clean Air Zone developments and take this into account with regard to traffic flows as applicable during the preparation of the Environmental Statement.
- Information on existing road surfacing is dependent on the accuracy of the data in the Highways England HAPMS database. Information on future resurfacing plans in the area will be based on the current maintenance proposals. Changes to the re-surfacing plans would affect the outcome of the noise assessment, in particular at Little Eaton junction.
- The Highways England HAPMS database contains details of one existing noise barrier on the northbound A38 off slip at the A6 junction - no height information was available, therefore, a height of 2m is assumed based on a visual inspection. Paper drawings of the original noise barrier locations at Bardens Drive/ Ferrers Way and Keddleston Road have been provided by the maintenance contractor, therefore, the location of these existing barriers will be estimated in the noise model. None of these existing barriers are critical to the outcome of the noise assessment.
- In order to quantify the likely vibration impact from construction works in accordance with the methods and guidance in BS 5228-2 (BSI, 2014), it is necessary to define the various activities to be undertaken and the equipment to be used, based upon the anticipated construction works programme. It is anticipated that during PCF Stage 3 details regarding construction activities and plant requirements will be available, therefore, a quantitative assessment of potential construction vibration is proposed.
- Road surfacing corrections as follows will be assumed during the assessment:
 - Standard hot rolled asphalt speed <75km/hr -1dB, speed ≥75km/hr 0dB;
 - Existing low noise thin surfacing speed <75km/hr -1dB, speed ≥75km/hr -2.5dB;
 - New low noise thin surfacing speed <75km/hr -1dB, speed ≥75km/hr -3.5dB.
- Where low noise surfacing only exists on part of the carriageway, the low noise surface correction will be applied if the majority of the carriageway has a low noise surface i.e. 2 lanes out of 3, or if there are only 2 lanes if the low noise surface is on the inside lane where a higher volume of traffic is concentrated.

- In the absence of detailed information, all other roads included in the detailed quantitative noise modelling will be assumed to be standard hot rolled asphalt in all scenarios. The road surface correction for standard hot rolled asphalt surfacing is -1dB at speeds < 75km/hr and 0 dB at speeds ≥75km/hr.
- Consideration of the inclusion within the assessment of roads with a flow below the CRTN low flow cut of 1,000 vehicles (18hr AAWT) will be made at PCF Stage 3.
- 10m x 10m grid to be used to produce noise change contour plots at height of 4m above ground.

12.11 References

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British Standards Institution (2014) BS 5228-1:2009+A1:2014. Code of Practice for Noise and Vibration Control on Construction and Open Sites.

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WHO (2009) WHO Night Noise Guidelines for Europe.

13 PEOPLE AND COMMUNITIES

13.1 Introduction

13.1.1 In accordance with IAN 125/15 (Highways England, 2015), the Environmental Statement will consider proposed scheme impacts upon people and communities and will take into account guidance provided in the DMRB Volume 11 Section 3 Part 6: Land Use (Highways Agency, 2001); Part 8: Pedestrians, Cyclists, Equestrians and Community Effects (Highways Agency, 1993); and Part 9: Vehicle Travellers (Highways Agency, 1993).

13.2 Summary of Relevant Policy

13.2.1 National, regional and local policies relevant to the assessment of people and communities are summarised in Table 13.1.

Table 13.1: National, Regional and Local Policies

Policy	Relevance
National Networks National Policy Statement (NNNPS) (DfT, 2014)	The NNNPS provides planning guidance for promoters of NSIPs on the road and rail networks, and the basis for the examination by the Examining Authority and decisions by the Secretary of State. Paragraphs 5.165, 5.166 and 5.168 of the NNNPS are relevant to this assessment.
National Planning Policy Framework (NPPF) (Department for Communities and Local Government, 2012)	The NPPF contains policies that are applicable to both travellers and community and private assets. Section 4 of the NPPF refers to the promotion of sustainable transport and the following sections of the NPPF set out objectives relevant to community and private assets (including land use): <ul style="list-style-type: none"> - Building a strong and competitive economy (Chapter 1); - Supporting a prosperous rural economy (Chapter 3); - Promoting healthy communities (Chapter 8); - Protecting Green Belt land (Chapter 9); and - Conserving and enhancing the natural environment (Chapter 11).
National Practice Policy Guidance (NPPG)	NPPG provides guidance on health and well-being, open spaces, sports and recreational facilities, public rights of way and local green space relevant to this assessment.
The Highways England Delivery Plan 2017-2018 (Highways England, 2017)	The Highways England Delivery Plan sets out a commitment to “ <i>address the unnecessary barriers our network creates, expand people’s travel choices, enhance and improve facilities, and make every day journeys as easy as possible.</i> ”
Safeguarding our Soils: A Strategy for England (DEFRA, 2009)	The Strategy aims to ensure soils are managed sustainably and degradation threats tackled successfully by 2030 to improve the quality of England’s soils and safeguard their ability to provide essential services for future generations.
Natural England’s TIN 49 Agricultural Land Classification: protecting the best and most versatile agricultural land (Natural England, 2012)	The technical note sets out the government policy to protect agricultural land.
City of Derby Local Plan Review (CDLPR) (DCiC, 2006)	The following policies relating to community, private assets and land use are relevant to this assessment: <ul style="list-style-type: none"> - Policy E1 Green Belt; - Policy E2 Green wedges; - Policy E8 Enhancing the natural environment; - Policy E16 Development close to open land.
Erewash Core	The following policies from the Core Strategy relevant to this assessment:

Policy	Relevance
Strategy (EBC, 2014)	<ul style="list-style-type: none"> - Policy 3: Green Belt; - Policy 12: Local services and healthy lifestyles; - Policy 16: Green infrastructure, parks and open space.
Derby City Council Right of Way Improvement Plan (RoWIP) (2014 - 2017) (DCiC, 2014)	The Derby City Council RoWIP provides guidance to help identify where improvement in the network can be made and encourage greater use of PRoW.
Derby Local Transport Plan 3 (LTP3) (2011 - 2027) (DCiC, 2011)	The Derby LTP3 sets out the long-term transport strategy for the Derby area, and highlights the importance of A38 Derby junction enhancements. It cites the proposed scheme as a 'Key Priority' to unlocking land for development in and around the city.
The Derbyshire RoWIP 2007 - 2012 (DCC, 2007) (including the Statement of Action 2013 - 2017 (DCC, 2013))	<p>The Derbyshire RoWIP considers:</p> <ul style="list-style-type: none"> - The extent to which local PRoW meet the present and likely future needs of the public; - The opportunities provided by local PRoW for exercise, open air recreation and the enjoyment of the authority's area together with the use of the network by local people as a means to access workplaces, schools and other local facilities; - The accessibility of local PRoW to blind or partially sighted people and those with limited mobility or other impairments.

13.3 NMUs and Vehicle Travellers

Study Area

- 13.3.1 The study area varies depending on the effect or type of resource being assessed. For the assessment of effects on non-motorised users (NMUs), the study area will include the DCO application boundary and all NMU facilities and land in community use within 500m of the proposed scheme.
- 13.3.2 For vehicle traveller views, the study area extends to the visual envelope which represents the extent of views from, as well as to, the A38 (Kingsway junction to Little Eaton junction) and an approximate 2km wide buffer zone either side of the centreline of the trunk road. The visual envelope is defined in DMRB Volume 11 Section 3 Part 5 Annex III (Highways Agency, 1993) as the area of land from which there is a view of any part of the proposed works, its structures or the traffic which will use it.

Baseline Conditions

Non-Motorised Users

- 13.3.3 There is a designated bridleway north of the Little Eaton junction that runs from Little Eaton to Breadsall. The existing bridleway passes under the A38 along the boundary of the proposed scheme footprint. The bridleway would not be impacted by the proposed scheme. There are no other bridleways within 500m of the proposed scheme.
- 13.3.4 There are a number of National Cycle Routes (NCR) and Regional Routes (RR) in close proximity to Kingsway junction, namely NCR54, NCR68 and RR66. The three cycle routes follow the same route along a disused railway north of Mackworth Park to meet the A38 just south of Kingsbury junction. From here the NCRs continue north parallel to the northbound carriageway of A38, before crossing under the carriageway on Brackensdale Avenue and continuing north parallel with the southbound carriageway. NCR54 and NCR68 turn east towards the city centre with RR66 continuing north parallel to the A38, crossing the A52 Ashbourne Road on a zebra crossing at Markeaton junction. NCR 66 continues north before leaving the A38 via the slip road, to continue west along Kedleston Road towards Allestree.

- 13.3.5 To the east of Kingsway junction there is a designated cycle route running south along the A5111 Kingsway to Uttoxeter New Road. There are a number of recommended un-marked on-road cycle routes promoted by DCiC in close proximity to Kingsway and Markeaton junctions which provide links to Mackworth and Markeaton Parks.
- 13.3.6 At Markeaton junction is furnished with pedestrian facilities on both sides of the carriageway and there is an uncontrolled pedestrian crossing on the A52 west arm, a zebra crossing on the A52 east arm, and signal controlled crossings on both the A38 arms of the junction.
- 13.3.7 The top of the entry slip to the A38 southbound is not signalised therefore all crossing facilities are uncontrolled between the various traffic islands. The top of the exit slip from the A38 northbound is signal controlled and cycle track users are crossed via two controlled crossing points.
- 13.3.8 An existing footbridge north of Markeaton junction provides pedestrian access across the A38 into Markeaton Park following the route of the 'Bonnie Prince Charlie Walk' National Trail.
- 13.3.9 NCR 54 runs along the A61 south of Little Eaton junction, crossing the A38 to the west of the junction and continuing north along the B6179. There is also a short section of footway designated for cyclists and pedestrians extending westwards from the A38 roundabout, along the northern edge of the A38 and continuing along Ford Lane. The Derwent Heritage Valley Way, the route of an 89km walking route, crosses under the A38 within the boundary of the proposed scheme, approximately 85m west of the Midland Mainline Railway. An additional three PRow converge on the road network close to the existing junction.
- 13.3.10 DCiC will update the PRow Definitive map by March 2018. Therefore, the PRow baseline data will be reviewed and updated during the preparation of the Environmental Statement.

Motorised Vehicles

- 13.3.11 The main travellers on the A38 are motorised vehicles travelling between Birmingham and Derby, as well as users moving between Derby and the M1 junction 28. The two-way Annual Average Daily Traffic (AADT) flows along the A38 have been recorded as being approximately 57,000 vehicles a day in 2015 (between Markeaton junction and Brackensdale Avenue, north of Kingsway junction). The 2015 AADT flows on the A38 over the River Derwent bridge to the west of Little Eaton junction have been recorded as approximately 46,000 vehicles per day.
- 13.3.12 Long delays along the A38 result in increased journey times and the fear of accidents. Slow moving traffic especially on the approach to congested junctions means that drivers have to brake suddenly which could potentially cause accidents. Drivers may also fear accidents occurring as a result of the impatience displayed by other drivers. It should be noted that although the situation on the A38 has improved somewhat after the construction of the 'Pinch Point'¹⁴ schemes at Markeaton junction and Little Eaton junction that were completed in 2015; the problems have not been resolved. Travellers often avoid the heavily trafficked A38 as journey times are still long, thus increasing driver stress which can be manifested in drivers taking risks. The existing A38 displays clear and visible signage that is in keeping with Highways England standards.
- 13.3.13 The proposed scheme passes through a combination of urban and rural areas. Driver's view along the A38 between Kingsway junction and Markeaton junction comprises a mixture of open grass verges, mature trees and shrubs. On the approach to Markeaton junction, the landscape opens out to views of residential and commercial properties with Markeaton Park positioned to the west of Markeaton junction. For most of the route between Markeaton

¹⁴ Pinch Point: The pinch point programme was designed by Highways England to deliver smaller scale improvement schemes, to help stimulate growth in the local economy and relieve congestion and/or improve safety.

junction and Little Eaton junction, drivers' views are restricted to the corridors of the A38, although there are intermittent views of nearby residential areas.

Additional Survey Requirements

13.3.14 An NMU (pedestrian, cyclist, equestrian or disabled user) survey was carried out in August 2014 which will inform the environmental assessment. The NMU survey included NMU facilities in the vicinity of Kingsway junction, Markeaton junction and Little Eaton junction. The requirement for supplementary NMU surveys is currently being reviewed.

Value of the Environmental and Resource Receptors

13.3.15 Resources comprise the routes within the study area as used by NMU and vehicle travellers, whilst the receptors are the travellers who would potentially be impacted by the proposed scheme. There is no standard guidance on applying a value to resources and receptors for this topic. Professional judgement has been used to define criteria to aid in applying a value to routes for pedestrians, cyclist and equestrians as set out in Table 13.2. Examples from within the study area have been provided, taking into account potential changes to the baseline conditions. No distinction in value will be applied to vehicle travellers due to the inherent variability among people's susceptibility to driver stress.

Table 13.2: Sensitivity of NMU Routes to Temporary Disruption or Permanent Change

Sensitivity	Description	Examples in Study Area, (Preliminary Valuation)*
Very High	Key routes used by pedestrians, cyclists and other NMUs. Routes record very high numbers of NMU journeys and/ or connect communities with employment land uses and other services with a direct and convenient NMU route. Routes are important since they offer opportunities to meet sustainable transport and public health objectives through active travel modes rather than private car use. Any interruption of these would inconvenience many people and could cause people to switch from active modes to private car use. Routes regularly used by vulnerable travellers such as the elderly, school children and people with disabilities, who may be disproportionately affected by small changes in the baseline due to potentially different needs.	Brackensdale Avenue underbridge (KW) Pedestrian Crossing and cycle tracks at Markeaton junction (M)
High	National or regional trails and routes likely to be used for recreation that record high use. The sensitivity of these routes is judged to be high because of the number of people affected and effects upon regional leisure. Crossing points on busy roads for NMU (roads with more than 8,000 vehicles per day) which may not currently record high use, but for which limited alternatives are available. These points are sensitive because disruption to these may affect the convenience or safety of journeys for NMU.	NCR54/NCR68 (KW, LE) RR66 (KW, M, Brackensdale Ave/ Kingsway Park Close intersect non-designated footway and cycle track (KW) Markeaton Park (M) Markeaton Park Footbridge (M) Bonnie Prince Charles Walk (National Trail) (M) NR672 (LE) Derwent Valley Heritage Way (LE)
Medium	Public rights of way and other routes close to communities which are used mainly for recreational purposes (for example dog walking), but for which alternative routes can be taken. These routes are likely to link to a wider network of routes to provide options for longer, recreational journeys. It is likely that direct and efficient journeys are not the priority for the majority of people using these routes so they would be more tolerant of disruptions and diversions. However, people	Kedleston Road (M) Breadsall FP No. 1, 2, 3, 4, 6, 24 Breadsall FP No.7, 23 and Little Eaton FP No. 17 Breadsall BW No. 18 and Little Eaton BW No. 29

Sensitivity	Description	Examples in Study Area, (Preliminary Valuation)*
	are likely to be sensitive to changes to the amenity and character of the overall route.	
Low	Routes which have fallen into disuse such as through past severance or which are scarcely used because they do not currently offer a meaningful route for either utility or recreational purposes. Whilst these routes would not be sensitive in terms of disruption from development proposals, they may present opportunities for enhancement if existing barriers or poor amenity can be overcome through development proposals.	Uncontrolled pedestrian crossings (KW)

*The following abbreviations illustrate which junction the route relates to, KW=Kingsway junction, M=Markeaton junction, LE=Little Eaton junction

Potential Impacts and Effects

Summary of Mitigation Proposals

13.3.16 The proposed scheme design aims to include at least the level of NMU provision that exists at present with enhancement provisions where appropriate and reasonable. NMUs requirements will be confirmed during PCF Stage 3 through consultation with appropriate stakeholders and reported in the Environmental Statement.

Summary of PCF Stage 2 Assessment

13.3.17 An assessment of NMUs and vehicle travellers has been undertaken at PCF Stage 2 – a summary of the key findings is provided below:

- **Pedestrians & Cyclists:** The assessment indicated that 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. During operation of the proposed scheme there would be potential moderate beneficial effects from improvements to existing NMUs facilities that could encourage more use due to improved amenity/ convenience or perception of safety.
- **Views from the Road:** Most people are considered to be tolerant to interruptions to views from the road as associated with construction works (e.g. low sensitivity). It is considered that during proposed scheme construction phase, the unavoidable adverse impacts on views from the road of medium magnitude at each junction would result in a potential effect of minor adverse significance (temporary). During proposed scheme operation, views from the road are anticipated to become more restricted at Kingsway junction and Markeaton junction (with drivers experiencing intermittent/ open views). Vehicle travellers using the Little Eaton junction are anticipated to experience a potential minor beneficial effect as the A38 would travel over embankment with open views of the surrounding area. Given the low sensitivity of vehicle travellers to views from the road, it is considered that during proposed scheme operation, potential effects would be negligible at Kingsway junction and Markeaton junction and a potential minor beneficial effect at Little Eaton junction.
- **Driver Stress:** Proposed scheme construction has the potential to contribute to driver stress where it leads to additional congestion and unreliability of journey times (moderate magnitude of impact on driver stress). It is considered that potential construction effects on driver stress along the proposed scheme would be low adverse (temporary). The proposed scheme design aims to reduce delays and congestion and is therefore considered that the proposed scheme would reduce frustration, fear of accidents and uncertainty of the route. It is therefore anticipated the proposed scheme operation would have a potential large beneficial effect on driver stress at each junction.

Proposed Scope of Assessment

13.3.18 A simple assessment of the proposed scheme on the effects on all travellers will be undertaken taking into consideration receptors within the proposed scheme extent that have

the potential to be impacted. There are numerous provisions for cyclists and pedestrians along the proposed scheme extent and these travellers may be impacted to a certain degree in terms of severance and an increase in journey lengths. No significant adverse effects on equestrians are anticipated as a result of the proposed scheme, as there are no equestrian facilities within the boundary of the proposed scheme and only a single bridleway within 500m of the works and which would not be impacted. It is therefore proposed that equestrians are scoped out of the assessment.

13.3.19 The assessment will identify the factors and effects relating to vehicle travellers. Driver stress and views from the road of the proposed scheme will be assessed taking into account the proposed scheme design and landscape mitigation provisions.

Proposed Assessment Methodology including Significance

13.3.20 The proposed methodology for the assessment of effects on all travellers will be undertaken in accordance with guidance in HA/200/08 (Highways Agency, 2008) and IAN 125/09 (Highways Agency, 2009) which merges the former chapters for 'Pedestrians, Cyclists, Equestrians and Community Effects' (DMRB Volume 11 Section 3 Part 9 - Highways Agency, 1993) and 'Vehicle Travellers' (DMRB Volume 11 Section 3 Part 8 - Highways Agency, 1993) into a combined 'Effects on All Travellers' section.

Non-Motorised Users

13.3.21 The potential for effects on NMUs will be undertaken in accordance with the relevant sections of DMRB Volume 11 Section 3 Part 8 (Highways Agency, 1993). The assessment will concentrate on changes in amenity and journey length. Amenity is defined as the relative pleasantness of a journey. It is therefore concerned with changes in the degree and duration of people's exposure to traffic (safety, noise, dust and air quality) and the impact of the proposed scheme plus any visual intrusion associated with the proposed scheme.

13.3.22 A judgement as to the overall significance of effect on pedestrians and cyclists will be made in accordance with Table 13.3.

Table 13.3: Significance Criteria for NMUs

Significance of Effect	Description
Large adverse	Direct impact on, or severance of, a route used by pedestrians, cyclists or equestrians, resulting in a substantial and permanent loss of amenity and use (NMU facilities of high to very high sensitivity). Increases of 30% or more in traffic flows along a route to increase volumes to over 16,000 vehicles per day which would be likely to deter use by most NMU, particularly road cyclists.
Moderate adverse	Introduction of new need to cross a highway for a previously uninterrupted route, or the introduction of new highway in close proximity to a route which was previously tranquil in character. The changes would not cause a significant extension of journey (<500m), but would cause loss of amenity/ convenience or substantially alter the character of the route. Increases of 30% or more in traffic flow along route to increase volumes to over 8,000 vehicles per day such that would be likely to deter use by some NMU, particularly road cyclists, or cause noticeably more intimidating conditions. Temporary severance to routes that are used by high numbers of pedestrians, cyclists or equestrians (during construction activities).
Minor adverse	No direct permanent impact, but some loss of amenity. Temporary disruption to routes or short-term loss of amenity (e.g. short-term disruption and diversions to NMU routes during construction activities).
No change	No significant change to route used by pedestrians, cyclists and/ or equestrians.
Minor beneficial	An improved at-grade crossing facility or other provision on an existing route that improves the amenity or convenience for NMU, for example the introduction of a traffic island or pelican crossing.
Moderate beneficial	Introduction of a new crossing or other facility on an existing NMU route that is likely to encourage more use due to improved amenity/ convenience or

Significance of Effect	Description
	perception of safety, for example a new cycle lane, grade separated crossing or replacement of grass verge with pavement. Reductions in traffic to below 8,000 vehicles per day or by more than 30% such that conditions for NMU such as road cyclists are less intimidating.
Large beneficial	Provision of a permanent new route useful for NMU where previously there was no route or access was very hazardous or perceived to be hazardous such that NMU did not regularly use the route. Reductions in traffic to below the threshold of 8,000 vehicles per day or by more than 60% such that NMU are more encouraged to take the route, particularly road cyclists.

Vehicle Travellers

13.3.23 A simple level assessment of vehicle travellers will be undertaken based on guidance in DMRB Volume 11 Part 9 Vehicle Travellers (Highways Agency, 1993). The proposed assessment methodology considers the following:

- **Views from the road:** In assessing the views of vehicle travellers it is essential to understand their sensitivity to changes in the landscape and views from the road. This relates both to the speed at which the landscape is viewed and also the ability of the drivers to concentrate on the road while travelling, particularly during the construction period. There are no established criteria to define the level of impact that a proposed road scheme has on travellers views, as such the significance of effects will be defined using professional judgement; and
- **Driver Stress:** Driver stress can be defined as the adverse mental and physiological effects experienced by a driver while travelling along a road network. Driver stress has main components that are considered in the assessment:
 - Frustration;
 - Fear of potential accidents;
 - Uncertainty relating to the route; and
 - Traveller care.

13.3.24 The level of driver stress is dependent upon the driver's experience and driving skills, knowledge of the route being taken, health and temperament. Factors to consider include:

- Lane flow;
- Travel speed;
- Junction frequency;
- Road surface characteristics; and
- Road layout and geometry.

13.3.25 For the purposes of the assessment, relative levels of value (sensitivity) will not be assigned to the receptors (vehicle travellers). For the purposes of the assessment, all drivers will be considered to have the same sensitivity in relation to drivers' stress.

13.3.26 As an indicator of driver stress/ frustration, DMRB tabulates the relationship between average peak hourly flow per lane and average journey speed, in order to describe the magnitude of drivers' stress on a three point scale: low; moderate and high (refer to Table 2 in DMRB Volume 11, Part 9 Vehicle Travellers - Highways Agency, 1993).

13.3.27 In accordance with DMRB, an assessment of driver stress is made for the worst year in the first 15 years after proposed scheme opening (the design year). The fear of accidents can become particularly acute in adverse weather conditions when spray from vehicles reduces visibility. Adverse weather conditions coupled with the limited sight distances caused by the scale and mass of HGVs, makes driving and overtaking more stressful and risky, and therefore increases the fear of accidents. Road uncertainty can increase stress and is caused primarily by signing that is inadequate for purpose.

13.3.28 The assessment of driver stress will also consider traveller care and whether sufficient traveller care facilities are available in close proximity to the proposed scheme. A judgement as to the overall significance of effect for drivers' stress will then be made in accordance with Table 13.4.

Table 13.4: Drivers' Stress Significance of Effect

Significance of Effect	Description
Very large beneficial or adverse	Where there would be a very major increase/ reduction in driver stress resulting from the proposed scheme compared to the Do-Minimum.
Large beneficial or adverse	Where there is a major increase/ reduction in driver stress resulting from the proposed scheme compared to the Do-Minimum.
Moderate beneficial or adverse	Where there is a moderate increase/ reduction in driver stress resulting from the proposed scheme compared to Do-Minimum
Slight beneficial or adverse	Where there is a minor increase/ reduction in driver stress resulting from the proposed scheme compared to the base year and Do-Minimum.
Neutral	Where no effects on driver stress is anticipated from the proposed scheme, or where the beneficial and adverse effects are considered balanced.

13.4 Community and Private Assets

Introduction

13.4.1 This section of the Environmental Statement will consider potential effects on community and private assets resulting from the proposed scheme. The assessment will take into consideration the guidance as outlined in DMRB Volume 11 Section 3 Part 8: Pedestrians Cyclist and Community Effects (Community Effects only for this section) (Highways Agency, 1993) and Part 6: Land Use (Highways Agency, 2001). The overall aim of the assessment will be to define existing land use patterns, and assess the effects of the proposed scheme on prevailing land use. Access to community facilities and services and other destinations also forms part of the assessment.

Study Area

13.4.2 The study area varies depending on the effect or type of resource being assessed. For the assessment of effects on land use, the study area will extend to 250m from the DCO application boundary to capture land directly impacted by the proposed scheme.

13.4.3 A study area for community effects is not defined in the DMRB. Therefore, a buffer zone of 250m from the proposed scheme is considered suitable. This will encompass potential community facilities in the vicinity of the A38 and any desire lines associated with them.

Baseline Conditions

13.4.4 This section describes all the agricultural and non-agricultural land uses of relevance to the proposed scheme.

Kingsway and Markeaton

13.4.5 There are a number of public open spaces in the vicinity of the junctions, namely Mackworth Park, open space adjacent to Greenwich Drive South and Markeaton Park.

13.4.6 Land use around Kingsway junction and Markeaton junction is of an urban nature. The existing Kingsway junction lies to the west of the Kingsway retail park which includes a Sainsbury's superstore and other retail units and north-west of Kingsbury Hospital. Land to the west of the A38, between Kingsway junction and Markeaton junction is primarily residential. Brackensdale Infant School is located immediately west of the current access road/ slip road from the A38 onto Brackensdale Avenue. Esso petrol station and McDonalds

fast food outlet are located on the south-west side of Markeaton junction. Land to the east of the A38, between Brackensdale Avenue and Markeaton junction is also primarily residential. Located south of Markeaton junction is a Territorial Army base.

- 13.4.7 North of Markeaton junction along the east side of the A38 are a number of residential properties, behind which is the Royal School for the Deaf and the University of Derby, Markeaton Street. Other potentially sensitive land uses include a number of local wildlife sites including Bramble Brook, the Kingsway roundabout and along the disused railway line at Kingsway junction, Markeaton Brook and the site to the south of the A38 immediately west of the disused railway.

Little Eaton

- 13.4.8 At Little Eaton junction there is a garden centre located to the west of the A38, a Starbucks, Mobile Home Park and Fourways, the location of the haulage business, all located to the north-west of the existing roundabout. The A38 together with the Midland Mainline railway and the River Derwent Valley separates the villages of Breadsall to the east and Allestree to the west.
- 13.4.9 Little Eaton junction lies east of the Derwent Valley Mills World Heritage Site (refer to Chapter 7: Cultural Heritage), which comprises the River Derwent Valley associated mills and other structures and buildings of historical importance, though there are no specific buildings of heritage importance in this section of the World Heritage Site intersected by the A38. East of Little Eaton junction is designated green belt¹⁵.
- 13.4.10 A number of land parcels in private ownership, including those used for agricultural purposes, would be impacted by the proposed scheme at Little Eaton junction.

Additional Survey Requirements

- 13.4.11 Some land owners in the vicinity of the proposed scheme would experience land loss. Those who use their land for agriculture were interviewed in 2015 in order to assess potential impacts upon farm viability. A further survey will be needed to capture any proposed scheme design changes since PCF Stage 2, taking into account land required for flood storage, construction compounds, and ecological mitigation land etc.
- 13.4.12 No other specific land use surveys are proposed other than on-going consultation with potentially affected land owners.

Value of the Environmental and Resource Receptors

- 13.4.13 For the purposes of this assessment and in the absence of guidance within DMRB, the sensitivity/ value of resources and receptors will be based on professional judgement and in accordance with Table 13.5.

¹⁵ Green belts are areas of open spaces to prevent urban sprawl and protect the character of rural communities, to protect forestry and agricultural activities and to provide wildlife habitat.

Table 13.5: Sensitivity Criteria - Community and Private Assets

Sensitivity	Description
High	<ul style="list-style-type: none"> · Residential, commercial or industrial buildings; · Buildings used by the community e.g. schools, community halls; · Community land that attracts users nationally e.g. national parks; · Designated public open space; and/ or · Religious sites and cemeteries.
Medium	<ul style="list-style-type: none"> · Residential, commercial or industrial land e.g. gardens; and/ or · Land used by the community on a regional scale, e.g. country parks, forests and other land managed in such a way as to attract visitors from a regional catchment.
Low	<ul style="list-style-type: none"> · Derelict or unoccupied buildings; and/ or · Locally used community land e.g. local parks and playing fields.

Potential Impacts and Effects

Summary of Mitigation Proposals

13.4.14 Environmental considerations have been taken into account during the development of the proposed scheme design, specifically aiming to minimise building demolition requirements along the proposed scheme alignment, and minimise land-take requirements outside of the existing highway boundary. Due to the permanent loss of public open space (at Kingsway junction and Markeaton junction), there would be a need to provide public open space exchange land.

Summary of PCF Stage 2 Assessment

13.4.15 An assessment of community and private assets was undertaken at PCF Stage 2 in-line with guidance provided in DMRB Volume 11 Section 3 Part 6 (Highways England, 2001) and Volume 11, Section 3, Part 8 (Highways England, 1993) – this identified the following potential residual effects resulting from the proposed scheme:

- **Loss of land used by the community:** The proposed scheme would result in a slight adverse effect due to loss of approximately 1,900m² of designated public open space (at Kingsway junction and Markeaton junction), reducing to a neutral effect with the provision of public open space exchange land;
- **Effects on development land:** No areas covered by current planning applications would be directly impacted by the proposed scheme;
- **Community facilities and severance:** Closure of existing accesses to/ from the A38 would have potential slight adverse effects (severance), except for the Ford Lane closure which is considered to constitute a potential moderate adverse effect in terms of community severance. During proposed scheme operation, the proposed scheme would potentially deliver an overall 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, although only one of these sites is engaged in commercial agriculture (i.e. turf production). If alternative access arrangements can be provided for the turf production site, residual effects would be reduced to non-significant levels.

Proposed Scope of Assessment

13.4.16 It is proposed that a detailed assessment is undertaken on the effects of the proposed scheme on community and private assets. This is due to potential adverse effects resulting from the loss of private property and community land. In accordance with DMRB Volume 11 Section 3 Part 6 (Highways Agency, 2001) and Volume 11 Section 3 Part 8 (Highways Agency, 1993), the assessment will consider the following aspects:

- Demolition of private property;
- Loss of land used by the community;
- Effects on development land;
- Community severance; and
- Effects on agricultural land and effects on individual farm units.

Proposed Assessment Methodology including Significance

Demolition of Private Property and Land Take

13.4.17 The assessment will be based on DMRB Volume 11 Section 3 Part 6 (Land Use) (Highways Agency, 2001) and identify residential, commercial, industrial and other properties at risk of demolition and/ or land-take. There is no specific guidance within DMRB in terms of significance and so the significance of effects will be assessed using the criteria in Table 13.6, which has been developed using professional judgement.

Table 13.6: Significance of Direct Impacts on Private Property (Residential and Non-residential) and Associated Land Take

Significance of Effect	Criteria
Large Adverse	Residential: Demolition of the whole of the property would affect the quality of life in the neighbourhood such that the loss of housing cannot be replaced in the locality. Non-Residential: Acquisition of the whole or a substantial portion of property and associated buildings, which may lead to closure of the business and a loss to the community which cannot be replaced in the locality.
Moderate Adverse	Residential: The land-take/ acquisition is sufficiently large so as to diminish the quality of life in the neighbourhood, although some replacement can be made in the locality. Non-Residential: Acquisition is sufficiently large so as to result in increased management/ operational difficulties for the business, or replacement site is in the locality.
Slight Adverse	Residential: Part of the curtilage is acquired, resulting in a decreased enjoyment of the residence, which would diminish the quality of life in the neighbourhood, although replacement could be made in the locality. Non-Residential: A small portion of the property/ land is acquired resulting in, at most, some slight management/operational difficulties for the business.

Community Land

13.4.18 DMRB Volume 11 Section 3 Part 6 (Land Use) (Highways Agency, 2001) sets out the methodology for assessing the loss of land used by the community. The assessment relates to direct impacts on common land, town or village green, allotments, and public open space. However, there is no specific guidance within DMRB in terms of significance. As such, the significance of effects will be assessed using the criteria in Table 13.7 which has been developed using professional judgement.

Table 13.7: Significance of Direct Impacts on Private Property (Residential and Non-residential) and Associated Land Take

Significance of Effect	Criteria
Large Adverse	Acquisition of the majority of land used by the community which cannot be replaced within the locality.
Moderate Adverse	Community land take is sufficiently large (although not representing the majority) so as to diminish the quality of life in the neighbourhood.

Significance of Effect	Criteria
Slight Adverse	A small portion of community land take is required which would affect the enjoyment of land used by the community, which would therefore diminish the quality of life in the neighbourhood.
Negligible	Negligible community land take with little or no overall impact on the enjoyment of the land and therefore quality of life in the neighbourhood.

13.4.19 There is also a need to consider community severance – this is concerned with the role of roads as a 'barrier' between different parts of a community, and the resulting distortion of journey patterns. Guidance on severance assessment is contained within DMRB Volume 11 Section 3 Part 8 (pedestrians, cyclists, equestrians and community effects) (Highways Agency, 1993). DMRB defines community severance as '*the separation of residents from facilities and services they use within their community caused by new or improved roads or by changes in traffic flows*'.

13.4.20 Significance criteria for community severance has been developed based upon guidance contained in DMRB Volume 11 Section 3 Part 8 (Highways Agency, 1993), and is set out in Table 13.8. New severance caused by increases in traffic levels is described on a three point scale: slight, moderate or severe. Slight increases in severance are likely to be experienced where journey patterns are generally maintained, but there would be some hindrance to movement such as an increase in journey length by up to 250m. Moderate effects would be expected where some residents, particularly children and elderly people, are likely to be dissuaded from making trips. Other trips will be made longer or less attractive. For severe effects, people are likely to be deterred from making trips to an extent sufficient to induce a re-organisation of their habits. Alternatively, considerable hindrance will be caused to people trying to make their existing journeys.

13.4.21 Relief of severance as a result of reduction in traffic levels will also be described using the terms slight, moderate or severe. A negligible impact is defined as less than 10% change in traffic levels.

Table 13.8: Significance of Community Severance Effects

Significance of Effect	Criteria
Large Beneficial/ Adverse	Crossing a road which has a change in traffic levels of >60%; or Length of walk journeys changed by over 500 m; or Change in walk experience - for example, increased severance if three or more new bridges or subways are traversed instead of three previous convenient at-grade crossings, or relief of severance if three or more at grade crossings are traversed instead of three or more previous bridges/ subways.
Moderate Beneficial/ Adverse	Crossing a road which has a change in traffic levels of 30 - 60%; or Length of journeys changed by 250m – 500m; or Change in walk experience - for example, increased severance if two new bridges are traversed instead of two previous convenient at-grade crossings or relief of severance if two at grade crossings are traversed instead of two previous bridges.
Slight Beneficial/ Adverse	Crossing a road which has a change in traffic levels of 10-30%; or Length of journeys changed by up to 250m; or Change in journey experience - for example, increased severance if a new bridge is traversed instead of a previous convenient at-grade crossing, or relief of severance if an at grade crossing is traversed instead of a previous bridge.
Neutral	Crossing a road which has a change in traffic levels of <10%; or Length of journeys not materially changed.

Loss of Development Land

13.4.22 DMRB Volume 11 Section 3 Part 6 (Land Use) ((Highways Agency, 2001) sets out the methodology for assessing the effects on development land. This relates to the impact of a proposed scheme on unimplemented planning permissions and development allocations in the Local Planning Authority development designations. There is no specific guidance within

DMRB in terms of significance of effects; therefore, this will be assessed qualitatively using professional judgement. Significant effects would include a permanent direct impact on a site allocated for development or a site with current planning permission.

Agricultural Land Use

13.4.23 The land use planning context for the consideration of agricultural land is provided primarily by national policies for development involving agricultural land set out in the NPPF (Department for Communities and Local Government, 2012). This policy advice is predicated upon principles of sustainable development and requires land use decision makers to take account of the need to protect, and make prudent use of natural resources. Consequently, it is necessary to have regard to the qualities of agricultural land involved in development proposals.

13.4.24 Where it is demonstrated that significant development of agricultural land is necessary, and the options of utilising previously developed land or poorer quality land are not available or inappropriate, decision makers are required to have regard to the economic and other benefits of the best and most versatile agricultural land (ALC Grades 1, 2 and 3a). Impacts associated with the loss of best and most versatile agricultural land will be assessed in accordance with Chapter 10: Geology and Soils, whilst the community and private assets assessment will only consider potential impacts upon farm holding viability.

13.4.25 With regard to farm holdings, impacts relate primarily to the loss of land and other key farm infrastructure (dwellings, buildings and other structures such as irrigation reservoirs and slurry pits), the fragmentation of land from the residually farmed area and disruption to existing farm operations from, for example, changes to access arrangements or conflicts of noise and dust from construction activities with sensitive land uses. The magnitude of potential impacts on farm holdings will be determined as detailed in Table 13.9.

Table 13.9: Magnitude of Impacts on Farm Holdings

Impact Magnitude	Land Take	Severance	Infrastructure	Disruption
High	20%+ of all land farmed	No access to severed land	Direct loss of farm dwelling, building or structure	Disruption discontinues land use or enterprise
Medium	10-20% of all land farmed	Access available to severed land via the public highway	Loss of or damage to infrastructure affecting land use	Disruption necessitates change to scale or nature of land use or enterprise
Low	5-10% of all land farmed	Access available to severed land via private way	Infrastructure loss/damage does not affect land use	Disruption does not affect land use or enterprise
Negligible	5% or less of all land farmed	No new severance	No impact on farm infrastructure	No disruption to land use or enterprise

13.4.26 Farm holding sensitivity is a reflection of the size of an affected holding, with larger holdings generally more able to accommodate change than smaller ones, and the nature of the particular agricultural activity. Complex activities, or ones dependent upon particular infrastructure or regular access to land, for example dairying, intensive livestock and horticulture, have a high degree of sensitivity to development impacts. General arable and grazing enterprises normally have a degree of operational flexibility which can adapt to changing circumstances. Non-commercial activities are deemed to have a low sensitivity. Given the complex nature of farm sensitivity, professional judgement has been applied. Thereafter, the significance of potential farm holding effects will be determined in accordance with Table 13.10.

Table 13.10: Farm Holding Significance Matrix

Sensitivity of Receptor	Magnitude of Impact			
	High	Medium	Low	Negligible
High	Major	Moderate	Moderate	Minor
Medium	Moderate	Moderate	Moderate/ minor	Minor
Low	Moderate	Moderate/ minor	Minor	Negligible
Negligible	Minor	Minor	Negligible	Negligible

13.5 Assumptions and Limitations

13.5.1 The PCF Stage 2 assessment did not include the sites required for flood storage, construction compounds, soil storage, and ecological mitigation areas. Further studies and surveys are proposed in 2018 which may identify new features with the potential to be affected by the proposed scheme.

13.6 References

DEFRA (2009) Safeguarding our Soils: A Strategy for England.

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14 ROAD DRAINAGE AND WATER ENVIRONMENT

14.1 Introduction

14.1.1 Road construction has the potential to affect the water environment due to runoff from impermeable surfaces, which increases in proportion to increases in road surface area. Runoff from road surfaces has the potential to transport a range of contaminants from the road surface into drainage channels and receiving watercourses or groundwater. The construction of structures within floodplains and on or over watercourses and groundwater catchments may also alter the hydrological/ hydrogeological regime of the area.

14.1.2 This chapter of the Environmental Statement will assess potential impacts and effects of the proposed scheme on the quality and quantity of existing ground and surface waters. It will also consider the potential effect of the proposed scheme on flooding and floodplains and the physical alteration of the hydrological/ hydrogeological regime.

14.2 Summary of Relevant Policy

14.2.1 Policy relevant to the assessment of road drainage and the water environment are summarised in Table 14.1.

Table 14.1: Relevant Legislation and National, Regional and Local Policies

Policy/ Legislation	Relevance to Proposed Scheme
National legislation	<ul style="list-style-type: none"> • Water Framework Directive (WFD) (2000/60/EC); • Groundwater Daughter Directive (2006/118/EC) Environmental Permitting Regulations (which amends the Water Resources Act 1991, and the Groundwater Regulations); • The Environment Protection Act 1990; • Environment Act 1995; • Flood Risk (England and Wales) Regulations 2009; • Flood and Water Management Act 2010; • Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 (as amended 2015); • Water Resources Act 1991; • Water Act 2014; • Groundwater (England and Wales) Regulations 2009; • Land Drainage Acts 1991 and 1994; and • Highways Act 1980. • Control of Pollution (Applications, Appeals and Registers) Regulations 1996 (SI1996/2971); • Control of Pollution (Consents for Discharge) (Secretary of State Functions) Regulations 1989.
National Networks National Policy Statement (NNNPS) (DfT, 2014)	<p>Paragraphs 5.90 - 5.115 and 5.219 - 5.231 specifically apply to flood risk and water quality respectively, and how impacts on the water environment affect the decision making process. The NNNPS states that when determining an application, the Secretary of State should be satisfied that flood risk will not be increased elsewhere and should only consider development appropriate in areas at risk of flooding where it can be demonstrated that:</p> <ul style="list-style-type: none"> • The most vulnerable development is located in areas of lowest flood risk unless there are overriding reasons to prefer a different location; • Development is appropriately flood resilient and resistant, including safe access and escape routes where required; • That any residual risk can be safely managed, including by emergency planning; and • That priority is given to the use of sustainable drainage systems (SuDs). <p>With regard to water quality, the Secretary of State should be satisfied that a proposal has had regard to the River Basin Management Plans and the requirements of the Water Framework Directive (WFD) (including Article 4.7) and its daughter directives, including those on priority substances and groundwater.</p>

<p>The National Planning Policy Framework (NPPF) (Department for Communities and Local Government, 2012)</p>	<p>This contains a number of statements with reference to road drainage and water, the most relevant of which are:</p> <ul style="list-style-type: none"> · Paragraph 100 – 104 under ‘Meeting the challenge of climate change, flooding and coastal change’; · Paragraph 146 under ‘Facilitating the sustainable use of minerals’; and · Paragraph 156 under ‘Local Plans’ <p>The NPPF is supported by National Planning Practice Guidance (NPPG) which provides guidance for local planning authorities on assessing the significance of water environment effects of proposed developments. The guidance highlights that adequate water and wastewater infrastructure is needed to support sustainable development.</p>
<p>Derby City Local Plan – Part 1 Core Strategy (DCiC, 2017)</p>	<p>The Derby City Local Plan - Part 1 Core Strategy was adopted by the DCiC on Wednesday 25 January 2017 and forms the statutory development plan for the City. Relevant DCiC commitments and policies which relate specifically to flood management and SuDS include:</p> <ul style="list-style-type: none"> · Policy CP2 - Adapting to Climate Change: (k) to (p) – Flood Risk and Water Management and 5.2.17 to 5.2.22 – Flood Risk and Sustainable Drainage; and · Policy AC7 – The River Derwent Corridor: 6.7.4; and AC8 – Our City Our River.
<p>Erewash Core Strategy (EBC, 2014)</p>	<p>The Erewash Core Strategy sets out the strategy for development across the Borough between 2011 and 2028 guiding development to specific areas. Policy 1 Climate Change – paras 5) to 9) relate to Flood Risk and Sustainable Drainage.</p>

14.2.2 The above policies identify the need for site-specific flood risk assessments (FRAs) to inform the assessment of flood risk from all types of flooding to and from the proposed scheme at each of the three junctions. They require the FRAs to consider the vulnerability of users of the proposed infrastructure, to consider the impacts of climate change and to confirm whether flood risk is increased elsewhere. The policies also identify measures to mitigate flood risk through sustainable surface water management.

14.2.3 With regard to water quality and water resources, the policies require consideration of the impacts of pollution from development on the water environment by assessing water bodies, protected areas under the Water Framework Directive (WFD, 2000/60/EC) safeguard zones, water protection zones, Source Protection Zones around potable groundwater abstractions and ecological sites.

14.3 The Study Area

14.3.1 The study area will cover the three junctions that comprise the proposed scheme, including the proposed scheme footprint and an area up to 1km from the proposed scheme provisional DCO application boundary. Water features located outside the study area but immediately within its surroundings have been included where it appears that there is hydraulic connectivity to features within the study area and the possibility that they could be significantly affected. Areas required for construction and for construction compounds are included within the DCO application boundary.

14.4 Baseline Conditions

14.4.1 The scoping stage has been informed by a desk-based assessment of available resources. These resources have included: the previous work undertaken for appraisal of options, FRAs, WFD assessments, qualitative and quantitative water quality assessment undertaken on preliminary designs at PCF Stage 2; publically available data (largely web-based sources such as the Environment Agency – What’s In Your Backyard, Catchment Data Explorer and Flood Map for Planning, MAGIC Maps and published reports); and data from water and sediment sampling undertaken at Markeaton junction.

14.4.2 The study area lies within the Humber River Basin District, Derwent Derbyshire management catchment, as set out within the Humber River Basin Management Plan (RBMP) (Environment Agency, 2015).

- 14.4.3 Surface and groundwater resources in the vicinity of the proposed scheme are shown in Figures 14.1 to 14.5 and described in the sections below.

Kingsway Junction

Surface Water

- 14.4.4 The main surface water feature at Kingsway junction is Bramble Brook and its associated streams (refer to Figure 14.1). The brook flows towards the east through the existing Kingsway junction, passing under the A38 and junction in culverts. Downstream of the junction, the brook passes into a further culvert before emerging to flow at the ground surface. Bramble Brook has no WFD waterbody identification (ID). In WFD terms, it is therefore considered to be part of the receiving waterbody, which in this case is Markeaton Brook, within the reach from Mackworth Brook to the River Derwent (WFD ID GB104028052).

- 14.4.5 As Bramble Brook is an ordinary watercourse, the Environment Agency holds no water quality data for the brook itself. In the RBMP, the receiving watercourse is classified as being of moderate ecological status and good chemical status in 2016, with objectives for these to be good by 2027. The existing junction is not contained within a surface water safeguard zone.

Groundwater

- 14.4.6 Kingsway junction overlies bedrock classified as a Secondary B aquifer status, with a small area of superficial deposits classified as Secondary A aquifer. These deposits comprise alluvium associated with Bramble Brook. Kingsway junction is not contained within a Source Protection Zone, is not within a Nitrate Vulnerable Zone and there are no records of groundwater abstractions within the catchment of the junction.

Flood Risk

- 14.4.7 Environment Agency flood risk mapping (February 2018) indicates a very low risk of river flooding from Bramble Brook at the site. However, as an 'Ordinary Watercourse', the brook comes under local authority jurisdiction and is not mapped accurately for river flooding by the Environment Agency. DCiC local knowledge and modelling have indicated that there are flood risk and storage issues at Kingsway junction. Environment Agency maps suggest a high risk of surface water flooding in places.

- 14.4.8 An initial FRA has been undertaken during PCF Stage 2 in accordance with the NPPF and DMRB to determine the risks of flooding to the proposed scheme, the risks of flooding that could result from the proposed scheme, and whether flood mitigation/ storage measures are required. The FRA indicates that flood storage areas will be required at Kingsway junction as part of the proposed scheme.

Markeaton Junction

Surface Water

- 14.4.9 At Markeaton junction the following surface water features are located in the vicinity of the proposed scheme: Markeaton Brook; Markeaton Lake and the downstream Mill Pond (refer to Figure 14.2).

- 14.4.10 Markeaton Brook forms part of the heavily modified Markeaton Brook system. It flows from a north-west to south-east direction. The brook passes under the A38 approximately 650m north of the proposed junction improvement works and continues eastwards where it eventually discharges into Mill Fleam located outside the study area. The section of Markeaton Brook that passes beneath the A38 closest to Markeaton junction is classified as an ordinary watercourse and not classified under the WFD. However, further to the north-east, another channel of Markeaton Brook is classified as a 'main river'. In the RBMP (Environment Agency, 2015), Markeaton Brook from source to Mackworth Brook is classified as having moderate ecological and good chemical status in 2016, with an objective of achieving good overall and ecological potential status by 2027.

Groundwater

14.4.11 Strata underlying Markeaton junction are classified as Secondary B aquifer status, overlain by superficial deposits classified as Secondary A aquifer. The superficial aquifer relates to the alluvial sediment associated with the Markeaton Brook. The Markeaton junction is not located within a groundwater Source Protection Zone, or a groundwater Nitrate Vulnerable Zone.

Flood Risk

14.4.12 Environment Agency flood risk mapping (February 2018) 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. The junction is also at a low risk of surface water flooding.

14.4.13 An initial FRA has been undertaken during PCF Stage 2 in accordance with the NPPF and DMRB to determine the risk of flooding to the proposed scheme, the risk of flooding that could result from the proposed scheme and to identify appropriate flood risk mitigation measures. The FRA established that there would be a low overall risk of flooding as a result of the proposed scheme. Without appropriate mitigation, surface water flood risk from the proposed works to adjacent areas would increase. Specific measures to mitigate for surface water flooding have, therefore, been incorporated into the proposed scheme design as part of the drainage strategy.

Little Eaton Junction

Surface Water

14.4.14 At Little Eaton surface watercourses in the vicinity of the proposed scheme include: the River Derwent (a main river) and floodplain; Dam Brook (an ordinary watercourse which flows north westwards from Breadsall); and Boosemoor Brook (an ordinary watercourse which flows westwards from Breadsall) (refer to Figure 14.3). The River Derwent flows southwards passing under the A38 to the west of Little Eaton junction. The confluence of Dam Brook and Boosemoor Brook is approximately 250m to the east of the junction.

14.4.15 The reach of the River Derwent in the vicinity of Little Eaton junction is part of the WFD water body with ID GB104028053240 - 'River Derwent from Bottle Brook to River Trent'. This waterbody is classified as being of good chemical and moderate ecological status in 2016. The WFD objectives for this waterbody are the same as the current classification i.e. no improvement is expected, but nor should there be any deterioration.

14.4.16 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. In WFD terms, it is therefore considered to be part of the River Derwent (Highways England, 2016). The brook flows in a westerly direction entering the study area to the east of Breadsall. It then continues to flow in parallel to Brookside Road and the A608, passing through Breadsall before it confluent with Boosemoor Brook approximately 100m east of Little Eaton junction. Dam Brook then flows south and passes beneath Alfreton Road (A61) approximately 250m south of Little Eaton junction. As detailed in Chapter 9: Biodiversity, Dam Brook has been known in the past to support a small population of white-clawed crayfish.

14.4.17 Boosemoor Brook is classified as an Ordinary watercourse and enters the study area to the north-east of Little Eaton junction. The brook flows in a south-westerly direction crossing Rectory Lane in the north of Breadsall, flowing through the field network before confluent with Dam Brook as noted above (see Figure 14.3). The confluence of Boosemoor Brook with Dam Brook is adjacent to the proposed scheme site boundary.

14.4.18 Records indicate that there are four surface water abstractions located along the River Derwent in the vicinity of the proposed scheme at Little Eaton junction. These relate to the spray irrigation system by Talbot Turf Supplies, whilst approximately 600m north of the junction there are two licences held by Severn Trent Water (STW) for potable water abstractions from the River Derwent.

14.4.19 The existing junction is contained within a surface water safeguard zone, being protected from pesticides.

Groundwater

14.4.20 Little Eaton junction overlies bedrock classified as Secondary A aquifer status, overlain by superficial deposits classified as secondary A aquifer. The superficial aquifer relates to the alluvial sediment associated with the River Derwent and its terraces. The Little Eaton junction is located within a Total Catchment Groundwater Source Protection Zone. The A38 to the west of the junction passes through both Outer and Inner groundwater Source Protection Zones (SPZ). These run parallel to the River Derwent and are associated with now disused filter tunnels that were historically used for drinking water abstraction.

14.4.21 Records indicate there is one groundwater abstraction located less than 250m from the proposed scheme. This relates to an abstraction of groundwater for horticultural watering (licence number: 03/28/46/0046) from Derby Garden Centre north of Little Eaton junction. Records show a groundwater abstraction 260m east of the junction for general farming and domestic use (licence number: 03/28/46/0006).

Flood Risk

14.4.22 The Environment Agency Flood maps (February 2018) indicate 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. Land to the west of the junction is shown on the maps to be at high risk of river flooding, while land to the east is at low risk. Land to the south is generally mapped as being at high risk of surface water flooding, while land to the east is low to high risk of surface water flooding.

14.4.23 There are known flooding events on Dam Brook where it flows through Breadsall.

14.4.24 An initial FRA has been undertaken during PCF Stage 2 in accordance with the NPPF and the DMRB to determine the risks of flooding to the proposed scheme, the risks of flooding that could result from the proposed scheme and whether flood mitigation measures would be required. The FRA indicates that the proposed scheme would result in a loss of floodplain which needs to be considered as part of the proposed scheme design.

14.5 Additional Survey Requirements

14.5.1 No further field surveys are planned to support the water resource impact assessment or FRAs.

14.6 Value of the Environmental and Resource Receptors

14.6.1 The value (importance) of potentially affected water environment features has been established using a 4-point scale (low, medium, high, very high), as per Table A4.3 in DMRB Volume 11 Section 3 Part 10 (HD 45/09) (Highways England, 2009).

14.6.2 The value of water resources features along the proposed scheme are as follows:

- **Kingsway Junction:** Bramble Brook is considered to be a medium sensitivity receptor. Groundwater in the vicinity of the junction is considered to be a medium sensitivity receptor. The Bramble Brook floodplain is considered to be of high sensitivity;
- **Markeaton Junction:** The Markeaton Brook system is considered to be a high sensitivity receptor. Groundwater in the vicinity of the junction is considered a medium sensitivity receptor;
- **Little Eaton Junction:** The River Derwent, Dam Brook and surface water abstractions are considered to be high sensitivity receptors. Groundwater in the vicinity of the junction is considered to be a medium sensitivity receptor with groundwater abstractions

considered to be high sensitivity. The River Derwent floodplain is considered to be of high sensitivity.

14.7 Potential Impacts and Effects

14.7.1 Potential effects on the water environment during the proposed scheme construction phase include:

- Risks to the water environment due to:
 - Excavation and the subsequent deposition of soils, sediment, or other construction materials causing pollution;
 - Spillage of fuels or other contaminating liquids causing pollution;
 - Temporary physical modifications interrupting the natural passage of surface and sub-surface flow; and
 - Mobilisation of contaminants following disturbance of contaminated ground or groundwater, or through uncontrolled site runoff.
- Risks to groundwater associated with construction of cuttings including:
 - Contamination risk to the underlying aquifers;
 - Temporary dewatering during cutting construction at Markeaton, leading to changes to groundwater flow; and
 - Release or leaching of substances (e.g. cement or grout) used during construction which may negatively impact groundwater quality.
- Potential increase in flood risk due to:
 - Construction work taking place within the floodplain;
 - Phased construction work may temporarily impact on the function of the floodplain;
 - Temporary and/ or permanent deposition of excavated material may impact on existing flood flow paths or flood storage areas;
 - During the construction process, operations within the floodplain could result in an increase in flood risk elsewhere.

14.7.2 Potential effects during the proposed scheme operational phase include:

- Effects on surface water arising from pollutants e.g. oils from fuel combustion/ accidental spillages and salts or herbicides from road maintenance;
- Direct physical and hydromorphological impacts from watercourse crossings and other hydraulically linked surface water features with potential for direct effects on the biological, chemical and physical WFD parameters for both surface waters and groundwater bodies;
- Permanent dewatering of the cutting at Markeaton, which has the potential to depress groundwater levels;
- Pumping of surface water and groundwater required for the operation of the cutting at Markeaton, which could cause changes in flows;
- Discharges from new sections of highway that have the potential to increase flood risk for receptors downstream; and
- Any road structures, highways cuttings, embankments or other landscaping features constructed in the floodplain which have the potential to alter flood flows and increase flood risk.

Summary of Mitigation Proposals

Construction Phase Mitigation Measures

14.7.3 The proposed scheme construction contractor would prepare and implement a CEMP which would include a range of measures to mitigate potential impacts as associated with water resources. Such measures would accord with legal compliance and good practice guidance when working with or around sensitive water resources. The CEMP would include relevant

water environment mitigation measures as taken from applicable Guidance for Pollution preventions (GPP) documents (<http://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/>).

- 14.7.4 During the proposed scheme construction phase, any discharges to surface water would require discharge consent. The conditions attached to any such consent, and limits on oils, suspended solids and other pollutants, would need to be adhered to by the selected construction contractor. Works undertaken above or within 8m of a Main river would also require an environmental permit from the Environment Agency; works that would affect an Ordinary water course would require consent from the Lead Local Flood Authority (LLFA).
- 14.7.5 At Kingsway junction and Little Eaton junction, there would be a requirement to protect construction plant, materials and construction workers from impacts due to flooding. Such measures would include, for example, locating construction compounds and storage areas outside of areas susceptible to flooding and having in place emergency flood response procedures. The implementation of such measures would also avoid any potential pollution of local watercourses by construction materials in the event of flooding.

Operational Phase Mitigation Measures

- 14.7.6 The proposed scheme design requires the diversion of Bramble Brook at Kingsway junction and Dam Brook at Little Eaton junction. Outline channel design requirements for these watercourse diversions will be confirmed during PCF Stage 3, but would ensure that existing flow conditions within the channels are maintained and not significantly impacted by such diversions such that there would be no significant adverse impacts on channel flooding characteristics. The ecological function of these channels (refer to Chapter 9: Biodiversity) will be taken into account during the design of these channel diversions.
- 14.7.7 The PCF Stage 2 FRAs indicate that flood storage provisions would be needed at Kingsway junction and potentially at Little Eaton junction. Additional modelling will be undertaken and flood storage provisions confirmed during PCF Stage 3 in consultation with DCiC and the Environment Agency as applicable, taking into account future climate change.
- 14.7.8 The proposed scheme would be provided with an appropriate surface water management system. The drainage for the proposed scheme would be designed and constructed in compliance with DMRB and the Manual of Contract Document for Highways Works (MCHW). The proposed drainage strategy will be confirmed during PCF Stage 3 in consultation with the Environment Agency, DCiC, DCC, STW and other statutory agencies, taking into account the findings of the FRAs prepared for the three junctions. The proposed drainage system will include the use of SuDS to enable attenuation of surface water flows due to increases in the impermeable area as a result of the construction of the proposed scheme. Balancing ponds provided for the attenuation of flows would also provide some water quality benefits with a reduction in suspended solids and soluble metals as the surface water runoff passes through the ponds.
- 14.7.9 Proposed scheme operation would not include any activities that are likely to generate contaminants that could pose significant risk to controlled waters. However, there would be potential for environmental risks as associated with spillages due to road accidents or faulty vehicles. To mitigate the impacts on controlled waters during the proposed scheme operation stage, the highway drainage system as described above would incorporate appropriate measures to minimise impacts associated with accidents and spillages. In addition, any spillages following road accidents would be routinely managed by Highways England who are responsible for the maintenance of trunk road assets with the Area 7 East Midlands Region.

Summary of PCF Stage 2 Assessment

- 14.7.10 The PCF Stage 2 assessment indicated that with adherence to best practice construction procedures and provision of an appropriate surface water management system, most water resource effects would not be significant. The exceptions to this would be potential effects

associated with surface water flow and flood risk at Kingsway junction and Little Eaton junction – as such further mitigation in the form of flood storage areas was proposed which indicated that such measures have the potential to mitigate effects to non-significant levels. These workable solutions will need to be further developed during PCF Stage 3.

14.8 Proposed Scope of Assessment

14.8.1 Baseline water resources within the study area will be presented within the Environmental Statement, together with details of the potential impacts and effects as associated with proposed scheme construction and operation. The methodology outlined in Section 14.9 will be followed to highlight areas of potential significance which constitutes a detailed assessment as defined by DMRB.

14.9 Proposed Assessment Methodology including Significance

14.9.1 The water quality and drainage assessment will be undertaken with regard to advice and methodologies set out in Department of Transport TAG Unit A3, Environmental Impact Assessment (Chapter 10 presents 'Impacts on the Water Environment' (Department of Transport, January 2014)), and DMRB Volume 11 Section 3 Part 10 HD 45/09 (Highways Agency, 2009). The assessment will consider potential impacts on water quality, impacts on flood risk and impacts on groundwater resources during proposed scheme construction and operation. The potential for operational impacts will be quantitatively using the Highways Agency Water Risk Assessment Tool (HAWRAT).

14.9.2 The Environmental Statement will refer to the results of FRAs to be undertaken for each junction and to the Water Framework Directive (WFD) compliance assessments to be prepared for Kingsway junction and Little Eaton junction as applicable.

14.9.3 With regard to operational impacts, the pollutants of main concern are vehicular in origin, and there is a general correlation between traffic volume and overall runoff quality. The operational impact assessment will thus use the Average Annual Daily Traffic flows (AADTs) for the proposed scheme as generated by the traffic modellers.

14.9.4 An assessment of the potential ecological impacts of routine runoff on surface waters is required in order to determine whether there is an environmental risk and if pollution mitigation measures are needed in specific circumstances. The HAWRAT has been developed for this purpose and the methodology behind it has been derived from a collaborative research programme undertaken by Highways England and Environment Agency which investigated the effects of routine road runoff on receiving waters and their ecology. An assessment of the potential impact to water resources from routine runoff will be undertaken using Method A from HD 45/09 (Highways Agency, 2009).

14.9.5 Other quantitative assessments which can be carried out using the methodologies within DMRB include Method C for impacts on groundwater and Method D for the assessment of potential impacts from spillages. For this scheme the Method C impact assessment for groundwater is not required as drainage from the road would be discharged to surface watercourses.

Evaluation of Receptors

14.9.6 The importance of the potentially affected water environment features will be established on the basis of a 4-point scale as described in para. 14.6.1.

Identification and Assessment of Potential Impacts

14.9.7 Methodologies described in DMRB Volume 11 Section 3 Part 10 HD 45/09 (Highways Agency, 2009) will be used in order to assess the likely concentrations of certain pollutants associated with routine road runoff in watercourses receiving road drainage, and to determine

the risk of a pollution incident as a result of accidental spillages. The results of the FRAs will be used to determine risks as associated with flooding, and the need for mitigation measures.

14.9.8 The magnitude of water resource impacts will be assigned taking into account impact avoidance measures embedded in the proposed scheme design (e.g. the drainage design and any flood storage areas) as well as standard management practices that will be implemented during proposed scheme construction and operation.

14.9.9 The magnitude of identified impacts will be determined on the basis of a 7-point scale (major adverse, moderate adverse, minor adverse, negligible, minor beneficial, moderate beneficial, major beneficial) as per per Table A4.4 in DMRB Volume 11 Section 3 Part 10 HD 45/09 (Highways Agency, 2009).

Identification of Significant Effects

14.9.10 The significance of potential water resource effects will be obtained by combining the importance of the attribute (as per para. 14.6.1) and the magnitude of the impact (as per para. 14.9.9). Effects will be graded such that their relative significance is indicated, in accordance with the matrix presented in Table A4.5 in DMRB Volume 11 Section 3 Part 10 HD 45/09 (Highways Agency, 2009).

14.10 Assumptions and Limitations

14.10.1 An intrusive ground investigation along the route of the proposed scheme was undertaken in 2016 – results from the investigation will be taken into account during PCF Stage 3 to further clarify risks to controlled waters, as well as off-site receptors and to further develop the mitigation proposals as detailed herein.

14.10.2 The proposed drainage design strategy is subject to review and ongoing development during PCF Stage 3 – this includes confirmation of highway discharge rates and whether Bramble Brook through Kingsway junction would be culverted or part open watercourse. The proposed drainage strategy will be further developed in consultation with the Environment Agency, DCiC, DCC, STW and other statutory agencies, taking into account the findings of the FRAs to be prepared for the three junctions as referred to herein.

14.10.3 As indicated in Section 14.9, the flood risk modelling undertaken during PCF Stage 2 aimed to demonstrate workable flood mitigation solutions at Kingsway junction and Little Eaton junction. Further modelling will be required during PCF Stage 3 in consultation with the appropriate agencies to optimise the location and design of proposed mitigation measures.

14.11 References

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Section 3, Part 10, HD 45/09.

15 CLIMATE

15.1 Introduction

15.1.1 This section presents the outcomes of the scoping assessment for the climate related topics. To align with the requirements of the EIA Regulations 2017 and the NNNPS (DfT, 2014) this section has been divided into two separate aspects:

- **Greenhouse gas (GHG) impact assessment:** effects on climate change of GHG emissions arising from the proposed scheme, including how the project will affect the ability of Government to meet its carbon reduction plan targets (in accordance with NNNPS para. 5.17); and
- **Climate change resilience assessment:** the resilience of the proposed scheme to climate change impacts, including how the project will take account of the projected impacts of climate change (in accordance with NNNPS para. 4.40 and the EIA Regulations).

15.1.2 For purposes of clarity, this section addresses each of these climate topic assessments separately.

15.1.3 As stated in the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5) Synthesis Report (IPCC, 2014), mitigation (i.e. reducing GHG emissions) and adaptation (i.e. responding to climate change impacts) are complementary approaches to reducing risks of climate change impacts over different timescales. Mitigation, in the short-term and medium-term, can substantially reduce climate change impacts in the latter decades of the 21st century. Benefits from adaptation can be realised now to address current risks, and can be realised in the future to address emerging risks. Innovation and investments in environmentally sound infrastructure and technologies can both reduce lifecycle GHG emissions and enhance resilience to climate change.

15.2 Study Area

GHG Impact Assessment

15.2.1 The study area covers all direct GHG emissions arising from activities undertaken within the proposed scheme boundary during the construction, operation and maintenance of the proposed scheme. It also includes indirect emissions embedded within the construction materials arising as a result of the energy used for their production as well as emissions arising from the transportation of materials and waste to and from the site.

15.2.2 The environmental impact associated with GHG emissions is a national and global issue. Consequently, the potential significance of the proposed scheme's lifecycle GHG emissions will be assessed by comparing the estimated GHG emissions from the proposed scheme against the reduction targets defined in the Climate Change Act (2008) and associated carbon budgets.

Climate Change Resilience assessment

15.2.3 The study area for the resilience assessment is the proposed scheme boundary i.e. it covers all assets and infrastructure which constitute the proposed scheme.

Planning Policy Context

15.2.4 The following national and local planning policies are of relevance and will be considered during the GHG impact assessment and the climate change resilience assessment:

- Climate Change Act 2008;
- NNNPS (DfT, 2014);

- EIA Directive 2014/52/EU;
- Carbon Budget Orders (2009);
- England Biodiversity Strategy (DEFRA, 2011);
- NPPF and associated PPG (Department for Communities and Local Government, 2012);
- Derby City Local Plan Part 1 – Core Strategy – CP 2 ‘Responding to Climate Change’ (DCiC, 2017).

15.3 Baseline Conditions

GHG Impact Assessment

- 15.3.1 The baseline for the GHG impact assessment will be a “business as usual” scenario whereby the proposed scheme does not go ahead. As such, there are associated GHG emissions from use and maintenance of the existing road. In addition, surrounding greenfield land will be acting as a GHG emissions sink. Accordingly, the baseline will include an estimation of the size of this GHG emissions sink so that effects associated with expected land use changes due to the proposed scheme will be included in the assessment.

Climate Change Resilience Assessment

- 15.3.2 A review of available and relevant information sources will be undertaken to establish existing and future baseline data and current understanding with regards to climate change and extreme weather risks.

Existing Baseline

- 15.3.3 The Local Climate Impacts Profile for Derby (LCLIP) (DCiC, 2011) analyses the impact that climate change and severe weather has had on DCiC and its related services and activities. As recorded in the LCLIP, between 2000 and 2010, a total of 60 severe weather events negatively impacted Derby, with each of these having varying degrees of consequence. The most commonly record events were associated with flooding and heavy rains, followed by high winds, storms, freezing temperatures and heavy snow. Evidence suggests that the number of severe weather events is increasing, with intense rainfall events occurring more frequently over the LCLIP analysis period. Heavy snow and strong winds are also noted as severe weather events known to cause disruption.
- 15.3.4 Specifically relating to highways, flooding, snow and ice have been the biggest weather-related issues recorded over the ten year LCLIP analysis period. Flooding on major roads into the city on numerous occasions has resulted in accessibility problems and has created extra workload for Derbyshire Fire and Rescue by, for example, rescuing stranded motorists. Storms have resulted in a large numbers of fallen trees and freezing temperatures and heavy snow has caused disruption and road accidents.
- 15.3.5 The Met Office baseline climate averages for Derby show that for the period 1981 - 2010, annual daily temperatures were 13.4°C, with July being the warmest month on average (mean daily temperature of 21.3°C) and January being the coldest month on average (mean daily temperature of 6.6°C). Mean annual rainfall levels were 709.4mm, with October being the wettest months on average (71.2mm of rainfall on average for the month) and February being the driest month on average (47.2mm of rainfall on average for the month).
- 15.3.6 A review of available and relevant information sources will be undertaken to establish baseline data and current understanding with regards to climate change and extreme weather risks.

Future Baseline

- 15.3.7 UK Climate Projections (2009) (UKCP09) projections for the East Midlands suggest that, by the 2050s (2040 - 2069), the region will experience an increase in summer mean temperature of around 2.5°C, and of winter temperatures of around 2.2°C compared to the 1961 - 90

baseline records. For the same time period, winter mean precipitation is expected to increase by up to 14% and summer mean precipitation is expected to decrease by 16%.

- 15.3.8 The proposed scheme area may already be susceptible to surface water run-off and flooding, and the impacts of high temperature, high winds and other weather types. These will be assessed as part of the study. The project, specifically the construction of the proposed scheme, has the potential to increase surface water run-off during periods of heavy precipitation as there will a reduced amount of bare land, soil and vegetation ground coverage.

15.4 Potential Impacts and Mitigation

GHG Impact Assessment

- 15.4.1 The proposed scope of the assessment is GHG emissions arising from the construction, operation, maintenance and use of the proposed scheme. End of life assessment of the demolition phase is considered out of scope for this proposed scheme. To identify the key contributing GHG emission sources and/ or activities associated with the proposed scheme, a lifecycle approach has been taken in this scoping assessment. This approach is consistent with the principles set out in BS EN 15804 (BSI, 2012) and PAS 2080 (PAS, 2016), IEMA guidance (IEMA, 2017) and Chapter 4 of the TAG Unit A3 Environmental Impact Appraisal (DfT, 2015). The key anticipated GHG emission sources are set out in Table 15.1.

Table 15.1: Key Anticipated GHG Emissions Sources

Lifecycle Stage	Activity	Primary Emission Sources
Pre-construction stage	Enabling works	Vehicles and fuel use for generators on site Workers travelling to and from the site of the proposed scheme
	Land clearance	Loss of carbon sink
Product stage	Raw material extraction and manufacturing of products required to build the proposed scheme	Embodied GHG emissions
Construction process stage	On-site construction activity Transport of construction materials (where these are not included in embodied GHG emissions) Transport of construction workers Disposal of any waste generated by the construction processes	GHG emissions from vehicle use GHG emissions from disposal of waste.
Operation stage	Operation of associated road and tunnel lighting, overhead gantries etc. Maintenance including re-surfacing	GHG emissions from energy and fuel use Embodied emissions associated with re-surfacing materials
Use stage	Vehicle journeys	GHG emissions per vehicle km Energy consumption

- 15.4.2 Mitigation measures will be identified to reduce GHG emissions across the lifecycle of the proposed scheme. Mitigating measures to be considered will include:

- CEMP prepared and implemented by the construction contractor to include a range of best practice construction measures;
- Specification of alternative materials with lower embodied GHG emissions; and
- Low carbon design specifications such as energy-efficient lighting and durable construction materials to reduce maintenance and replacement cycles.

15.4.3 The final selection of the most appropriate mitigation measures will be detailed as part of the lifecycle GHG impact assessment in the Environmental Statement for the proposed scheme. This will include GHG emission mitigation measures concerning construction and operation of the proposed scheme.

Climate Change Resilience Assessment

15.4.4 The proposed scheme area may be vulnerable to a range of climate change risks, including an increased frequency and severity of prolonged and/ or heavy precipitation events, prolonged droughts and heatwaves, a greater frequency of very hot days, and an increased risk of storms. Warmer temperatures may also mean that the risks associated with ice and snow will decrease over time, but retaining the ability to respond to these events will remain important.

15.4.5 The proposed scheme itself may also be vulnerable to a range of climate change risks. These include, but are not limited to:

- Material deterioration due to high temperatures and also from periods of heavy rainfall;
- Flood risk on the network and damage to drainage systems;
- Storm damage to structures and other assets;
- Inaccessible network during extreme weather events; and
- Reduced pavement and asset deterioration (over time) from less exposure to freezing, snow and ice.

15.4.6 A number of general mitigation and adaptation measures will be considered to address these risks, many of which will have been identified by other parts of the EIA and the proposed scheme design. The assessment will assume that the proposed scheme will be designed to be resilient to impacts arising from current weather events and climatic conditions, and designed in accordance with current planning, design and engineering practices and codes. The assessment will also identify and take into account the existing resilience measures for each risk either already in place or in development for infrastructure and assets.

15.5 Assessment Methodology

GHG Impact Assessment

15.5.1 In line with the World Business Council for Sustainable Development/ World Resources Institute Greenhouse Gas Protocol guidelines (WBCSD)/ WRI, 2004), the GHG emissions study will be reported as tonnes of carbon dioxide equivalent (tCO₂e) and consider the six Kyoto Protocol gases:

- Carbon dioxide (CO₂);
- Methane (CH₄);
- Nitrous oxide (N₂O);
- Sulphur hexafluoride (SF₆);
- Hydrofluorocarbons (HFCs); and
- Perfluorocarbons (PFCs).

15.5.2 GHG emissions will be assessed using a calculation-based methodology as per the equation:

- Activity data x GHG emissions factor = GHG emissions value

15.5.3 In line with the NNNPS (DfT, 2014), significance of impacts will be assessed by comparing estimated GHG emissions arising from the proposed scheme with UK carbon budgets, and the associated reduction targets.

15.5.4 In line with the EIA Regulations Schedule 4 Part 5, a description of the likely significant effects of the development on the environment, resulting from the vulnerability of the proposed scheme to climate change, will be provided.

- 15.5.5 The emissions assessment outcomes will also be put into context in terms of sector specific carbon impacts by comparing estimated project emissions against other similar infrastructure schemes.
- 15.5.6 Whilst the scope of the assessment will cover the lifecycle stages identified above, we propose that the GHG assessment will comprise two parts reflecting both the level of certainty of future activity and GHG emissions and the extent that the predicted GHG emissions will be additional to the existing GHG inventory.
- 15.5.7 The first part of the GHG assessment will include the construction, operation (e.g. road lighting) and maintenance of the proposed scheme itself. The majority of these emissions will be additional to the existing National GHG inventory and will be compared to the Carbon Budgets and other similar infrastructure schemes.
- 15.5.8 The second part of the GHG assessment will be the 'use' of the proposed scheme i.e. those resulting from vehicles travelling on the road. As at least part of the GHG emissions associated with the use of the proposed scheme will be displacement from elsewhere in the UK, they will not be additional to the UK GHG inventory. We recognise that identifying and quantifying the balance of what is additional versus displaced with any level of certainty will be challenging. The GHG assessment for proposed scheme 'use' will therefore be done on a scenario basis, with quantification of a number of different scenarios to provide a range for the additional GHG emissions associated with the proposed scheme.
- 15.5.9 Two types of data will be collected for the GHG assessment: activity data and GHG emissions factors. A set of standard data quality principles will be applied so that the results from the GHG assessment are as accurate and representative as possible:
- **Age:** the GHG assessment will be based on activity data and GHG emissions factors applicable to the study period;
 - **Geography:** activity data will reflect the design of the proposed scheme. GHG emissions factors will be representative of the UK construction industry and UK transport sector;
 - **Technology:** the default solution will be to apply data which is representative of the UK construction industry and transport sector. However, technology specific data may be used for the purpose of developing scenarios of the future;
 - **Methodology:** activity data will be gathered directly from the proposed scheme's engineering and design teams to enable consistency and completeness of data collection; and
 - **Competency:** activity data will be generated by the engineering and design teams in-line with applicable industry standards. Data gaps will be replaced with either peer reviewed publications (e.g. paper published in recognised journals) or industry specific literature (e.g. UK construction trade associations). GHG emissions factors will be sourced from a range of sources: environmental product declarations (EPDs) (which adhere to the BS EN 15804 standard (BSI, 2012), Life Cycle Analysis (LCA) tools (also aligned with best practice), and industry specific and Government sources which are widely accepted and used.

Climate Change Resilience Assessment

- 15.5.10 This assessment will address the resilience assessment of the proposed scheme to climate change impacts. The assessment will include all infrastructure and assets associated with the proposed scheme. It will assess resilience against both gradual climate change, and the risks associated with an increased frequency of extreme weather events.
- 15.5.11 The assessment will assume that the proposed scheme will be designed to be resilient to impacts arising from current weather events and climatic conditions, and designed in accordance with current planning, design and engineering practices and codes. The assessment will also identify and take into account the existing resilience and adaptation measures for each risk either already in place or in development for infrastructure and assets.

15.5.12 The degree to which the frequency of these potential hazards may change as a result of climate change is explained in the UKCP09 climate change projections.

15.5.13 In line with the EIA Regulations Schedule 4 Part 5, a description of the likely significant effects of the proposed scheme on the environment, resulting from the vulnerability of the proposed scheme to climate change, will be provided.

15.6 Assumptions, Limitations and Uncertainties

15.6.1 The methodology as detailed above assumes that the following information will be available:

- Information on energy use, types and quantities of materials used and waste generated will be available during the design process. Where it is not available, assumptions based on industry approximations and professional best practice will be made.

15.6.2 GHG emissions from the end of life stage of the proposed scheme have been scoped out of the assessment due to the anticipated operational length of the proposed scheme.

15.6.3 All assumptions and limitations, including any exclusion, together with assumptions for choices and criteria leading to exclusion of input and output data will be documented as part of the assessment to be included in the Environmental Assessment.

15.7 References

BSI (2012) BS EN 15804:2012+A1:2013 – Sustainability of Construction Works.

Climate Change (2009) The Carbon Budgets Order No.1259.

DEFRA (2011) Biodiversity 2020: A strategy for England's wildlife and ecosystem services.
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Publicly Available Specification (PAS) (2016) PAS 2080: 2016 Carbon Management in Infrastructure.

UK Climate Projections (2009) (UKCP09) UK Climate Change Risk Assessment 2017 Evidence Report. <http://ukclimateprojections.metoffice.gov.uk/21678>

UK Climate Change Risk Assessment (CCRA) (2012) <https://www.theccc.org.uk/tackling-climate-change/preparing-for-climate-change/climate-change-risk-assessment-2017/>

World Business Council for Sustainable Development (WBCSD)/ World Resources Institute (WRI) (2004) Greenhouse Gas Protocol. <http://www.wri.org/publication/greenhouse-gas-protocol>

16 CUMULATIVE EFFECTS

16.1 Introduction

16.1.1 The need to consider cumulative effects in planning and decision making is set out in planning policy including NPPF and the NNNPS (DfT, 2014). Paragraph 4.16 of the NNNPS specifies that “*When considering significant cumulative effects, any environmental statement should provide information on how the effects of the applicant’s proposal would combine and interact with the effects of other development (including projects for which consent has been granted, as well as those already in existence).*”

16.1.2 In addition NNNPS paragraph 4.3 states that:

“In considering any proposed development, and in particular, when weighing its adverse impacts against its benefits, the Examining Authority and the Secretary of State should take into account:

- *its potential benefits, including the facilitation of economic development, including job creation, housing and environmental improvement, and any long-term or wider benefits; and*
- *its potential adverse impacts, including any longer-term and cumulative adverse impacts, as well as any measures to avoid, reduce or compensate for any adverse impacts.”*

16.1.3 The assessment of cumulative effects will consider the following:

- The **combined effects** from the proposed scheme on single receptors resulting from a number of environmental impacts, for example noise, air quality and visual effects;
- The **cumulative effects** associated with other developments in the vicinity of the proposed scheme which are under construction or have been consented, which when combined with the effects of the proposed scheme may have an incremental significant effect.

16.1.4 DMRB Volume 11, Section 2 Part 5: Assessment and Management of Environmental Effects (HA205/08) (Highways Agency, 2008) requires that possible cumulative effects are included as part of the assessment process. Cumulative effects are broadly defined as incremental effects that result from the accumulation of a number of individual effects, either caused by the proposed scheme (intra-project effects) or by other reasonably foreseeable developments which would be under construction at the same time as the proposed scheme or built later (inter-project effects).

16.1.5 Where it is identified that other schemes are expected to be complete before construction of the proposed scheme, their effects will be considered through the extrapolation of the future baseline.

16.2 Potential Impacts and Effects

16.2.1 A cumulative impact assessment was undertaken at PCF Stage 2, the results of which are summarised below. The assessment will be updated at PCF Stage 3 to take into account any additional proposed developments within the vicinity of the proposed scheme and the results of the environmental assessment of the proposed scheme design as presented in the Environmental Statement.

Combined Effects

Construction

16.2.2 The PCF Stage 2 assessment indicates that some of the identified receptors including properties located in proximity to the Kingsway junction and Markeaton junction (such as

Greenwich Drive South and Greenwich Drive North, Kingsway Park Close, Raleigh Street, Thurcroft Close, Windmill Hill Lane, Enfield Road, Ashbourne Road, plus users of NMU facilities such as National Cycle Route NR54 and NR68 and Regional Cycle Route (RR) 66) and receptors at Little Eaton junction (such as include the Ford Farm Mobile Home Park, eastern Allestree and western Breadsall village plus users of NMU facilities including NR54) have the potential to experience combined effects associated with dust, pollutant emissions, noise, severance and visual intrusion during the proposed scheme construction phase.

- 16.2.3 The mitigation measures identified at PCF Stage 2 aim to control individual impacts as well as potential combined effects. There is the potential for construction phase cumulative effects; however, these would be temporary, but potentially locally significant - thus defined as being of minor significance.

Operational Phase

- 16.2.4 There is limited potential for combined effects during operation of the proposed scheme, both beneficial and adverse. Such effects are not anticipated to be significant.
- 16.2.5 The proposed scheme would include appropriate landscape mitigation planting which would progressively mature and integrate the proposed scheme into the prevailing landscape. As such, whilst operational combined effects would be potentially permanent, they are anticipated to reduce with time as the proposed scheme landscape design matures.

Cumulative Effects

- 16.2.6 An initial assessment of cumulative effects concluded that there would be no significant cumulative effects for the majority of resources and receptors as a result of the proposed development and other development schemes in the vicinity of the proposed junction. There are anticipated to be minor adverse effects resulting from a loss of agricultural land and minor effects on landscape and some visual receptors during the construction phase at Kingsway junction.

16.3 Assessment Methodology

Study Area

- 16.3.1 The study area will not be defined prior to undertaking the assessment, but will depend on the findings of specialist topics and information on the extent of impacts of other developments in the area.

Combined Effects

- 16.3.2 The assessment methodology for combined effects will involve the identification of effect interactions associated with the proposed scheme upon separate environmental resources. The significance of construction and operational phase environmental effects will be brought forward from the technical chapters of the EIA into a matrix, providing a clear summary of potential effects upon defined environmental resources. The potential significance of identified combined effects upon environmental resources will be based upon the balance of significance scores (refer to sections below on significance).

Cumulative Effects

- 16.3.3 The Inspectorate's Advice Note 17 (Planning Inspectorate, 2005) on the assessment of cumulative effects identifies a four stage approach:
- **Stage 1:** establish the project's zone of influence and identify a long list of 'other development';
 - **Stage 2:** identify a shortlist of 'other development' for the cumulative impact assessment;
 - **Stage 3:** information gathering; and

- **Stage 4:** assessment.

16.3.4 The assessment of potential cumulative effects arising from the proposed scheme in combination with other proposed developments (inter-project effects) will primarily constitute a desk-top study of planning documents considered relevant to the assessment. The focus of the desk-top study will be the collection of information relating to the background of relevant projects, their expected timelines and likely environmental impacts. Details of the assessment stages are provided below.

Stage 1 - Long-list of Other Development

16.3.5 A review of other developments will be undertaken, initially encompassing a 'zone of influence' defined by the environmental topic specialists and the traffic model area.

16.3.6 As the proposed scheme design progresses, the list of 'other development' to be included in the assessment of cumulative effects will be reviewed and developed in consultation with the local planning authorities, statutory consultees and other relevant organisations.

16.3.7 Development will be included in the initial long-list based on the following criteria¹⁶:

- Development currently under construction;
- Approved applications which have not yet been implemented (covering the past five years and taking account of those that received planning consent over three years ago and are still valid, but have not yet been completed);
- Submitted applications not yet determined;
- Refused applications, subject to appeal procedures not yet determined;
- On the national infrastructure planning programme of projects;
- Development identified in the relevant development plan (and emerging development plans); and
- Development identified in other plans and programmes which set the framework for future development consents/ approvals, where such development is reasonably likely to come forward.

16.3.8 Criteria will be developed and applied to filter development which may be excluded from the initial long list, having regard to the size and spatial influence of each development. These criteria will be documented and set out within the Environmental Statement.

Stage 2 – Short-list of Other Development

16.3.9 At Stage 2, any developments of a nature or scale without the potential to result in cumulative impacts will be excluded, following discussion with the local planning authorities and consideration of each environmental topic's likely zone of influence. The justification for including or excluding developments from the long list will be provided in a matrix, modelled on the example given within Appendix E of the Inspectorate's Advice Note 17 (Planning Inspectorate, 2015).

Stage 3 – Information Gathering

16.3.10 Information relating to other developments will be collected from the appropriate source (which may include the local planning authority, the Inspectorate or directly from the applicant/ developer) and will include, but not be limited to:

- Proposed design and location information;
- Proposed programme of construction, operation and demolition; and

¹⁶ These criteria are derived from those presented in Planning Inspectorate Advice Note 17, Table 3 (Planning Inspectorate, 2015).

- Environmental assessments that set out baseline data and effects arising from 'other development'.

Stage 4 – Assessment

16.3.11 The assessment will include a list of those developments considered to have the potential to generate a cumulative effect together with the proposed scheme, and this will be documented in a matrix¹⁷ which includes the following:

- A brief description of the development;
- An assessment of the cumulative effect with the proposed scheme;
- Proposed mitigation applicable to the proposed scheme including any apportionment; and
- The likely residual cumulative effect.

Significance of Effects

16.3.12 The criteria for determining the significance of any cumulative effect will be based upon:

- The duration of effect i.e. will it be temporary or permanent;
- The extent of effect e.g. the geographical area of an effect;
- The type of effect e.g. whether additive or synergistic;
- The frequency of the effect;
- The 'value' and resilience of the receptor affected; and
- The likely success of mitigation.

16.3.13 The significance of potential combined and cumulative effects will be determined taking into account the guidance within Table 2.6 of DMRB Volume 11, Section 2, Part 5 (HA 205/08) (Highways England, 2008).

16.3.14 Where potentially significant combined and cumulative effects are identified, additional mitigation proposals will be recommended as applicable. Some such mitigation measures may be beyond the control of Highways England for the proposed scheme, but could provide useful guidance to relevant planning authorities when considering other development planning applications.

16.4 Human Health

16.4.1 The EIA Directive (2014/52/EU) aims to achieve high levels of protection of human health and wellbeing and the environment. It requires that direct and indirect effects of a project on human health and wellbeing should be identified, described and assessed in a method appropriate to each individual case. It also requires consideration of potential interactions between human health and wellbeing and other aspects included in the EIA Directive such as land, air, climate, noise and landscape when identifying and evaluating potential effects.

16.4.2 As detailed in Section 5.8, a number of EIA topics will consider human health within the scope of their assessments. A qualitative assessment of information collated via the other topic assessments will be undertaken and presented within the cumulative effects chapter of the Environmental Statement.

16.4.3 The qualitative assessment of the potential effects of the proposed scheme on human health will consider the following health and well-being determinants as identified from those set out in the HUDU Rapid Health Impact Assessment Tool Second Edition 2015 (NHS, 2015):

- Access to healthcare services and other social infrastructure;

¹⁷ The assessment matrix will reflect the example presented at Appendix 2 of Planning Inspectorate's Advice Note 17 (Planning Inspectorate, 2015).

- Access to open space and nature;
- Air quality, noise and neighbourhood amenity;
- Accessibility and active travel;
- Access to healthy food;
- Access to work and training; and
- Social cohesion and neighbourhoods.

16.4.4 Within these determinants, the following direct and indirect influences on human health and wellbeing that the proposed scheme could generate will be discussed and conclusions drawn:

- Direct effects on health and wellbeing through changes in noise and air pollution, water quality and climate change;
- Lifestyle changes such as encouraging travel by means other than private car, for example encouraging walking and cycling behaviours;
- Effects on local employment opportunities and activity through changes in access to employment;
- Effects on access to key services and social infrastructure such as health facilities and education facilities; and
- Effects on accessibility to open space and recreation space.

16.5 References

Department for Transport (DfT) (2014) National Policy Statement for National Networks (NPSNN), The Statutory Office.

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Highways England (2008) Design Manual for Roads and Bridges: Volume 11 Section 2 Part 5 HA 205/08. Assessment and Management of Environmental Effects.

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NHS (2015) HUDU Planning for Health, Rapid Health Impact Assessment Tool.

<https://www.healthyurbandevlopment.nhs.uk/wp-content/uploads/2013/12/HUDU-Rapid-HIA-Tool-Jan-2013-Final.pdf>

Planning Inspectorate, Advice Note 17 (2015) Cumulative Effects Assessment Relevant to Nationally Significant Infrastructure Projects;

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17 SUMMARY OF ASSESSMENT SCOPE

17.1 Characteristics of the Development

17.1.1 The proposed scheme is classed as an NSIP and involves the grade separation of three junctions on the A38 through Derby.

17.1.2 The proposed scheme would resolve conflicts between local traffic and strategic movements using the A38, as well as removing conflicts between NMUs and vehicles using the A38 to the benefit of both. Highways England's high-level objectives for the proposed scheme include improving economic competitiveness, the environment and quality of life by reducing congestion in the surrounding urban areas and on the A38 inter-regional road. In addition, it is considered that the proposed scheme would increase the capacity of the strategic road network and facilitate housing and employment growth within Derby City. The overarching objective is to deliver a proposed scheme that is affordable and delivers high value for money.

17.2 Location of the Development

17.2.1 These three junctions span an approximate distance of 5.5km along the A38 to the west and north of Derby, passing through the administrative areas of DCiC, EBC and DCC.

17.2.2 Kingsway junction and Markeaton junction are located in a predominantly urban environment, with a mixture of residential housing, commercial, retail, health care and educational establishments. There are a number of public open spaces in the vicinity of the junctions, namely Mackworth Park, open space adjacent to Greenwich Drive South and Markeaton Park.

17.2.3 Little Eaton junction is set in a semi-rural environment, with the Ford Farm Mobile Home Park, the property Fourways, commercial and retail facilities located to the north of the existing junction. The Derby Garden Centre occupies the space between the A38 and the B6179 to the north of the junction (accessed off the B6179). The eastern edge of Breadsall village is located approximately 400m to the south-east of the existing junction, whilst the southern edge of Little Eaton village is located approximately 900m to the north of the junction. The A38 to the west of the existing junction crosses over the River Derwent and the Sheffield to Derby railway.

17.3 Characteristics of Potential Impacts and Effects

17.3.1 Proposed scheme construction activities have the potential to give rise to a range of potential environmental impacts, and resultant effects (e.g. temporary offices, construction compounds, material storage areas and worksites; temporary accesses and haul routes; demolition of structures, removal of existing infrastructure; vegetation clearance, soil removal; ground and excavation works; routing of services and utilities). Activities during the proposed scheme operation phase that might give rise to environmental impacts, and resultant effects, relate to changes in traffic flow and composition (potential for consequential noise and air quality impacts); additional street lighting and signs; and highway maintenance and management practices.

17.3.2 Table 17.1 summarises the proposed scope of the EIA, which is based upon the consideration of potential impacts and the significance of potential effects, whilst Table 17.2 provides details of those aspects which it is proposed to scope out of the EIA.

Table 17.1: Summary of Proposed Scheme EIA Scope

Aspect	Details
Air Quality	There are existing areas of poor air quality associated with traffic emissions along the route of the existing A38 and within Derby. The proposed scheme would alter the location and patterns of traffic flows, which in turn could impact upon air quality. However, whilst the proposed scheme is not anticipated to result in significant air quality effects, a detailed air quality assessment will be included in the Environmental

Aspect	Details
	Statement.
Cultural Heritage	The proposed scheme has the potential to impact upon both designated and undesignated archaeological remains. There are also potential impacts on the setting of both designated and undesignated heritage assets. There are a limited number of cultural heritage receptors in the vicinity of the proposed scheme; however, the presence of the Derwent Valley Mills World Heritage Site is a key consideration. Thus a detailed assessment, including a Heritage Impact Assessment for the World Heritage Site, will be undertaken which will assess the potential impacts of the proposed scheme on identified heritage assets, including their setting.
Landscape and Visual Impacts	The proposed scheme has the potential to generate a range of landscape and visual effects. Landscape effects would reduce over time following maturation of the proposed scheme landscaping. Visual effects upon representative viewpoints during proposed scheme construction and operation have the potential to range from negligible to major adverse in the short term (depending on the receptor sensitivity and the predicted impact magnitude), although effects would reduce over time again due to maturation of the proposed scheme landscaping. As a consequence, it is proposed that a detailed assessment will be undertaken which will assess the potential effects of the proposed scheme on the prevailing landscape and visual receptors.
Biodiversity	The proposed scheme has the potential to result in the loss of the A38 Kingsway Roundabout Local Wildlife Site (LWS) and the partial loss of the Alfreton Road Grassland LWS, plus potentially impact upon a range of ecological habitats and protected species. A key challenge will be to deliver a proposed scheme design that delivers no-net-loss of biodiversity in the long term through appropriate mitigation and enhancement. Given the potential ecological and biodiversity effects of the proposed scheme, a detailed assessment will be undertaken and reported in the Environmental Statement.
Geology and Soils	There are a number of locations along the proposed scheme where contaminated materials may be encountered, whilst some agricultural soils 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. Given that most geology and soil effects can be appropriately managed, a simple level of assessment will be undertaken and reported in the Environmental Statement.
Materials	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. The proposed assessment will focus on quantifying volumes of materials and waste arising, identifying mitigation measures to reduce the volumes and assessing the effects on the local environment. The assessment will investigate the likely availability of materials and as part of the design process will recommend measures to drive resource efficiency. It is proposed that a detailed assessment will be undertaken based on information available at the time of the assessment.
Noise and Vibration	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 significant adverse construction noise effects. During proposed scheme operation, noise effects at residential receptors have the potential to range from moderate beneficial to large adverse. Given the potential noise effects of the proposed scheme, a detailed assessment will be undertaken and reported in the Environmental Statement.
People and Communities	The proposed scheme has the potential to affect journeys and conditions for pedestrians and other non-car based travellers - the facilities for such users included in the proposed scheme design aim to provide at least the level of provision that exists at present, with enhanced provisions at locations deemed appropriate and reasonable. In addition, the proposed scheme would affect the driving environment and reduce delays, with knock on benefits for driver stress. A simple assessment of the proposed scheme on the effects on all travellers will be undertaken taking into consideration receptors within the proposed scheme extent.

Aspect	Details
	The proposed scheme also has the potential to impact upon local communities and private assets, particularly in relation to the demolition of private property, loss of land used by the community (i.e. public open space), community severance, and effects on agricultural land and individual farm units. It is thus proposed that a detailed assessment is undertaken on the effects of the proposed scheme on community and private assets.
Road Drainage and the Water Environment	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 areas may be needed at Kingsway junction and Little Eaton junction in order to avoid significant effects. Given the presence of water sensitive receptors and the risks associated with flooding, a detailed assessment will be undertaken and reported in the Environmental Statement.
Climate Change	The Environmental Statement will include a climate change chapter which will consider: i) a greenhouse gas (GHG) assessment; and ii) a climate change resilience assessment. The GHG assessment will quantify and report GHG emissions associated with the construction, operation, use, and maintenance of the proposed scheme in the form of the 'carbon footprint'. The climate change resilience assessment will assess how resilient the proposed scheme is to the potential impacts associated with climate change and an increased frequency of extreme weather events.
Cumulative Effects	The Environmental Statement will present a two-stage approach to assessing potential cumulative effects. The first stage will identify potential combined effects – namely the potential for several different environmental effects associated with the proposed scheme acting upon single receptors. The second stage will consider potential cumulative effects resulting from proposed scheme effects acting together with the effects from other development proposals within the study area. Mitigation measures will be recommended as guidance for planning authorities when considering other applications in the vicinity of the proposed scheme.

Table 17.2: Summary of Aspects to be Scoped Out of the EIA

Aspect Scoped Out	Reason
Proposed scheme decommissioning	Para. 5.4.4: Highly unlikely that the proposed scheme would be demolished/ decommissioned after its design life as the road is likely to have become an integral part of the infrastructure in the area. In the unlikely event of proposed scheme demolition/ decommissioned, this would be part of the relevant statutory process at that time, including EIA as appropriate.
Dismantling of proposed scheme components during maintenance/ operation	Para. 5.4.5: During proposed scheme operation, should any components require replacement/ repair, such works would be undertaken by the A38 Managing Agent Contractor (Highways England) in accordance with their standard maintenance practices. Such practices require the investigation, assessment and appropriate management of potential environmental effects associated with such works in accordance with their environmental management planning systems. As such, the assessment of potential environmental effects associated with the replacement of proposed scheme components during its operational phase has been scoped out, given that these will be appropriately managed such that significant environmental effects would be avoided.
Minor highway works at the Ford Lane junction with the A6 (Duffield Road)	Para. 2.5.27: Minor works would be required at the Ford Lane junction with the A6 (Duffield Road) located approximately 1km to the north of the A6 junction with the A38. This would comprise limited kerb widening, with the works being undertaken within the existing highway boundary. It is considered that given the works at the Ford Lane/ A6 junction would be very minor and located within the existing highway boundary, such works would not have the potential to generate significant environmental effects (in their own right or in combination with other components of the proposed scheme). It is thus proposed that the environmental effects associated with the construction and operation of the improved Ford Lane/ A6 junction are

Aspect Scoped Out	Reason
	scoped out of the EIA.
Heat and radiation	Para. 5.6.4: Neither heat nor radiation are of relevance to the proposed scheme.
Transboundary impacts	Para. 5.6.5 and Appendix 1.2: Proposed scheme is not anticipated to generate any significant potential transboundary effects.
Air quality impacts on construction and maintenance workers	Para. 6.8.3: The proposed scheme construction and operational maintenance phases will be undertaken in a manner that appropriately protects the health and safety of workers (given that this is a legal compliance requirement). As such, construction/ operational/ maintenance workers have been scoped out of the assessment.
Carbon monoxide, 1,3-butadiene, benzene, lead and sulphur dioxide	Para. 6.4.9: National assessments have demonstrated that there is no risk of carbon monoxide, 1,3-butadiene, benzene, lead and sulphur dioxide concentrations exceeding the relevant UK AQS objectives due to emissions from traffic anywhere in the UK. It is, therefore, proposed that these pollutants are scoped out of the assessment.
Biodiversity	<p>Para. 9.4.4: Impacts of the proposed scheme upon European Sites and their associated features have been scoped out from further assessment owing to there being no reasonable impact pathways. Therefore, an HRA is not required to support the DCO application for the proposed scheme (although an HRA screening will be undertaken).</p> <p>Table 9.1: Osierbed and Gravelpit Woods LWS and Friar Gate Station LWS.</p> <p>Table 9.1: Beech Wood LWS; Bunkers Wood LWS; Mickleover Egginton Greenway LWS; Inglewood Avenue Meadow LWS; and Redbourn Lane Hedge LWS.</p> <p>Table 9.1: Hatherings Wood LWS; Botany Stream Margin Complex LWS; Burley Wood LWS; Drum Hill Fields Breadsall Moor LWS; Eaton Parkwood LWS; Whitaker Lane Woodland LWS; Moor Plantation and Drumhill LWS; Great Farley's Wood LWS; Horsley Carr LWS; and Woodlands School Hedge LWS.</p> <p>Table 9.2: Great crested newts.</p>
Impacts upon Local Geological Sites	Para. 10.4.3: There are no Local Geological Sites (formerly Regionally Important Geological Sites (RIGS)) within the defined study area.
Impacts of potentially contaminated soils on construction, maintenance workers and construction materials	Para. 10.6.3: The proposed scheme construction and operational maintenance phases will be undertaken in a manner that appropriately protects the health and safety of workers (legal compliance requirement), whilst the proposed scheme will use materials that are appropriate for the identified ground conditions. As such, construction/ operational/ maintenance workers and construction materials have been scoped out of the assessment.
Impacts upon agricultural soils at Kingsway and Markeaton junctions	Para. 10.6.4: No land in the vicinity of Kingsway junction and Markeaton junction are used for agricultural purposes and thus impacts upon agricultural soils at these junctions will be scoped out of the EIA.
Operational phase materials resource use and waste generation	Para. 11.9.4: Waste management and materials impacts during operation of the proposed scheme will be scoped out of assessment, given that material use and waste generation is expected to be very small during proposed scheme operation, whilst materials and waste will be appropriately managed by the A38 Managing Agent Contractor (Highways England).
Equestrians	Para. 13.3.18: No public bridleways would be impacted by the proposed scheme.
Demolition phase GHG emissions	Para. 15.6.2: GHG emissions from the end of life stage of the proposed scheme have been scoped out of the assessment due to the anticipated operational length of the proposed scheme (also refer to para. 5.4.4).

17.4 Environmental Effects - Conclusions

- 17.4.1 The characteristics of the proposed scheme, together with the prevailing local environmental conditions, indicates that proposed scheme construction and operation has the potential to generate some potentially significant environmental effects. The proposed scope of the environmental assessment that will be reported in the Environmental Statement seeks to predict the likely effects of the proposed scheme, following the appropriate inclusion of impact avoidance measures in the proposed scheme design and following the implementation of appropriate mitigation and management measures that aim to reduce effects to non-significant levels. The proposed assessment will also identify potential beneficial effects and allow for potential enhancement opportunities to be identified and included in the proposed scheme design where feasible.

17.5 Next Stages

Adopting a Formal Scoping Opinion

- 17.5.1 This EIA Scoping Report is now submitted to the Inspectorate with a formal request for a scoping opinion in accordance with Regulation 10 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.
- 17.5.2 The scoping opinion sets out the Secretary of State's formal written opinion on the information to be included in the Environmental Statement. The Secretary of State must adopt a scoping opinion within 42 days of receiving a scoping request. Before adopting a scoping opinion, the Secretary of State must consult the prescribed consultation bodies who have 28 days to respond. Responses received after the 28 day deadline will not be considered within the Secretary of State's scoping opinion, but will be forwarded to the applicant, for their consideration.

Preliminary Environmental Information Report (PEI Report)

- 17.5.3 The next step in the EIA process will be the preparation and publication of the PEI Report. The focus of the PEI Report is to enable the local community to understand the potential environmental effects of the proposed scheme, and thus to inform their consultation responses regarding the proposed scheme. Statutory consultation for the proposed scheme is planned to take place later this year.
- 17.5.4 Details of how the PEI Report will be published and consulted upon will be set out in the Statement of Community Consultation (SoCC) to be published prior to consultation.
- 17.5.5 The PEI Report will be 'preliminary' whose function is to obtain the views of various stakeholders (including the wider community) regarding the proposed scheme. During this time the proposed scheme design and EIA process will be on-going and thus the understanding of the likely environmental effects of the proposed scheme would be evolving as new information and mitigation details emerge. As such, the provisional DCO application boundary as detailed in Figures 1.2a/ b is anticipated to change as the proposed scheme design evolves.

DCO Application

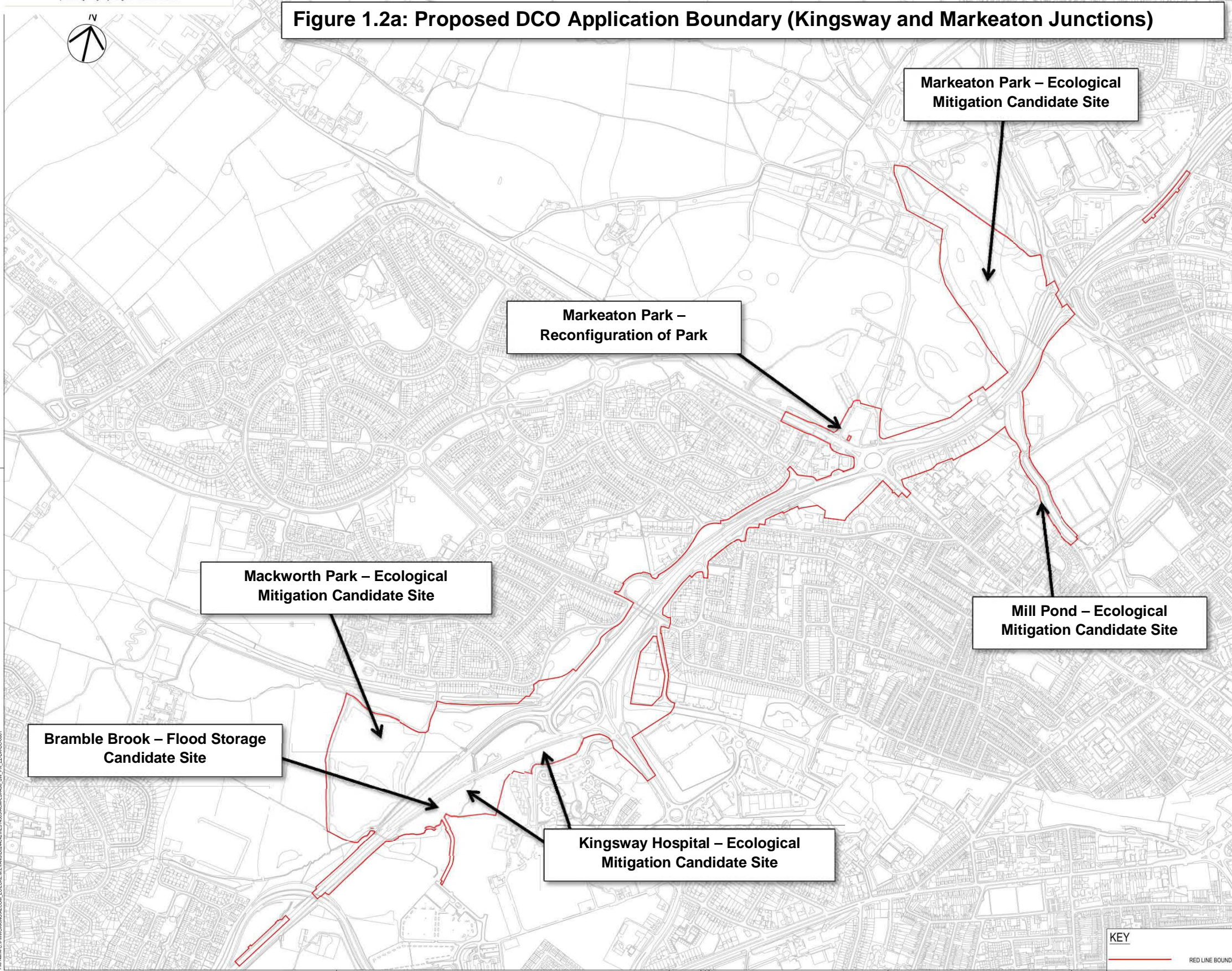
- 17.5.6 It is anticipated that the Environmental Statement will be submitted as part of the DCO application in 2019. Once the application has been accepted by the Inspectorate, there is a set period for the DCO process. It is anticipated that the Secretary of State's decision would be made in 2019. Details of the acceptance and evaluation process as applicable to the proposed scheme will be published on the National Infrastructure Planning website.

FIGURES

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Figure 1.2a: Proposed DCO Application Boundary (Kingsway and Markeaton Junctions)



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Ecological enhancement site at Markeaton amended, OS mapping updated	SW	12/02/18	P02
Ecological enhancement site at Markeaton amended, OS mapping updated	AJW	26/02/18	P03
Ecological enhancement site at Markeaton amended, OS mapping updated	LE	26/02/18	P04

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Working on behalf of

Project Title:
**A38
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Drawing Title:
**RED LINE BOUNDARY
 SHEET 1 OF 2**

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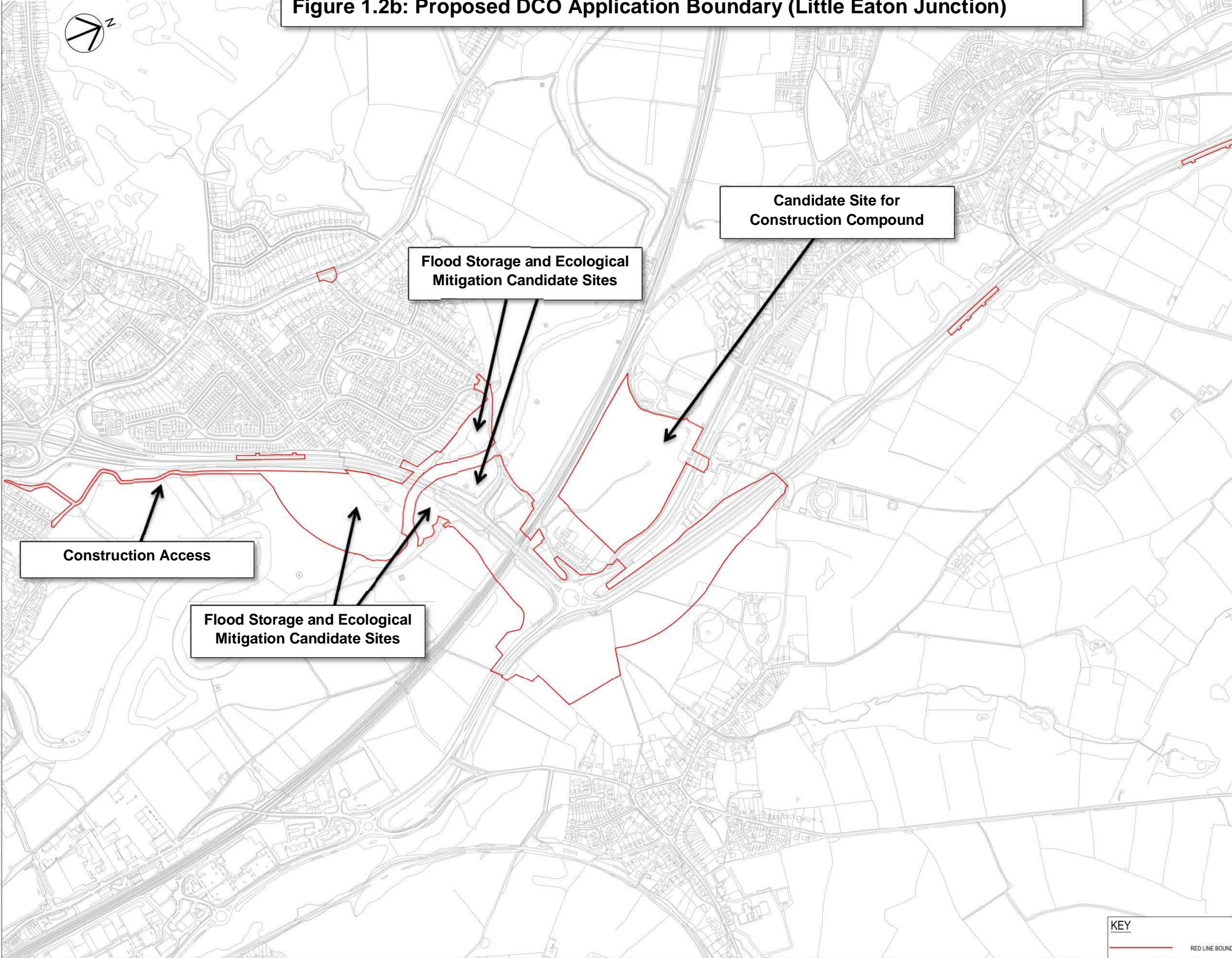
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Figure 1.2b: Proposed DCO Application Boundary (Little Eaton Junction)



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4	SO	AJW	20/02/18	P04

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Drawing Title:
RED LINE BOUNDARY SHEET 2 OF 2

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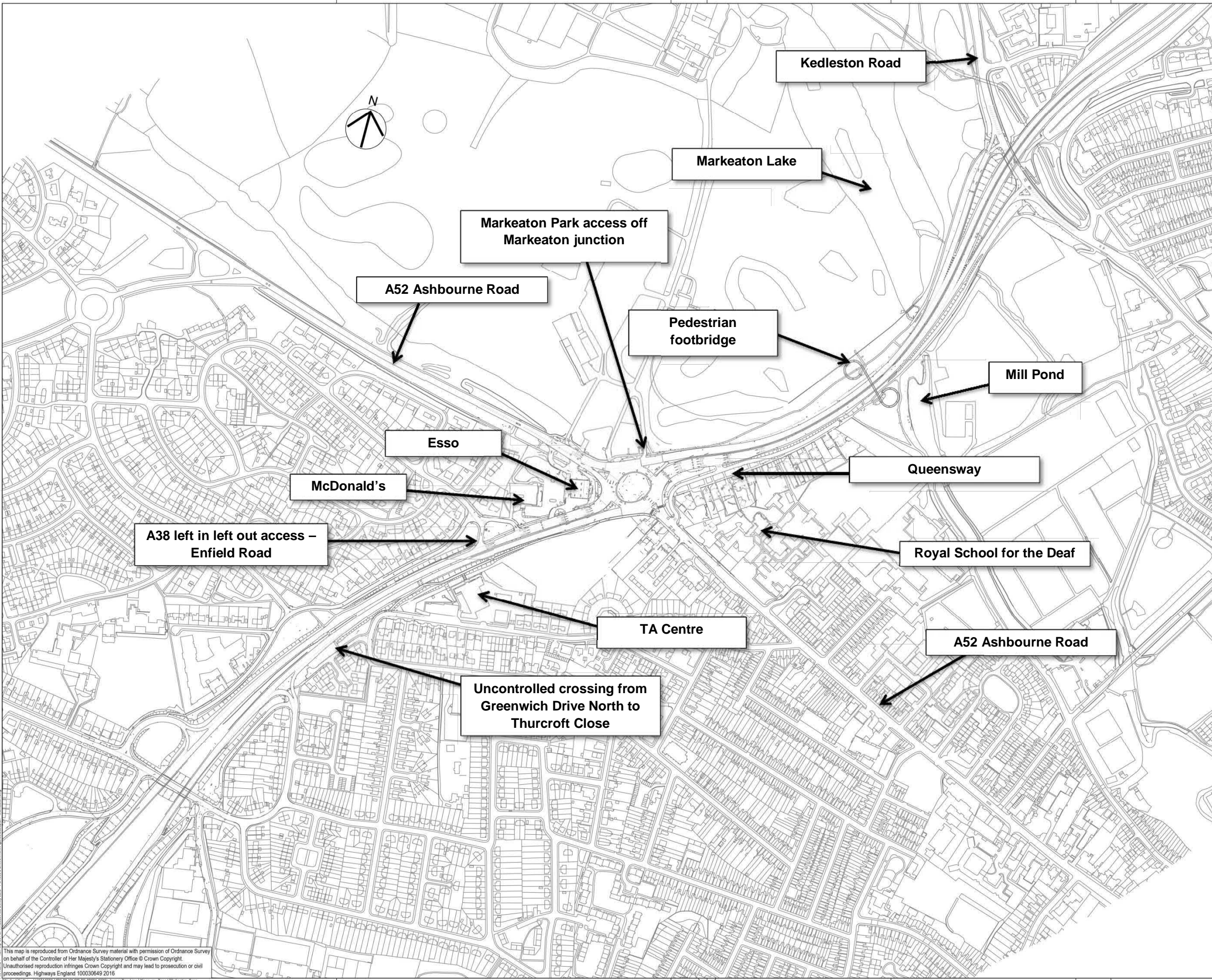
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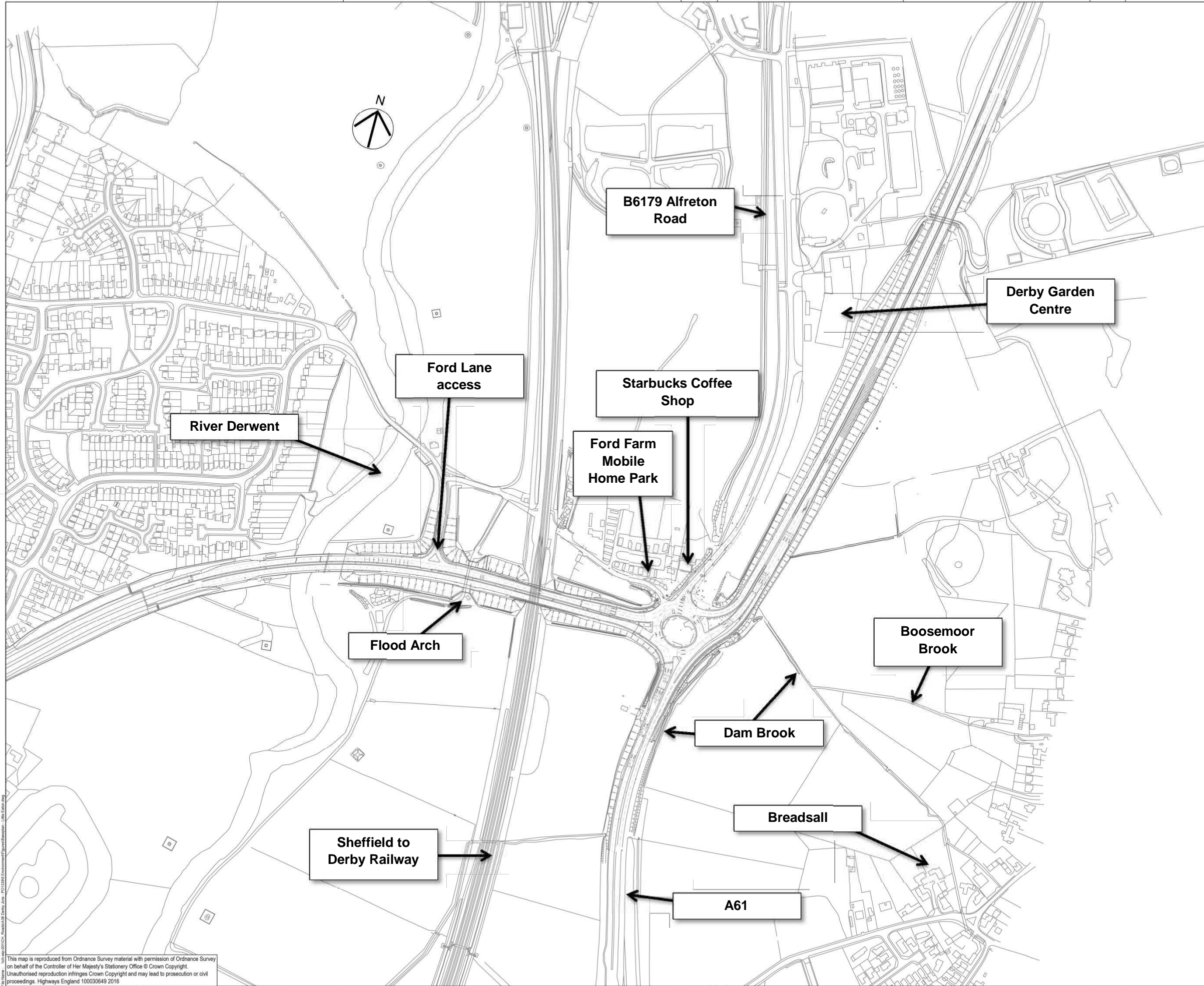


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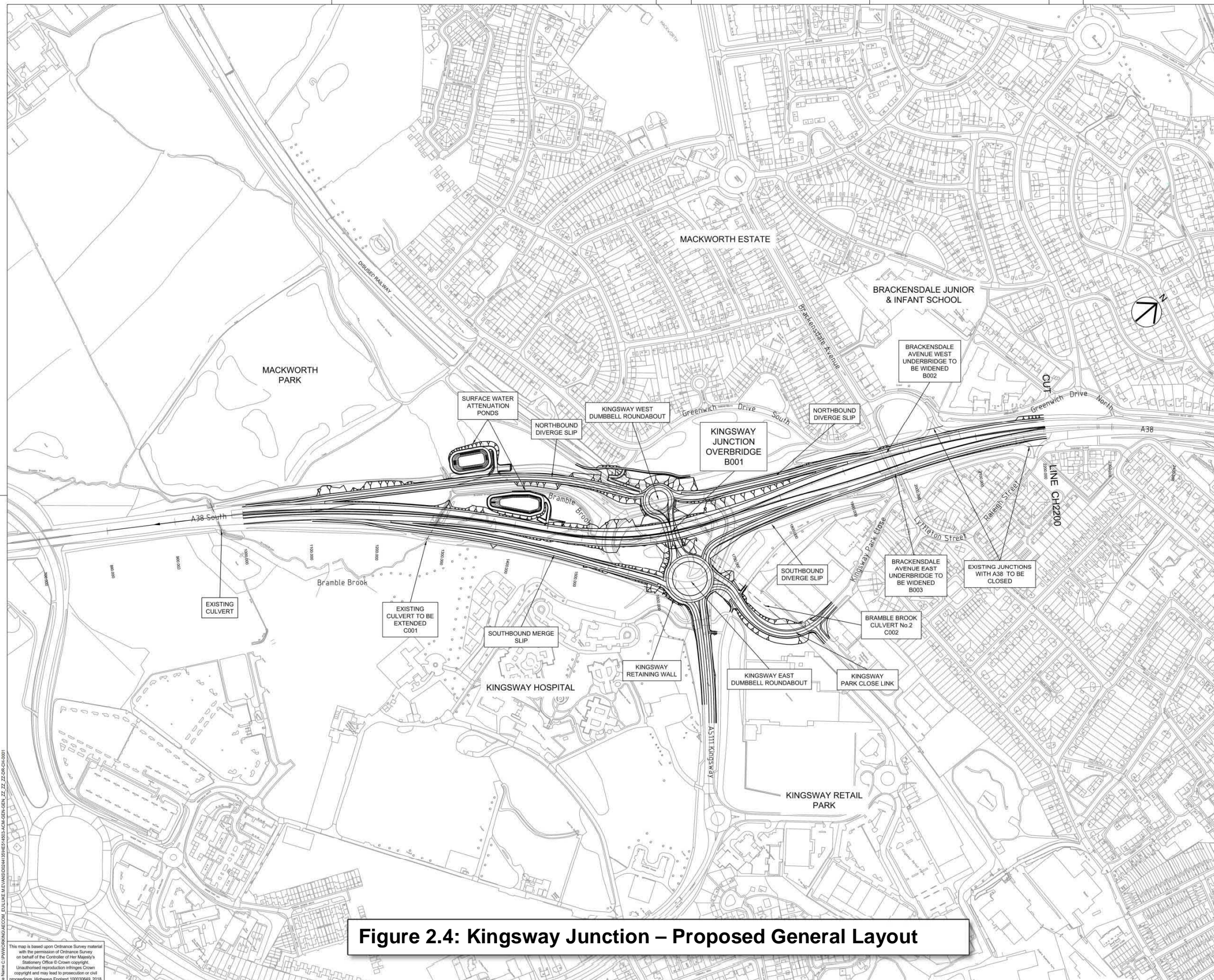


Figure 2.4: Kingsway Junction – Proposed General Layout

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Project Title: **A38 DERBY JUNCTIONS**

Drawing Title: **KINGSWAY JUNCTION GENERAL LAYOUT**

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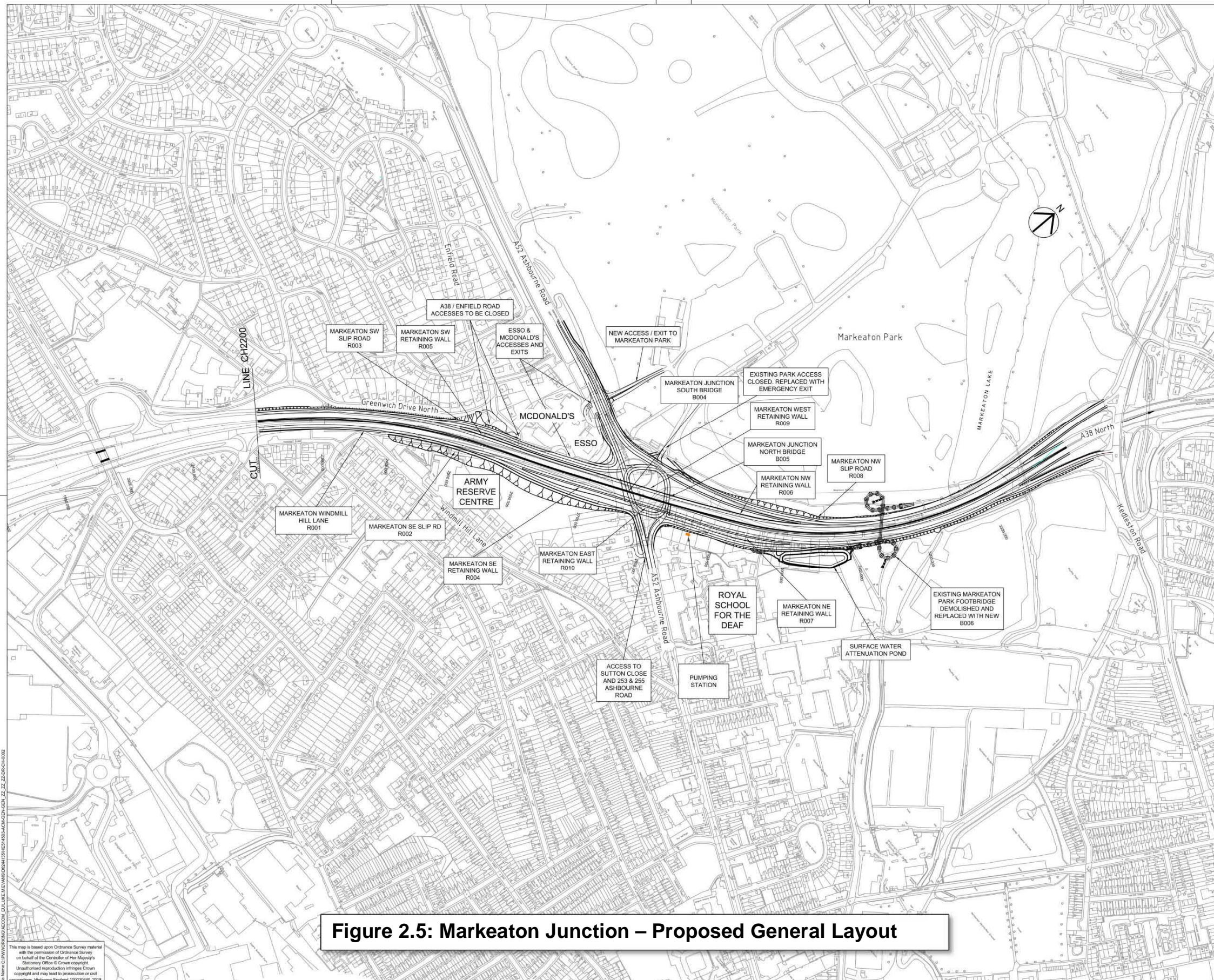


Figure 2.5: Markeaton Junction – Proposed General Layout

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Drawing Title: **MARKEATON JUNCTION GENERAL LAYOUT**

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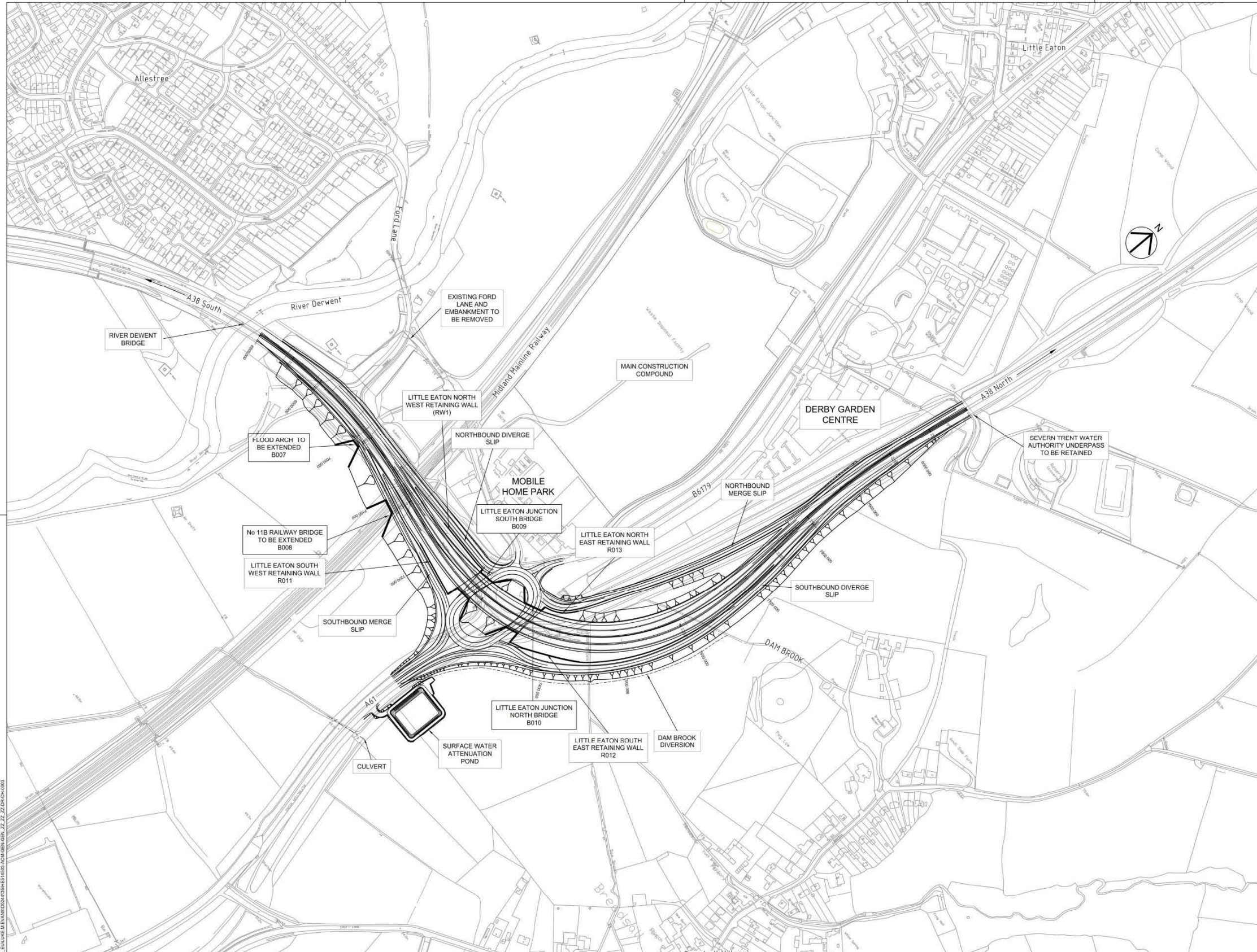
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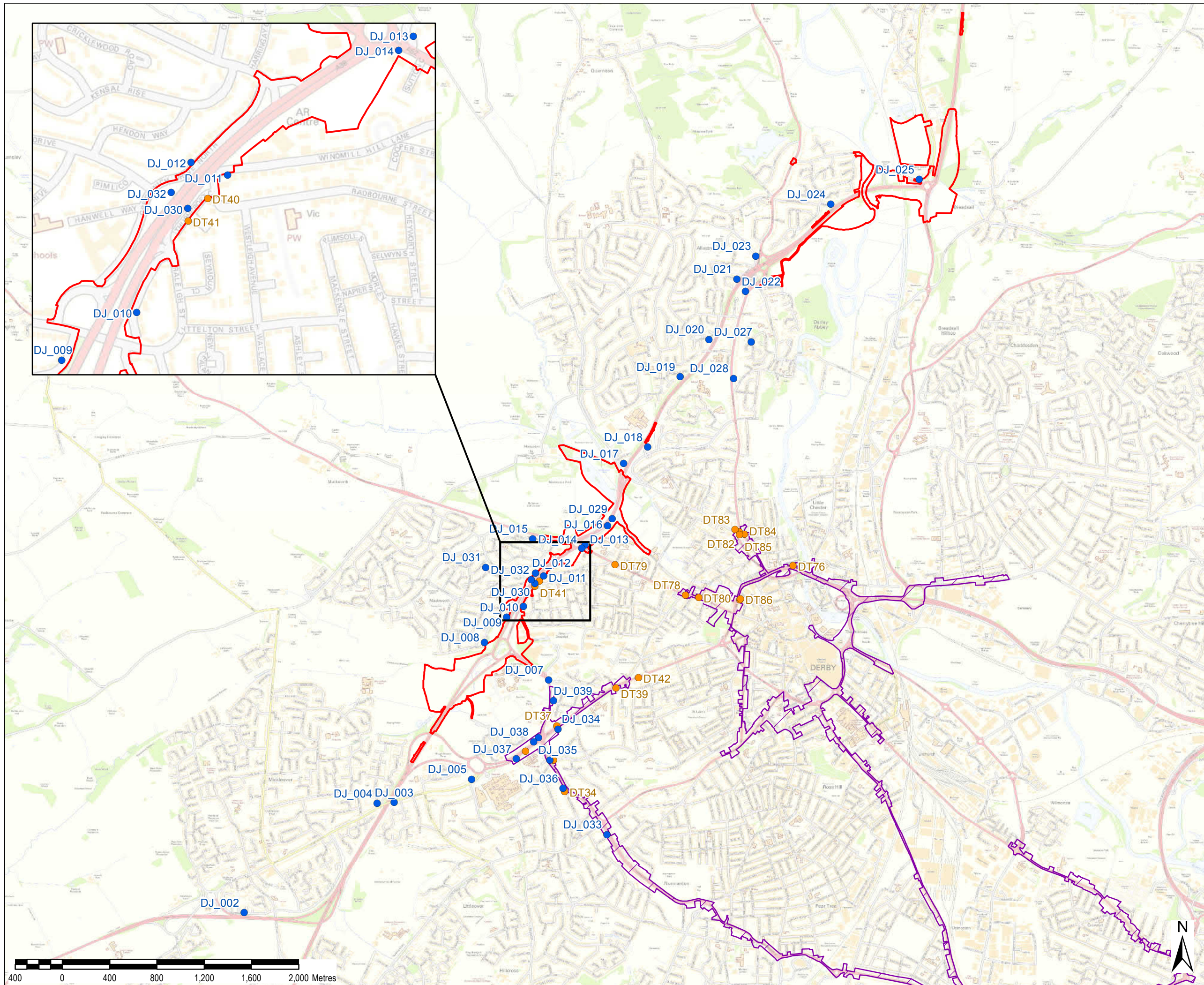
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Figure 2.6: Little Eaton Junction – Proposed General Layout

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	Drawn By: _____ Date: _____ Checked By: _____ Date: _____ Approved By: _____ Date: _____
Rev#	Revision Details
D	DRAFT

Job Title
**A38
DERBY JUNCTIONS**

Drawing Title
**AQMAs AND AIR QUALITY
MONITORING LOCATIONS**

AECOM Internal Project Number 60471077	Zone/Mileage	Subsidiary
Designed AECOM	Drawn EC	Stage 1 check EC
	Stage 2 check DD	Approved SW

Scale at A3
1:30,000

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Drawing Number
FIGURE 6.1



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- LEGEND**
- Proposed DCO Application Boundary
 - 500m Study Area
 - Listed Buildings
 - Conservation Area
 - Flood Plain (A4)
 - Non-Designated Heritage Assets
 - Non-Designated Heritage Assets
 - Non-Designated Heritage Assets

Note
Figure illustrates proposed scheme design as detailed in Chapter 2: The Proposed Scheme

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INFORMATION

Client
Highways England
Major Projects
The Cube
99 Whitfield Street
Birmingham
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Project Title
A38 DERBY JUNCTIONS

Drawing Title
LOCATION OF HERITAGE ASSETS AT PROPOSED KINGSWAY AND MARKEATON JUNCTIONS

Drawn GB	Checked AC	Approved SW	Date 14/02/2018
AECOM Internal Project No. 60533462		Scale @ A3 1:12,500	

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Drawing Number FIGURE 7.1	Rev 0
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File Name: K:\Newproj\7071330 - A38 Derby Junctions.Little Eaton\Heritage\GIS\MXD\A38.MARKEATON.mxd

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- LEGEND**
- Proposed DCO Application Boundary
 - 500m Study Area
 - Listed Buildings
 - Conservation Area
 - Flood Plain (A4)
 - Non-Designated Heritage Assets
 - Non-Designated Heritage Assets
 - Derwent Valley Mills WHS Core Area (A41)
 - Derwent Valley Mills WHS Buffer Zone

Note
Figure illustrates proposed scheme design as detailed in Chapter 2: The Proposed Scheme

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INFORMATION

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199 Whitfield Street
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B1 1RN



Project Title

A38 DERBY JUNCTIONS

Drawing Title

LOCATION OF HERITAGE ASSETS AT PROPOSED LITTLE EATON JUNCTION

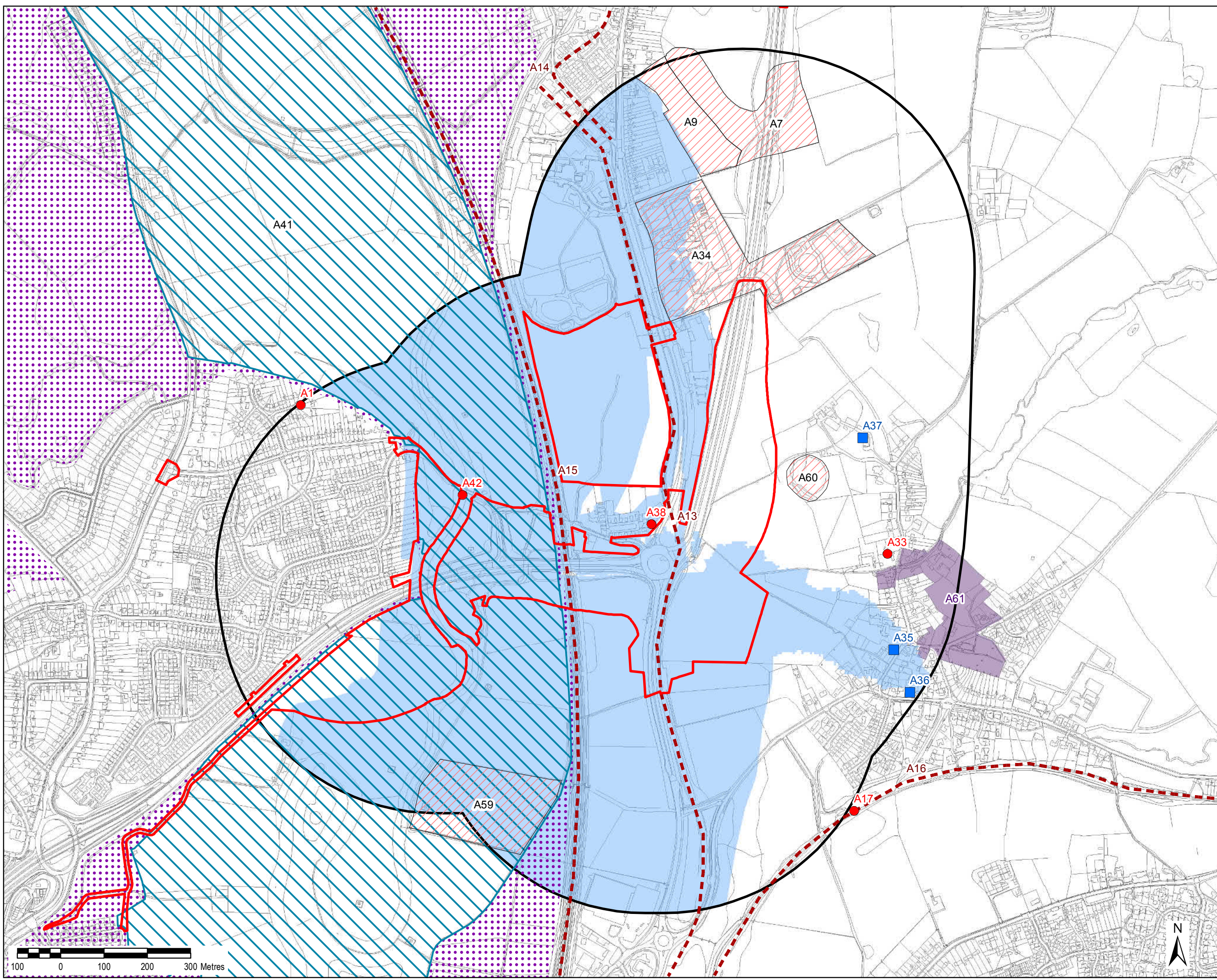
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AECOM Internal Project No. 60533462		Scale @ A3 1:8,000	

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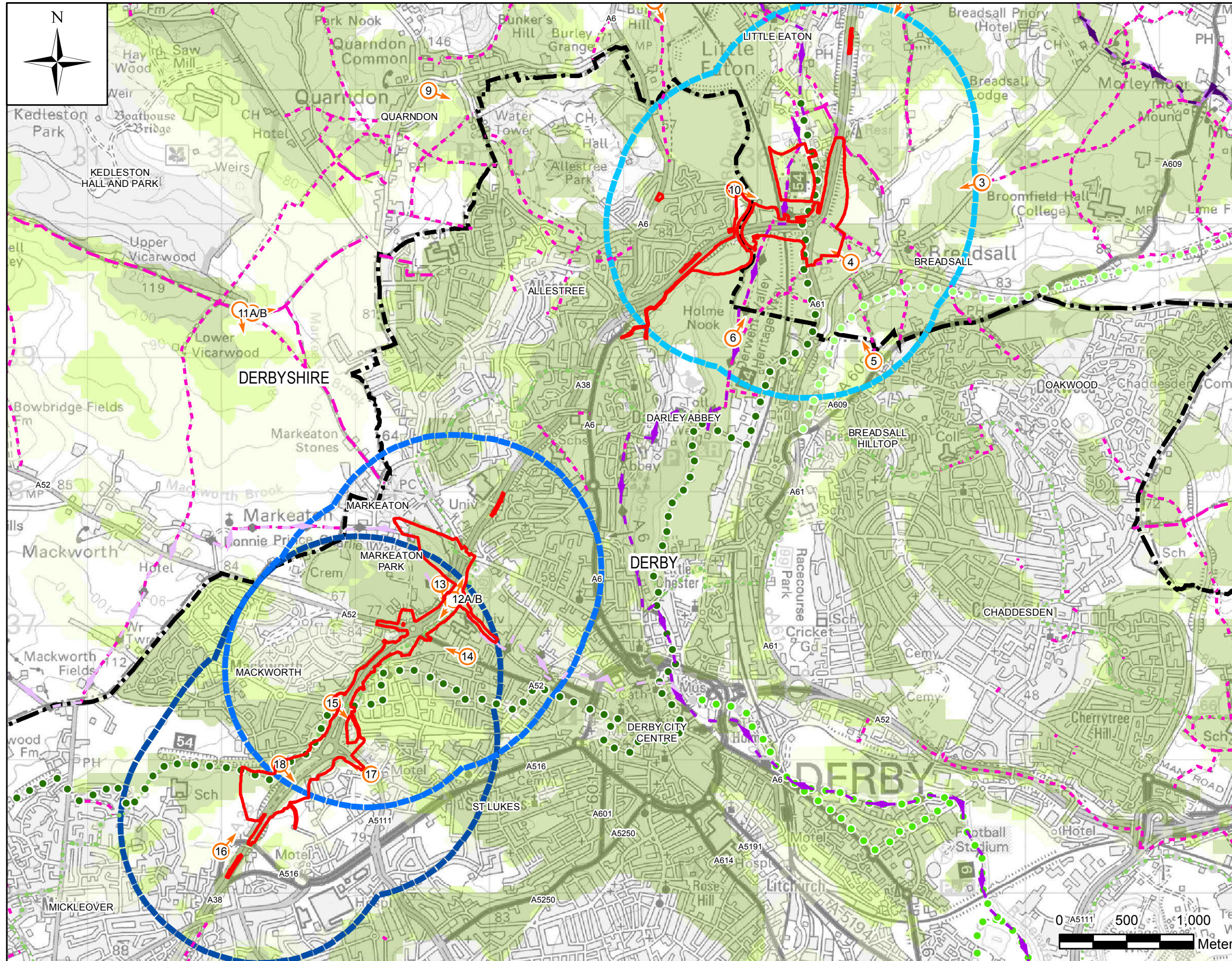
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Drawing Number FIGURE 7.2	Rev 0
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File Name: K:\Newproj\7071330 - A38 Derby Junctions_Little Eaton\Heritage\GIS\MXD\A38 LITTLE EATON.mxd



LEGEND

- RLB
- Little Eaton 1km study area
- Markeaton 1km study area
- Kingsway 1km study area
- County boundary
- Viewpoint

Zone of Theoretical Visibility

- Visibility of lighting columns only
- Visibility of HGVs and lighting columns
- Visibility of cars, HGVs and lighting columns

Public Rights of Way

- Bridleway
- Byway Open to All Traffic
- Footpath
- Restricted Byway
- Temporarily Stopped Up

Long-Distance Footpaths

- Bonnie Prince Charlie Walk
- Centenary Way
- Derwent Valley Heritage Way
- Midshires Way

National Cycle Routes

- National Route 54
- National Route 6
- National Route 672
- Regional Route 66

0 500 1,000 Meters

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Client: highways england

Project: **A38 Junctions**

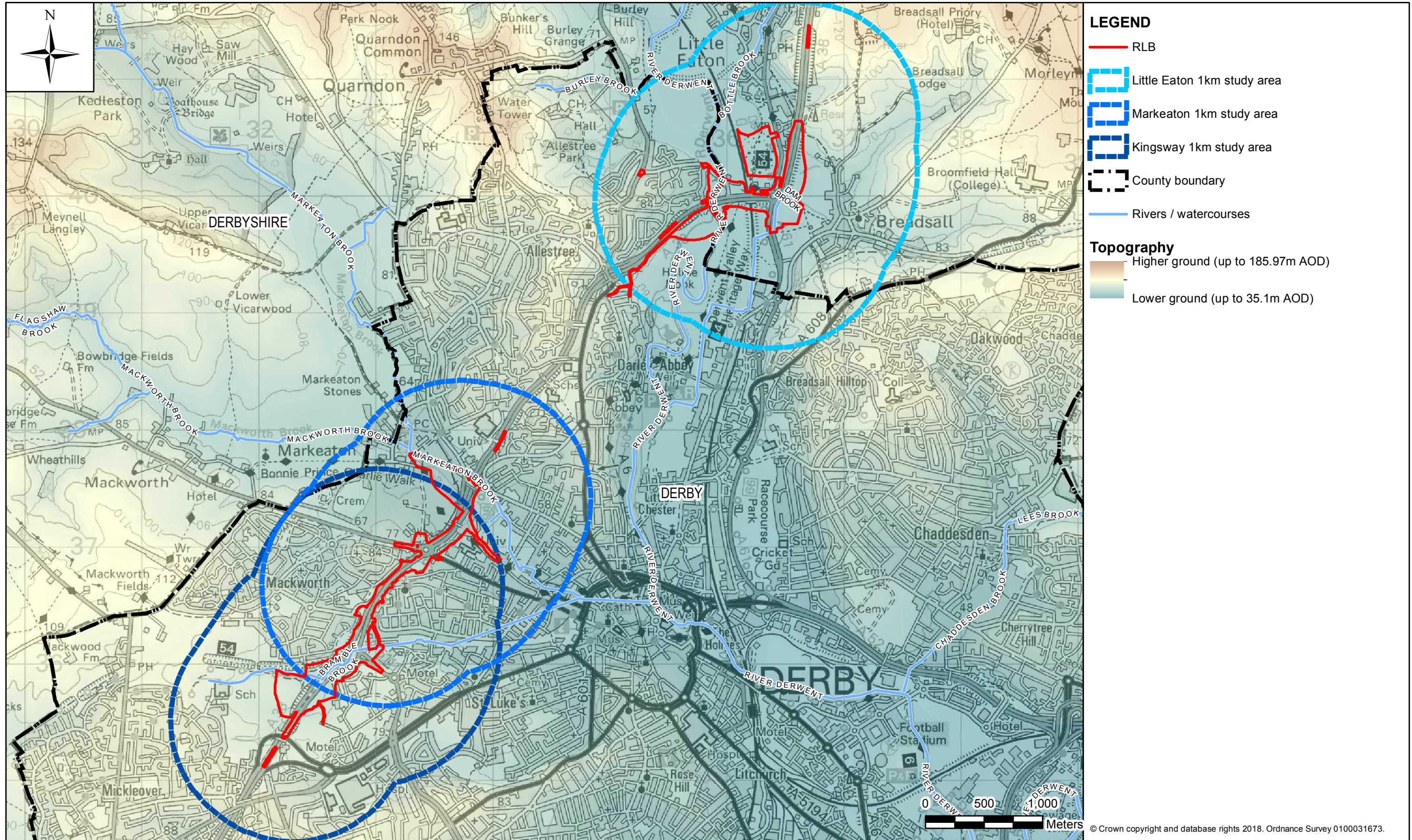
Title: **Figure 8.1- Zone of Theoretical Visibility and Viewpoints**

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Design: RW	Drawn: RW
Chk'd: NW	App'd: NW
Date: 02/03/2018	Scale at A3: 1:30,000
Drawing Number: Figure 8.1	
A3	



LEGEND

- RLB
- Little Eaton 1km study area
- Markeaton 1km study area
- Kingsway 1km study area
- County boundary
- Rivers / watercourses

Topography

- Higher ground (up to 185.97m AOD)
- Lower ground (up to 35.1m AOD)

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Client:	
Project:	A38 Junctions

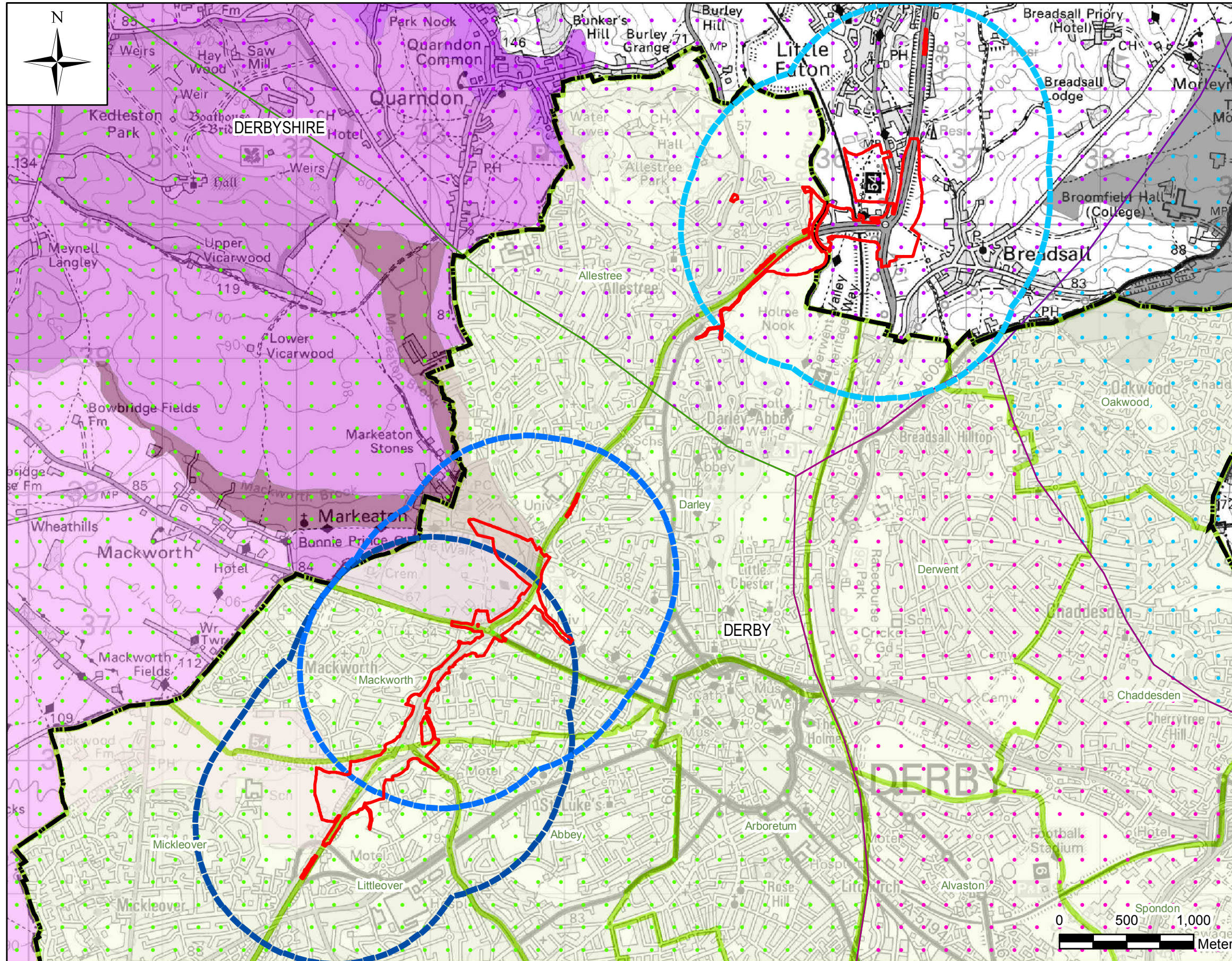
Title:	Figure 8.2 - Topography and drainage
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Drawing Number:	Figure 8.2		A3



LEGEND

- RLB
- Kingsway 1km study area
- Markeaton 1km study area
- Little Eaton 1km study area
- County boundary
- Derby Townscape wards

National Character Areas

- NCA 38 - NOTTINGHAMSHIRE, DERBYSHIRE AND YORKSHIRE COALFIELD
- NCA 50 - DERBYSHIRE PEAK FRINGE AND LOWER DERWENT
- NCA 68 - NEEDWOOD AND SOUTH DERBYSHIRE CLAYLANDS
- NCA 69 TRENT VALLEY WASHLANDS

Derbyshire Peak Fringe and Lower Derwent LCA

- Gritstone Heaths and Commons LCT
- Riverside Meadows LCT
- Wooded Farmlands LCT
- Wooded Slopes and Valleys LCT

Needwood and South Derbyshire Claylands LCA

- Estate Farmlands LCT
- Riverside Meadows LCT
- Sandstone Slopes and Heaths LCT
- Settled Farmlands LCT
- Settled Plateau Farmlands LCT

Nottinghamshire, Derbyshire and Yorkshire Coalfield LCA

- Coalfield Village Farmlands LCT
- Plateau Estate Farmlands LCT

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Client: highways england

Project: **A38 Junctions**

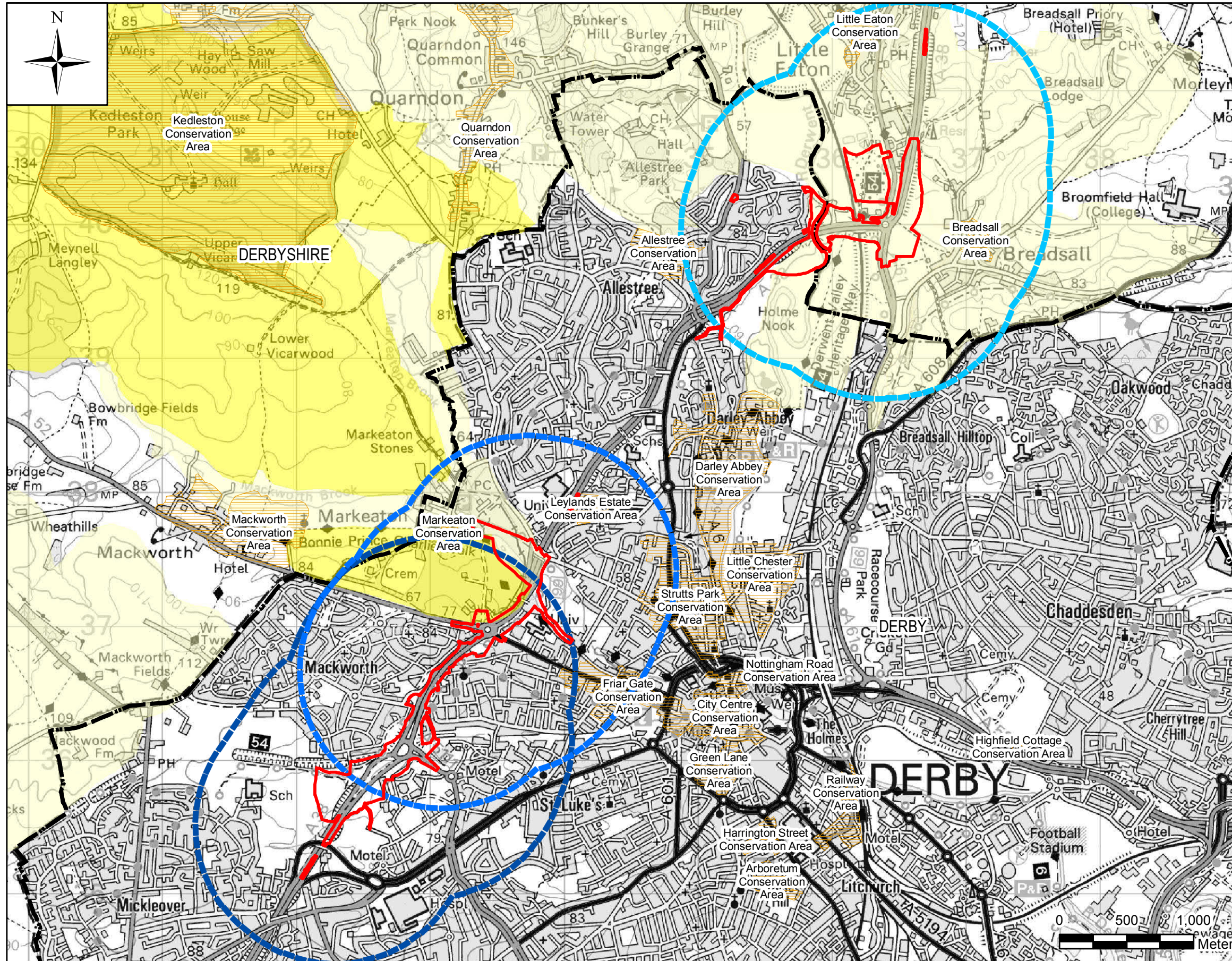
Title: **Figure 8.3 - Landscape Character**

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Date:	02/03/2018	Scale at A3:	1:30,000
Drawing Number:			Figure 8.3
			A3



LEGEND

- RLB
- Little Eaton 1km study area
- Markeaton 1km study area
- Kingsway 1km study area
- County boundary
- Conservation
- Green Wedge
- Green Belt
- Registered Park and Garden

World Heritage Site

- Derwent Valley Mills, Core
- Derwent Valley Mills, Buffer Zone

Areas of Multiple Environmental Sensitivity

Type

- Primary
- Secondary

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Client: highways england

Project: **A38 Junctions**

Title: **Figure 8.4 - Landscape Designations**

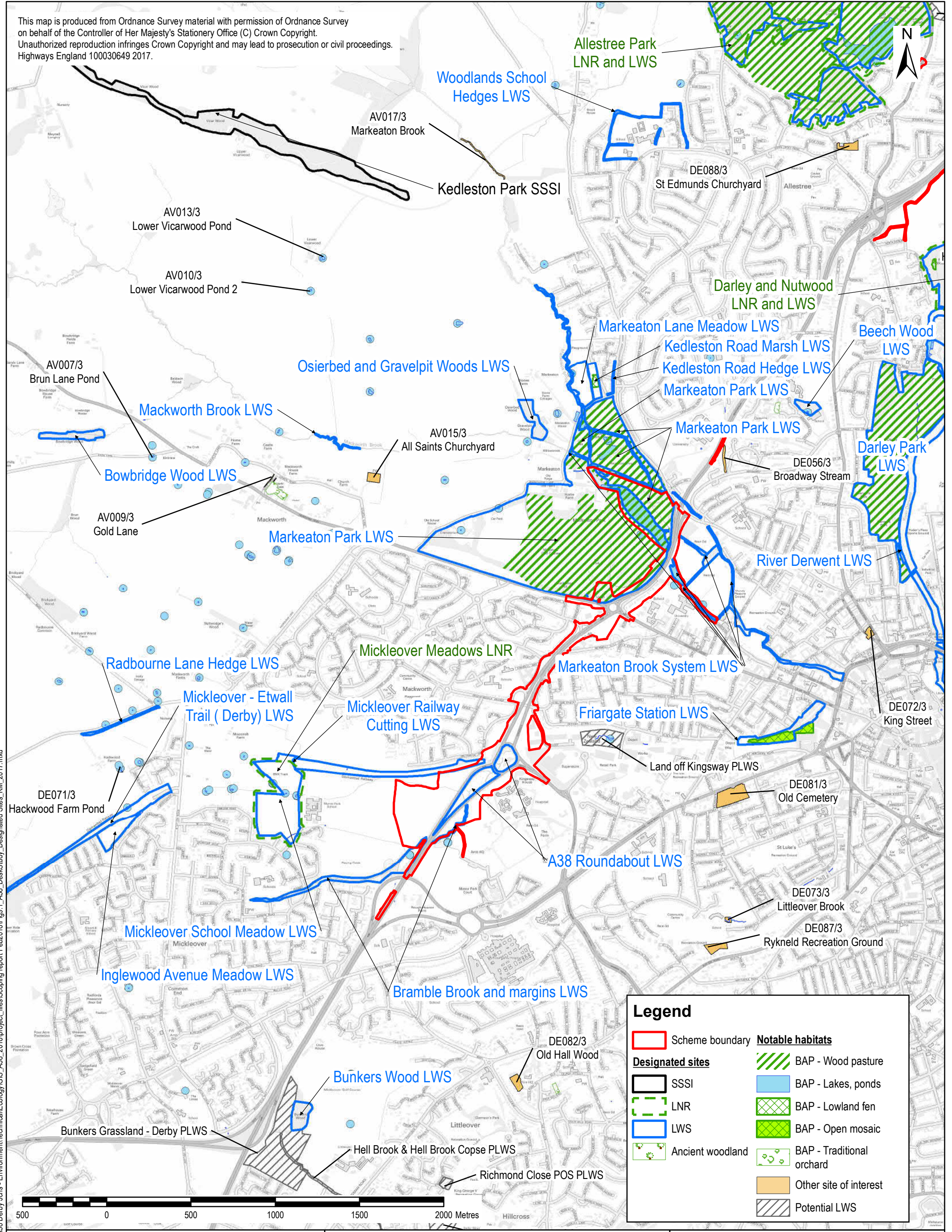
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Date: 02/03/2018	Scale at A3: 1:30,000
Drawing Number: Figure 8.4	
A3	

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Legend

Scheme boundary	Notable habitats
SSSI	BAP - Wood pasture
LNR	BAP - Lakes, ponds
LWS	BAP - Lowland fen
Ancient woodland	BAP - Open mosaic
Potential LWS	BAP - Traditional orchard
	Other site of interest
	Potential LWS

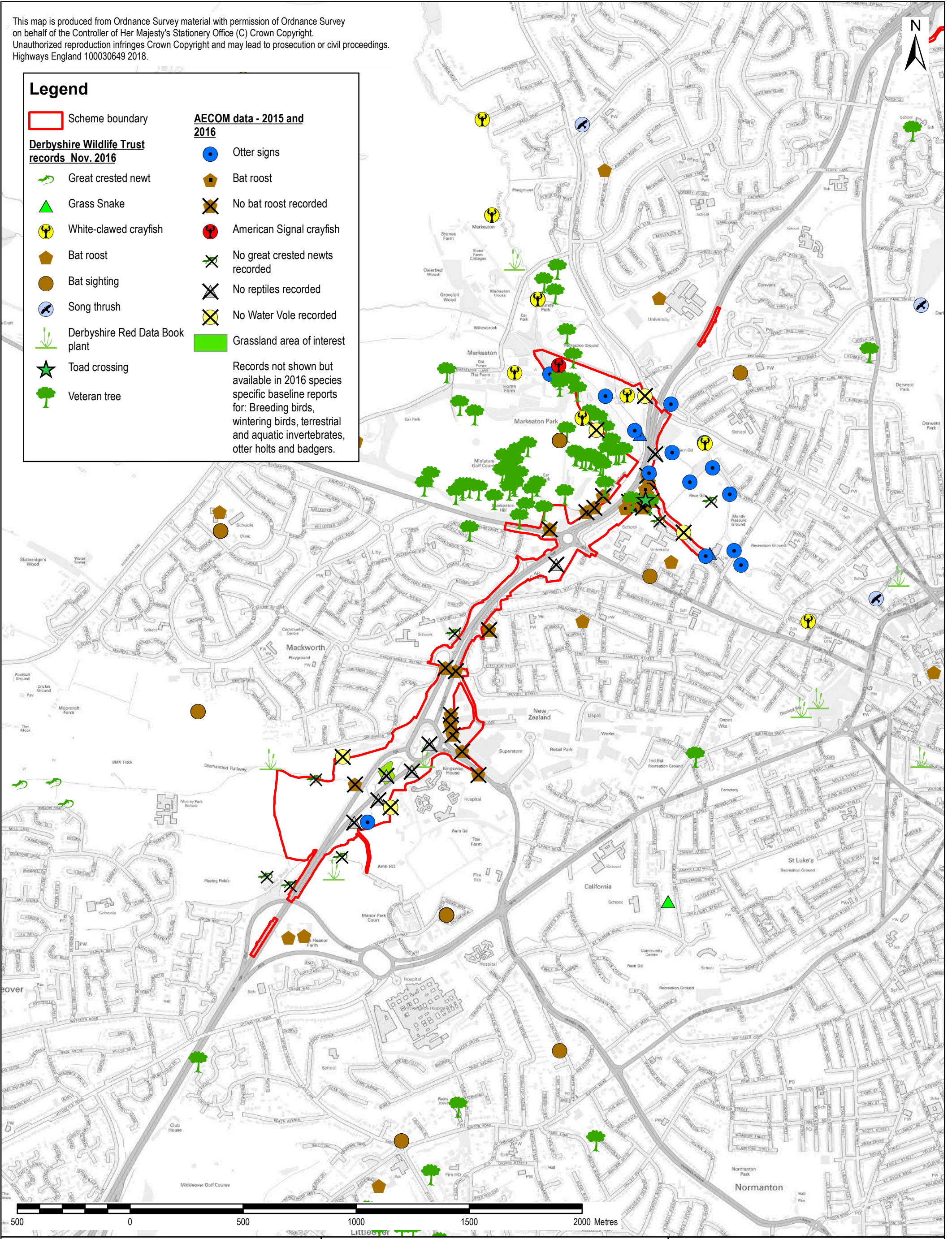
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Drawn GSB	Checked HP	Approved OB			
Date 28/02/2018	Scale @ A3 1:20,000	Purpose of issue FINAL	AECOM Royal Court Basil Close, Chesterfield Derbyshire, S41 7SL +44 (0) 1246 209221 +44 (0) 1246 209229 www.aecom.com		
Drawing Number Figure 9.1	Rev 1	 			

File Name: X:\Highways Agency\47071390_A38 Derby Junctions - Environmental Technical Ecology\GIS_A38_2018\project_files\Scoping report\Feb2018\Fig9.1_A38_DeskStudy_Designated Sites_KM_2017.mxd

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Legend

- Scheme boundary
 - Derbyshire Wildlife Trust records Nov. 2016**
 - ↶ Great crested newt
 - ▲ Grass Snake
 - ⦿ White-clawed crayfish
 - ⬢ Bat roost
 - Bat sighting
 - ⦿ Song thrush
 - ↶ Derbyshire Red Data Book plant
 - ★ Toad crossing
 - 🌳 Veteran tree
 - Otter signs
 - ⬢ Bat roost
 - ✕ No bat roost recorded
 - American Signal crayfish
 - ✕ No great crested newts recorded
 - ✕ No reptiles recorded
 - ✕ No Water Vole recorded
 - Grassland area of interest
- Records not shown but available in 2016 species specific baseline reports for: Breeding birds, wintering birds, terrestrial and aquatic invertebrates, otter holts and badgers.



File Name: X:\Highways Agency\47071390_A38 Derby Junc - Environment\Technical\Ecology\GIS_A38_2018\project_files\Scoping report Feb2018\Fig9.3_A38_DesktStudy_Protected species_KM_2017.mxd

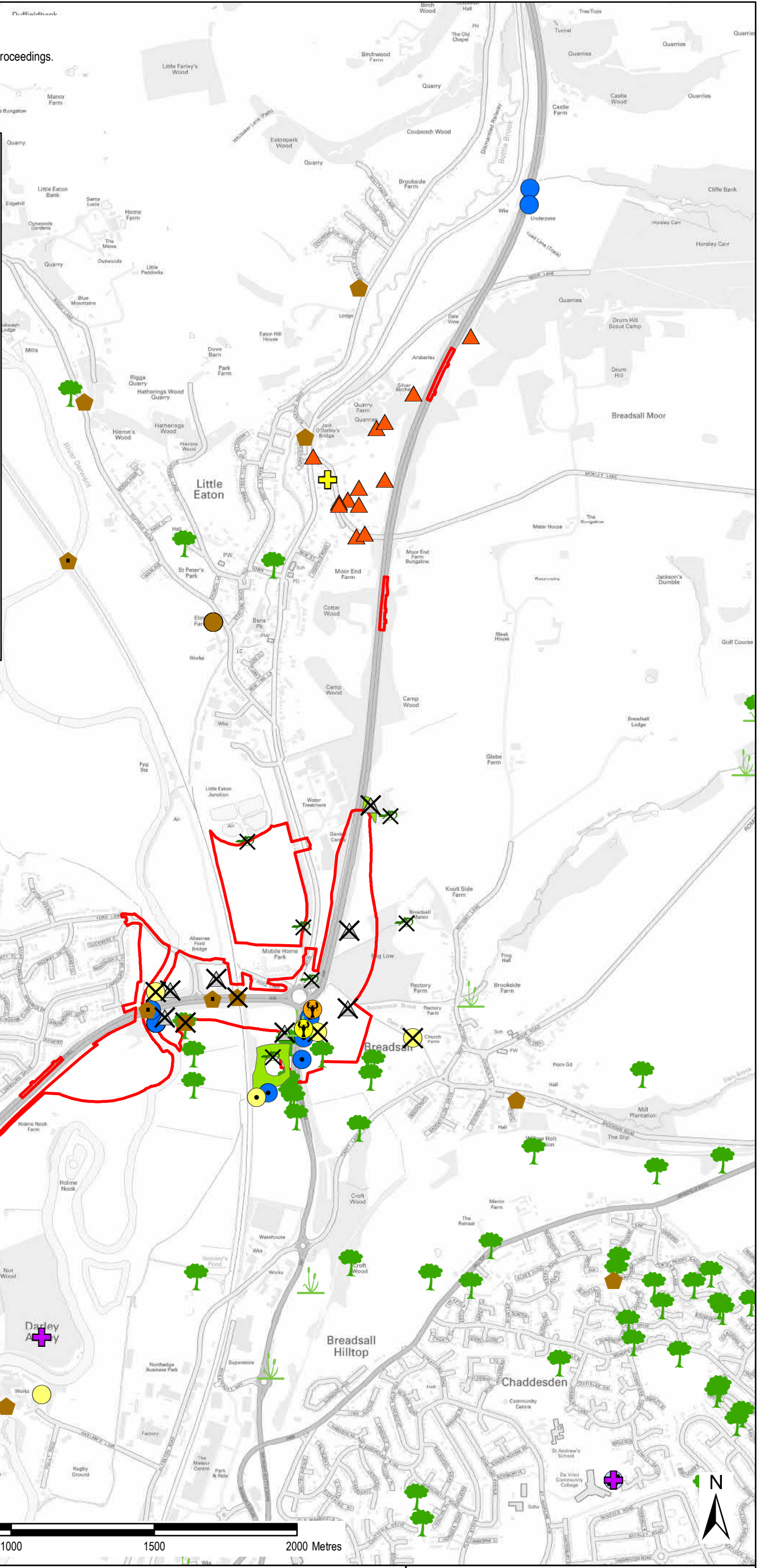
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<p>Drawn GSB</p>		<p>Checked HP</p>		<p>Approved OB</p>	
<p>Date 28/02/2018</p>		<p>Scale @ A3 1:15,000</p>		<p>Purpose of issue FINAL</p>	
<p>Drawing Number Figure 9.3</p>		<p>Rev 1</p>		<p>AECOM Royal Court Basil Close, Chesterfield Derbyshire, S41 7SL +44 (0) 1246 209221 +44 (0) 1246 209229 www.aecom.com</p>	

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Legend

- Scheme Boundary
 - Derbyshire Wildlife Trust records Nov. 2016**
 - Great crested newt
 - White-clawed crayfish
 - Bat roost
 - Bat sighting
 - House sparrow, song thrush
 - Cinnabar, Latticed heath
 - Hedgehog
 - Otter
 - Grass Snake
 - Slow-worm
 - Water vole
 - Derbyshire Red Data Book plant
 - Veteran tree
 - AECOM data - 2015 and 2016**
 - Water vole signs
 - No Water Vole recorded
 - Otter signs
 - Bat roost
 - No bat roost recorded
 - 1 ♂ White-clawed crayfish
 - No reptiles recorded
 - Grassland area of interest
- Records not shown but available in 2016 species specific baseline reports for: Breeding and over-wintering birds; terrestrial and aquatic invertebrates; and badgers.






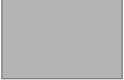




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Project Title/Drawing Title A38 DERBY JUNCTIONS LITTLE EATON DESK STUDY - 2017 PROTECTED AND NOTABLE SPECIES RECORDS		AECOM Internal Project Number 60533462		
Drawn GSB	Checked HP	Approved OB	Highways England Major projects Piccadilly Gate Store Street Manchester M1 2WD AECOM Royal Court Basil Close, Chesterfield Derbyshire, S41 7SL +44 (0) 1246 209221 +44 (0) 1246 209229 www.aecom.com	
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Legend

	Scheme boundary		Tall Ruderal		Broad-Leaved Tree Line
	50m buffer		Inundation Vegetation		Running Water
Habitats					
	Semi-natural Broad-leaved Woodland		Standing Water		Species-Poor Hedge
	Broad-leaved Plantation Woodland		Water Body - Dry		Species-poor Defunct Hedge
	Coniferous Plantation Woodland		Rocks		Species-Poor Hedge With Trees
	Mixed Plantation Woodland		Arable		Fence
	Dense Scrub		Amenity Grassland		Wall
	Scattered Scrub		Introduced Shrub		Dry Ditch
	Scattered Broad-leaved Trees		Building		
	Mixed Scattered Trees		Bare Ground		
	Semi-Improved Neutral Grassland		Hard Standing		
	Marshy grassland		Invasive Non-Native Species		
	Improved Grassland		Other Habitat		
	Poor Semi-Improved Grassland		No access		
			Private Gardens - Not surveyed		

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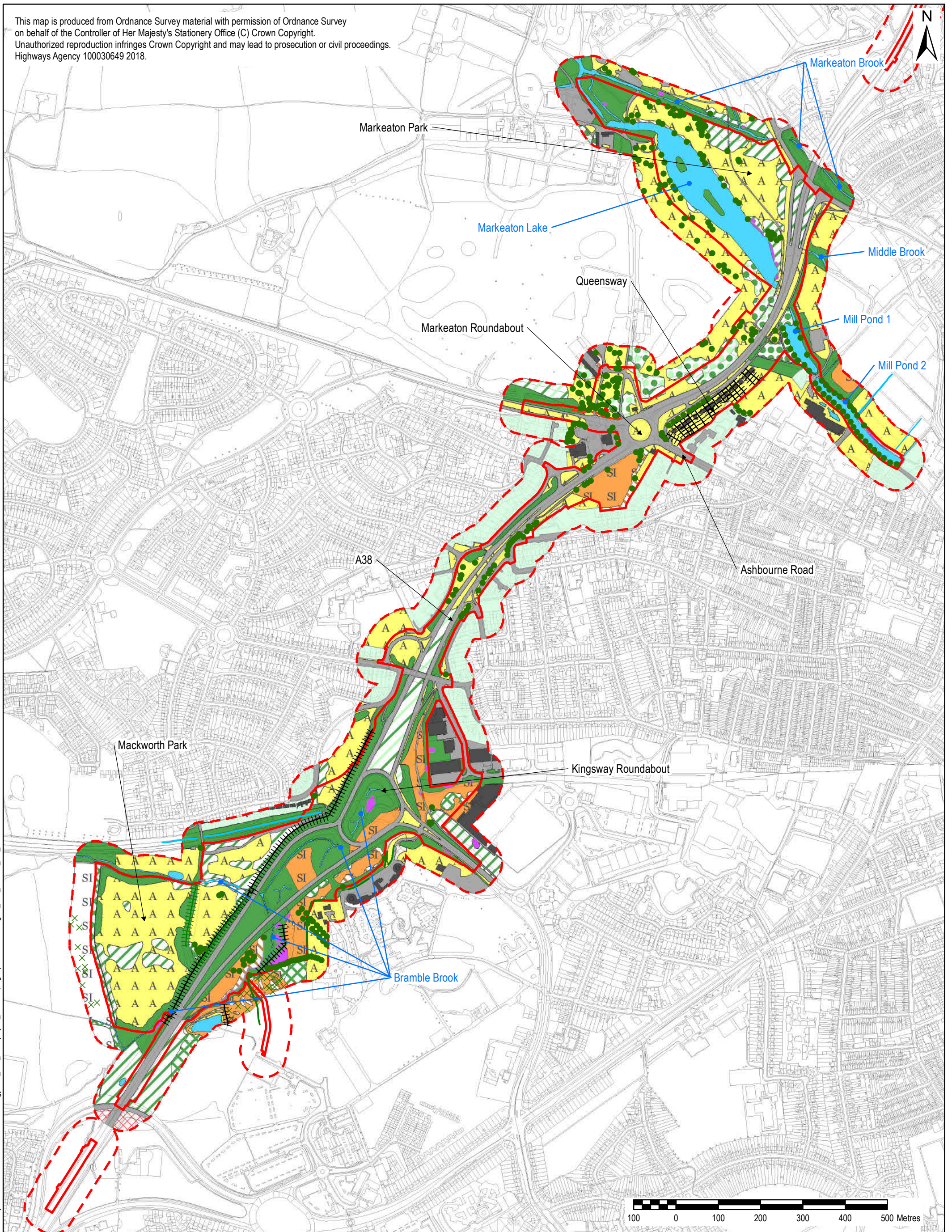
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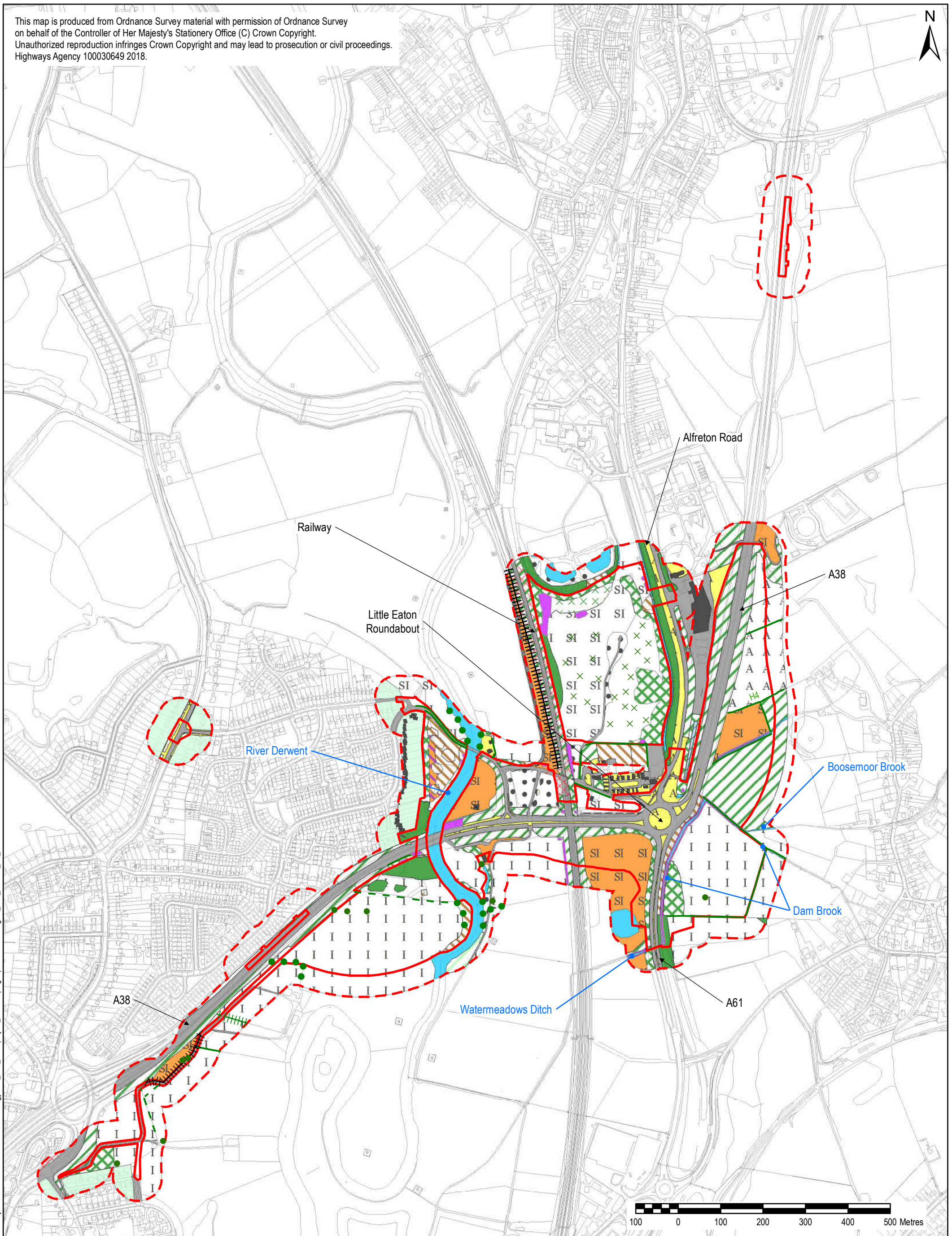


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Project Title/Drawing Title A38 DERBY JUNCTIONS KINGSWAY MARKEATON PHASE 1 HABITAT SURVEY 2017			AECOM Internal Project Number 60533462		Highways England Major projects Piccadilly Gate Store Street Manchester M1 2WD	
Drawn GSB	Checked JS	Approved PB	 			
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Drawing Number Figure 9.6			Rev 1		AECOM Royal Court Basil Close, Chesterfield Derbyshire, S41 7SL +44 (0) 1246 209221 +44 (0) 1246 209229 www.aecom.com	

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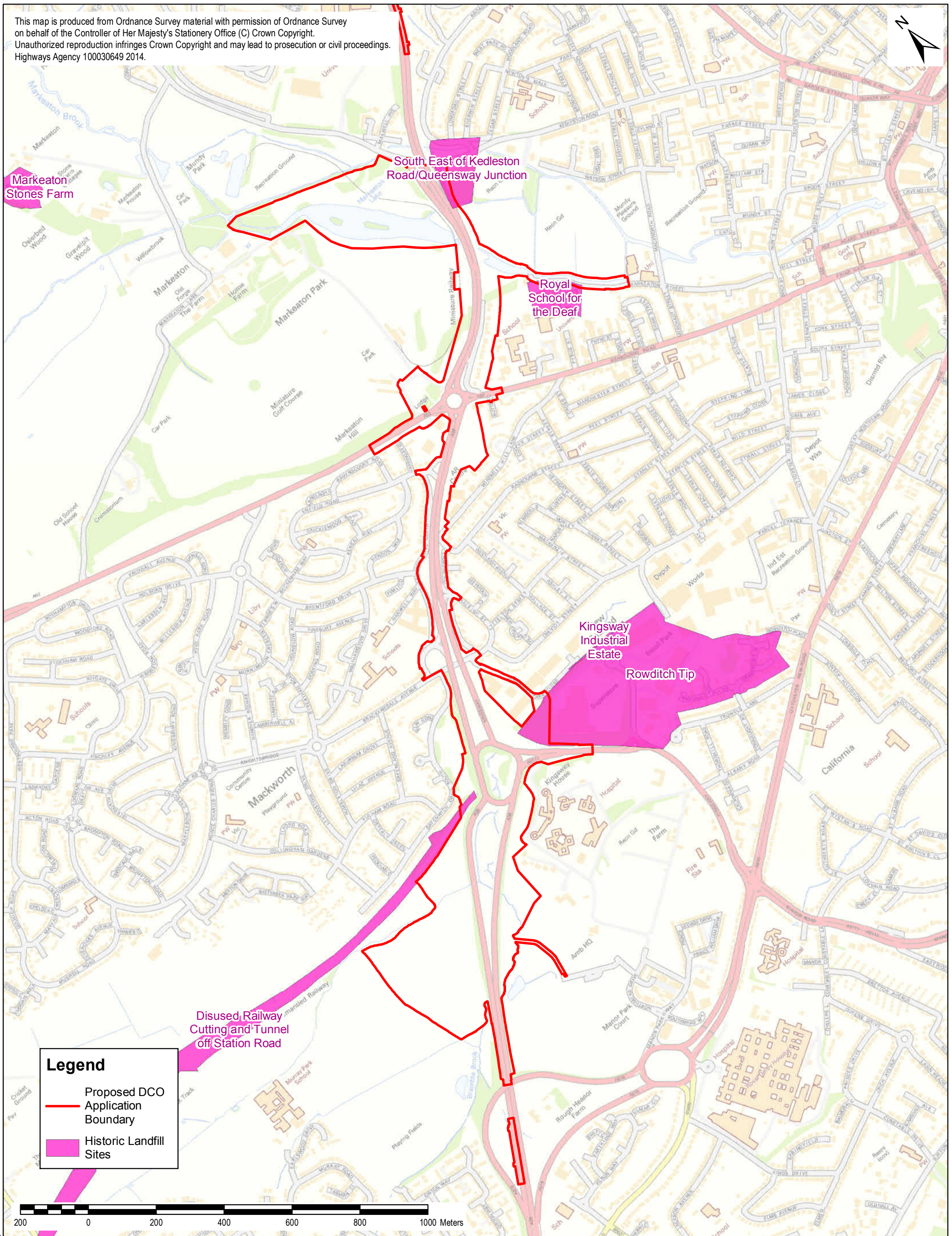


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A38 DERBY JUNCTIONS LITTLE EATON PHASE 1 HABITAT SURVEY 2017		60533462		 	
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Date 28/02/2018		Scale @ A3 1:8,000		Purpose of issue FINAL	
Drawing Number Figure 9.7		Rev 1		AECOM Royal Court Basil Close, Chesterfield Derbyshire, S41 7SL +44 (0) 1246 209221 +44 (0) 1246 209229 www.aecom.com	

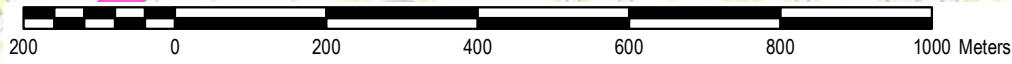
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Legend

- Proposed DCO Application Boundary
- Historic Landfill Sites

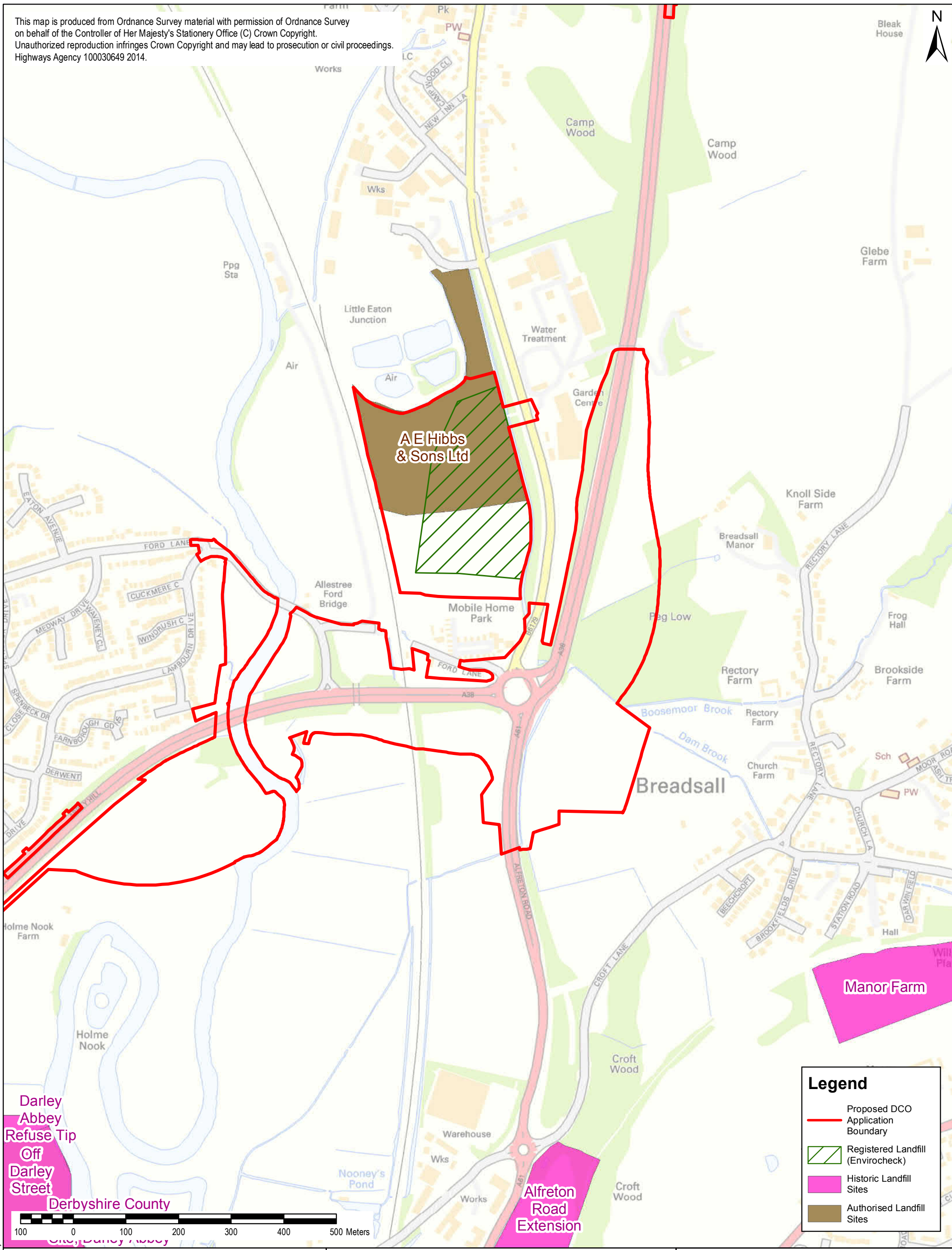


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Date 28/02/2018		Scale @ A3 1:10,000		Purpose of issue FINAL	
Drawing Number Figure 10.1		Rev F		AECOM Royal Court Basil Close, Chesterfield Derbyshire, S41 7SL +44 (0) 1246 209221 +44 (0) 1246 209229 www.aecom.com	

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File Name: \\ch-wip-001\CH_Roads\A38 Derby Jctns - POT33912 CAD\12.1\WIP\FIGURE 10.1 - MARKEATON AND KINGSWAY.mxd

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Legend

- Proposed DCO Application Boundary
- Registered Landfill (Envirocheck)
- Historic Landfill Sites
- Authorised Landfill Sites

Darley Abbey Refuse Tip Off Darley Street Derbyshire County

Project Title/Drawing Title
**A38 DERBY JUNCTIONS IMPROVEMENT
 LITTLE EATON
 HISTORIC & AUTHORISED LANDFILL SITES**

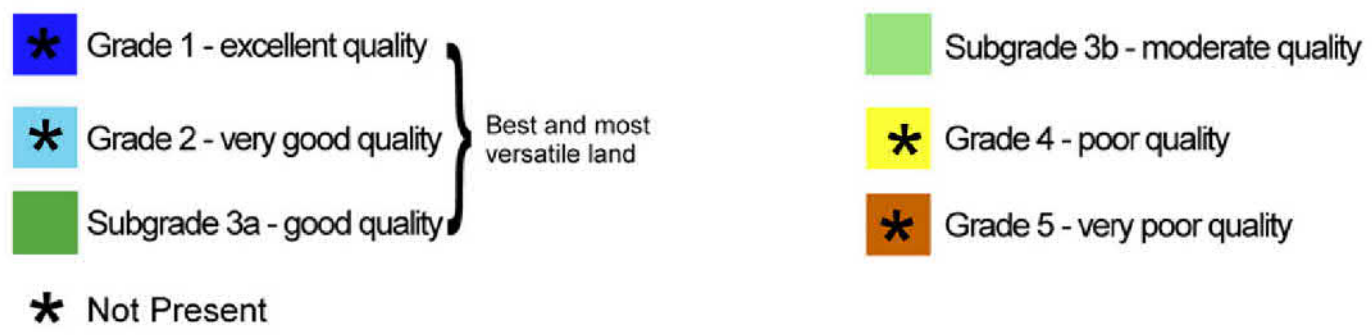
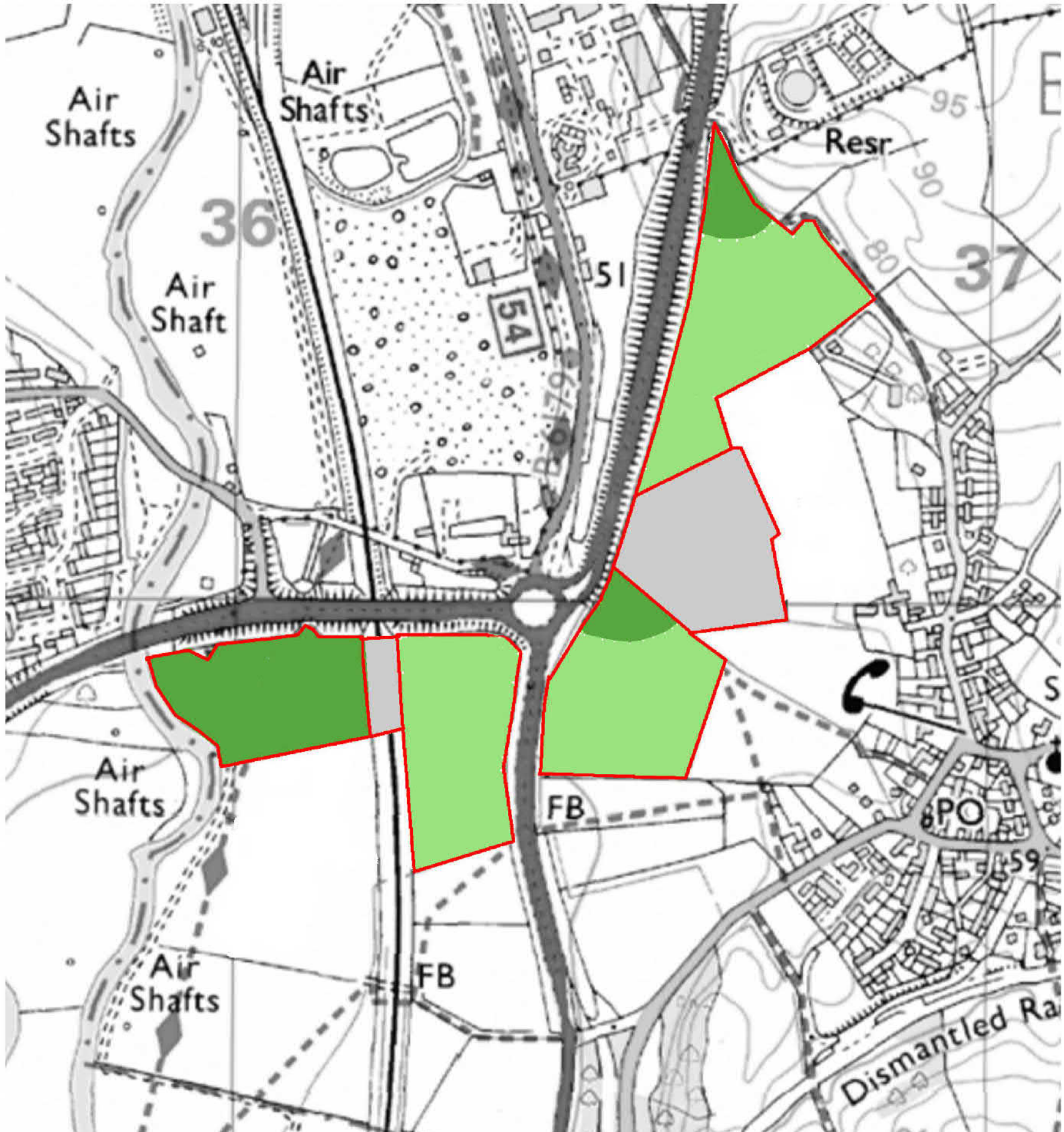
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Drawn GB	Checked SW	Approved SW
Date 28/02/2018	Scale @ A3 1:6,500	Purpose of issue FINAL
Drawing Number Figure 10.2		Rev F

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File Name: \\ch-wip-001\CH_Roads\A38 Derby Jctns - P0133912 CAD\12.1\WIP\FIGURE 10.2 - LITTLE EATON.mxd

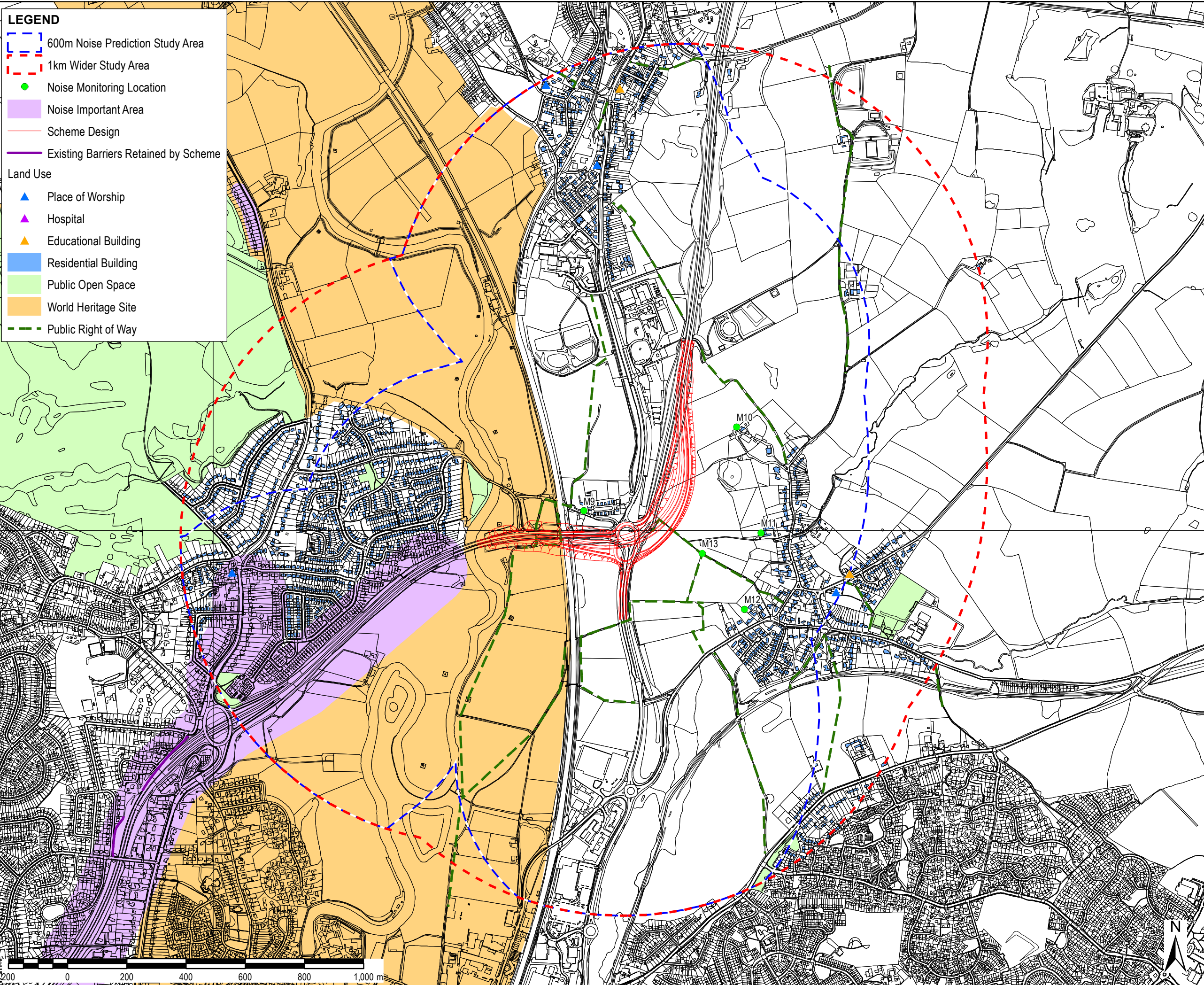


BASED ON FIGURE RAC 6542-2 FROM READING AGRICULTURAL CONSULTANTS

Project Title/Drawing Title A38 DERBY JUNCTIONS IMPROVEMENT AGRICULTURAL SOIL QUALITY AT LITTLE EATON JUNCTION	AECOM Internal Project Number 60533462			Highways England Major projects Piccadilly Gate Store Street Manchester M1 2WD
	Drawn GB	Checked SW	Approved SW	
	Date 28/02/2018	Scale @ A3 NTS	Purpose of issue FINAL	
Drawing Number Figure 10.3			Rev F	AECOM Royal Court Basil Close, Chesterfield Derbyshire, S41 7SL +44 (0) 1246 209221 +44 (0) 1246 209229 www.aecom.com

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LEGEND

- 600m Noise Prediction Study Area
- 1km Wider Study Area
- Noise Monitoring Location
- Noise Important Area
- Scheme Design
- Existing Barriers Retained by Scheme

Land Use

- ▲ Place of Worship
- ▲ Hospital
- ▲ Educational Building
- Residential Building
- Public Open Space
- World Heritage Site
- - - Public Right of Way

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**A38
DERBY JUNCTIONS**

**NOISE LOCATION PLAN
LITTLE EATON JUNCTION**

AECOM Internal Project Number 60533462	Zone/Mileage	Satibility
Designed AECOM	Drawn SJ	Stage 1 check DH
		Stage 2 check SS
		Approved SS
Scale at A3 1:12,000	Originated	Date 02/03/2016

Highways England
Major Projects
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Stone Street
Manchester
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FIGURE 12.1a

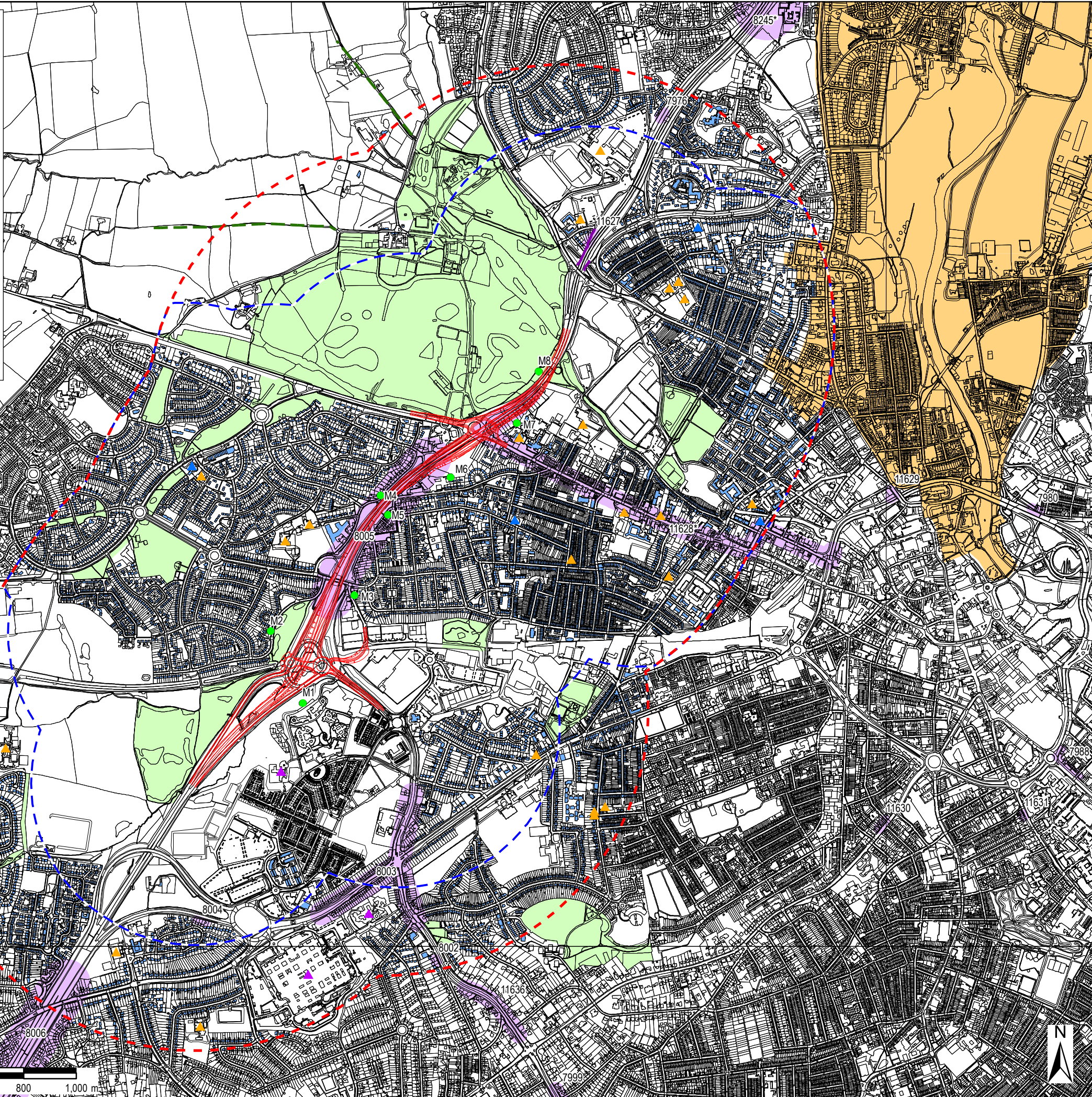
Date Saved: 28/07/2016
File Name: I:\5004 - Information Systems\60471077_A38_Noise02_Maps\Figure 11.3 - Location Plan.mxd

LEGEND

- 600m Noise Prediction Study Area
- 1km Wider Study Area
- Noise Monitoring Location
- Noise Important Area
- Scheme Design
- Existing Barriers Retained by Scheme

Land Use

- ▲ Place of Worship
- ▲ Hospital
- ▲ Educational Building
- Residential Building
- Public Open Space
- World Heritage Site
- - - Public Right of Way



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Rev#	Revision Details						
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**A38
DERBY JUNCTIONS**

**NOISE LOCATION PLAN
KINGSWAY JUNCTION AND
MARKEATON JUNCTION**

AECOM Internal Project Number 60533462		Zone/Mileage	Satlabity
Designed AECOM	Drawn SJ	Stage 1 check DH	Stage 2 check SS
Scale at A3 1:15,000		Originated	Date 27.02.2017

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Major Projects
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Stone Street
Manchester
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FIGURE 12.1b

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Bramble Brook

Legend

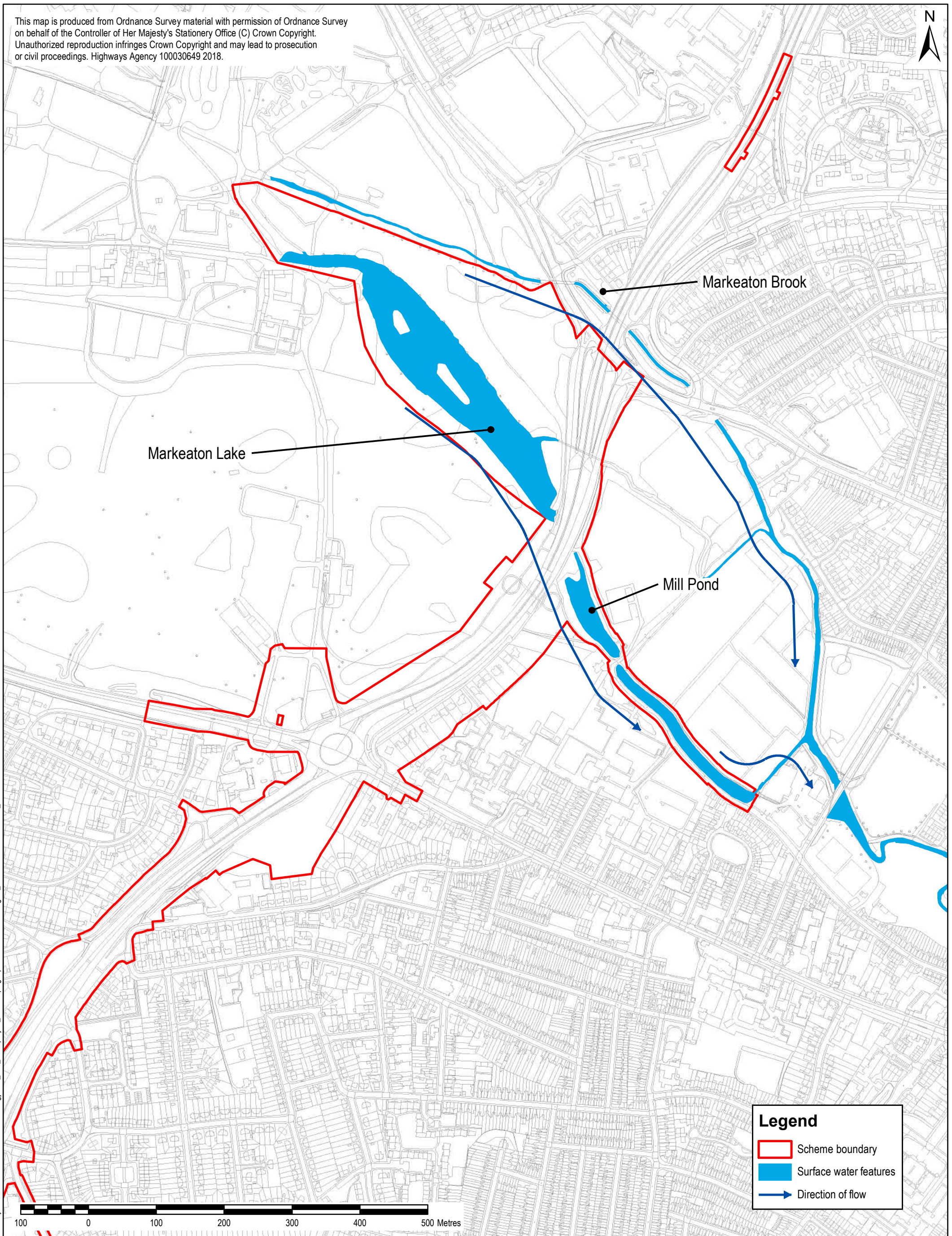
- Scheme boundary
- Surface water
- Direction of flow



A38 DERBY JUNCTIONS SURFACE WATER FEATURES KINGSWAY			Project Number 60533462		Highways England Major projects Piccadilly Gate Store Street Manchester M1 2WD
Drawn GSB	Checked JW	Approved SB	AECOM Royal Court Basil Close, Chesterfield Derbyshire, S41 7SL +44 (0) 1246 209221 +44 (0) 1246 209229 www.aecom.com		
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File Name: X:\Highways Agency\47071390_A38 Derby Juncs - Environment\Technical\GIS_A38_2018\project_files\Scoping report\Feb2018\Water\Fig 14_1 Surfaces water features_Kingsway_2018.mxd

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Markeaton Brook

Markeaton Lake

Mill Pond

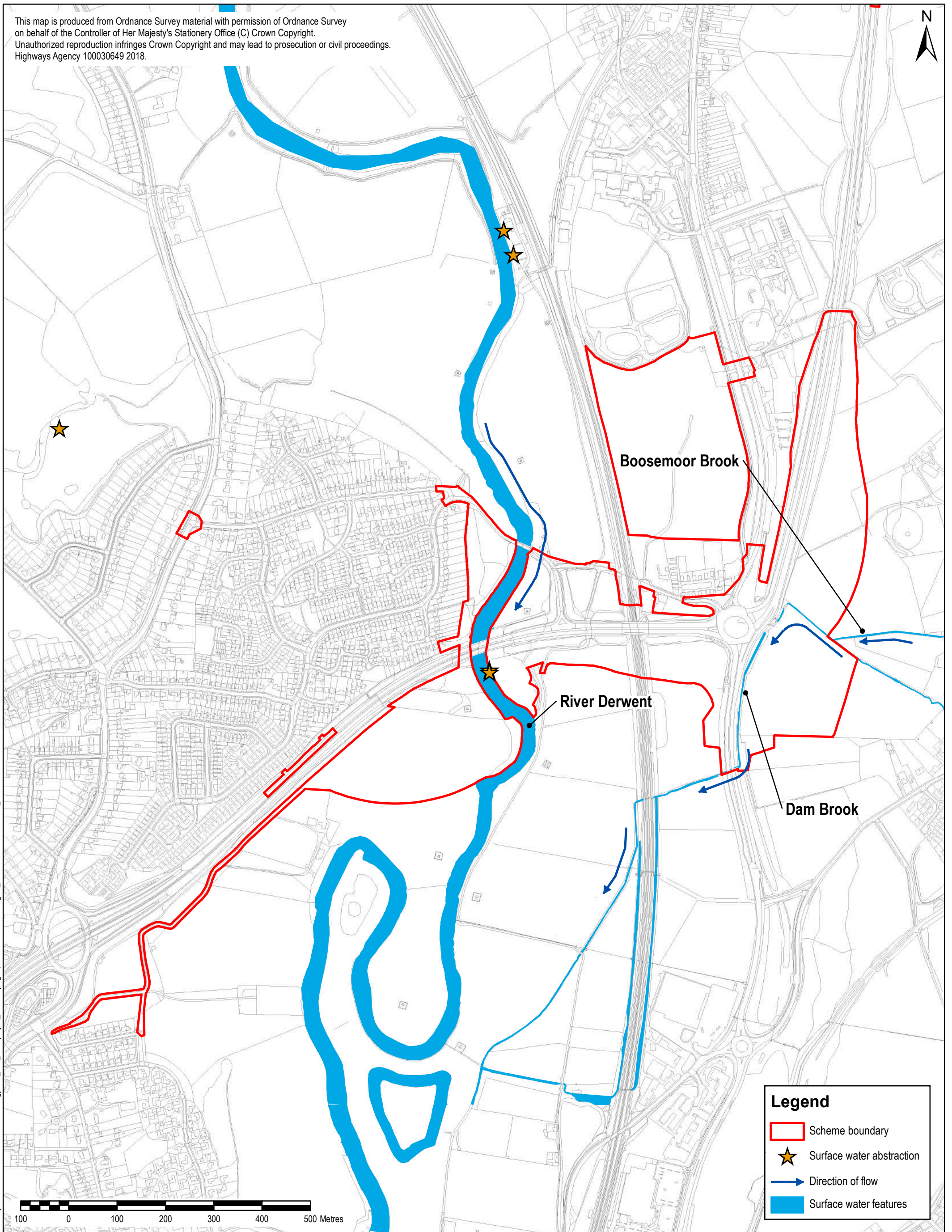
Legend

- Scheme boundary
- Surface water features
- ➔ Direction of flow

<p>Project Title/Drawing Title</p> <p>A38 DERBY JUNCTIONS SURFACE WATER FEATURES MARKEATON</p>		<p>Project Number 60533462</p>		<p>Highways England Major projects Piccadilly Gate Store Street Manchester M1 2WD</p>	
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Legend

- Scheme boundary
- ★ Surface water abstraction
- Direction of flow
- Surface water features

Project Title/Drawing Title
**A38 DERBY JUNCTIONS
 SURFACE WATER FEATURES
 LITTLE EATON**

Project Number 60533462		
Drawn GSB	Checked JW	Approved SB
Date 02/03/2018	Scale @ A3 1:7,000	Purpose of issue FINAL
Drawing Number Figure 14.3		Rev 1

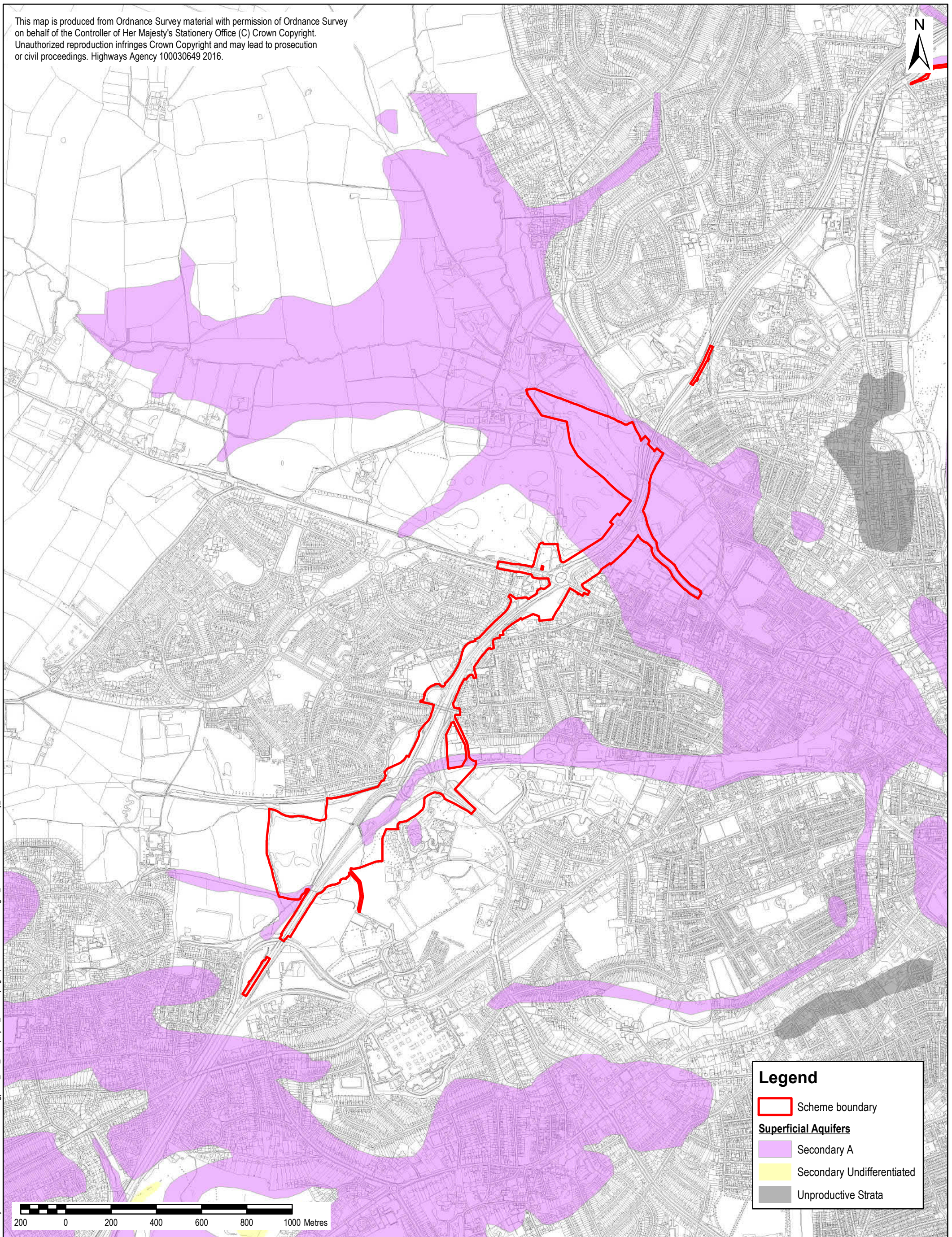
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Legend

- Scheme boundary
- Superficial Aquifers**
- Secondary A
- Secondary Undifferentiated
- Unproductive Strata

Project Title/Drawing Title

**A38 DERBY JUNCTIONS
GROUNDWATER VULNERABILITY
KINGSWAY AND MARKEATON**

Project Number
60533462

Drawn
GSB

Checked
JW

Approved
SB

Date
02/03/2018

Scale @ A3
1:15,000

Purpose of issue
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Drawing Number
Figure 14.4

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Store Street
Manchester
M1 2WD



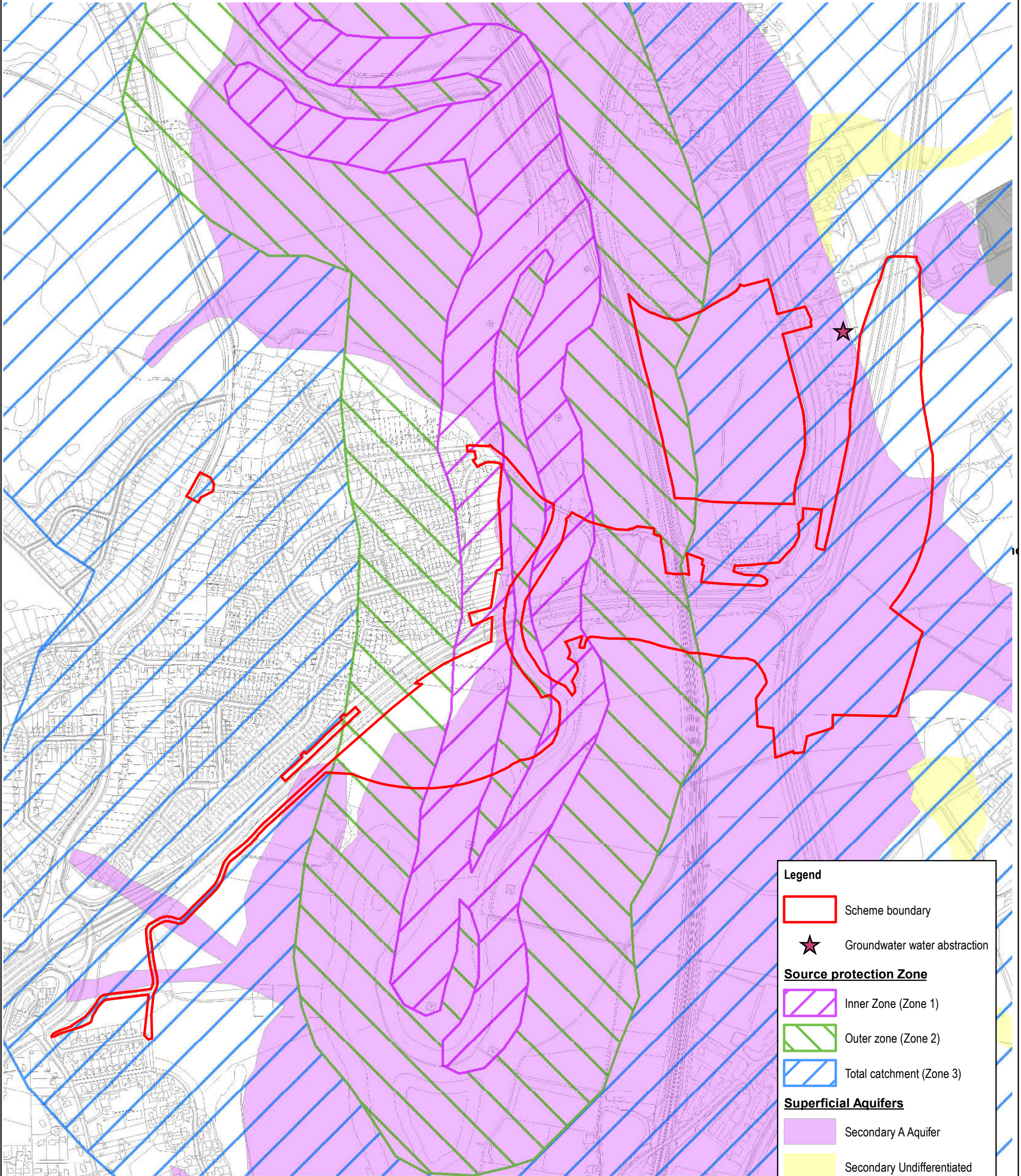
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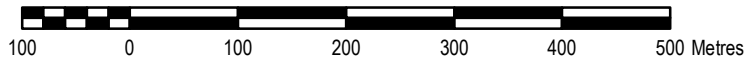
File Name: X:\Highways Agency\47071390_A38 Derby Juncs - Environment\Technical\Ecology\GIS_A38_2018\project_files\Scoping_report_Feb2018\Water\Fig14_4 Groundwater Vulnerability_KM.mxd

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Legend

- Scheme boundary
- ★ Groundwater water abstraction
- Source protection Zone**
- Inner Zone (Zone 1)
- Outer zone (Zone 2)
- Total catchment (Zone 3)
- Superficial Aquifers**
- Secondary A Aquifer
- Secondary Undifferentiated
- Unproductive Strata



A38 DERBY JUNCTIONS GROUNDWATER VULNERABILITY LITTLE EATON		Project Number 60533462		
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Drawing Number Figure 14.5		Purpose of issue FINAL		
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Project Title/Drawing Title A38 Derby Junctions - Environment Technical Ecology/GIS_A38_2018/project_files/Scoping report/Feb2018/Water/Fig14_5 Groundwater Vulnerability_Little Eaton_Junctions.mxd			Highways England Major projects Piccadilly Gate Store Street Manchester M1 2WD AECOM Royal Court Basil Close, Chesterfield Derbyshire, S41 7SL +44 (0) 1246 209221 +44 (0) 1246 209229 www.aecom.com	

APPENDICES

APPENDIX 1.1: GLOSSARY AND ABBREVIATIONS

Glossary of Selected Terms

AADT	Annual Average Daily Traffic is a measure used in transportation engineering and is the number of vehicles that will use a new or improved road on an average day
AQMA	Air Quality Management Area - Places where air quality objectives are not likely to be achieved. Where an AQMA is declared, the local authority is obliged to produce an Action Plan in pursuit of the achievement of the air quality objectives.
CEMP	Construction Environmental Management Plan - A site specific plan developed to ensure that appropriate environmental management practices are followed during the construction phase of a project.
Cumulative Effects	Effects upon the environment that result from the incremental impact of an action when added to other past, present or reasonably foreseeable actions. Each impact by itself may not be significant but can become a significant effect when combined with other impacts.
EIA	Environmental Impact Assessment - A process by which information about environmental effects of a proposed development is collected, assessed and used to inform decision making. For certain projects, EIA is a statutory requirement.
Environmental effect	The consequence of an action (impact) upon the environment such as the decline of a breeding bird population as a result of the removal of hedgerows and trees.
Environmental impact	The change in the environment from a development such as the removal of a hedgerow.
Environmental Statement	A document produced in accordance with the EIA Directive as transposed into UK law by the EIA Regulations to report the results of an EIA.
Flood Zone Three	This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
Flood Zone Two	This zone comprises land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year.
Grade Separated Junction	A junction where the conflicting traffic flows are kept apart, usually by means of a bridge or tunnel.
LA10,18h	The noise level exceeded for 10% of the time between 06:00 and 24:00. It is the noise parameter calculated in the methodology provided in Calculation of Road Traffic Noise (CRTN). A reasonably good correlation has been shown to exist between this index and residents' perception of traffic noise over a wide range of exposures.
Mitigation	Measures including any process, activity, or design to avoid, reduce, remedy or compensate for negative environmental impacts or effects of a development

NSIP	Nationally Significant Infrastructure Projects (NSIP) are large scale developments such as certain new harbours, power generating stations (including wind farms), highways developments and electricity transmission lines, which require a type of consent known as 'development consent' under procedures governed by the Planning Act 2008 (and amended by the Localism Act 2011).
PEI	<p>Preliminary Environmental Information (PEI) is defined in the EIA Regulations as: 'information referred to in Part 1 of Schedule 4 (information for inclusion in environmental statements) which –</p> <ul style="list-style-type: none">(a) has been compiled by the applicant; and(b) is reasonably required to assess the environmental effects of the development (and of any associated development).'
Principal Aquifer	These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.
Receptor	A component of the natural or man-made environment that is affected by an impact, including people.
Secondary A aquifer	<p>These are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.</p> <p>These are generally aquifers formerly classified as minor aquifers.</p>
Secondary B aquifer	These are predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.
Setting	The surroundings within which a heritage asset is experienced and any element which contributes to the understanding of its significance.
Source Protection Zone	Source Protection Zones ("SPZ") show the risk of contamination from any activities that might cause pollution to groundwater sources such as wells, boreholes and springs used for public water supplies. The closer the activity, the greater the risk. SPZs can comprise of up to three main zones (inner, outer and total catchment). A fourth zone of special interest can also occasionally be applied to a groundwater source.
Water Framework Directive	<p>The Water Framework Directive (WFD) introduced a new system for monitoring and classifying the quality of surface and ground waters.</p> <p>The Directive requires that Environmental Objectives be set for all surface waters and groundwater to enable them to achieve Good Ecological Potential/Status by a defined date.</p>

Abbreviations Used

AADT	Annual Average Daily Traffic
ALC	Agricultural Land Classification
AQMA	Air Quality Management Area
AQS	Air Quality Strategy
ARN	Affected Road Network
BAP	Biodiversity Action Plan
BS	British Standard
BSI	British Standard Institution
CEMP	Construction Environmental Management Plan
CO ₂	Carbon Dioxide
CL:AIRE	Contaminated land: Applications in Real Environments
CRTN	Calculation of Road Traffic Noise
dB	Decibel
DCADCC	Development Control Archaeologist for Derbyshire County Council
DCiC	Derby City Council
DCC	Derbyshire County Council
DCO	Development Consent Order
Defra	Department for the Environment Food and Rural Affairs
DfT	Department for Transport
DCLG	Department for Communities and Local Government
DM	Do Minimum
DTM	Digital Terrain Model
DMRB	Design Manual For Roads and Bridges
DS	Do Something
EAR	Environmental Assessment Report
EBC	Erewash Borough Council
EC	European Community
EclA	Ecological Impact Assessment
EIA	Environmental Impact Assessment
ELC	European Landscape Convention
EPD	Environmental Product Declarations
ESA	Environmentally Sensitive Area
EU	European Union
GCN	Great Crested Newt
GVZ	Groundwater Vulnerability Zone
HAPMS	Highways Agency Pavement Management System
HAWRAT	Highways Agency Water Risk Assessment Tool
HE	Historic England
HGV	Heavy Goods Vehicle
HER	Historical Environment Record
HRA	Habitat Regulations Assessment
IAN	Interim Advice Note
IEEM	Institute of Ecological and Environmental Management
IEMA	Institute of Environmental Management and Assessment
LAQM	Local Air Quality Management
LCA	Local Character Area
LCA	Life Cycle Analysis
LCT	Landscape Character Type
LNR	Local Nature Reserve
LPA	Local Planning Authority
LPACO	Local Planning Authority Conservation Officer
LTT	Long Term Trend
LVIA	Landscape and Visual Impact Assessment
LWS	Local Wildlife Site
MAC	Managing Agent Contractor
MAGIC	Multi-agency Geographic Information Centre

mAOD	Metres Above Ordnance Datum
NCA	National Character Area
NMU	Non-Motorised User
NNNPS	National Networks National Policy Statement
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
NPPF	National Planning Policy Framework
NPSE	National Policy Statement for England
NRMM	Non-road Mobile Machinery
NSIP	Nationally Significant Infrastructure Project
NVZ	Nitrate Vulnerable Zone
PCF	Project Control Framework
PEI	Preliminary Environmental Information
PINS	Planning Inspectorate
PM	Particulate Matter
PCM	Pollution Climate Mapping
PPS	Planning Policy Statement
PRoW	Public Right of Way
PLWS	Potential Local Wildlife Site
RIGS	Regionally Important Geological Sites
SAC	Special Area of Conservation
SAM	Scheduled Ancient Monument
SFAIRP	So Far As Is Reasonably Practicable
SGAR	Stage Gate Assessment Review
SPA	Special Protection Area
SPZ	Source Protection Zone
SRO	Senior Responsible Owner
SSSI	Site of Special Scientific Interest
STW	Severn Trent Water
SWMP	Site Waste Management Plan
TAG	Transport Analysis Guidance
TPH	Total Petroleum Hydrocarbons
UK	United Kingdom
WebTAG	Transport Analysis Guidance Website
WFD	Water Framework Directive
VE	Visual Envelope
ZTV	Zone of Theoretical Visibility
ZVI	Zone of Visual Influence

APPENDIX 1.2: TRANSBOUNDARY EFFECTS SCREENING MATRIX

Appendix 1.2: Transboundary Effects Screening Matrix

A1.2.1. Regulation 32 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 requires the consideration of any likely significant effects on the environment of another European Economic Association (EEA) State.

A1.2.2. Guidance upon the consideration of transboundary effects is provided in the Inspectorate's Advice Note 12: Transboundary impacts (Planning Inspectorate, 2015).

A1.2.3. The following screening matrix provides the consideration of transboundary effects for the proposed scheme, taking guidance from Advice Note 12 (Annex).

Table A1: Screening Matrix for Likely Significant Effects on the Environment of Another EEA State

Criteria and Relevant Considerations	Commentary with Regard to Proposed Scheme
Characteristics of the development <ul style="list-style-type: none"> Size of the development Use of natural resources Production of waste Pollution and nuisance Risk of accidents Use of technologies 	<p>The proposed scheme concerns the grade separation of three junctions spread over an approximate 5.5km distance along the A38 to the west and north of Derby. The proposed scheme passes through the administrative areas of Derby City Council, Erewash Borough Council and Derbyshire County Council. Some of the resources required for the construction of the proposed scheme are likely to be obtained from the global market e.g. steel, but it is envisaged that materials would be obtained locally wherever possible. No waste, nuisances or accidents are likely that would extend beyond the border of the UK. No novel technologies are proposed that have potential for transboundary effects.</p>
Geographical area <ul style="list-style-type: none"> What is the extent of the area of a likely impact under the jurisdiction of another EEA state? 	<p>No impacts are likely to extend beyond the jurisdiction of the UK, with the exception of potential release of greenhouse gas emissions.</p>
Location of development <ul style="list-style-type: none"> What is the existing use? What is the distance to another EEA state? (Name EEA state) 	<p>The existing land use is highway for the majority of the proposed scheme, although the proposed Little Eaton junction would cross mainly agricultural land to the south and east of the existing A38. The proposed scheme is located approximately 310km from France and 300km from Southern Ireland.</p>
Cumulative impacts <ul style="list-style-type: none"> Are other major developments close by? 	<p>No other developments of the scale of the proposed scheme have been identified in the vicinity of the proposed scheme. There are a number of proposed developments within 5km of the proposed scheme which have been taken in account by the traffic model. The potential cumulative effect upon transport emissions from the proposed scheme and proposed development will therefore be accounted for in the proposed scheme EIA. However, it is not anticipated that there is potential for cumulative transboundary greenhouse gas emissions effects from these developments.</p>
Carrier <ul style="list-style-type: none"> By what means could impacts be spread (i.e. what pathways)? 	<p>The impact of greenhouse gas emissions would be spread by atmospheric processes.</p>
Environmental importance <ul style="list-style-type: none"> Are particular environmental values (e.g. protected areas – name them) likely to be affected? Capacity of the natural environment Wetlands, coastal zones, mountain and forest areas, nature reserves and parks, Natura 2000 sites, areas where environmental quality standards already exceeded, densely populated areas, landscapes of historical, cultural or archaeological significance 	<p>There are no internationally designated ecological sites within 2km of the proposed scheme. The nearest nationally important designated ecological site is Breadsall Railway Cutting Sites of Special Scientific Interest (SSSI) located approx.1.7km east of the proposed scheme. The proposed scheme is located within 30km of six SACs – the nearest being Gang Milne SAC located approximately 19km to the north-west of the Kingsway and Markeaton junctions; and approximately 17km to the north-west of Little Eaton junction. A screening exercise has determined that there would be no significant effects of the proposed scheme on European sites, and therefore no European sites are required to be considered and taken forward to Appropriate Assessment.</p> <p>The proposed scheme would result in residual moderate adverse effects (at the County/ Unitary Authority level) on the A38 Kingsway</p>

Criteria and Relevant Considerations	Commentary with Regard to Proposed Scheme
	<p>Roundabout LWS (total site loss) and the Alfreton Road Grassland LWS (approx. 22% loss). However, proposed mitigation and enhancement measures have the potential to result in an overall slight positive effect at the Local level in the medium to long term.</p> <p>The proposed scheme at Little Eaton junction traverses a section of the Derwent Valley Mills World Heritage Site which is a heritage designation of international importance – effects on the World Heritage Site are considered to be slight. No known cultural heritage is likely to be significantly affected.</p> <p>Effects on the prevailing landscape during proposed scheme construction are predicted to range from negligible to minor adverse, reducing to negligible during scheme operation following maturation of scheme landscaping (Year 15).</p> <p>The proposed scheme traverses populated areas and has the potential to generate a range of noise and visual effects, although air quality effects are not anticipated to be significant.</p>
<p>Extent</p> <ul style="list-style-type: none"> What is the likely extent of the impact (geographical area and size of the affected population)? 	<p>The only potential transboundary environmental impact which is considered likely is from greenhouse gas emissions, which are known to contribute to changes on climate on a global scale.</p>
<p>Magnitude</p> <ul style="list-style-type: none"> What will the likely magnitude of the change in relevant variables relative to the status quo, taking into account the sensitivity of the variable? 	<p>Total UK greenhouse gas emissions were estimated to be 495.7 million tonnes carbon dioxide equivalent (MtCO₂e) in 2015, whilst greenhouse gas emissions from UK transport were estimated to be approximately 120 MtCO₂e (Department for Business, Energy & Industrial Strategy (7 February 2017¹⁸). The proposed scheme would make a negligible contribution to UK greenhouse gas emission. It is proposed to calculate the likely greenhouse gas emissions as part of the proposed EIA scope.</p>
<p>Probability</p> <ul style="list-style-type: none"> What is the degree of probability of the impact? Is the impact likely to occur as a consequence of normal conditions or exceptional situations, such as accidents? 	<p>The probability of the proposed scheme to contribute to greenhouse gas emissions is likely and would occur as a consequence of the construction and normal operating conditions.</p>
<p>Duration</p> <ul style="list-style-type: none"> Is the impact likely to be temporary, short-term or long-term? Is the impact likely to relate to the construction, operation or decommissioning phase of the activity? 	<p>The impact is likely to be long-term, relating to both construction and operation.</p>
<p>Frequency</p> <ul style="list-style-type: none"> What is likely to be the temporal pattern of the impact? 	<p>The temporal pattern is likely to be relatively constant.</p>
<p>Reversibility</p> <ul style="list-style-type: none"> Is the impact likely to be reversible or irreversible? 	<p>The impact is considered irreversible within human lifetimes.</p>

¹⁸ <https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-2015>

APPENDIX 7.1: GAZETTEER OF HERITAGE ASSETS

Appendix 7.1: Gazetteer of Heritage Assets (refer to Figures 7.1 and 7.2) (to be updated during PCF Stage 3)

Reference numbers are SMR numbers, National Monuments Records (prefixed ID) or from Historic England National Heritage List Entry (prefixed NHLE)

Asset Number	Reference	Junction	Site Type	Description	Period	Value
A1	32403	Little Eaton	Findspot	Neolithic flint knife found in garden of Cobwebs, Chester Avenue, Allestree, in May 1957.	Prehistoric	Negligible
A2	18943; ID313380	Kingsway/ Markeaton	Findspot	Polished stone axehead found at 130 Radbourne Street, Derby, c. 1959	Prehistoric	Negligible
A3	18986; ID608154	Kingsway/ Markeaton	Findspot	Polished greenstone axe found whilst topsoiling for Allestree link road in 1983 (find spot location probably incorrect)	Prehistoric	Negligible
A4	-	Kingsway/ Markeaton, Little Eaton	Buried deposits	Archaeological and palaeo-environmental deposits along River Derwent floodplain Potential buried remains, including buried deposits of palaeo-environmental interest along the River Derwent floodplain, Markeaton Brook, Bramble Brook and their tributaries, including in-filled palaeo-channels.	Prehistoric to Modern	Medium
A5	32054, 99020	Kingsway/ Markeaton	Road	Roman Road (course of), Rocester/Derby/Broxtowe, through Derby City Possible route through Derby of the Roman road joining the forts at Rocester, Derby and Broxtowe	Roman	Low
A6	32380	Kingsway/ Markeaton	Findspot	Denarius of Galienus Valerius Maximus (292-305) dug up in garden c.1904	Roman	Negligible
A7	22325	Little Eaton	Temporary camp?	Camp Wood, Little Eaton An early C19 reference to a Roman camp at Breadsall is said to refer to Camp Wood at Little Eaton, although no evidence has been found. Quarrying activity may have destroyed any former evidence of a Roman Camp.	Roman	Negligible
A8	32823	Kingsway/ Markeaton	Deer park	Site of Markeaton medieval deer park, Derby The site of a former medieval deer park. It lies to the NE of what is now known as Markeaton Park. The site is now under a large housing estate & the University of Derby grounds, but many of the former boundaries are still traceable.	Medieval	Negligible
A9	22328; ID313704	Little Eaton	Lynchets	Lynchets west of Camp Wood, Little Eaton A series of lynchets were noted in or before 1967.	Medieval to Post-medieval	Low
A10	32359	Kingsway/ Markeaton	Ridge and furrow, Landscaped park, Public park	Markeaton Park, Markeaton, Derby Landscape park associated with Markeaton Hall created in the 1770s by William Emes; part became a public park in c.1964. Fossilised ridge and furrow from the former Markeaton medieval village can be discerned amidst Emes' landscaping.	Medieval, Post-medieval to Modern	Low
A11	32358	Kingsway/ Markeaton	Manor house, Country house	Site of Markeaton Hall, Markeaton, Derby Site of country house built 1754-55, on or near the site of an earlier hall. Demolished 1964.	Medieval, Post-medieval to Modern	Low
A12	32135	Kingsway/ Markeaton	Mill pond, Corn mill, Watermill, Colour mill	Former Markeaton Mills, Markeaton Street, Derby Colour works founded after corn milling ceased on the site before 1818. All that remains of a once extensive colour grinding mill is the large mill pond, its feeder and outfall adjoining the brook course. A survey of 1737 currently provides the earliest evidence of a watermill on this site, although it is possible that one of the three watermills recorded on Markeaton Brook in 1272 also stood in this area.	Medieval, Post-medieval to Modern	Low
A13	99010	Little Eaton	Canal	Derby Canal, Little Eaton branch Canal that was opened in 1795.	Post-medieval	Low
A14	22311	Little Eaton	Tramway	Little Eaton Tramway (route of) The route of the Little Eaton Tramway is visible as a raised embankment. It was opened in 1793 and closed in 1908.	Post-medieval	Low
A15	99032	Little Eaton	Railway	The North Midland Railway Railway largely constructed between 1837 and 1838 and opened in July 1840.	Post-medieval	Low

Asset Number	Reference	Junction	Site Type	Description	Period	Value
A16	99013	Kingsway/ Little Eaton	Railway, Earthwork	Derbyshire & North Staffordshire Extension (dismantled), Great Northern Railway Railway line opened 1878; out of use by 1964 and now dismantled. Part now forms some of the Great Northern Greenway countryside trail for walkers and cyclists. Remnants of the Great Northern Railway embankment were located during an archaeological evaluation in advance of housing development at Alfreton Road.	Post-medieval	Negligible
A17	17307	Little Eaton	Railway station, Station Masters House	Site of Breadsall Railway Station and the station house, off Station Road, Breadsall Site of a railway station and station house of 1878, demolished, but some remains were uncovered as part of the Great Northern Greenway countryside trail.	Post-medieval	Negligible
A18	99046	Kingsway/ Markeaton	Toll road	Derby to Brassington (via Hlland Ward) turnpike road One of the earliest turnpike roads in Derbyshire, sanctioned by an Act of 1738. Built with the understanding that the road from Manchester would be extended S to complete the link across the Peak District.	Post-medieval	Negligible
A19	99045	Kingsway/ Markeaton	Toll road	Derby to Hurdlow (via Ashbourne) turnpike road One of the earliest turnpike roads in Derbyshire, sanctioned by an Act of 1738.	Post-medieval	Negligible
A20	32500	Kingsway/ Markeaton	Brickyard	Site of brickyard, Slack Lane, Derby Brickyard in operation until about 1900.	Post-medieval	Negligible
A21	32501	Kingsway/ Markeaton	Brickyard	Site of brickyard, Bright Street, Derby Brickyard in operation until about 1900.	Post-medieval	Negligible
A22	32620	Kingsway/ Markeaton	Brickyard	Site of brickyard, Slack Lane, Derby Brickyard in operation by 1852.	Post-medieval	Negligible
A23	32470	Kingsway/ Markeaton	Icehouse	Site of icehouse, Markeaton Hall, Derby Approximate site of an icehouse shown on late C19 & early C20 maps.	Post-medieval	Negligible
A24	32121	Kingsway/ Markeaton	Brewhouse	Site of Brewhouse, Noel Street, Derby Brewhouse built in the late 1860s. Small two storey brewhouse which served the Gallant Hussar Public House on the street corner. Exact location not known at present.	Post-medieval	Negligible
A25	32120	Kingsway/ Markeaton	Brewery	Site of Manchester Brewery, Ashbourne Road, Derby Site of a brewery established in 1848, but now demolished.	Post-medieval	Negligible
A26	32652	Kingsway/ Markeaton	Maltings	Manchester Road Maltings, Ashbourne Road, Derby Former malthouse complex associated with the nearby Manchester Brewery; a couple of buildings of the 1880s survive. On the City of Derby Local List.	Post-medieval	Low
A27	32785	Kingsway/ Markeaton	Public house	Wagon & Horses Public House, No. 149 Ashbourne Road, Derby A pub established by 1833. On the City of Derby Local List.	Post-medieval	Low
A28	32653	Kingsway/ Markeaton	Gate, Railings	Gates and railings to former church, Ashbourne Road, Derby Ornate gates and railings to former church along Ashbourne Road at the corner with Surrey Street. A chapel is shown on the site on the 2nd ed. 25"O.S. map, so was presumably built sometime between c.1880 & 1899, when the 1st ed. was revised. The railings may be of the same date. On the City of Derby Local List.	Post-medieval	Low
A29	32542	Kingsway/ Markeaton	Cottage home	Former home for Penitent Females, Bass Street, Derby Former Home for Penitent Females designed by George Henry Sheffield; built 1866-68, and extended 1993 as apartments. On the City of Derby Local List.	Post-medieval	Low
A30	NHLE1215688; 32181	Kingsway/ Markeaton	Toll house	161, Ashbourne Road Listed Building, grade II Early C19. Originally a toll house.	Post-medieval	Medium
A31	NHLE1215689	Kingsway/ Markeaton	Cottage	193 and 195, Ashbourne Road Listed Building, grade II Early C19. A pair of modest cottages	Post-medieval	Medium

Asset Number	Reference	Junction	Site Type	Description	Period	Value
A32	NLHE1230498; 32462	Kingsway/ Markeaton	Conservatory	Conservatory in Markeaton Park Listed Building, grade II Conservatory. Late C18 possibly designed by Joseph Pickford of Derby for the Mundy family.	Post-medieval	Medium
A33	17318	Little Eaton	House	Manor Cottage, 39 Rectory Lane, Breadsall A small late C18 house with major C20 extensions.	Post-medieval	Low
A34	22313	Little Eaton	Waterworks	Waterworks, Alfreton Road, Little Eaton Waterworks established in 1848 off Alfreton Road. The works were enlarged in the C20. A building of 1848 survives.	Post-medieval	Low
A35	NHLE1205253	Little Eaton	Cottage	23, Rectory Lane Listed Building, grade II Cottage. Probably early C17. Timber-framed, encased in C20 in cement render.	Post-medieval	Medium
A36	NHLE1328832	Little Eaton	Farmhouse	Rose Cottage Shamrock Cottage Listed Building, grade II Farmhouse, now two cottages. Probably early C17. Timber-framed with painted brick noggin.	Post-medieval	Medium
A37	NHLE1141233	Little Eaton	Rectory	Breadsall Manor Listed Building, grade II Rectory, now private house. Early C19. Red brick	Post-medieval	Medium
A38	-	Little Eaton	Farm building	Ford Farm Farmhouse and associated structures (boundary wall and gate pillar) that are originally shown on historic O.S map. The building is now re-used as a coffee house. Dates from at least mid- C19, it is double fronted with a central doorway of two storeys and two bays. Heavily altered.	Post-medieval	Low
A39	-	Kingsway/ Markeaton	Lodge	Buried remains of lodge at Markeaton Park S entrance The remains of a lodge that is shown on O.S. maps, but that has since been demolished.	Post-medieval	Negligible
A40	-	Kingsway/ Markeaton	Boundary wall	Markeaton Park boundary wall Wall of indeterminable date possibly relocated to present position late C20. Forms the southern boundary to Markeaton Park. It is a stone wall of squared tooled sandstone with segmental coping stones.	Post-medieval to Modern	Low
A41	-	Kingsway/ Markeaton, Little Eaton	World Heritage Site	Derwent Valley Mills World Heritage Site The World Heritage Site occupies the Derwent Valley and is bound to the east by the North Midlands Railway. Running through the heart of the site is the River Derwent which was key to the industrial development of the valley. The Derwent Valley, upstream from Derby on the southern edge of the Pennines, contains a series of C18 and C19 cotton mills and an industrial landscape of high historical and technological significance.	Post-medieval	Very High
A42	32104	Little Eaton	Ford, Bridge	Ford, Allestree Ford Bridge, Allestree, Derby Ford through the Derwent replaced by a bridge in the early C20.	Post-medieval to Modern	Negligible
A43	32158	Kingsway/ Markeaton	Silk mill	Former Ashbourne Road Mills, Payne Street, Derby Former silk mill built 1850s. Small two storey brick building with slate roof. This is all that survives of a silk mill built by John & William Rickard in the 1850s.	Post-medieval to Modern	Low
A44	32569	Kingsway/ Markeaton	Church, Font	St Barnabas Church, Radbourne Street, Derby Church built 1880 - 1903, designed by Arthur Coke-Hill; early font (medieval to post-medieval) allegedly from Dale Abbey. On the City of Derby Local List.	Post-medieval to Modern	Low
A45	32364	Kingsway/ Markeaton	Plaque	Cast iron sign, 191 Ashbourne Road, Derby C19 /early C20 cast iron sign attached to building. On the City of Derby Local List.	Post-medieval to Modern	Low

Asset Number	Reference	Junction	Site Type	Description	Period	Value
A46	32122	Kingsway/ Markeaton	Malt house, Brewery, Vinegar brewery	Former malthouse, brewery and vinegar works, Sherwin Street / Kedleston Road Malthouse built in late 1870s, with most buildings erected 1906; now a residential home for the elderly. On the City of Derby Local List.	Post-medieval to Modern	Low
A47	32780	Kingsway/ Markeaton	Primary school	Markeaton Primary School, Bromley Street, Derby Early C20 red brick school building. On City of Derby Local List.	Post-medieval to Modern	Low
A48	32315	Kingsway/ Markeaton	Landscape park	Thornhill Park (former), Kingsway, Derby Park created c.?1821.	Post-medieval to Modern	Negligible
A49	32314	Kingsway/ Markeaton	Country house, Psychiatric hospital	Thornhill, Kingsway, Derby Villa built 1821; later incorporated into Derby Lunatic Asylum.	Post-medieval to Modern	Low
A50	32581	Kingsway/ Markeaton	Psychiatric hospital	Borough Lunatic Asylum, Uttoxeter Road, Rough Heanor, Derby Institution built in stages from 1884 to 1914; designed by B S Jacobs of Hull.	Post-medieval to Modern	Low
A51	32357	Kingsway/ Markeaton	Farm	Site of Humbleton Farm, Mackworth, Derby Farm established following Parliamentary Enclosure in 1763, built over in c.1950.	Post-medieval to Modern	Negligible
A52	32582	Kingsway/ Markeaton	House	Kingsway House, Uttoxeter Road, Rough Heanor, Derby House built 1936-38, by C H Aslin.	Modern	Low
A53	32583	Kingsway/ Markeaton	Nurses hostel	Kingsway Hospital Nurses Home, Uttoxeter Road, Derby 1930s nurses home by George Morley Eaton. On the City of Derby Local List.	Modern	Low
A54	32812	Kingsway/ Markeaton	Pillar box	Cast iron pillar box, Brackensdale Avenue, Mackworth, Derby Edward VIII cast iron pillar box, one of only 271 in the country. On the City of Derby Local List.	Modern	Low
A55	18978	Kingsway/ Markeaton	Hosiery factory	Britannia Mills, Markeaton Street/Mackworth Street, Derby Hosiery mill built in 1912 on the site of an earlier mill and now used as part of Derby University. On the City of Derby Local List.	Modern	Low
A56	ID1473097	Kingsway/ Markeaton	Heavy anti-aircraft battery	The site of a WW2 heavy anti-aircraft battery at Markeaton It was listed as unarmed in 1942, and had been manned by 319 Battery of the 68th Royal Artillery Regiment in 1940.	Modern	Negligible
A57	ID1423384	Kingsway/ Markeaton	Spigot mortar emplacement	The site of a WW2 spigot mortar base Site of WW2 mortar base, 50 yards N of the old railway bridge, Kingsway, Derby.	Modern	Negligible
A58	ID1412127	Kingsway/ Markeaton	Army camp	Army Camp 1901 - 2000 Markeaton Park was an army camp for the No 1 Young Soldiers Training Centre.	Modern	Negligible
A59	17321	Little Eaton	Ring ditch ?	Possible Ring Ditch, c.400 m East of Holme Nook, Breadsall Cropmark suggestive of a ring ditch identified on an aerial photograph of c.2006.	Unknown	Medium
A60	17303	Little Eaton	Natural feature	Peg Low, Breadsall Mound originally assumed to have been a barrow but, following excavation in the 1930s, now thought to be a natural feature.	Unknown	Negligible
A61	DDR7043	Little Eaton	Conservation area	Breadsall Conservation Area	n/a	Medium
A62	DDR7269	Kingsway/ Markeaton	Conservation area	Friar Gate Conservation Area	n/a	Medium
A63	DDR7270	Kingsway/ Markeaton	Conservation area	Leylands Estate Conservation Area	n/a	Medium

