A38 Derby Junctions

TR010022

Volume 6

6.1 Environmental Statement

Chapter 2 – The Scheme

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6.1 Environmental Statement
Chapter 2 The Scheme

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2. The Scheme

2.1 Need for the Scheme

2.1.1 The A38, which passes through Derby, is part of the strategic road network and provides a route between Birmingham and the M1 at junction 28, thereby providing a route for north-south long-distance journeys by private vehicle. 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 and queues at the three roundabout junctions on the A38 in Derby, namely at Kingsway junction, Markeaton junction and Little Eaton junction. These are the only three roundabouts remaining on the 63km (39 miles) length of the A38 between the A38/A5148 "Swinfen" junction (near Lichfield) and the M1.

2.1.2 Derby and its immediate surrounding area have plans for significant housing and employment growth. As a result, the traffic demands on the A38 through Derby are forecast to grow. Consequently, existing delays and queues at these junctions are expected to worsen due to increasing levels of traffic.

2.1.3 As detailed in the Transport Assessment Report [**TR010022/APP/7.3**], the consequences of not progressing the Scheme are that:

- Queues and delays on local roads around Derby would become worse as traffic demand continues to increase.
- The A38 would maintain its relative unattractiveness to long-distance strategic trips, and hence discourages both car and freight trips to use this length of the strategic road network in peak traffic flow periods.

2.1.4 In order to resolve the existing and predicted traffic problems along this stretch of the A38, the Scheme would comprise the grade separation of Kingsway junction, Markeaton junction and Little Eaton junction. Grade separation would be achieved by the A38 passing through Kingsway junction and Markeaton junction via underpasses, and on an embankment flyover at Little Eaton junction.

2.1.5 Grade separation of these three A38 junctions would provide journey time benefits to all vehicles, including those travelling along this strategic route. 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. Upon Scheme opening in 2024, the total journey time saving along the A38 northbound would be 5 minutes 27 seconds in 2024 during the 08:00 to 09:00 peak hour, whilst the decrease in total journey time along the A38 southbound would be 7 minutes 21 seconds in 2024 during the 0800 – 0900 hours peak time period. There would also be benefits to many local trips, which would result from an overall increase in the capacity of these junctions and resolve conflicts between local traffic and strategic movements using the A38. As indicated in the Transport Assessment Report [**TR010022/APP/7.3**], the largest modelled decrease in total journey time along the A38 northbound would be 6 minutes 44 seconds in 2039 during the 08:00 to 09:00 peak hour, whilst the largest decrease in total journey time along the A38 southbound would be 9 minutes 25 seconds in 2039 during the 0800 – 0900 hours peak time period. This indicates that journey time savings would be greater

in 2039 than in 2024 because the existing junctions in 2039 (without the Scheme) would be more overloaded by the higher 2039 traffic flows.

2.1.6 In addition to improving journey times for both long-distance traffic and local intra-urban trips, grade separation would result in road safety improvements. Cars and heavy-goods vehicles using the A38 come into conflict with local intra-urban trips at these at-grade junctions, whilst there are also conflicts with pedestrians and cyclists. These conflicts are a risk to road safety that would not exist if the junctions were grade-separated.

2.1.7 The A38 junction improvements would attract vehicles onto the strategic road network and, more importantly, away from less suitable roads with their many priority junctions, and potential conflicts between vehicle movements, pedestrians and cyclists. The Transport Assessment Report [**TR010022/APP/7.3**] indicates that over the 60-year evaluation period, the Scheme would avoid 1,396 collisions across the whole highway network. These would include avoiding eight fatal casualties and 135 serious casualties (i.e. saving of 143 killed and seriously injured).

2.1.8 Grade separation provided by the Scheme would also deliver the following benefits:

- Improve public transport links: The Scheme forms one of the key bus corridor improvement measures cited within the "Derby Local Transport Plan, Local Transportation Plan Three (LTP3) 2011 – 2026" Part 1 Strategy (Derby City Council (DCiC), 2011). The Scheme would thus provide benefits by improving the reliability of bus services across the A38 for those travelling on public transport.
- Facilitate economic growth: The Derby City Local Plan (DCiC, 2017) identifies the A38 as being of key importance to economic and development growth in the Derby area. The Derby Local Transport Plan LTP3 states that "*Without the grade separation there will be significant constraints on development in the north and west of the city".* In addition, the Derbyshire Local Transport Plan (2011 - 2026) (Derbyshire County Council (DCC), 2011) states that "*these A38 junctions represent a major constraint for the County, and their improvement is important to the County's wider economic prosperity, as well as linking with possible housing developments in the Derby Housing Market Area*".

2.1.9 In summary, the Scheme would provide benefits in terms of:

- Reduced conflicts between strategic and local trips, pedestrians and cyclists, resulting in a reduction in road accident causalities.
- Improved road safety, by attracting vehicles away from less suitable roads.
- Benefits to users of public transport by reducing delays.
- Facilitate future economic growth and development in Derby and the wider county.

2.1.10 Further information regarding the benefits (including the monetised benefits) and the need for the Scheme are provided in the Planning Statement [**TR010022/APP/7.2**]. Reference should also be made to the Transport Assessment Report [**TR010022/APP/7.3**] for a summary of the transport issues and the expected transport impacts.

2.2 Scheme objectives

2.2.1 Highways England's high-level objectives for the 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, the 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 Scheme that ensures increased capacity to realise the associated economic and social benefits that the Scheme would bring, whilst also being affordable and delivering high value for money.

2.2.2 The Scheme-specific objectives as defined by Highways England are as follows:

- Economy:
  - To reduce delays and increase reliability of journeys on the strategic corridor.
  - Assist in bringing forward development and regeneration opportunities in the surrounding area and immediately adjacent to the Scheme.
  - To minimise traffic disruption due to construction works and incidents.
  - To achieve optimal whole-life cost taking into account future maintenance, operation and disruption to users.
- Environment:
  - To minimise impacts on both the natural and built environment, including designated landscape and biodiversity features.
  - To seek to mitigate impacts on air quality and noise.
  - To ensure effective measures are in place to protect watercourses from pollutant spillage on the highway.
  - To investigate and to encourage the use of environmentally friendly operations and products throughout the project life cycle.
- Society:
  - To improve the safety for all road users.
  - To manage the safety risk for road workers in accordance with the requirements of GD 04/12 (now replaced by GG104) - Standard for the Safety Risk Assessment on the Strategic Road Network and the Health and Safety at Work 1974 Act to be As Low As Reasonably Practicable (ALARP).
  - To improve safety for residents in the vicinity of the junctions.
  - To facilitate integration with other transport modes where applicable.

  - To ensure a consistent high standard of signing relating to the junctions.
  - To reduce severance by maintaining or providing appropriate facilities for crossing, and travelling along the route for pedestrians and cyclists.
- Public Accounts:
  - To be affordable and represent High Value for Money according to Department for Transport (DfT) appraisal criteria.
- Scheme-specific:
  - Improve integration by supporting the local transport plan.
  - Facilitate regional development and growth in Derby City and its surrounding areas and increase capacity of the strategic road network to absorb growth.

2.3 Scheme location and prevailing conditions

2.3.1 The three junctions that comprise the Scheme are located at Kingsway junction (NGR: SK 327 360), Markeaton junction (NGR: SK 334 369) and Little Eaton junction (NGR: SK 364 399). These three junctions are located over an approximate distance of 5.5km on the A38 to the west and north of Derby (see Chapter 1: Introduction, Illustration 1.1 in Section 1.2).

2.3.2 The Scheme passes through the administrative areas of DCiC and DCC. Erewash Borough Council (EBC) is the local planning authority for the section of the Scheme that falls within DCC's administrative area.

2.3.3 Kingsway junction and Markeaton junction are located in a predominantly urban environment (see Figures 2.1 and 2.2 [**TR010022/APP/6.2**]), with a mixture of residential housing, commercial, retail, health care and educational establishments. Note that all figures cited herein are located in Environmental Statement (ES) Volume 2 [**TR010022/APP/6.2**]. There are a number of public open spaces in the vicinity of these junctions, namely Mackworth Park, open space adjacent to Greenwich Drive South, Markeaton Park and at Mill Pond.

2.3.4 Little Eaton junction is set in a semi-rural environment (see Figure 2.3 [**TR010022/APP/6.2**]), 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 existing junction, with Allestree located approximately 600m west of the junction. The A38 to the west of the existing junction crosses over the River Derwent and the Midland Mainline railway line.

2.3.5 The land at Little Eaton junction is designated as green belt, whilst parts of the Scheme to the west of the Midland Mainline railway line are located within the boundary of the Derwent Valley Mills World Heritage Site (WHS) (refer to Chapter 6: Cultural Heritage for details).

2.3.6 Markeaton junction and Little Eaton junction were both modified as part of the Pinch Point Programme[1] – these works took place during 2014 and were completed in early 2015. These junction improvement works are providing a measure of relief, but do not replace the need for long-term grade-separation.

2.3.7 The Scheme boundary, which includes land to be required temporarily and permanently for the construction, operation and maintenance of the Scheme, is shown in Figure 2.4a and Figure 2.4b [**TR010022/APP/6.2**].

2.4 Baseline scenario

2.4.1 The baseline scenario refers to the conditions that currently exist in the area within which the Scheme would be implemented, and how these conditions would change and evolve in the future, without the introduction of the Scheme.

2.4.2 Without improvement, the current congestion and journey reliability problems experienced on the A38 around Derby and the surrounding highway network are expected to persist and worsen over time. This is because traffic levels on the A38 are forecast to grow faster than the national average due to a combination of normal traffic growth, and planned future development within Derby.

2.4.3 Wider environmental changes are also predicted to occur over time as a consequence of factors such as climate change, which could increase the risk and intensity of flood events affecting the road network.

2.4.4 Further details of how the current baseline conditions may alter in the future, both with and without the Scheme, are introduced in Chapter 4: Environmental Impact Assessment Methodology and presented in more detail in Chapters 5 to 14.

2.4.5 An important change to future baseline conditions within Derby will be local actions that are being undertaken associated with improving air quality. In 2015 under the National Air Quality Plan, DCiC was one of five councils required to introduce a Clean Air Zone (CAZ), to be operational by 2020. However, under a revision to the national plans released in May 2017 (Defra, 2017), a nitrogen dioxide (NO_2) compliance plan is required. DCiC has thus been investigating methods to improve air quality in the city. Following public consultation from 30th July to 24 September 2018, DCiC announced their preferred approach to address roadside NO_2 air quality issues within the city by introducing a series of traffic management measures based around Stafford Street, complemented by wider network management (includes junction improvements to the Ashbourne Road/Uttoxeter Old Road junction, Uttoxeter New Road/Stafford Street junction, and Ford Street/Friar Gate junction) (DCiC, 2018). The purpose of these measures is to restrict traffic flows along Stafford Street. DCiC plans to have these measures in place in mid-2019, and thus well in advance of Scheme construction (preliminary works due to start in November 2020 – refer to Table 2.2). Details regarding DCiC's strategy are provided in Chapter 6: Air Quality, which also considers how the Scheme could impact upon air quality along Stafford Street during both Scheme construction and operation.

[1] 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.

2.4.6 Information concerning other future planned developments, other major schemes and development allocations identified in planning policy that are likely to change baseline conditions in the vicinity of the Scheme are presented in Chapter 15: Assessment of Cumulative Effects.

2.5 Scheme description

2.5.1 The Scheme design has been developed through an iterative process in parallel with the environmental impact assessment (EIA). The development of the Scheme design has been informed by knowledge of environmental constraints, the environmental assessment of emerging design proposals and options, and engagement with stakeholders (including the responses received during statutory consultation). Scheme drawings are presented in Figures 2.5 to 2.7 [**TR010022/APP/6.2**] for Kingsway junction, Markeaton junction and Little Eaton junction respectively.

2.5.2 The Scheme would operate with a speed limit of 50 miles per hour (mph) through Kingsway and Markeaton junctions and as far north as Kedleston Road junction. Through Little Eaton junction the speed limit would be 70mph, with an advisory speed of 50mph. The existing national speed limit between Kedleston Road junction and Little Eaton junction would be retained (i.e. 70mph).

Kingsway junction

2.5.3 The proposed Kingsway junction (refer to Figure 2.5 [**TR010022/APP/6.2**]) would comprise a dumbbell roundabout arrangement and linkages at existing ground level, with the A38 passing beneath the junction in an underpass (the low point of the proposed mainline A38 would be approximately 6.5m below the level of the existing junction 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, with the national speed limit (70mph) south of the existing roundabout).

2.5.4 In addition to grade-separation of the existing A38/A5111 Kingsway junction (with the A38 mainline passing beneath the bridge connecting the new dumbbell roundabouts), the number of lanes on the A38 from the north side of Kingsway junction through Markeaton junction to the south side of Kedleston Road junction would be increased from two to three lanes in each direction. Two existing bridges over Brackensdale Avenue would be widened (on the inside) to cater for the provision of the additional lane on each carriageway. The existing accesses from and to the A38 at Brackensdale Avenue and Raleigh Street would be closed for safety reasons. The existing section of carriageway associated with the left in, left out access onto the A38 from Brackensdale Avenue would thus be made redundant by the Scheme and would be closed and appropriately landscaped. The junction onto the Kingsway Park Close link road from Brackensdale Avenue would be signalised.

2.5.5 The proposed Kingsway junction would be provided with appropriate lighting, namely the provision of lighting columns along the mainline A38 which would be approximately 15m high light-emitting diode (LED) luminaires, as well as 12m high lighting columns on the junction and associated slip roads. Lighting would tie in with existing lighting outside the Scheme boundary as applicable.

2.5.6 The junction would be provided with appropriate signage. Due to limited verge widths and to provide clarity of lane allocation through an area of closely spaced junctions, gantry mounted direction signs would be provided between Kingsway junction and Kedleston Road junction (see Figure 2.5 [**TR010022/APP/6.2**]).

2.5.7 The proposed Kingsway junction would be provided with a highway drainage system that would incorporate a surface attenuation pond, underground storage tanks and treatment designed in accordance with HD 33/16 Design of Highway Drainage Systems (Highways England, 2016) (refer to para. 2.5.60) (also refer to the Road Drainage Strategy in Appendix 13.4 [**TR010022/APP/6.3**]). Provisions for additional flood storage would also be provided within the junction (with a flap valve pipe outfall) and within the adjacent Kingsway hospital site (refer to Table 2.1 and Chapter 13: Road Drainage and Water Environment). Existing culverts on Bramble Brook would be replaced or extended as required, whilst the brook would also be diverted within the junction.

2.5.8 The Scheme footprint at Kingsway junction would require permanent land take from an area of public open space adjacent to Greenwich Drive South as well as losses from the eastern edge of Mackworth Park (collective loss of approximately 1,521m^2) – see Figure 2.8 [**TR010022/APP/6.2**]. In addition, as illustrated in Figure 2.8 [**TR010022/APP/6.2**], the Scheme would permanently occupy an area of approximately 529m^2 that is defined as being proposed public open space. Thus, at Kingsway junction the Scheme would result in the total permanent loss of approximately 2,050m^2 public open space and proposed public open space. Given the loss of public open space at Kingsway junction (and at Markeaton junction - refer to para. 2.5.23), there would be a need for replacement public open space to be offered in exchange. It is proposed that replacement public open space for the Scheme would be provided using the area vacated by buildings to be demolished on Queensway, areas of the existing A38 at Markeaton junction that would be removed and landscaped and the area left vacant by the closure of Brackensdale Avenue access to and from the A38 (refer to para. 2.5.23). The Planning Statement [**TR010022/APP/7.2**] includes an assessment as related to public open space and details of replacement public open space offered in exchange.

2.5.9 Footpaths and cycleways would be provided at the new Kingsway junction - these would be as detailed in para. 2.5.74 (and as discussed in Chapter 12: People and Communities).

2.5.10 Figure 2.5 [**TR010022/APP/6.2**] illustrates the need for minor 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 Scheme works, and would comprise signage works within the existing highway verges.

Markeaton junction

2.5.11 The proposed Markeaton junction (refer to Figure 2.6 [**TR010022/APP/6.2**]) 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. Retaining walls would be constructed between the A38 and the slip roads to reduce the footprint of the junction. The northbound slip roads would be approximately on the line of the existing northbound A38 carriageway.

2.5.12 In addition to grade-separation of the existing A38/A52 Markeaton junction, as noted in para. 2.5.4, additional lanes are proposed in both directions between Kingsway junction and Kedleston Road junction and through Markeaton junction. The existing footbridge to the north of the junction would be demolished and replaced in the same location – the replacement footbridge would be wider than the existing footbridge to allow for the additional lanes on the A38. The existing left in, left out access from the A38 onto Enfield Road would be closed for safety reasons.

2.5.13 The proposed speed limit would be 50mph through this section of the A38 and on 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.

2.5.14 The proposed Markeaton junction would be provided with appropriate lighting, namely lighting columns along the mainline A38 using approximately 15m high LED luminaires, as well as 12m high lighting columns on the junction and associated slip roads. Lighting would tie in with existing lighting outside the Scheme boundary as applicable.

2.5.15 As noted in para 2.5.6, gantry mounted direction signs would be provided from Kingsway junction through to Kedleston Road junction (see Figure 2.6 [**TR010022/APP/6.2**]).

2.5.16 The Scheme would involve the demolition of 15 detached residential properties on Queensway to allow the construction of the southbound diverge slip road, 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 a revised access further to the east on Ashbourne Road would be provided which would require land from a further four residential properties. There would also be a need to alter the access into the Royal School for the Deaf off Ashbourne Road.

2.5.17 Markeaton junction would be signalised at all four ground level approaches, namely the A38 northbound diverge slip road; the A52 eastbound approach; the A38 southbound diverge slip road; and the A52 westbound approach.

2.5.18 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. Similarly the culvert beneath the A38 connecting Markeaton Lake with Middle Brook would be retained and would not need to be extended.

2.5.19 The proposed Markeaton junction would be provided with a highway drainage system that would incorporate a pumping station, two underground storage tanks, a surface attenuation pond and treatment designed in accordance with HD 33/16 Design of Highway Drainage Systems (Highways England, 2016) (refer to para. 2.5.60) (refer to the Road Drainage Strategy in Appendix 13.4 [**TR010022/APP/6.3**]). Drainage from the Scheme would outfall into existing highway drainage arrangements, including continued discharges into Mill Pond (following appropriate attenuation and treatment).

2.5.20 The existing access into Markeaton Park from Markeaton junction would be closed, although it would be retained for emergency vehicle access. It is proposed that the existing park exit onto the A52 would be reconfigured to create the new park access. This would require the relocation of the existing park boundary wall, together with some rearrangements of the park's internal road infrastructure to facilitate a bus turning circle. The new park access onto the A52 would be signalised and provided with a pedestrian crossing.

2.5.21 The existing electrical substation near the existing park exit (and located within the Scheme boundary) would not be affected by the Scheme, although the closed toilet facilities block would be removed. The existing mobile phone mast at Markeaton junction would need to be relocated close to its current position.

2.5.22 The Scheme would result in the loss of access to the McDonald's restaurant and the Esso petrol station off the A38 northbound carriageway to the south of the junction. During Scheme operation, traffic accessing McDonald's and the petrol station would use a revised access off the A52 (i.e. the new signalised junction with the revised Markeaton Park access), with an exit onto the new A38 northbound diverge slip road. Access would be maintained during the Scheme construction phase until the new arrangements would be in place. Chapter 3: Scheme History and Assessment of Alternatives details the alternative access arrangements considered for the petrol station and McDonald's.

2.5.23 An area of approximately 5,738m^2 of public open space would be permanently lost to the Scheme at Markeaton junction (see Figure 2.9 [**TR010022/APP/6.2**]). This includes land from within Markeaton Park and at Mill Pond, and includes the additional space occupied by the supporting structure and landing ramps associated with the replacement Markeaton footbridge. Given the loss of public open space at Markeaton junction (and Kingsway junction - refer to para. 2.5.8), there would be a need for replacement public open space to be offered in exchange. The total permanent public open space loss (including proposed public open space) amounts to approximately 7,788m^2. It is proposed that replacement public open space offered in exchange would be provided using the area vacated by the buildings to be demolished on Queensway, areas of the existing A38 at Markeaton junction that would be removed and landscaped, and the area left vacant by the closure of Brackensdale Avenue access to and from the A38 – these locations have a combined area of approximately 7,832m^2 and thus covers the public open space losses due to the Scheme (i.e. a surplus of approximately 44m^2) (refer to Figures 2.8 and 2.9 [**TR010022/APP/6.2**]). Use of the area at Queensway as replacement public open space has been agreed in principle with DCiC, with the new area of public open space being integrated with facilities for pedestrians and cyclists connecting the A52 Ashbourne Road with the proposed new footbridge. The Planning Statement [**TR010022/APP/7.2**]

includes an assessment as related to public open space and details of replacement public open space offered in exchange. Chapter 3: Scheme History and Assessment of Alternatives details the alternative public open space arrangements considered, and actions taken to minimise public open space losses.

2.5.24 Footpaths and cycleways would be provided at the new Markeaton junction - these would be as detailed in para. 2.5.74 (and as discussed in Chapter 12: People and Communities).

2.5.25 Figure 2.6 [**TR010022/APP/6.2**] illustrates that minor highway improvement works would be carried out to the north of Kedleston Road junction. Such works are geographically separated from the main Scheme works, and would comprise signage works and associated road restraint systems within the existing highway verge.

Little Eaton junction

2.5.26 The proposed Little Eaton junction (refer to Figure 2.7 [**TR010022/APP/6.2**]) would comprise an enlarged roundabout at existing ground level with the A38 being on an embankment and passing above the roundabout on two 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 by the Scheme), and 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.

2.5.27 The A38 mainline would pass over the new roundabout on two bridges on embankment. The new A38 mainline would be approximately 11m above existing ground level at the highest point on the north side of the junction before quickly dropping down to around 3m above existing ground level. It would be around 9m above the existing roundabout carriageway level on the high side of the mainline. The A38 mainline would continue to the west of the existing A38 and re-join the existing A38 alignment immediately south of the Water Treatment Works Accommodation Bridge, which would not be affected.

2.5.28 The Ford Lane access onto the A38 (located between the River Derwent bridge and the Flood Relief Arch/Accommodation Bridge), would be closed for safety reasons. In order to enable access into the turf production site to the south of the existing A38 (via the Flood Relief Arch Accommodation Bridge), it is proposed that turf vehicles would use Ford Lane to access the area from the A6 Duffield Road. Such access arrangements would also enable Severn Trent Water (STW) to access their facilities in the vicinity of the River Derwent. These additional access arrangements may require some strengthening works to the Ford Lane bridge over the River Derwent. A strengthening assessment would be undertaken which may indicate that no or limited works are needed to the bridge. However, in the worst-case the bridge may need to be closed for up to three months in order to complete such bridge strengthening works (which would not

require any works to the bridge footings). In addition, there would be a need to realign Ford Lane and reconfigure the junction with Lambourn Drive.

2.5.29 The proposed A38 mainline 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.

2.5.30 The proposed Little Eaton junction would be provided with a highway drainage system that would incorporate two attenuation ponds and runoff treatment designed in accordance with HD 33/16 Design of Highway Drainage Systems (Highways England, 2016) (refer to para. 2.5.60) (refer to the Road Drainage Strategy in Appendix 13.4 [**TR010022/APP/6.3**]).

2.5.31 A short section of Dam Brook located adjacent to the east of the existing A38 would need to be diverted. In addition, a flood alleviation channel would be provided to connect a surface watercourse downstream of Breadsall Manor with the realigned Dam Brook. New sections of swale ditch would also be required to connect existing drainage ditches to the realigned Dam Brook.

2.5.32 Given that the new A38 embankment would result in the loss of River Derwent floodplain, a floodplain compensation area would be provided to the south of the A38 and to the west of the River Derwent (refer to Figure 2.10 [**TR010022/APP/6.2**]). Further details are provided in Table 2.1 and in Chapter 13: Road Drainage and Water Environment. Chapter 3: Scheme History and Assessment of Alternatives provided details regarding the various alternative sites considered for the floodplain compensation area.

2.5.33 The proposed Little Eaton junction would be provided with appropriate lighting. The new at-grade roundabout and the approaching slip-roads would be provided with overhead lighting columns comprising of approximately 12m high LED luminaires. However, the A38 mainline would not have overhead lighting in order to minimise visual intrusion. Lighting provided at the roundabout would tie in with existing lighting outside the Scheme boundary as applicable. To ensure drivers would be aware of the bend in the road at this location, appropriate signing would be installed along with the provision of solar powered studs integrated within the road pavement – these would indicate the alignment of the road to drivers, noting that these are being used along a stretch of the A38 from Ripley junction (approximately 12km north of Little Eaton junction) to junction 28 of the M1.

2.5.34 Footpaths and cycleways would be provided at the new Little Eaton junction - these would be as detailed in para. 2.5.74 (and as discussed in Chapter 12: People and Communities).

2.5.35 Scheme implementation would necessitate a minor reconfiguration and signalisation of the Ford Lane junction with the A6 (Duffield Road) located approximately 1km to the north of the A6 junction with the A38 (Palm Court junction). Here there would be a need to undertake limited kerb realignment, 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 existing Ford Lane access onto the A38.

2.5.36 Figure 2.7 [**TR010022/APP/6.2**] illustrates minor highway improvement works to the south of Little Eaton junction (to the south of where the A38 crosses the River Derwent), as well as works at two locations to the north of the junction. Such works are geographically separated from the main Scheme works, and would comprise signage works and associated road restraint systems within the existing highway verge.

Limits of Deviation

2.5.37 The assessments included within this ES are based on the design of the Scheme described in this chapter (Chapter 2: The Scheme) and presented in Figures 2.5 to 2.7 [**TR010022/APP/6.2**]. They are also based on the works listed in the DCO as shown on the Works Plans [**TR010022/APP/2.5**], the General Arrangement Scheme Layout Plans [**TR010022/APP/2.6**] and the maximum area of land anticipated as likely to be required, taking into account the proposed limits of deviation for the Scheme.

2.5.38 Limits of deviation have been incorporated within the Order Limits to allow minor modifications to be made to the design of the Scheme during the detailed design and construction stages. Such flexibility is required, for example, to enable the construction contractor to alter their working procedures or make minor adjustments to the position of certain infrastructure in response (for example) to unforeseen ground conditions.

2.5.39 The limits of deviation have been determined based on design, construction and buildability factors, and have been taken into consideration as part of the EIA. Thus the assessments as reported within this ES take account of the applicable limits of deviation being requested by the draft DCO.

2.5.40 The limits of deviation have been defined using lateral limits of deviation for all infrastructure elements within the Scheme, and vertical limits of deviation for all the road elements.

2.5.41 The vertical limits of deviation are referenced against the vertical profile levels indicated on the Engineering Section Drawings [**TR010022/APP/2.10**] and are permitted to deviate by a maximum of 0.5m upwards or downwards, other than the link road from Kingsway junction to Kingsway Park Close which is permitted to deviate by a maximum of 1m upwards or downwards.

2.5.42 Given the constrained nature of the Scheme corridor, the A38 mainline and road edges would not deviate horizontally by more than 1m (noting that the horizontal deviation through Kingsway and Markeaton junctions is anticipated to be no more than 0.5m). In no case would the Scheme extend beyond the defined Order boundaries. In respect of the excavations within the flood storage areas at Kingsway junction and the floodplain compensation area at Little Eaton junction, these can deviate vertically to a maximum of 0.5m downwards, but to any distance upwards to ground level. With regard to the floodplain compensation area at Little Eaton junction, this area could deviate horizontally within the confines of the area illustrated on the Works Plans [**TR010022/APP/2.5**] (refer to Sheet 3 - Work No 31).

2.5.43 The environmental assessment conclusions regarding likely significant effects as presented within this ES as related to the Scheme as detailed in Figures 2.5 to 2.7 [**TR010022/APP/6.2**], also apply to any Scheme deviations within these defined limits of deviation.

Land take

2.5.44 The rights to acquire the land required to deliver the Scheme are being sought by Highways England through the DCO application.

2.5.45 The Scheme's temporary and permanent land take requirements have been identified through a combination of the design-development and EIA processes, and through engagement with landowners that would be affected by its progression. These are defined by the Order Limits within the DCO application illustrated in the Land Plans [**TR010022/APP/2.2**] – also refer to Figures 2.4a and 2.4b [**TR010022/APP/6.2**].

2.5.46 All areas of land within the Order Limits are located within the administrative boundaries of DCiC, EBC and DCC.

2.5.47 The Order Limits include land which would be taken permanently to accommodate the engineering, drainage and environmental components of the Scheme. Land has also been identified within the Order Limits that would be acquired temporarily to facilitate construction of the Scheme. This temporary land acquisition would be required for utilities diversion, construction site compounds, vehicular access, haul routes, construction working areas, the temporary storage of materials and for environmental purposes e.g. flood storage areas, floodplain compensation area, ecological mitigation planting. It is noted that the areas with in Mackworth Park, Markeaton Park and at Mill Pond are largely associated with land requirements for ecological mitigation.

2.5.48 In addition to the permanent land acquisition, permanent rights in land are being sought within the DCO application to undertake utility diversions, and for future maintenance access.

Highway design

2.5.49 The following highway design principles have been applied in the development of the Scheme:

a) The Scheme design is based on good practice, as embodied in Highways England's Design Manual for Roads and Bridges (DMRB).

b) An 'earthworks balance' is sought to minimise importing or exporting earthworks materials to and from the site.

c) Roadside features such as lighting would be minimised to reduce visual impacts, whilst remaining consistent with safety requirements.

2.5.50 Further detail on the principles to be applied during the Scheme detailed design stage are provided in the Planning Statement [**TR010022/APP/7.2**].

2.5.51 The new A38 carriageway would be formed of three lanes in each direction from north of Kingsway junction, through Markeaton junction to the south of Kedleston Road junction, and two lanes in each direction at Little Eaton junction (each lane comprising 3.65m wide running lanes), with typically a 2.5 - 3.5m verge. The verge width would be increased as required to provide the appropriate unobstructed visibility around curves. Further localised increases in verge width to accommodate highway features such as signs, vehicle restraint systems, and gantries have been included where required.

2.5.52 The central reserve width would be 1.8m as a minimum, although this would be increased as required to provide the appropriate visibility around curves.

2.5.53 As part of the network resilience and future proofing of the Scheme, it is proposed to install a ducted network along the length of the Scheme for future highways communications provision.

2.5.54 Vehicle restraint systems would be provided in accordance with current standards. For the majority of the length of the Scheme, there would be a rigid concrete barrier in the central reserve.

Climate change adaptation

2.5.55 To ensure that the strategic road network can meet the challenge of changing climate, the Scheme design has taken into account the potential effects of climate change. At this DCO design stage, the main climate change considerations are related to material deterioration, flood risk and drainage systems.

2.5.56 Section 10(3)(a) of the Planning Act 2008 (as amended) (PA 2008) requires the Secretary of State to have regard to the desirability of mitigating, and adapting to, climate change in designating National Policy Statements (NPS). Within the National Policy Statement for National Networks (NPSNN) (Department for Transport (DfT), 2014), the responsibilities of the applicant are set out in paragraphs 4.40 - 4.47 and are summarised as follows:

a) Applicants are required to consider the impacts of climate change when planning location, design, build and operation and the ES should set out how the proposed development will take account of the projected impacts of climate change.

b) For transport infrastructure with safety-critical elements and a design life of the asset is 60 years or greater, as with the Scheme, the applicant is required to apply the UK Climate Projections 2009 (UKCP09)[2] high emissions scenario (high impact, low likelihood) against the 2080 projections at the 50% probability level.

c) The applicant is required to take into account the potential impacts of climate change using the latest UK Climate Projections available at the time and ensure that the ES that is prepared identifies appropriate mitigation or adaptation measures for the estimated lifetime of the new infrastructure.

[2] As detailed in Chapter 14: Climate, the latest UK Climate Projections (UKCP18) have been applied to the climate assessment reported herein.

d) The applicant is required to demonstrate that there are no critical features of the design which may be seriously affected by more radical changes to the climate beyond that projected in the latest set of UK climate projections.

2.5.57 The applicant is required to base any adaptation measures on the latest set of UK Climate Projections, the Government's national Climate Change Risk Assessment and consultation with statutory consultation bodies and assess any measures in the ES, which should set out how and where such measures are proposed to be secured.

2.5.58 Each of these requirements has been addressed and an assessment is included within Chapter 14: Climate.

Drainage design and flood risk

Drainage design

2.5.59 The Scheme would include an appropriate highway runoff drainage system designed in accordance with DMRB guidance (refer to the Road Drainage Design Strategy provided in Appendix 13.4 [**TR010022/APP/6.3**]) noting that the Scheme would result in an increase in the impermeable highway area. Where possible, betterment of existing runoff rates to existing outfalls would be provided. However, where betterment cannot be provided, existing discharge rates would be maintained (refer to Appendix 13.4 [**TR010022/APP/6.3**] for details).

2.5.60 The highway drainage design includes the provisions as follows at each junction (refer to Appendix 13.4 [**TR010022/APP/6.3**]):

- Kingsway junction:
  - Highway runoff surface attenuation pond within the junction footprint.
  - Underground highway runoff storage tank on the edge of Mackworth Park, discharging into a tributary of Bramble Brook via a swale.
  - Two underground cellular storage tanks within each of the junction dumbbell roundabouts.
  - Realignment of Bramble Brook within the junction plus associated culverting.
  - Attenuation using oversized carrier pipes.
  - Narrow filter drains.
  - Combined kerb drainage units.
  - Trapped gully pots and road-side linear drains.
  - Petrol interceptors at outfalls and connections to existing public sewers as applicable (five outfalls in total).
  - By-pass separators.
- Markeaton junction:
  - Pumping station adjacent to the southbound diverge slip road to pump highway runoff from the mainline underpass.

  - To provide groundwater exclusion and avoid post-construction groundwater pumping, a secant form of pile construction is proposed at the Markeaton junction cutting, combined with a water excluding reinforced concrete base slab.
  - Attenuation using the carrier pipework network.
  - Narrow filter drains.
  - Combined kerb drainage units.
  - Two underground attenuation tanks, plus a surface attenuation pond, discharging via a swale ditch into Mill Pond.
  - Trapped gully pots and road-side linear drains.
  - Petrol interceptors at outfalls and connections to existing public sewers as applicable (six outfalls in total).
  - By-pass separators.
- Little Eaton junction:
  - A highway runoff attenuation pond located to the east of the A61 that would be owned and operated by Highways England (pond would receive runoff from Highways England assets).
  - A highway runoff attenuation pond located to the east of the A61 that would be owned and operated by DCC (which would receive runoff from DCC assets).
  - Attenuation using oversized pipes.
  - Narrow filter drains.
  - Combined kerb drainage units.
  - Trapped gully pots and road-side linear drains.
  - Petrol interceptors at outfalls and connections to existing public sewers as applicable (five outfalls in total).
  - By-pass separators.

2.5.61 Outfalls would be provided to local watercourses, with flow rates limited in accordance with Environment Agency requirements.

2.5.62 The Scheme drainage design includes an allowance for the effects of climate change (refer to Appendix 13.4 [**TR010022/APP/6.3**]). Attenuation has been provided for up to and including 100 years plus 40% climate change allowances through a combination of enlarged pipes and cellular storage tanks or open attenuation ponds depending on the junction. In addition, the drainage system has been designed to reduce the risk of flooding through the use of sustainable drainage systems (SuDs).

Flood risk

2.5.63 The Scheme would cross areas that are at potential risk from flooding. All sources of flood risk to and from the Scheme, including the impact of a changing climate on flood risk, have been assessed as part of the Flood Risk Assessments (FRAs) for each junction (refer to Appendices 13.2A, 13.2B and 13.2C [**TR010022/APP/6.3**]) and which are considered within Chapter 13: Road Drainage and the Water Environment.

2.5.64 Flood mitigation features included within the Scheme design are detailed in Table 2.1 (other than the measures included within the highway drainage system design as detailed in the section above).

Table 2.1: Flood risk mitigation and storage requirements

Junction	Proposals
Kingsway junction	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 existing 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. To mitigate flood risks associated with Bramble Brook, a flood storage area would be provided within the Scheme footprint (with a flap valve pipe outfall), as well as three flood storage areas to the south-west of the Scheme within the Kingsway hospital site (see Figure 2.5 [**TR010022/APP/6.2**]). The placement of flood storage areas adjacent to Bramble Brook within the Kingsway hospital site has been discussed and agreed with the site owners and developers.
Markeaton junction	The FRA for Markeaton junction indicates that no further flood mitigation measures are needed other than those measures included within the highway drainage system design (refer to the Road Drainage Design Strategy provided in Appendix 13.4 [**TR010022/APP/6.3**]).
Little Eaton junction	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. Given that the proposed Little Eaton junction embankment would occupy floodplain associated with the River Derwent, a floodplain compensation area would be required. Following an evaluation of various options (refer to Chapter 3: Scheme History and Assessment of Alternatives), the floodplain compensation area would be located to the south of the A38 and to the west of the River Derwent – this area is within the Derwent Valley Mills WHS. As such, the compensation area has been appropriately designed to create a naturalistic landform that would not have a significant effect on the WHS (refer to Chapter 6: Cultural Heritage), whilst also retaining isolated trees of ecological note (refer to Figure 2.10 [**TR010022/APP/6.2**]). Other flood risk provisions included in the Scheme design at Little Eaton junction comprise: • Realignment of Dam Brook to create a more sinuous channel form with a vegetated corridor. This would improve river connectivity, whilst the installation of in-channel features such as berms and point bars would improve bed and bank structure. The reinstatement of a more natural bed formation would also improve floodplain connectivity and create new wetland habitat. • In order to mitigate surface water flood risks associated with an unnamed stream emanating from Breadsall Manor, a multi-stage flood alleviation channel would be created which would connect the stream with the realigned

Junction	Proposals
	Dam Brook. A new 600mm diameter culvert from the watercourse under the new A38 embankment would also be provided that would connect into an existing culvert in order to convey flows from the flood alleviation channel when it exceeds its storage potential.

Intelligent transport system

2.5.65 The existing CCTV system at Kingsway junction, Markeaton junction and Little Eaton junction would be replicated in the Scheme design to provide at least the same level of coverage that currently exists. No other communication infrastructure is proposed as part of the Scheme.

Lighting and signage

2.5.66 Street lighting is an important consideration within the Scheme design and its application is subject to good practice associated with any appropriate safety assessments.

2.5.67 Lighting would be required at the three junctions and applicable sections of the Scheme. The lighting used would be appropriate for the Scheme; namely approximately 15m high columns with LED luminaires on the mainline through Kingsway and Markeaton junctions, plus 12m high columns on the junctions and slip roads which would tie in with existing lighting outside the Scheme boundary as applicable. Such LED lighting uses less energy than conventional luminaires, whilst reducing light spill into adjacent areas. As detailed in para. 2.5.33, at Little Eaton junction 12m high columns with LED luminaires would be provided at the new at-grade roundabout and the approaching slip-roads, whilst the A38 mainline through the junction would be unlit to minimise visual intrusion upon nearby residents. To ensure drivers would be aware of the bend in the road at this location, appropriate signing would be installed along with the provision of solar powered studs integrated within the road pavement.

2.5.68 A signing strategy has been developed in consultation with DCiC and the East Midlands Asset Delivery team (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 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 clear routing that makes the best use of the existing highway network, eliminating conflicting signs and improving driver information.

2.5.69 The proposed signing strategy is based on existing signs and existing destinations. In some cases this would result in new signs with a number of destinations. Due to limited verge widths and the requirement for large retaining walls, along with complex merge and lane drop arrangements on the Scheme, in some instances the most appropriate signing arrangement would be to provide gantry mounted direction signs. As such, up to seven gantries are proposed along the Scheme section between Kingsway junction and Kedleston Road junction and approaches (refer to Figure 2.5 and 2.6 [**TR010022/APP/6.2**]).

Earthworks and landform

2.5.70 The Scheme would require a number of embankments and cuttings to be formed to accommodate the horizontal and vertical alignment as shown in Figures 2.5 to 2.7 [**TR010022/APP/6.2**]. Earth retaining structures would be required in the form of embedded retaining walls or reinforced concrete structures.

2.5.71 The Scheme proposals include the following (refer to Figures 2.5 to 2.7 [**TR010022/APP/6.2**]):

- Cutting at Kingsway junction (through the existing roundabout embankments) with the low point of the proposed mainline A38 being approximately 6.5m below the level of the existing junction roundabout. The new mainline A38 would pass beneath the new junction dumbbell roundabouts.
- Cutting to enable a link from Kingsway junction to Kingsway Park Close (excavated through an area of former landfill).
- Extension of the embankment to the north of the Kingsway junction west dumbbell roundabout.
- Cutting with retaining walls at Markeaton junction to a maximum depth approximately 7.6m below existing ground levels to enable the new mainline A38 to pass beneath the new junction roundabout.
- Retaining walls along Markeaton junction northbound slip roads.
- Retaining wall along the boundary of Markeaton Park to reduce land take.
- Embankment at Little Eaton junction with the new mainline A38 passing over the new junction roundabout. The embankment would have a maximum height of approximately 11m above existing ground level and approximately 9m above the existing roundabout carriageway level on the high side of the mainline.
- Retaining walls associated with the slip roads at Little Eaton junction (RW1, R011, R012, R013).

Downgrading of existing A38 and adjacent roads

2.5.72 The Scheme would integrate fully with the existing A38, whilst some sections of the existing A38 and adjacent roads would be made redundant by the Scheme which would be closed and landscaped. Proposals are as follows:

- The existing access from the A38 onto Brackensdale Avenue would be closed for safety reasons. This area (approximate area of 1,384m^2) would be appropriately landscaped and integrated with the adjacent area of informal open space (this area would form part of the replacement public open space offered in exchange – refer to Section 2.5.23).
- The existing access from the A38 onto Raleigh Street would be closed.
- The existing access from the A38 onto Enfield Road would be closed.
- The existing Markeaton Park access would be closed due to the Scheme and would be downgraded, although it would be retained for emergency vehicle access.

- A small section of existing carriageway associated with the existing northbound A38 from Markeaton junction would be made redundant by the Scheme. This area would be appropriately landscaped and integrated with the adjacent park (this area would form part of the replacement public open space offered in exchange – refer to Section 2.5.23).
- The existing carriageway associated with the left in, left out access onto the A38 from Ford Lane (located between the River Derwent bridge and the bridge over the Midland Mainline railway line) would be made redundant by the Scheme (approximate area of 704m^2). This area would be closed to vehicle access, appropriately landscaped and provided with facilities for pedestrians and cyclists to enable continued access to adjacent pedestrian and cyclist routes.
- A section of existing A38 mainline carriageway located to the north of Little Eaton junction would be made redundant by the Scheme (approximate area of 5,900m^2). This area would be appropriately landscaped.

Public rights of way

2.5.73 Facilities for pedestrians and cyclists are based on the fundamental premise that the Scheme design aims to include at least the level of provision that exists at present with enhanced provision where appropriate and reasonable. In undertaking the design of the proposed pedestrian and cyclist facilities, the requirements of the Equality Act 2010 have been considered where required in order to take appropriate account of the needs of disabled users.

2.5.74 Given the nature of the Scheme, a number of existing public rights of way (PRoWs) would be impacted (refer to Chapter 12: People and Communities). To mitigate such effects, the Scheme design includes the provisions for pedestrians and cyclists as detailed below (refer to Figures 12.3a to 12.3c [**TR010022/APP/6.2**]).

- Kingsway junction:
  - A new perimeter footpath and occasional seating would be provided around the flood storage areas within the Kingsway hospital site (traversing Bramble Brook).
  - National Cycle Route NR54/NR68/RR66 would be subject to a minor diversion due to the need to acquire a small section of public open space for the proposed western roundabout embankment at Kingsway junction.
  - A new pedestrian/cyclist route would be provided across Kingsway junction from Mackworth Park. This new route would link Mackworth from Greenwich Drive South to the A5111 Kingsway.
  - A signalised crossing would be provided on Brackensdale Avenue (east of the A38) at the A38 underbridge (the two existing bridges over Brackensdale Avenue would be widened to cater for the provision of the additional lane on each carriageway).
  - A controlled crossing would be provided on the proposed link road from Kingsway junction (eastern roundabout) to Kingsway Park Close.

- The uncontrolled pedestrian crossing of the A38 from Greenwich Drive North to Thurcroft Close would be closed permanently for safety reasons, with alternative routes being available either at Brackensdale Avenue or Markeaton junction.
- Uncontrolled crossings of side roads would be provided at Raleigh Street and Thurcroft Close on the eastern side of the A38.
- All other existing pedestrian and cyclist routes would be retained.

- Markeaton junction:
  - Closure and diversion of the existing footpath and cycleway (route of RR66) from Raleigh Street to the A52, east of the A38. The combined footway and cycleway would be widened to 3m with clear signage.
  - Controlled (toucan) crossings would be provided on all arms of Markeaton junction.
  - Controlled crossings would be provided on the A52 west of the Esso garage to provide access into Markeaton Park from the west.
  - The existing Markeaton Park footbridge to the north of the junction would be demolished and replaced in a similar location with a new footbridge (extended to allow for the additional A38 lanes).
  - Realignment of the existing footpath and cycleway (route of RR66) from the A52 to Kedleston Road. The combined footway and cycleway would be widened to 3m with clear signage (passing through the area of replacement public open space offered in exchange - refer to para. 2.5.23).
  - All other existing pedestrian and cyclist routes would be retained.
- Little Eaton junction:
  - NR54 would cross the new proposed southern slip roads (using a controlled toucan crossing) and use the bridge to pass under the mainline A38. An uncontrolled crossing would be provided from the section of the NR54 that runs along the B6179 to provide access to the other side of the road.
  - The footpath and cycleway (FP No. 23) from Ford Lane to the junction along the northern side of the A38 would be retained.
  - The Derwent Valley Heritage Way (FP No. 7) would pass beneath the A38 via the Flood Relief Arch which would be extended.
  - Breadsall FP No. 3 would be subject to a minor diversion outside the new fence line and join Breadsall FP No. 1.
  - All other existing pedestrian and cyclist routes would be retained.

2.5.75 During the Scheme construction phase there would need to be a number of closures and diversions of existing PRoW and facilities for pedestrians and cyclists – these are detailed in Chapter 12: People and Communities.

Environmental Masterplans and securing mitigation

2.5.76 The Environmental Masterplans presented in Figures 2.12a to 2.12h [**TR010022/APP/6.2**] show mitigation measures embedded into the Scheme design. This includes landscape planting, noise barriers, flood storage areas, floodplain compensation area, ecological mitigation features and the pedestrian and cyclists facilities as described above.

2.5.77 The mitigation measures shown on the Environmental Masterplans have been factored into the assessment of significant effects presented in the ES topic chapters (Chapters 5 to 14). These mitigation measures are also described in the Outline Environmental Management Plan (OEMP) together with details of how they will be secured (refer to Appendix 2.1 [**TR010022/APP/6.3**]. Appendix 2.2 [**TR010022/APP/6.3**] provides an Environmental Mitigation Schedule which details the various environmental mitigation measures that have been integrated within the Scheme design and illustrated on the Environmental Masterplans (this appendix replicates Table 3.2c within the OEMP).

2.5.78 The Environmental Masterplans (Figures 2.12a to 2.12h [**TR010022/APP/6.2**]) include measures that would:

- Assist with integrating the Scheme into the surrounding landscape.
- Provide visual interest to people travelling on the Scheme.
- Reduce visual impacts by screening and filtering views of the Scheme.
- Reduce noise impacts associated with the Scheme (e.g. low noise surfacing and noise barriers).
- Mitigate for the loss of existing vegetation.
- Create new areas of ecological habitat as part of the wider objective of achieving “no net loss” in biodiversity across the Scheme.
- Ensure the connectivity of PRoW and other routes used by pedestrians and cyclists are maintained.
- Provide for the storage, treatment and discharge of road runoff, and provide features for the mitigation of flooding risks.

2.5.79 These measures would be secured by requirements in the DCO, which would ensure that the Scheme is undertaken in accordance with the following:

- The Scheme design as illustrated on the plans submitted within the DCO application [**TR010022/APP/2.6**].
- The OEMP which contains details of all standard mitigation measures that would be implemented during construction of the Scheme – refer to Appendix 2.1 [**TR010022/APP/6.3**].
- Table 3.2c within the OEMP (Appendix 2.1 [**TR010022/APP/6.3**]) which details the mitigation measures that are embedded within the Scheme design (and which are shown on the Environmental Masterplans (refer to Figures 2.12a to 2.12h [**TR010022/APP/6.2**]).
- Other specific mitigation obligations relating to key topic areas such as archaeology, landscaping and drainage.

2.5.80 These measures would be secured by Highways England by placing a contractual responsibility on the appointed contractor and subcontractors to comply with the DCO requirements.

Traffic flows

2.5.81 Construction and operation of the Scheme is predicted to alter the speed, flow and routing of vehicles using both the local and strategic road networks.

2.5.82 Traffic forecasts have been generated for both the without and with the Scheme cases using computer modelling to predict changes in traffic flows. The traffic forecasts are based on simulations of the existing traffic conditions on the road network and account for the increase in vehicles that population growth, future planned development sites and growth in employment and wealth could generate.

2.5.83 The Transport Assessment Report [**TR010022/APP/7.3**] provides details of the modelled traffic conditions that would occur at different years in the future, both with and without the Scheme in place. In summary, the Scheme would:

- Reduce journey times along the A38 corridor.
- Reduce journey times on the radial routes that cross the A38.
- Attract trips onto the A38 that would otherwise travel on less suitable roads.
- Save a predicted 1,396 personal injury collisions over a period of 60 years.
- Be affordable and represent high value for money.
- Improve the reliability of journeys.
- Improve the resilience of the road network.
- Separate vehicles on the trunk road from walkers and cyclists.
- Facilitate regional development and employment growth.
- Support the housing growth planned in Derby and the wider area.
- Increase the capacity of the strategic road network to absorb growth.
- Deliver an improvement identified in the National Infrastructure Plan 2016 – 2021 (Infrastructure and Projects Authority, 2016).

2.5.84 Further information regarding the benefits (including the monetised benefits) and the need for the Scheme are provided in the Planning Statement [**TR010022/APP/7.2**].

2.6 Construction

Construction activities

2.6.1 The approach to Scheme construction described below is indicative, but it is representative of the likely approach to be adopted and has been defined taking advice from Highway England's appointed buildability advisors for the Scheme.

2.6.2 Further provisions in relation to the management of Scheme construction phase environmental effects would be provided in a Construction Environmental Management Plan (CEMP), which would be developed and implemented by the construction contractor. The CEMP would be based on the OEMP included in this Application (refer to Appendix 2.1 [**TR010022/APP/6.3**]) and which would be approved as part of the making of the DCO.

2.6.3 Scheme construction activities are anticipated to require the following activities: installation and use of temporary offices and welfare facilities, construction compounds, vehicle parking, material storage areas and worksites; installation and use of temporary accesses and haul routes; demolition of existing structures, removal of existing infrastructure; vegetation clearance and soil removal; ground and excavation works; piling; infrastructure construction activities, routing of services and utilities.

2.6.4 The Scheme boundaries as shown in Figure 2.4a and Figure 2.4b [**TR010022/APP/6.2**] allow for temporary traffic management areas, temporary working and storage areas, material stockpiles, haul roads, and provision for site compounds to be used during the Scheme construction phase – refer to Figures 2.11a to 2.11c [**TR010022/APP/6.2**].

Construction programme

2.6.5 Subject to securing a DCO, preliminary works are planned to start in late 2020, with the main construction works following in early 2021. The Scheme is due to fully open to traffic in 2024.

2.6.6 The construction programme assumes that the works would occur at all three junctions simultaneously, although it is anticipated that the programme would be split into a number of different phases at each junction to coordinate the works in a manner that would, where possible, enable effective materials re-use and minimise disruption (see sections below).

2.6.7 As indicated in Chapter 8: Biodiversity, water vole are considered to be absent from Dam Brook. However, should water vole be found within Dam Brook during pre-construction surveys (considered to be a low risk), ecological mitigation works have the potential to delay the start of the main construction works at Little Eaton junction, thus extending the construction works at this junction. However, for the purposes of the EIA, a shorter construction programme is assumed to represent the worst case given that all construction activities would be undertaken over a shorter duration and thus there would be a greater intensity of construction activities (noting that such works would continue to be undertaken in accordance with the core working hours as per Table 2.4 and paras. 2.6.62 to 2.6.64).

2.6.8 Illustration 2.1 provides an indicative high level summary of the main elements of the Scheme construction programme and indicates that the works are anticipated to be divided into eight main construction traffic management phases (further details are provided in the paragraphs below) (i.e. traffic management scenarios 0 through 7).

2.6.9 Illustration 2.1 indicates that main construction works would commence across all three junctions in 2021, with Kingsway junction being completed and opened to traffic first, followed by Little Eaton junction, with Markeaton junction being the last to become operational.

2.6.10 Preliminary key Scheme milestone and target dates are detailed in Table 2.2.

Table 2.2: Preliminary key milestone and target dates

Milestone	Target date
Secretary of State (SoS) DCO Decision	August 2020
Land entry effected	November 2020, dependent on powers in DCO
Start of DCO preliminary works	November 2020
Start of main works	March 2021
Full Scheme open to traffic	2024

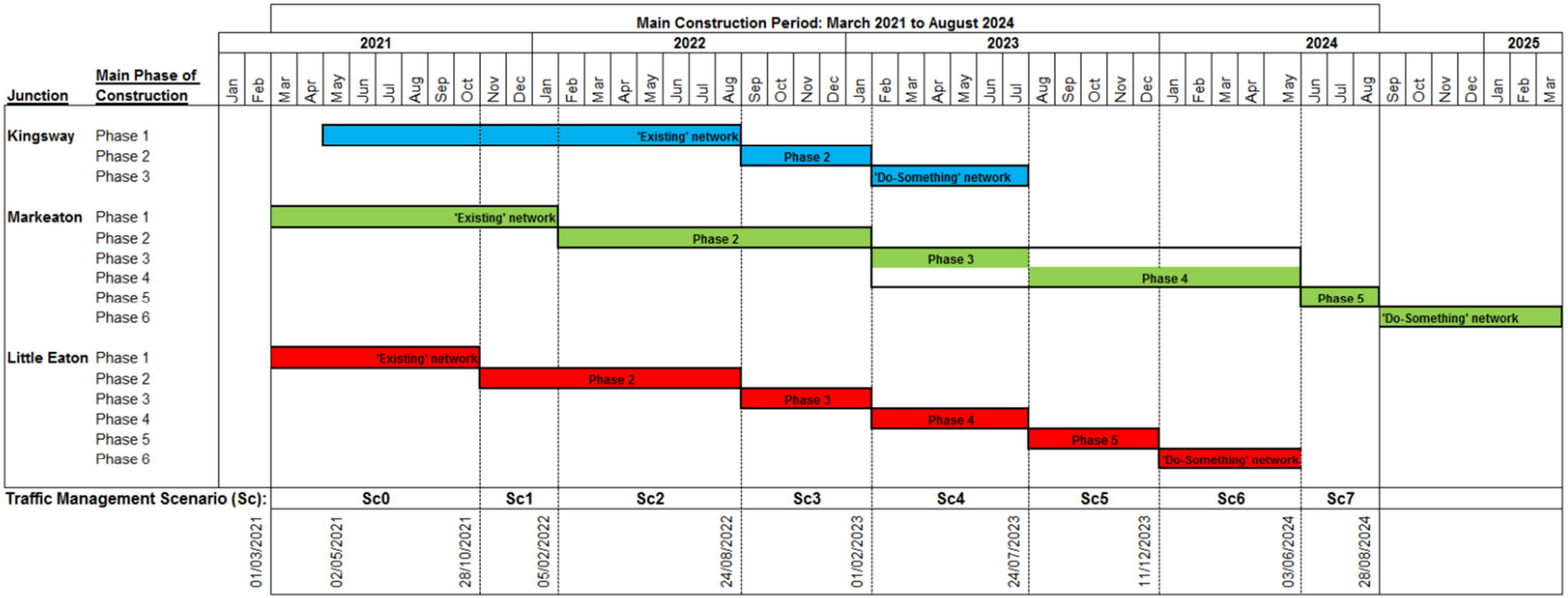

Illustration 2.1: High level Scheme construction programme

2.6.11 The preliminary works delivered under the DCO would consist of flood risk and ecological survey/mitigation works, remedial work in respect of any contamination or other adverse ground conditions, erection of temporary fencing, diversion and laying of underground apparatus, demolition works, utilities works, site clearance and establishment of compounds – further details are provided in Table 2.3.

Table 2.3: List of preliminary works

Preliminary works	Envisaged activities
Utilities	Utilities surveys together with advance utilities diversions and utilities clearance works.
Ecological surveys and ecological advance works	Undertaking of ecological pre-construction surveys and where applicable ecological advanced works (e.g. ecological clearance, invasive weed treatments or ecological mitigation in advance of the main construction works).
Advanced archaeological works	Measures to protect archaeological remains in situ and to record archaeological remains through investigation, prior to the construction of the Scheme (refer to Chapter 6: Cultural Heritage).
Geotechnical investigations	Collection of additional geotechnical information for areas such as the historical landfill area at Kingsway junction, as well as the floodplain compensation area and the former landfill site at Little Eaton junction (to be used as the construction compound).
Site clearance	Vegetation within the Scheme footprint would be cleared outside of the bird breeding season in order to avoid adverse ecological effects (refer to Chapter 8: Biodiversity).
Demolition works	Demolition of structures and properties.
Establishment of compounds and satellite compounds	Works to enable the establishment of the main compound at Little Eaton junction and the various satellite compounds as detailed in Figures 2.11a to 2.11c [**TR010022/APP/6.2**].
Flood storage works at Kingsway hospital site	Excavation works within the Kingsway hospital site to create flood storage areas adjacent to Bramble Brook (refer to Chapter 13: Road Drainage and Water Environment). Such works are anticipated to take approximately two weeks to complete with excavated material being re-used within the Scheme.
Diversion of Bramble Brook	Bramble Brook would need to be diverted to clear the way for works within Kingsway junction. The brook diversion works would require the creation of a new brook alignment plus the creation of a flood storage area within the junction.
Diversion of Dam Brook	Dam Brook would need to be diverted to clear the way for the Little Eaton embankment. The brook diversion works would require the creation of a new brook alignment, followed by appropriate reinstatement and ecological mitigation works (refer to Chapter 8: Biodiversity). As part of the brook diversion works, two ecology ponds adjacent to the brook would be created.

Preliminary works	Envisaged activities
Floodplain compensation excavation works to the west of the River Derwent	Excavation works to create a floodplain compensation area (refer to Figure 2.10 [**TR010022/APP/6.2**]) to mitigate for the loss of River Derwent floodplain due to the Scheme (refer to Chapter 13: Road Drainage and Water Environment). Excavation works would take approximately 10 weeks to complete, with excavated material being re-used within the Scheme. Following site profiling, the area would be restored to pasture for continued agricultural use by the landowner.

2.6.12 The planned preliminary works (refer to Table 2.3) would be undertaken by the main construction works contractor. The mitigation measures described in Section 3 of the OEMP (refer to Appendix 2.1 [**TR010022/APP/6.3**]) cover the planned preliminary works and the main construction works.

2.6.13 The construction plan would be refined during the detailed design of the Scheme with appropriate regard to reducing the potential for environmental impacts during the construction phase.

2.6.14 Illustration 2.1 indicates that the construction works at each junction are anticipated to be split into a number of phases, with the various phases being sequenced in a manner that minimises road user disruption and construction programme duration. A description of the anticipated phasing of the construction works is provided in the sections below. The Traffic Management Plan (TMP) provided in Appendix 2.3 [**TR010022/APP/6.3**] provides details of the various construction phase traffic management scenarios 0 through 7.

Kingsway junction

2.6.15 The construction works at Kingsway junction are anticipated to be split into three main phases as follows (refer to Illustration 2.1).

2.6.16 **Phase 1:** Traffic would continue to use the existing A38 configuration with reduced lane widths (3.25m minimum) to facilitate the widening of the northbound and southbound mainline carriageways. Lane 1 and 2 closures would be utilised during off peak periods only.

2.6.17 Localised lane closures of the existing configuration would be required to complete the final tie-in to the new dumbbell roundabout. The activities would include (refer to Figure 2.5 [**TR010022/APP/6.2**] for details of chainages (ch.)):

1. Construct northbound and southbound mainline from ch. 1000.000 – 1500.000.
2. Construct overbridge and offline dumbbell roundabout sections.
3. Construct tie-in link road to Kingsway Park Close.
4. Construct Brackensdale Avenue bridge widening.
5. Construct northbound and southbound mainline widening ch. 1750.000 – 2300.000.

2.6.18 The main construction activities during this phase would be:

- Statutory undertakers protection works and diversions.
- Earthworks.
- Drainage works.
- Roadworks.
- Kingsway junction bridge works.
- Retaining walls.
- Brackensdale Avenue bridge works northbound and southbound.

2.6.19 **Phase 2:** Traffic would be diverted off the existing roundabout onto the new road configuration to enable the remaining section of main carriageway to be completed. The activities include:

1. Divert traffic around the new junction.
2. Construct remaining sections of the mainline carriageway within the old junction area.

2.6.20 The main construction activities during this phase would be:

- Switch traffic management.
- Drainage works.
- Earthwork.
- Roadworks.

2.6.21 **Phase 3:** Works would be substantially complete to the existing carriageway. Traffic would be switched onto the new junction, but localised traffic management would be required to complete outstanding off-line works.

2.6.22 The main construction activities during this phase would be:

- Switch traffic management.
- Drainage works.
- Roadworks.

Markeaton junction

2.6.23 The construction works at Markeaton junction are anticipated to be split into six main phases as follows (refer to Illustration 2.1).

2.6.24 **Phase 1:** Traffic would continue to use the existing A38 configuration with reduced lane widths (3.25m minimum) to facilitate the widening of the northbound and southbound mainline carriageways. Lane one and two closures would be utilised during off peak periods only.

2.6.25 Overnight and temporary closures would be required to remove the existing Markeaton footbridge which would be advertised well in advance. The A38/Enfield Road accesses would be closed permanently during this phase.

2.6.26 Activities would include (refer to Figure 2.6 [**TR010022/APP/6.2**] for details of chainages):

1. Construct northbound weaving lane from start to ch. 2500.000.
2. Construct southbound weaving lane from start to ch. 2500.000.
3. Construct southbound secant pile walls ch. 2600.000 – 2750.000 and ch. 2800.000 – 3025.000.
4. Construct southbound diverge slip road.
5. Construct southbound merge slip road.
6. Construct temporary works across existing roundabout for A52.
7. Install temporary traffic signal control at northbound entry and at the top of the southbound diverge slip.

2.6.27 The main construction activities during this phase would be:

- Statutory undertakers protection works and diversions.
- Demolition works (houses adjacent to westbound carriageway east of junction).
- Demolition and removal of existing footbridge.
- Earthworks.
- Drainage works.
- Retaining wall Windmill Hill Lane.
- Contiguous piled retaining wall at the southbound merge slip road.
- North bridge works.
- Secant piled retaining walls.
- Temporary roadworks to facilitate Phase 2.

2.6.28 **Phase 2:** Temporary junctions controlled by traffic signals would be brought into operation to control the traffic flow on the A38 and A52 traffic crossing the junction.

2.6.29 Overnight and temporary closures would be required to install the new Markeaton footbridge which would be advertised well in advance.

2.6.30 Activities would include:

1. Divert A52 onto temporary connection and switch on traffic signals.
2. Divert southbound traffic onto the new southbound slip roads and through controlled junction.

3. Divert northbound traffic onto temporary diversion across the junction.
4. Right turn movements would be prohibited, but for limited periods only.
5. Construct new A38 bridges and associated secant pile retaining wall.
6. Construct northbound secant pile retaining wall ch. 2800.000 – 2975.000.
7. Construct southbound carriageway ch. 2500.000 – 2700.000.
8. Construct northbound carriageway ch. 3025.000 – 3150.000.
9. Construct northbound merge slip ch. 2800.000 – 2900.000.
10. Construct temporary diversion ch. 2850.000 – 3025.000.

2.6.31 The main construction activities during this phase would be:

- Statutory undertakers diversions.
- Earthworks.
- Drainage works.
- Construct new footbridge.
- North bridge works.
- Secant piled retaining walls.
- Roadworks to northbound diverge slip road.

2.6.32 **Phase 3:** Temporary link north of the A38 would be removed and traffic would use the new alignment with northbound traffic to the east of the A38/A52 junction diverted onto the temporary diversion between ch. 2850.000 and 3025.000 to facilitate construction of the new northbound merge slip.

2.6.33 Activities include:

1. Divert A52 onto new roundabout and remove temporary link.
2. Construct secant pile retaining wall between roundabout bridges.
3. Divert northbound A38 onto temporary link ch. 2850.000 – 3150.000.
4. Excavate for new A38 southbound carriageway ch. 2550.000 – 2700.000.
5. Excavate for new northbound merge slip ch. 2875.000 – 3100.000.
6. Construct new retaining wall for northbound merge slip.
7. Construct remaining portion of the new A38 northbound merge slip ch. 2875.000 – 3250.000.

2.6.34 The main construction activities during this phase would be:

- Temporary roadworks ch. 2850.000 – 3000.000.
- Statutory undertakers protection works and diversions.

- South bridge works.
- Secant piled retaining walls.
- Earthworks.
- Drainage works.
- Roadworks northbound merge slip road.

2.6.35 **Phase 4:** Traffic diverted onto the new roundabout configuration utilising the merge and diverge slip roads to facilitate construction of the remaining sections of the new main carriageway. The temporary diversion between ch. 2850.000 and 3025.000 would also be removed at this phase. Main construction activities include:

1. Divert northbound traffic onto new northbound merge slip.
2. Remove temporary northbound road.
3. Excavate between secant piled walls and beneath roundabout bridges ch. 2750.000 – 3050.000.
4. Construct A38 northbound carriageway ch. 2750.000 – 3025.000.
5. Construct A38 southbound carriageway ch. 2550.000 – 3100.000.

2.6.36 The main construction activities during this phase would be:

- Earthworks.
- Road slab works.
- Retailing wall works.
- Drainage works.
- Roadworks.

2.6.37 **Phase 5:** Northbound A38 traffic would be diverted onto the new southbound main carriageway to enable the diverge slip to be completed. This would involve closing the diverge slip with traffic wishing to go north on the A52 being diverted to Kedleston Road junction (detailed diversion routes would be agreed with DCiC).

2.6.38 Activities would include:

1. Divert northbound carriageway onto new southbound carriageway ch. 2500.000 – 2800.000.
2. Close northbound diverge slip.
3. Construct northbound secant piled wall ch. 2600.000 – 2750.000.
4. Excavate for northbound carriageway and northbound diverge slip ch. 2550.000 – 2750.000.
5. Construct retaining wall adjacent northbound diverge slip ch. 2575.000 – 2700.000.
6. Complete northbound carriageway ch. 2550.000 – 2750.000.

7. Construct northbound diverge slip.

2.6.39 The main construction activities during this phase would be:

- Roadworks.
- Contiguous piled retaining wall south west slip.

2.6.40 **Phase 6**: Works complete and traffic switched onto the new junction.

Little Eaton junction

2.6.41 The construction works at Little Eaton junction are anticipated to be split into six main phases as follows (refer to Illustration 2.1).

2.6.42 **Phase 1:** This period includes an approximate six months settlement period for the embankment works, therefore, Phase 1 would start after approximately 11 months, and after Dam Brook realignment. Traffic would continue to use the existing road configuration with reduced lane widths to facilitate access where required.

2.6.43 Localised lane closures would be required to complete works at pinch points and also to facilitate access to the works. Phase 1 allows substantial sections of the new works to be completed off line with the remaining phases likely to cause minimum disruption relative to the other two junctions.

2.6.44 Activities would include:

1. Construct new carriageway and embankment off line.
2. Widen westbound slip to accommodate two lanes.
3. Construct new flood arch structure and railway bridge extensions.
4. Construct temporary (smaller) roundabout.
5. Construct traffic signals on the A61 south.

2.6.45 The main construction activities during this phase would be:

- Statutory undertakers protection works and diversions.
- Earthworks.
- Approximately six months settlement period to embankment.
- Drainage works.
- Roadworks southbound merge slip road.
- Roadworks southbound diverge slip road.
- Railway bridge extension.
- Flood arch extension works.

2.6.46 **Phase 2:** With Phase 1 completed, the flow of traffic through the junction would be reasonably free flowing with traffic being kept away from the work zones. Traffic would be diverted onto completed sections of the new alignment with temporary traffic signals in operation at the A38/A61 junction.

2.6.47 Localised lane closures of the existing configuration would be required to complete works at pinch points and also to facilitate access to the works.

2.6.48 Activities would include:

1. Construct remainder of eastbound carriageway.
2. Complete roundabout carriageway.
3. Traffic signal control A38/A61 traffic.

2.6.49 The main construction activities during this phase would be:

- Statutory undertakers diversions.
- Earthworks.
- Drainage works.
- Roadworks.
- Construct underbridges west and east.
- Reinforced earth retaining walls.
- Piled reinforced concrete retaining wall north-east.

2.6.50 **Phase 3:** Traffic would be diverted onto the new roundabout configuration using the new underbridges. Access to complete the underbridge wing walls and then place the plug infill would cause some access issues for material deliveries that would need to be controlled.

2.6.51 Activities include:

1. Construct centre of roundabout including remaining bridge abutments.

2.6.52 The main construction activities during this phase would be:

- Statutory undertakers diversions.
- Earthworks.
- Drainage works.
- Roadworks.
- Complete wing walls to underbridges west and east.
- Reinforced earth retaining wall.
- Piled reinforced concrete stem wall north east.

2.6.53 **Phase 4:** Drivers approaching from the A38 west would not have access to the A61 Alfreton Road southbound and therefore alternative diversion routes would need to be constructed and signed. This arrangement would be required to install the east bridge deck beams and complete construction.

2.6.54 Activities include:

1. Direct traffic around one side of roundabout.
2. Construct bridge deck beams.
3. Complete bridge construction with roundabout.

2.6.55 The main construction activities during this phase would be:

- Statutory undertakers diversions.
- Earthworks.
- Drainage works.
- Roadworks.

2.6.56 **Phase 5:** Drivers approaching from the A61 Alfreton Road would not be able to travel ahead into Little Eaton or turn right to the A38 north. Therefore, alternative diversion routes would need to be constructed and signed accordingly. This arrangement would be required to install the west bridge deck beams and complete construction.

2.6.57 Activities include:

1. Direct traffic around one side of roundabout.
2. Construct bridge deck beams.
3. Complete bridge construction with roundabout.

2.6.58 The main construction activities during this phase would be:

- Earthworks.
- Drainage works.
- Roadworks.

2.6.59 Phase 6: Activities include

1. Complete outstanding elements.

2.6.60 The main construction activities during this phase would be:

- Roadworks.

Working hours

Core working hours

2.6.61 During the Scheme construction phase, the project-wide core working hours are defined in Table 2.4.

Table 2.4: Core working hours

Works	Core working hours
All works including earthworks	07:30 – 18:00 Monday to Friday 08:00 – 13:00 Saturdays with no working on Sundays and Bank Holidays Exceptions to these core working hours are detailed in the paragraphs below

2.6.62 To maximise productivity, a period of up to one hour before and up to one hour after normal working hours would be used for start-up and close down of activities. This would include, but not be limited to, deliveries, movement to place of work, unloading, maintenance and general preparation works. These periods would not be considered an extension of core working hours.

2.6.63 Some activities with limited durations would be undertaken outside of the core working hours, namely:

- Night-time closures for Markeaton footbridge demolition and installation of the new footbridge.
- Junction and slip road tie-in works.
- Installation of bridge decks.
- Installation of sign gantries.
- Installation of temporary and permanent line markings.
- Overnight traffic management measures; as agreed with the highway authority in advance.
- Any emergency works.
- Works associated with traffic management and signal changes.

2.6.64 Any other work carried out outside the core working hours, or any extension to the core hours, may be possible with the prior agreement of the local highway authority provided that the activity is not materially worse than the activities assessed within this ES.

Construction compounds, material storage and stockpiles

2.6.65 The main construction compound would be located to the north of Little Eaton junction on a vacant land plot that was previously used for landfilling (area up to approximately 4ha) (refer to Figure 2.11c [**TR010022/APP/6.2**]). Temporary access to the compound would be off the B6179. The site compound would include temporary site offices (meeting rooms, reception area, toilets, showers, changing rooms, first aid room, prayer room, ICT server, print room), canteen and restroom, CCTV room, stores, filing room, training facility for inductions and on-site training, staff parking, heavy goods vehicles (HGV) parking, traffic management compound, vehicle recovery compound, materials laydown area and stores. The compound would be provided with appropriate security fencing and temporary lighting. Refer to Figure 2.11c [**TR010022/APP/6.2**] for an indicative compound layout.

2.6.66 Stockpile areas would store topsoil and other materials that need to be retained on site for re-use within the proposed works, as well as small scale satellite compound areas. These would be located along the Scheme within the Scheme boundary as indicated in Table 2.5 (refer to Figure 2.11a to 2.11c [**TR010022/APP/6.2**]). Topsoil stockpiles would generally be located at the perimeter of working areas so that they would also screen the works from the public. The stockpiles would be approximately 2m to 3m in height, and may be sown with grass seed to reduce their visual impact should they be present for extended periods. The footprints of the areas used for construction purposes would generally be returned to their former use following completion of the construction works.

Table 2.5: Stockpile areas and satellite compounds used during Scheme construction (refer to Figures 2.11a to 2.11c [TR010022/APP/6.2])

Junction	Sites
Kingsway junction	• Laydown area for construction materials, storage and welfare facilities within the junction footprint. • Area adjacent to Brackensdale Avenue access to and from the A38 – satellite construction compound for materials storage and welfare facilities.
Markeaton junction	• Area in the Army Reserves Centre – satellite construction compound for materials storage and welfare facilities. • Area on Queensway following building demolition – laydown area for construction materials, storage and welfare facilities.
Little Eaton junction	• Area adjacent and east of Little Eaton junction - excavated material stockpile area (noting that material storage would take place following Dam Brook realignment).

Haul routes and access tracks

2.6.67 A temporary bridge would be required over the ditch running adjacent to the B6179 Alfreton Road (route of the former Derby Canal) to provide access into the proposed main construction compound at Little Eaton junction (refer to Figure 2.11c [**TR010022/APP/6.2**]). The foundations of the temporary bridge structure would be installed back from the edge of the ditch in order to minimise disturbance and adverse impacts on the former Derby Canal (see para. 2.6.101).

2.6.68 Generally, construction plant would travel along the Scheme using the existing A38 and completed sections of the Scheme (refer to Figures 2.11a to 2.11c [**TR010022/APP/6.2**]). However, other haulage, access roads include the following:

- The main material haulage routes to and from the Scheme would be the existing A38 (north and south), the A61 (south), the A6 (north), the A52 (west) and the A5111 Kingsway.
- Direct access from the A38 into the Kingsway hospital site to facilitate excavation of the flood storage areas (refer to Table 2.1).
- Access from the northbound A38 diverge slip road at Kedleston Road junction into Markeaton Park in order transport topsoil from the A38 Roundabout Local Wildlife Site (LWS) (within Kingsway junction) into the park in order to create a species rich grassland (refer to Chapter 8: Biodiversity)
- Direct access from the A38 into the floodplain compensation area located to the west of the River Derwent and south of the A38 at Little Eaton junction. This arrangement would avoid the need for material haulage from the excavation area through the residential areas adjacent to Duffield Road.

2.6.69 Where necessary, access and haul routes would be constructed from site won material. Access and haul road maintenance and dust control measures would be adopted. Access and haul routes would be reinstated to their former uses upon completion of the Scheme construction works.

Construction traffic (off-site)

2.6.70 Strategic signage would be provided north of Junction 28 on the M1 to alert drivers to the Scheme construction works and thus provide drivers with options to avoid the A38. Similar signage would also be provided for northbound traffic on the A38 to the south of the A50 Toyota junction.

2.6.71 Where possible, material excavated from the Kingsway and Markeaton junctions would be used to construct the embankment at Little Eaton junction; however, there would be some material that would need to be transported during off-peak periods along the A38 and completed sections of the Scheme, for re-use off-site or disposal, as applicable (refer to Chapter 11: Material Assets and Waste). Other construction traffic would consist of vehicles delivering the products required for the construction of

the Scheme, including concrete, bitumen, aggregates, pipes and steel. Some deliveries would arrive as abnormal loads, such as large construction plant, bridge beams and Markeaton footbridge. Construction worker vehicles would also access the main construction compound at Little Eaton junction, as well as satellite facilities (refer to Table 2.5 and Figures 2.11a to 2.11c [**TR010022/APP/6.2**]).

2.6.72 Taking into account the Scheme design details, material balance and workforce, Illustration 2.2 provides details of construction phase traffic flows for the duration of the Scheme construction phase (HGVs and light construction vehicles). This illustrates that construction vehicle flows would be at a maximum towards the end of the first year of construction works, mainly associated with material haulage.

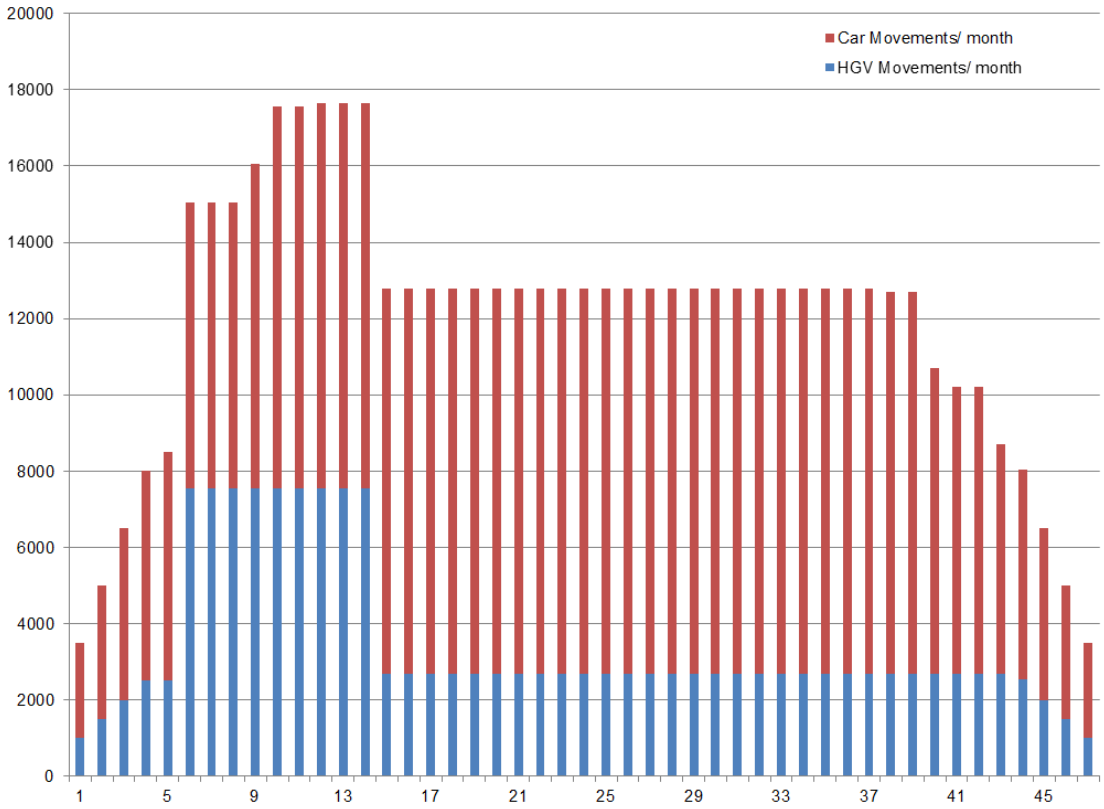

Illustration 2.2: HGV and light construction vehicles flows during the Scheme construction phase

2.6.73 It has been assumed that HGV deliveries of construction materials would be made in a 12 hour period between 7am and 7pm other than in exceptional circumstances (refer to para. 2.6.62). HGV deliveries to the Scheme construction sites would be restricted to the following main highway corridors – details of percentage HGV distribution are also provided (refer to Figures 2.11a to 2.11c [**TR010022/APP/6.2**]):

- A38 (north) - 27%.
- A61 (south) - 19%.

- A6 north - 10%.
- A52 west - 10%.
- A5111 Kingsway - 11%.
- A38 south - 23%.

2.6.74 The percentage distribution takes account of which roads in the vicinity of the Scheme are suitable for HGV use, including associated weight restrictions, as well as the location of various construction material suppliers. Such access restrictions would prevent HGVs from using local roads and thus prevent HGVs from passing through sensitive villages such as Little Eaton.

2.6.75 Light construction vehicles (non-HGV) would access the Scheme construction sites via the existing highway approach roads according to existing distribution patterns.

2.6.76 A detailed TMP would be prepared and implemented by the construction contractor and would define those measures to be used by the contractor to reduce the impacts from construction traffic. The construction contractor's detailed TMP would be based upon outline TMP for the Scheme as provided in Appendix 2.3 [**TR010022/APP/6.3**].

A38 traffic during construction

2.6.77 Traffic management would be required during the construction phase, noting that construction activities would progress at all three junctions simultaneously. The construction works at each junction would be programmed into distinct traffic management phases. These construction phases have then been combined with the expected rate of construction progress at each junction to develop eight traffic management scenarios that represent the expected construction duration of the whole Scheme (see Illustration 2.1). The TMP provided in Appendix 2.3 [**TR010022/APP/6.3**] provides details of these various construction phase traffic management scenarios (scenarios 0 through 7).

2.6.78 Appropriate traffic management measures would be put in place in order maintain traffic flows on the existing A38 and other local roads during Scheme construction, whilst allowing safe working at the interface between the existing road network and the Scheme.

2.6.79 The contractor's TMP would require reduced speed limits applied to specific links adjacent to the construction sites, temporary junction layouts, traffic signals, potential changes to turning priorities, closures to slip roads and over-night closures.

2.6.80 Such traffic management proposals would change the operational performance of the existing junctions and would increase the journey lengths for diverted trips. However, the overall strategy is, where possible, to maintain existing A38 journey times in order to encourage drivers not to make undesirable route choice changes onto local roads.

2.6.81 Traffic modelling of the various construction phases has been undertaken which indicates that with the appropriate design of construction phase traffic management systems, existing journey times along the A38 could be maintained. However, during the most active Scheme construction phases, traffic management has the potential to increase the A38 journey time through this section of the A38 by approximately two minutes. Journeys on some radial routes could be longer. The size of the increase in journey times would depend upon the radial route considered and the specific phase of traffic management being implemented.

Construction methods

2.6.82 The construction of the Scheme would use typical construction techniques associated with major infrastructure projects, including site clearance, excavations and piling.

2.6.83 Earthworks, including cuttings and embankments, would be required to create the new junctions (refer to para. 2.5.71). Embankments would be constructed using imported fill and, where possible, using site-won materials. The pavement construction would use relatively standard techniques, including (where appropriate) capping layer, sub-base, base and surface courses. Inlay and overlay strengthening techniques would also be utilised to maximise re-use of existing carriageway construction.

Plant and equipment

2.6.84 Construction of the Scheme would require a large quantity of plant and equipment. The volume of earth to be moved would require large excavators, dump trucks, dozers, compactors plus graders, bowsers and stabilising plant. Indicative construction plant requirements have been defined taking advice from the Highways England's appointed buildability advisors for the Scheme – such information has been used during the EIA (e.g. to estimate potential noise effects) (refer to Chapter 9: Noise and Vibration).

Workforce

2.6.85 Taking advice from Highways England's appointed buildability advisors, it is anticipated that the workforce would vary over the course of the construction phase. The maximum workforce during the Scheme construction phase has been estimated to be approximately 600 staff. Such staffing figures have been taken into account to generate construction phase traffic data used within parts of the EIA (i.e. the traffic flows as detailed in Illustration 2.2).

Utilities

2.6.86 Construction of the Scheme would require the diversion, relocation and protection of existing utility assets including water, wastewater, electricity, gas and telecommunications. Utilities works have been investigated and forms part of the Scheme construction works as assessed within this ES. This investigation indicates that there are a significant number of utilities located along the A38 corridor, especially in the vicinity of Markeaton junction.

2.6.87 Main utilities works required during the Scheme construction phase include the following:

- Kingsway junction:
  - Diversion of 11kv electricity cables south of the junction (between Mackworth Park and the area to be used for flood storage areas in the Kingsway hospital site).
  - Relocation of 11kv electricity cables within the carriageway of the northbound slip road.
  - Relocation of 132kv electricity cables, BT, 11kv cables and gas pipeline associated with the link road to Kingsway Park Close.
  - Within carriageway works to a water pipeline along Kingsway Park Close.
  - Within carriageway works to a gas main along Kingsway Park Close
- Markeaton junction:
  - Diversion of numerous utilities at Markeaton junction, including sewer, water, gas, telecommunications, and electrical cables, with utilities being diverted either side of the new A38 alignment. There would be utilities diversions into the area left vacant by property demolition at Queensway, as well as use of a utilities corridor located within Markeaton Park adjacent to the northbound carriageway of the new A38 mainline. This utilities corridor would be cleared of vegetation and trees before the diversion works, with the area being appropriately restored and returned to park use following completion of the works. The area occupied by the utilities corridor would be cordoned off from public use for the duration of the construction phase, with public access diversion routes being appropriately signposted.
  - The existing mobile phone mast and associated cabinets located at the existing Markeaton Park exit would be relocated close to their existing position.

- Little Eaton junction:
  - Diversion of a foul sewer pipeline at the floodplain compensation area to the west of the River Derwent. Such diversion works would be undertaken prior to the excavation works and would be undertaken in a manner that would not adversely affect the veteran trees located to the north of the floodplain compensation area.
  - Protection works to a medium gas pressure main that passes through the Flood Arch/Accommodation Bridge under the A38 to the east of the River Derwent.
  - Diversion of water, electricity cable, gas pipeline and telecommunications through the new junction.
  - Diversion of a STW combined sewer, requiring temporary use of land owned by the Derby Garden Centre.
  - Diversion and undergrounding of 11kv cables, requiring temporary land use.

2.6.88 Such required utilities diversions would be further investigated and planned in detail by the contractor as part of the construction works detailed design. These utilities works are all located within the Scheme boundary, however, there remains the risk that some utility companies would need to undertake some minor connection works within existing highway carriageways that are outside the Scheme boundary through permitted development rights. This includes minor connection works outside the Scheme boundary on the A52 Ashbourne Road. Potential environmental impacts associated with such works are considered in Chapter 15: Assessment of Cumulative Effects.

2.6.89 The main construction site compound to the north of Little Eaton junction would require a new 'temporary' utility connection for the provision of water, sewerage disposal, electricity and telecommunications. Such connections would be picked up from existing utilities located along Alfreton Road.

2.6.90 Electricity connections would be required at each junction. New electricity cables would typically be run along roads or tracks and be buried at a depth of about 1m. They would be created at the start of the construction phase and be available for use at the satellite compound areas as detailed in Figures 2.11a to 2.11c [**TR010022/APP/6.2**]. Such electricity connections would be retained to provide power during Scheme operation (e.g. for traffics signals and CCTV etc.).

2.6.91 Mains water connections would be required at each junction and would be used to provide potable water to the satellite compound areas as detailed in Figures 2.11a to 2.11c [**TR010022/APP/6.2**]. The mains connections would typically be run along roads or tracks and be buried at a depth of about 1m.

2.6.92 Should foul water system connections not be available at the satellite compound areas as detailed in Figures 2.11a to 2.11c [**TR010022/APP/6.2**], foul water would be stored in double skinned tanks on site and transported to a local sewage treatment works by tanker.

Building demolition

2.6.93 The Scheme would require the demolition of a number of existing structures as follows:

- Demolition of 15 detached residential properties on Queensway.
- 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 new access would be provided which would require land from a further four residential properties).
- The closed toilet facilities block to the north of the Scheme within Markeaton Park would be demolished.
- Demolition and removal of the existing footbridge at Markeaton junction. It is estimated that a replacement footbridge would be installed approximately one and a half years after existing bridge demolition. However, this is subject to review during the construction planning detailed design stage, with the aim of minimising the duration without a footbridge.

Excavated materials

2.6.94 Construction of the Scheme would require excavation in places to form cuttings for the highway and where possible, this material would then be used to form embankments.

2.6.95 Table 2.6 provides details of predicted cut and fill volumes and estimates of material re-use and materials landfilling during the Scheme construction phase. Table 2.6 indicates that the estimated quantities of earthworks materials are imbalanced by approximately 318,328m^3. Table 2.6 thus indicates that large quantities of material would require importation during the Scheme construction phase. The origin of imported material resources cannot be confirmed at this time as this would be determined by the Scheme contractor during the construction works detailed design stage. However, there is a wealth of mineral sources within the Derbyshire region, and thus it is the aim that materials required for the Scheme would be sourced locally in order to minimise transportation distances. Potential material donor sites include colliery, existing quarries and development schemes in the East Midlands with a materials surplus - further details regarding potential construction material sources are provided in Chapter 11: Material Assets and Waste.

2.6.96 Table 2.6 indicates that some excavated materials would not be suitable for re-use (approximately 45,130m^3) that would need to be transported off-site to licensed waste management facilities.

Table 2.6: Predicted cut and fill and estimated material re-use and landfilling for the Scheme (approximate)

Junction	Cut (m^3)	Fill (m^3)	Balance (m^3)	Cut material re-use (m^3)	Cut material to be landfilled (m^3)
Kingsway junction	58,143*	66,651	-8,508	20,386	37,759
Markeaton junction	73,714	7,393	66,321	66,343	7,371
Little Eaton junction	43,673**	419,814	-376,141	43,673	0
Totals	**175,530**	**493,858**	**-318,328**	**130,402**	**45,130**

* includes approximately 7,800m^3 excavation from flood storage areas within Kingsway hospital site
** includes approximately 36,000m^3 excavation from floodplain compensation area to the west of the River Derwent

2.6.97 It is the intention that as much of the reusable cut material would be re-used on site as feasible. Re-use of excavated material would minimise the need to transport this material on the highway network for re-use or disposing it off-site. This would reduce the environmental impacts associated with the construction of the Scheme, particularly in relation to the air quality and noise impacts of construction traffic on people and communities living along excavated materials re-use and disposal routes. This strategy would also help reduce greenhouse gas emissions during the Scheme construction phase. In this regard, it is the aim that the approximately 7,800m^3 of material excavated from the flood storage areas at the Kingsway hospital site and approximately 36,000m^3 of material excavated from the floodplain compensation area to the west of the River Derwent, would be re-used by the Scheme.

2.6.98 Should any such materials not be re-used on site, the construction contractor would seek to re-use material elsewhere, although some materials may require off-site disposal.

2.6.99 The approach to materials and waste management is considered further in Chapter 11: Material Assets and Waste.

Construction materials

2.6.100 The estimated main types and quantities of construction materials anticipated (excluding earthworks) to be used during Scheme construction are shown in Table 2.7 (refer to Chapter 11: Material Assets and Waste for details).

Table 2.7: Estimated main types and quantities of materials used during Scheme construction

Material resources	Quantity (approximate)		
	Tonnes	m^3	Other
Cement bound granular material	54,000	26,000	-
Concrete (ready mixed)	175,000	70,000	-
Concrete (products) e.g. precast concrete	-	-	17,000m
Steel	9,000	11,000	-
Asphalt and bituminous material	86,000	36,000	-
Aggregates (Type 1 sub-base)	54,000	28,000	-
Geotextile	-	-	412,000m^2
Filter drain material	7,500	3,400	-
Timber/plywood e.g. form work and shuttering	700	1,300	-

Temporary watercourse crossings

2.6.101 Temporary access for construction vehicles, plant and cars to cross existing watercourses would be considered on merit at each location with local environmental and engineering constraints and cost taken into consideration. However, access to the proposed main construction compound at Little Eaton junction adjacent to the B6179 Alfreton Road would require an access across the former Derby Canal by installing a temporary bridge structure (or similar) (refer to para. 2.6.67).

2.6.102 Foundations for such temporary bridge structures would be installed back from the edge of the watercourse to minimise impact on the existing vegetation and watercourse profile. The design of the foundations would be dependent on ground conditions and loading requirements, but may comprise of pad foundations or a simple piled foundation. The deck could be prefabricated and lifted into position.

2.6.103 A proprietary, modular bridging system, designed to accommodate construction traffic may be installed to span between the bridge foundations, clear of the watercourses. The bridges could either be pre-assembled and craned into position or be slid across the watercourse using a cantilevered launch technique. The benefits of using a proprietary system include:

- Rapid build.
- Assembly using light plant.
- Can be crane built or cantilever launched.
- Long span capability.
- Robust.
- High fatigue capability.

- Heavy axle and wheel load capacity.
- Optional ramps, footways, parapets and barriers can be incorporated into the design.
- Various deck options are available.

2.6.104 The bridging systems would be removed upon completion of the works, with the affected footprint areas being reinstated to their former conditions.

2.6.105 The contractor would be able to define an alternative means of temporary watercourse crossings if such measures would achieve the same environmental outcomes. In such cases, the contractor would secure the written approval of Highways England prior to implementing any alternative measures and in so doing, would demonstrate to Highways England that the use of the alternative measures would not lead to any materially new or materially different adverse environmental effects compared to those as presented in this ES.

Environmental management plan

2.6.106 An OEMP has been prepared in parallel with the development of the Scheme design and construction methodology. It includes construction, operational and maintenance mitigation measures which have been defined in part by the requirements which arise from the technical assessments presented in this ES. The technical assessments within this ES have taken account of the agreed measures within the OEMP as 'embedded mitigation'. The OEMP is provided within Appendix 2.1 [**TR010022/APP/6.3**] and would be secured by DCO requirement.

2.6.107 The construction of the Scheme would be subject to measures and procedures defined within a CEMP (refer to para. 2.6.2). The CEMP would be based on, and incorporate, the requirements of the OEMP (see Appendix 2.1 [**TR010022/APP/6.3**]), and would include the implementation of industry standard practice and control measures for environmental impacts arising during Scheme construction, such as the control of dust and the approach to waste management on site. The CEMP would be produced by the contractor prior to works commencing - the OEMP provides details of contractor responsibilities with regard to CEMP (and other construction phase plans) preparation.

2.7 Operation and long term maintenance

2.7.1 Once the Scheme is opened, it would form part of the A38 Trunk Road and be part of the strategic road network. Maintenance of the strategic road network is undertaken on a routine basis and following major incidents such as road traffic accidents and extreme weather events (including use of de-icing agents during winter months).

2.7.2 The Scheme has been designed in a way that minimises the frequency of future interventions through the incorporation of low maintenance materials, equipment and features that reduce the amount of repairs required. Examples include the appropriate location of equipment to facilitate access for routine inspections. Accordingly, no significant maintenance activities are likely to be required within the first five years of the Scheme being operational.

2.7.3 During the design stages, a Maintenance and Repair Strategy Statement has been developed. This follows Highways England's methodology and has been developed in collaboration with the East Midlands Asset Delivery team (Highways England)[3]. It is a requirement that this document is submitted and approved at key stages in the Scheme design development.

2.7.4 Maintenance is defined as actions needed to inspect, repair, adjust, alter, remove, replace or reconstruct all aspects that relate to the Scheme. Typical maintenance activities include: the inspection and repair of safety barriers; signage; drainage infrastructure; lighting; environmental barriers; structures; repairs to the carriageway surface; renewal of road markings; maintenance of highway verges and boundaries; management of the soft estate; and the inspection and clearance of road drains.

2.7.5 Landscaping between the verge and highway boundary would be inspected and maintained in accordance with any overarching plan developed for the long term management of the soft estate, including any periodic litter picking. Maintenance would be more intensive during the first three to five years after Scheme opening to ensure the successful establishment of any planting, with management operations reducing to a three to six month cycle after this period.

2.7.6 Maintenance operations would be undertaken on a day to day basis by the East Midlands Asset Delivery team (i.e. Highways England). Such maintenance activities would, wherever feasible, be programmed in a way that enables their combination with other planned operations to reduce disruption to road users associated with lane closures and diversions.

2.7.7 Long-term maintenance and assets repairs (including decommissioning of certain elements that comprise the Scheme (refer to Section 2.6) such as lighting columns) would be undertaken as required to maintain the appropriate standards for the strategic road network.

2.7.8 Scheme maintenance activities would be as authorised under the DCO. As required by the OEMP (see Appendix 2.1 [**TR010022/APP/6.3**], industry standard control measures would be applied and encapsulated in a Handover Environmental Management Plan (HEMP). Upon completion of Scheme construction, the CEMP (refer to para. 2.6.107) would be converted into the HEMP. The HEMP must be submitted to the Secretary of

[3] East Midlands Asset Delivery team covers approximately 79km of motorway and 428km of trunk roads in Nottinghamshire, Derbyshire, Leicestershire, Lincolnshire, Northamptonshire and Rutland (Area 7). The area includes stretches of the M1, M69, M6, as well as the A1, A14, A38 and A46

State for approval within 28 days of the opening of the Scheme for public use, after which the Scheme would be maintained in accordance with the HEMP.

2.7.9 Should any particular elements that comprise the Scheme need to be dismantled or replaced once they reach the end of their design life, such maintenance works would be undertaken by the East Midlands Asset Delivery team (Highways England) in accordance with the HEMP. Given the appropriate management of environmental impacts during maintenance works (including dismantling and replacing Scheme elements in accordance with the HEMP), no likely significant effects are predicted.

2.7.10 Should activities be required that do not form part of Scheme maintenance activities as authorised under the DCO, the East Midlands Asset Delivery team would consider the potential for such activities to impact upon the prevailing environment and define any associated consenting requirements (e.g. whether such activities require a statutory EIA). Such works would only be undertaken following the identification of environmental sensitive receptors, potential significant environment effects, the definition of appropriate environmental mitigation requirements and following appropriate consenting approvals. All such works would be screened and assessed in accordance with the environmental procedures and protocols as detailed in DMRB Volume 11 (Highways Agency, 1993 to date) and associated Interim Advice Notes (IANs). Adherence to such established procedures would ensure that environmental effects are identified and appropriately managed.

2.8 Decommissioning

2.8.1 It is highly unlikely that the Scheme would be demolished after its design life as the road would have become an integral part of nationally important infrastructure. In the event of the Scheme needing to be demolished, this would conform to the statutory process at that time, including EIA as appropriate. Demolition of the Scheme is not, therefore, considered further in this ES (as confirmed in the Scoping Opinion – refer to Appendix 4.1 [**TR010022/APP/6.3**]. Also refer to Chapter 4: Environmental Impact Assessment Methodology).

2.9 References

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