

**M54 to M6/M6 (Toll) Link Road
Scheme Assessment Report**

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1 INTRODUCTION

1.1 Purpose of the Report

- 1.1.1 Highways England is developing a link road between the M54, M6 and M6 Toll to provide a link between Junction 1 of the M54, M6 North, M6 Toll and the A460 to Cannock. The M54 to M6/M6 Toll Link Road (herein referred to as ‘the Scheme’) aims to reduce congestion on local / regional routes, particularly the A460 and A449 and deliver improved transport links to encourage the development of the surrounding area, providing social and economic benefits for the West Midlands region.
- 1.1.2 This document is a Project Control Framework (PCF) Stage 2 Scheme Assessment Report (SAR) for the M54-M6 / M6 Toll Link Road Scheme. Assessment of a number of alternative options has been undertaken previously by the then incumbent designer (Atkins).
- 1.1.3 In December 2016 Highways England instructed AECOM Amey to investigate the feasibility of additional scheme options. This report is intended to report on the comparative PCF Stage 2 assessments between the new options and the original recommended preferred route. It provides a summary of the options assessed, commenting on the degree to which each alternative option provides a solution to the current problems and future demands. It also presents an evaluation of the costs and an assessment of the traffic, economic, operation and maintenance and environmental factors of the options.
- 1.1.4 Its purpose is to summarise the key information presented in the Environmental Assessment Report, the Traffic Forecasting Report, the Economic Assessment Report and finally, the Report on Public Consultation. Based on the findings from the evaluation work presented and summarised in this document, conclusions are drawn and a recommended route option is given.

1.2 Scheme History

- 1.2.1 In 2014, Highways England commissioned Atkins as their consultant to develop route options for the scheme. The Options recommended at Stage 1 for more detailed assessment during Stage 2 are included as follows:
- **Option A(E)** - D2AP from J1 of M54 to J11 of M6, eastern route through Hilton Park with nearest part of proposed new road approx. 250m away from residential properties on Dark Lane. J11 of M6 remains unchanged.
 - **Option A(W)** - D2AP from J1 of M54 to J11 of M6, western route through Hilton Park with nearest part of proposed new road approx. 25m away from residential properties on Dark Lane. J11 of M6 remains unchanged.
 - **Option B(E)** - D2AP from M54 J1 to JT8 of M6 Toll, eastern route through Hilton Park with nearest part of proposed new road approx. 250m away from residential properties on Dark Lane. Freeflow links to M6.
 - **Option B(W)** - D2AP from M54 J1 to JT8 of M6 Toll, western route through Hilton Park with nearest part of proposed new road approx. 250m away from residential properties on Dark Lane. Freeflow links to M6.
 - **Option C** - Widening of M54 from J1 to J10a of M6 and M6 from J10a to J11a and provision of north facing slips at J10a of M6. Remodelled J11 provides separation between the strategic and local traffic.

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- 1.2.2 The results of the assessment undertaken in August 2015 were that Option B(W) was assessed as providing the best overall solution when considered against the objectives of the scheme. This recommendation did not fully align with the outcome of a public consultation exercise where Option C gained the most support from members of the public as it followed the M54 and M6 in order to utilise existing highways corridors where possible.
- 1.2.3 Further assessment work was undertaken by Atkins on Option C. The result of this work was a recommendation that the conclusions originally made in 2015 remain valid and Option B(W) should remain as the recommended preferred route option for the scheme.
- 1.2.4 Following the Atkins public consultation in 2015 a meeting took place between Highways England, the local Member of Parliament and representatives of Sharesill where it was agreed that the alignment of the link road near M6 J11 be amended to allow the A460 to cross over the new link road. Atkins produced a sketch alignment to verify if this was feasible, and introduced the change into the overall Option B(W) handover details (See Section 4.2).
- 1.2.5 On 13 September 2016, AECOM Amey was awarded the M54-M6/M6 Toll Link Road contract, by Highways England, under Lot 1 of the Highways England Collaborative Delivery Framework (CDF). The Contract is to provide design and engineering services for the PCF Development Phase of the project for PCF Stage 3 preliminary design and Stage 4 statutory procedures and powers, including design, technical assurance, and support during the Development Control Order (DCO) process to resolve objections where possible and to make Orders.
- 1.2.6 Since mobilising PCF Stage 3 in September 2016 the project has been subject to deferment as Highways England sought to secure PRA.
- 1.2.7 In December 2016 Highways England instructed AECOM Amey to investigate the feasibility of an additional variation of scheme option 'Modified Option C(E)', a variation on Option C originally developed by the then incumbent designer. This option arose following meetings with Highways England and the Secretary of State.
- 1.2.8 Option C as assessed in the 2015 and 2016 studies, utilised the existing M6 corridor by providing a direct link between the M54 and M6 at Junction 10a. The M6 would be converted to All Lane Running and the existing M6 Junction 11 demolished and replaced with free flow slip roads to the north of the existing junction in order to increase the sub-standard weaving length between Hilton Park Services and M6 Junction 11. However, assessment indicated that Option C experienced issues with utilising the existing M6 corridor in incorporating the additional merge slip roads and additional traffic flows in what is already a congested section of carriageway. Furthermore, Option C would result in sub-standard weaving distance along the M6 which raises significant safety concerns.
- 1.2.9 Modified Option C(E) has been developed to mitigate the issues experienced by Option C by providing a new 'offline' link alongside the M6 corridor rather than connecting to the M6 corridor. This option is similar to Option B(W) at the north of the scheme, but adopted an alignment closer to the original Option C that the route followed the M54 and M6 in order to utilise existing highways corridors where possible.
- 1.2.10 In January 2017 AECOM Amey undertook a feasibility assessment of 'Modified Option C(E)'. The result of the assessment was that Modified Option C(E) was considered a viable option. However it was also reported that the route had a significant impact on Scheduled Ancient Woodland. A further Scheme option, Modified Option C(W) was identified to mitigate the impact on areas of Ancient Woodland. It was recommended further detailed assessments were undertaken to produce comparative PCF Stage 2 assessments between the new options and Option B(W).

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- 1.2.11 Owing to the alteration in alignment to Option B(W) mentioned in 1.2.4 to be consistent and to indicate a variation from that identified at the 2015 public consultation this option was renamed Modified Option B(W) (See Section 4.2).
- 1.2.12 AECOM Amey commenced work on the Stage 2 options assessment in March 2017, the results of which are summarised in this report.
- 1.2.13 The comparative PCF Stage 2 assessments between the new options and Modified Option B(W) completed in 2017, recommended that the conclusions originally made in the 2015 study remain valid and Option B(W) should remain as the recommended preferred route option for the scheme. However, as a result of complications in securing third party funding contributions for the scheme, AECOM Amey were instructed to review alternative cost saving options for the preferred route Modified Option B(W).
- 1.2.14 Scheme option Modified Option B(W) (excluding M6 Toll Link) was identified as a cost saving solution. This option is a variant of Modified Option B(W), connecting to M6 J11 rather than directly to M6 Toll Junction T8.

1.3 Scheme Objectives

- 1.3.1 The need for the scheme is demonstrated by:
- Analysis of accident data, journey times and traffic flows in the M6 M54 corridor, which has identified that there are significant issues which the proposed scheme would address.
 - Accident rates on the main routes used between the M6 and M54, the A449 and A460 through Featherstone, which are higher than the national average for these categories of road.
 - Journey time analysis which demonstrates congestion on the A449 and A460, with significantly lower speeds than during free-flow conditions. Observations of M6 Junction 11 identify significant queuing at this location.
 - Traffic flows on the A460 which significantly exceed the maximum recommended traffic flow for the relevant road type. There is also a high level of HGVs on the A460 which would be more appropriate utilising the proposed scheme.
- 1.3.2 The Scheme Objectives are documented within the Client Scheme Requirements (CSR). The key Scheme objectives, as supplied by Highways England in the CSR dated July 2017, are as follows:

Environment

- To minimise impacts of the trunk road network on both the natural and built environment.
- 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 encourage the use of environmentally friendly operations and products throughout the project life cycle.
- To encourage traffic to use more appropriate routes.
- To use environmentally friendly lighting when replacing existing or providing new systems.

Safety

- To improve the safety for all road users.

- To improve safety for residents along the A460.
- To seek to reduce severance and safety for non-motorised users.
- To manage the safety for road works.

Economy

- To take action to reduce congestion and increase the reliability of journey times.
- Assist in bringing forward development and regeneration opportunities in the surrounding area.
- To minimise traffic disruption due to roadworks and incidents.
- To plan all works to achieve optimum whole life costs taking into account future maintenance and operations and disruption to users.
- To reduce disruption and delays to road users thereby improving journey time reliability.
- To be affordable and represent High Value for Money according to DfT appraisal criteria.

Project Specific Objectives

- Facilitate regional development and national growth and increase capacity of the strategic road network to absorb growth.
- Minimise the impact on the local landscape and local communities.
- Make best use of the existing Strategic Road Corridors.

2 EXISTING CONDITIONS

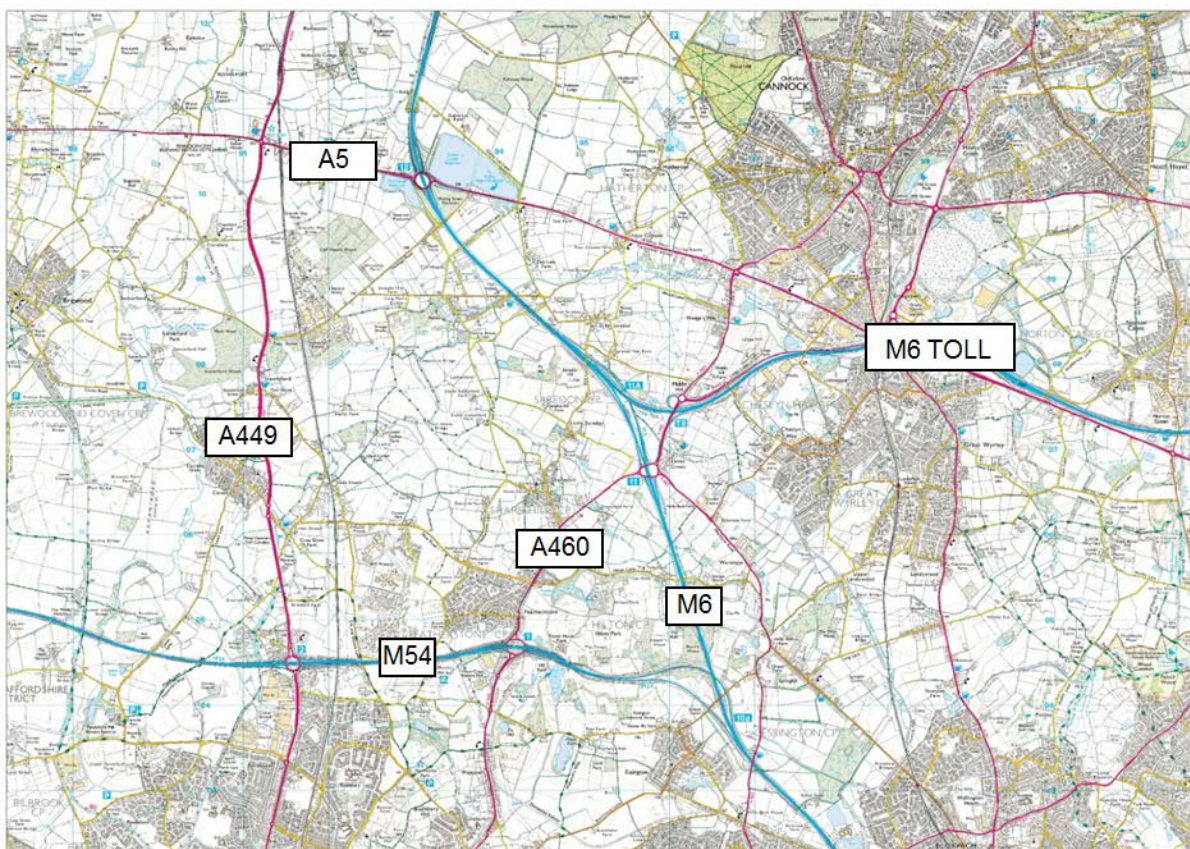
2.1 Introduction

2.1.1 For continuity between the current PCF Stage 2 options selection phase and work undertaken by the previous consultant, the existing conditions in the following section are as reported in the 2015 study. Accident and air quality data has been updated based on the latest information available.

2.2 Existing Highway Network

2.2.1 The current signed trunk road route between the M54 east and the M6 north is the A449 (T), featuring a National Speed limit and the A5 (T) with a 50mph speed limit, travelling between M54 Junction 2 and M6 Junction 12, see Figure 2-1. There is no signed route to the M6 Toll from the M54. Traffic heading for the M6 north and the M6 Toll diverts at Junction 1 on to the A460 local road, past the villages of Featherstone and Shareshill, then through M6 Junction 11.

Figure 2-1 Location Plan



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2.2.2 The existing A460 west of the M6 is a single carriageway road approximately 10 metres wide with no physical separation between the flows of traffic in each direction. The junction with the A460 and M54 Junction 1 is a grade separated roundabout and the junction with the A460 and M6 Junction 11 is a signalised grade separated junction. The A460 continues from M6 Junction 11 to M6 Toll Junction T8 as a dual 2 lane all-purpose (D2AP) road. M6 Toll Junction T8 is a grade separated junction.

2.2.3 The A460 predominantly features a 40mph speed limit, interspersed with 30mph and 50mph sections. The A460 has numerous minor roads and accesses joining it between the M54 and the M6, requiring six priority junctions and one signal controlled junction.

These provide access to Featherstone, Shareshill, Hilton Park and other isolated properties. These junctions are all at-grade and result in right turning traffic having to cross on-coming traffic to exit and enter the junctions. At Featherstone and Shareshill there are ghost island right turn lanes. The junction with New Road and Dark Lane in Featherstone is a signalised cross road.

- 2.2.4 There is a continuous footway on the western side of the A460; however on the eastern side the footway is discontinuous. The A460 is predominately straight, although there are a few moderate bends and it is illuminated along its length. The southern half of the A460 is largely residential to the west and rural to the east. The northern half is generally rural on both sides. There are currently no cycle specific measures along this part of the A460.

2.3 Traffic Conditions

Journey Times

- 2.3.1 A number of journey routes in the study area have been assessed to determine the level of congestion in the study area. The following has been observed:
- Journey times on the M6 between Junction 10 and Junction 13 are 31% higher southbound in the AM peak and 29% higher northbound in the PM peak than free-flow conditions;
 - There are no significant delays on average on the M6 Toll Junction T4 to T8 and M6 Junction 10a to M54 Junction 2 during the peak periods;
 - Journey times on the A449 / A5 between M54 Junction 2 and M6 Junction 12 are 13% higher southbound in the AM peak and 11% higher northbound in the PM peak compared to off-peak journey times. Compared to free-flow conditions, journey times on this route are 58% higher southbound in the AM peak and 51% higher northbound in the PM peak; and
 - Journey times on the A460 increase significantly compared to the off peak by around 51% in the AM peak southbound and 41% in the PM peak northbound. The average travel speeds also reflect this, reducing from 51kph to around 35kph in the AM and PM peak hour directions.
- 2.3.2 Journey time surveys were undertaken along the A449, A5, A460 and M54 in September 2013 during the AM and PM peak periods. These surveys identified significant congestion at the following locations:
- M6 Junction 11 on the A460 east / northern approach during the PM peak; and
 - M54 Junction 1 to M6 Junction 10a southbound during the AM peak.
- 2.3.3 There are a significant number of existing junctions along the A449 and A460. It should be noted that the roundabouts and signalised junctions are a source of delay for through traffic on these routes. The priority junctions are also shown which may also result in delays due to the impact of vehicles turning right and vehicles pulling into the mainline flow from stationary.
- 2.3.4 The level of delay has been determined using data from the HATRIS database. This shows that there is a significant increase in delay on the A449 during the peak hours, as junctions are at capacity. These delays would be expected to increase in future years as traffic flows increase.

2.4 Traffic Volumes

- 2.4.1 Traffic volumes along the key roads affected by the scheme have been analysed using the TRADS database and the Department for Transport (DfT) GB Road Traffic counts.
- 2.4.2 Table 1 shows the observed Annual Average Daily Traffic (AADT) in 2012 compared to the minimum and maximum opening year capacities for a rural road, based on TA46 / 97. Traffic flows on the A460 exceed the maximum capacity for a road of this type and the traffic flows on the A5 between the A449 and M6 Junction 12, are within 13% of the maximum capacity.

Table 1 2012 AADT v Capacity on Key Roads

Road	Road Type	Traffic Flow (AADT)	Capacity	
			Min	Max
A449 (between M54 J2 and A5)	D2AP 70mph	26,238	11,000	39,000
A460 (between M54 J1 and M6)	WS2 40mph	23,992	6,000	21,000
A5 (between A449 and M6 J12)	WS2 50mph	18,178	6,000	21,000

Table 2 2012 AADT HGVs

Road	Traffic Flow (AADT)	Daily HGVs	Daily Percentage HGVs
A449 (between M54 J2 and A5)	26,238	1,613	6.1%
A460 (between M54 J1 and M6)	23,992	2,388	10.0%
A5 (between A449 and M6 J12)	18,178	1,224	6.7%

- 2.4.3 There is a high percentage of HGVs on the A460, compared to the A449 and A5, which demonstrates that this route is being used as an alternative to the strategic route via the A449 and A5. Traffic counts from 2006 show that the percentage of HGVs on the A460 is approximately 18% during the Inter-Peak. The proposed scheme would provide a more appropriate route for these HGVs.

2.5 Accidents

- 2.5.1 Accident data obtained from the DfT and analysed for the five-year period from January 2013 to 2016 within the main study area shows that there are accident clusters at roundabouts on the routes, particularly at M6 Junction 12, M54 Junction 2, M54 Junction 1, M6 Junction 11 and at the roundabouts connecting the A34, A449, A460 and the A5. It has also been observed that there are a significant number of accidents along the A460 between the M54 and M6.
- 2.5.2 Consideration of the accidents along the A460 between M54 J1 and M6 J11 highlights that in addition to the clusters at roundabout identified previously, there are accident clusters at the A460 / New Road / Dark Lane road junction.
- 2.5.3 Accident rates on the main routes used between the M6 and M54, the A449 and A460 through Featherstone, are higher than the national average for these categories of road.

2.6 Geological and Geotechnical Conditions

2.6.1 The geology is summarised in Table 3 and Table 4.

Table 3 Recent and Quaternary Geology

Material	Typical Description	Extent
Made Ground	For the main highways generally a mudstone / shale rubblely fill of hardcore	Associated with the main highway links of the M54 and M6. Made ground associated with the former Hilton Colliery may also be encountered.
Top Soil	Variable thickness	Much of the project area
Alluvium	Interbedded soft clays, silts, sands and gravels with minor peat deposits	Typically associated with watercourses which generally cross the project area in a south-west to north-east direction.
Glaciofluvial Deposits	Medium dense sands and gravels	Generally associated with the present-day river systems
Glacial Till	Stiff gravelly sandy clay	Most of the southern section and M6 J11 roundabout of the project area.

Table 4 Solid Geology

Group	Formation	Member	Typical Description	Extent
Sherwood Sandstone Group	Chester Formation	-	Very stiff sandy mudstones, very dense weathered sandstones and silty, clayey sands and gravels with occasional boulders	Western portion of the project area
Warwickshire Group	Salop Formation	Enville Member	Highly weathered slightly silty mudstone with bands of fine to coarse calcareous sandstone and siltstone	Central portion of the project area bordering the Kidderminster Formation
		Alveley Member	Dense to very dense interbedded clayey silt and silty fine to medium sand with occasional fragments and bands of very weak sandstone	Central portion of the project area bordering the Etruria Formation
	Etruria Formation	-	Weathered silty mudstones with hard sandstone bands	Eastern portion of the project area

2.7 Road Drainage and the Water Environment

2.7.1 The project area includes features such as rivers, canals, brooks and tributary streams as well as numerous scattered ponds. The overall drainage pattern across the area shows that surface water is generally drainage from south-east to the north-west.

2.7.2 The Latherford Brook water quality has been assessed by the Environment Agency within their Water Framework Directive (WFD) River Basin Management Plans. It is currently classified 'Moderate Potential' status with regard to ecological quality and 'Good' in respect of the chemical quality. None of the other watercourses potentially impacted by the scheme have been assessed by the Environment Agency.

2.8 Groundwater Quality / Hydrogeology

2.8.1 No parts of the study area are located within a Source Protection Zone (SPZ). SPZs provide an indication of the areas with the potential to affect groundwater supplies should pollutants be released into the groundwater.

2.8.2 There are no surface water abstraction licences within 250m of the scheme.

2.8.3 There is one groundwater abstraction licence within 250m of the scheme. It is located to the north of the M54, to the west of M6 Junction 10A. The licence holder is Somerford Home Farm and the abstraction is for agricultural spray irrigation.

2.9 Topography

2.9.1 Route Modified Option B(W) and Modified Option B (West) (excluding M6 Toll Link) pass through a largely rural area between the villages of Cheslyn Hay in the north east and Featherstone in the south west and through the centre of Hilton Park.

2.9.2 Route Modified Option C (E) and Modified Option C(W) follow the existing M6 / M54 corridor. The route options cross a number of tributaries of the River Penk, including Latherford Brook. The River Penk flows in a northerly direction approximately 1km west of the A460.

2.10 Contaminated Land

2.10.1 There are a number of operational and historical landfills within 500m of the route options. Potential sources of ground contamination have also been identified in the vicinity of the route options.

2.11 Air Quality

2.11.1 The study area includes affected routes within 13 local authorities with these routes passing through 16 Air Quality Management Areas (AQMA). The nearest AQMA is approximately 380m south of the Scheme. Local authority and Highways England monitoring data for 2015 indicates that:

- The annual mean objective value for PM10 is well below the annual mean PM10 EU limit value thresholds across the study area.
- The annual mean objective value for NO2 is exceeded at selected roadside monitoring sites within the study area.

2.11.2 The air quality study area includes residential properties, schools and hospitals. The key area of population within the air quality study is Featherstone, where properties are within 200 metres of the route options.

2.12 Noise & Vibration

2.12.1 There are nine Noise Important Areas within 1km of the Scheme. The majority of the noise sensitive receptors in the scheme area are residential properties.

2.12.2 In addition to residential properties, communities generally contain non-residential noise sensitive locations, for example churches, schools and hospitals. It is understood that there are hospitals within the study area.

2.13 Cultural Heritage

2.13.1 Seventeen designated heritage assets have been identified within the study area around the options. These include four assets of high value:

- Hilton Hall, Hilton Park, a Grade I listed building;
- The Conservatory, Hilton Park, a Grade I listed building;
- Moseley Old Hall, a Grade II* listed building; and
- The Church of St Mary and St Luke, Sharesill, a Grade II* listed building.

2.13.2 There are no designated historic landscapes within the study area however a number of non-designated historic landscapes have been identified:

- Hilton Park - a non-designated historic park that has been defined as Historic Parkland within South Staffordshire Local Plan.
- Formal garden, Old Moseley Hall - to the south-west of the study area there is a small formal garden that surrounds Old Moseley Hall.
- Essington Historic Environment Character Zones
- Featherstone Historic Environment Character Zones
- Great Wyrley Historic Environment Character Zone

2.14 Landscape

2.14.1 The study area is located within Natural England's National Character Area (NCA) Profile: 67 Cannock Chase and Cank Wood. This NCA profile gives a useful context for the broad landscape character and existing pressures on the landscape at a regional scale.

2.14.2 Key attributes of this NCA profile relevant to the study area are listed below:

- A varied landscape ranging from the open heathlands and plantations of Cannock Chase, through towns, reclaimed mining sites and new developments, to dense urban areas;
- Extensive coniferous plantations, woodlands and historic parklands occur across the NCA, even within the urban areas where they are predominantly small and include lots of young plantations;
- Away from the unenclosed landscape of Cannock Chase, fields generally have a regular pattern and are frequently enclosed by mature hedgerows with some hedgerow trees. Farming is generally mixed with arable cultivation in large fields. Livery is concentrated around the flanks of the Chase; and
- The settlement pattern is complex and contrasting, with some areas densely populated and others relatively sparse. The conurbation includes a mosaic of urban areas, former industrial land and patches of farmland, with an extensive urban fringe.

2.14.3 The landscape change section of the NCA profile lists a number of potential opportunities. Those which are relevant to the study area are listed below:

- Further landscape change in the corridor of the M6 Toll Road, with new services and industrial development concentrated around junctions, with consequent landscape impact.
- New developments provide opportunities to ensure a high standard of design and a contribution to green infrastructure, building upon the network of sites in the Black Country and the urban fringe.

2.15 Nature Conservation

2.15.1 There is only one statutory site of importance for nature conservation within 1.5km of the scheme and that is Stowe Pool and Walk Mill Clay Pit SSSI. There are a number of non-statutory sites within 1km, including:

- Lower Pool Site of Biological Interest (SBI) – open water pool with aquatic and marginal vegetation. Modified Option B(W) and Modified Option B(W) (exc M6 Toll Link) passes through the SBI, however Modified Option C(E) and Modified Option C(W) do not have any hydrological links to the SBI;

- Brookfield Farm (north-east of) Shareshill SBI – wet woodland and marshy grassland – all of the Scheme options will pass through the site;
- Keepers Wood, Hilton Park SBI – ancient, semi-natural woodland, including several small ponds, directly impacted by Modified Option C(E), adjacent to Modified Option C(W) and linked to Modified Option B(W) through arable farmland and hedgerows;
- Saredon Hall Farm Biodiversity Action Site (BAS) – west of M6 Toll Junction T8 – oak-elm broadleaved woodland and two ponds with diverse flora. Adjacent to all of the Scheme options apart from Modified Option B(W) (excluding M6 Toll Link) and;
- The Hag BAS – woodland with steep-sided pond. Adjacent to Modified Option C(E) and Modified Option C(W) on its western boundary.

2.15.2 The majority of land immediately adjacent to the scheme is intensively farmed agricultural land including arable land and improved pasture, with small areas of woodland. Hedges are present throughout the area.

2.15.3 There are areas of Ancient Woodlands in the vicinity of the scheme. Burn's Wood (east) and Burn's Wood (west) are currently located either side of the M6 south of Hilton Park services. Spring Coppice, Keepers Wood and Beech Head are located directly adjacent to the current M54 motorway between M54 Junction 1 and M6 Junction 10a.

2.16 Facilities for Non-Motorised Users

2.16.1 There are several Public Rights of Way (PRoW) to the north-east of Essington that pass through agricultural fields and connect to the B4156.

2.16.2 North of M54 Junction 1 and to the east of the A460 lies Hilton Park. The park includes a sizeable area of open countryside and formal gardens, however, there are no PRoWs within the park. To the west of the A460 there are several PRoWs that pass through Featherstone and Shareshill and across the agricultural fields between the two villages.

2.16.3 To the north of Hilton Park, in the triangle of agricultural land between Hilton Lane, the A460 and the M6, there is a network of PRoWs most of which are connected to Hilton Lane and provide access via a bridge over the M6 towards Cheslyn Hay and Great Wyrley villages.

2.16.4 To the north east of M6 Junction 11, a bridleway and a public footpath both link to Laney Green village.

2.16.5 There is one designated cycle route (Hilton Lane). There is no segregated route for cyclists along the A460 itself.

2.16.6 An NMU survey was undertaken in August and September 2017 and indicated that the current routes are infrequently used.

2.16.7 High level initial discussions have taken place with Officers from Staffordshire County Council with regard PRoW's.

3 SUMMARY OF DO-MINIMUM CONSEQUENCES

3.1 Introduction

3.1.1 This chapter describes a scenario in which the scheme is not implemented and provides a summary of the existing problems, future demand and the consequences of not introducing the improvements proposed by the scheme. Highways England guidance states that the SAR should provide a summary of 'Do-Nothing' consequences. A 'Do-Nothing' scenario is one in which there will be no development in the study area and that there will be no improvements of any sort to the link between the M54, M6 and M6 Toll in the scheme's design life. This situation is unlikely and therefore a Do-Minimum scenario has been used for the baseline assumption.

3.2 Summary of key points

3.2.1 Analysis of accident data, journey times and traffic flows in the M6 M54 corridor has identified that there are significant issues which are anticipated to worsen in the Do-Minimum scenario due to the general growth in traffic over time.

3.2.2 Accident rates on the main routes used between the M6 and M54, the A449 and A460 through Featherstone are higher than the national average for these categories of road. Accident rates are anticipated to remain above the national average in the Do-Minimum scenario.

3.2.3 Traffic flows on the A460 significantly exceed the maximum recommended traffic flow for the relevant road type. There is also a high level of HGVs on the A460. Traffic flows on the A460, including HGVs, are anticipated to increase in the Do-Minimum scenario due to the general growth in traffic over time.

3.3 Traffic Model

3.3.1 Data on future developments has been sourced from local authorities and by undertaking desktop research. Potential future highway schemes have been provided by Highways England and Local Authorities.

3.3.2 A Do-Minimum core scenario has been built into the traffic model to include all 'near certain' and 'more than likely' highway schemes which may impact upon the proposed scheme options. It would also include all 'near certain' and 'more than likely' developments which are of significant size.

3.4 Air Quality and Noise under Do-Minimum Scenario

3.4.1 As part of the air quality assessment, two scenarios were modelled, it included an existing base year, as well as Do-Minimum and Do-Something scenarios in the first full year of opening.

3.4.2 The annual mean concentrations of NO₂ are predicted to exceed the annual mean of NO₂ UK AQS objective and EU limit value thresholds (>40 µg/m³) at 19 receptors in total. This includes 17 receptors along the M6 south of the Scheme in the 2021 Do-Minimum scenario and two receptors in Sedgley, south of Wolverhampton.

3.4.3 Virtually all the residential buildings experience a negligible (0.1 - 2.9 dB) increase in traffic noise levels from 2021 to 2036 in the absence of the Scheme during both the daytime and night-time. This is due to the general growth in traffic over time. All the non-residential sensitive buildings experience a negligible increase. A very small number of residential buildings experience no change or a negligible reduction in traffic noise levels from 2021 to 2036 without the Scheme. All of these buildings are located in Essington where some local roads are anticipated to undergo a very slight reduction in either traffic flow or the proportion of HGVs from 2021 to 2036.

4 SUMMARY OF ROUTE OPTIONS

4.1 Introduction

4.1.1 The options to be assessed are as given below:

- **Modified Option B (West)** - It is an iteration of the preferred route Option B(W) from the previous option selection stage. The option would comprise a new 2 lane motorway standard link road (D2M), approximately 3.5km (2.2 miles) in length between the M54 Junction 1 and the M6 Toll Junction T8. This would result in free flow links between the M54, M6 Junction 11 and M6 Toll motorways and the proposed link road.
- **Modified Option C (East)** - This option would comprise a new 2 lane motorway standard link road (D2M), approximately 5.8km (3.6 miles) in length between the M54 and the M6 Toll Junction T8. The proposed alignment for Modified Option C(E) runs along the current M54 corridor from before Junction 1 of the M54 for approximately 2.9km before diverting northwards to run parallel with the existing M6 motorway, to the west of the Hilton Park motorway service area. The alignment continues northwards adjacent to the flood plain of the River Penk before crossing under the re-aligned A460 road to the west of Junction 11. To the north of the crossing, the route follows a similar alignment to that of Modified Option B(W) to tie into a free flow arrangement at the M6 Toll T8 Junction and the access to the M6 motorway in both directions.
- **Modified Option C (West)** – This option would comprise a new 2 lane motorway standard link road (D2M), approximately 5.4km (3.4 miles) in length between the M54 and the M6 Toll Junction T8. The proposed alignment for Modified Option C(W) commences west of Junction 1 of the M54 and diverts northwards through Hilton Park to the west of Keepers Wood. The route passes under Hilton Lane near to the current motorway overbridge and proceeds northwards. North of Hilton Lane the route of Modified Option C(W) is the same as that for Modified Option C(E), passing under the re-aligned A460 road to the west of Junction 11 of the M6. To the north of the crossing, the alignment follows a similar alignment to that of the Modified Option B(W).
- **Modified Option B (West) (excluding M6 Toll Link)** – This option is a variant of Modified Option B (W). This option would comprise of a new dual carriageway link road (D2AP), approximately 2.5km (1.6 miles) in length between the M54 Junction 1 and the M6 Junction 11, bypassing the villages of Featherstone and Shareshill to the east of the existing A460 and be sited to the west of Hilton Hall. This option would provide free flow links to and from the M54 and the proposed link road and connect into an improved M6 Junction 11.

4.1.2 A schematic of the options to be assessed can be seen in Figure 2.

4.1.3 For all options, the design of the junctions is subject to further optioneering as part of preliminary design.

4.2 Amendments to Option B(W) design since the previous options stage

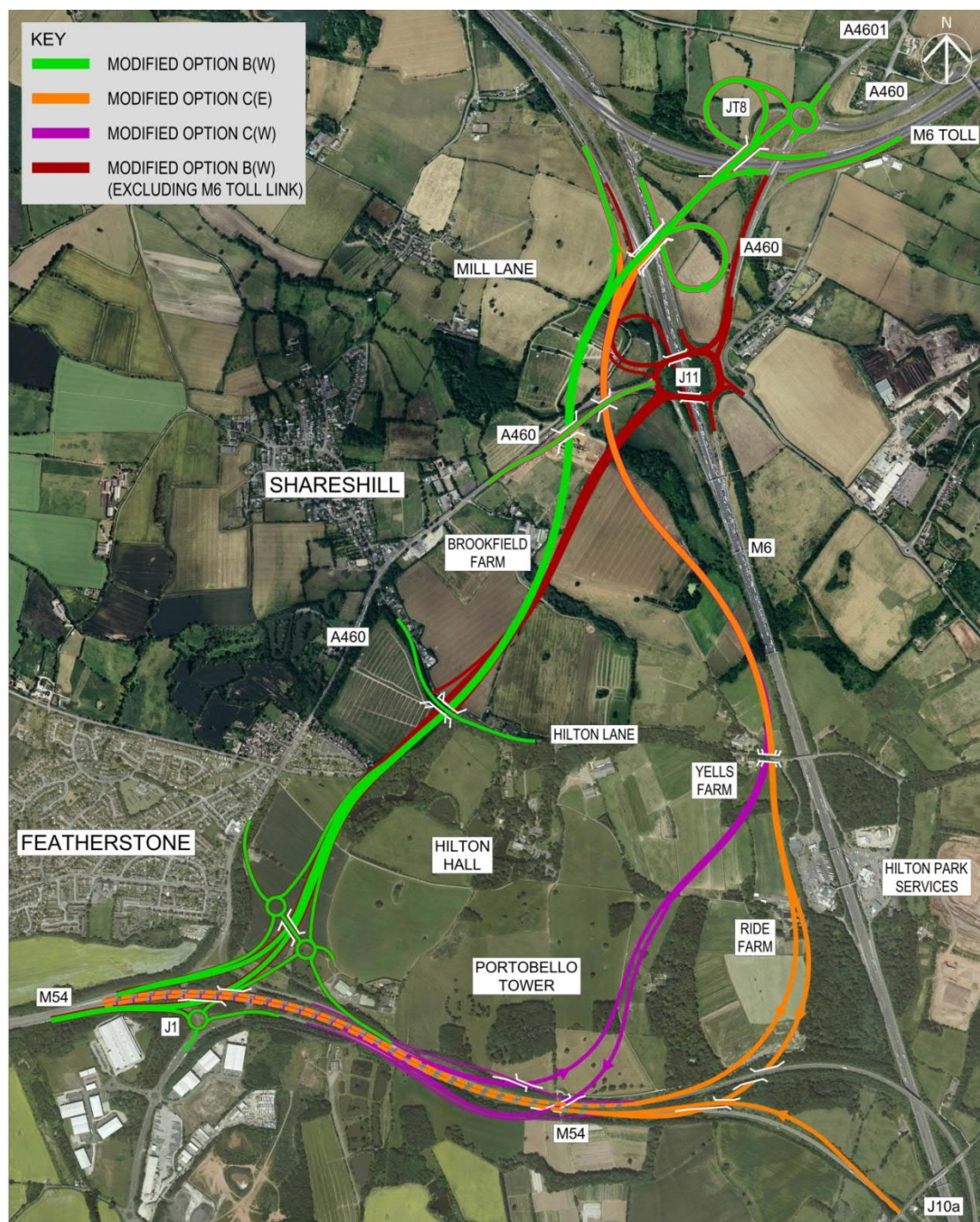
4.2.1 The preferred route from the previous option selection stage, Option B(W), has been redefined as 'Modified Option B(W)' in order to distinguish between the two stages. The following is a list of amendments to the design that have been made since the previous options stage:

- The vertical alignment of the link road to the south of M6 Junction 11 has been amended as agreed following consultation between Highways England, the Member of Parliament and the residents of Shareshill regarding the perception of reduced visual and noise intrusion. Feedback from the previous consultation

exercise identified that one of the key concerns relating to Option B(W) is the potential visual impact of the new link road as it was originally proposed for the link road to pass over the existing A460. The vertical alignment design at this location has been changed so that the A460 is taken over the new link which has been lowered to a level similar to that of the existing A460.

- The change in vertical alignment of the link road to the south of M6 Junction 11 required the minor relocation of the drainage attenuation basins at this location.
- During the previous consultation exercise concerns were raised relating to Option B(W) as it would have a significant effect on the setting of listed buildings at Hilton Hall. Mitigation measures were identified including mounding / false cutting in the vicinity of Hilton Hall which has been included in the scheme design to mitigate this impact.

Figure 2 - SAR Route Options



4.3 The standard of the link

- 4.3.1 For all options, the design speed for the link road is 120kph, the interchange link roads are 85kph and the slip roads are 70kph.
- 4.3.2 Modified Option B(W) and Modified Option C(W) could be constructed as an All-Purpose Dual carriageway or a motorway standard link whereas Modified Option C(E) would need to be constructed as a motorway standard link as this option ties directly into the M54 with no alternative route. Modified Option B(W) (excluding M6 Toll Link) would need to be constructed as an All Purpose Dual carriageway as the current proposed junction layout at M6 Junction 11 severs the A460 link for non-permitted motorway users. Further junction optioneering is to be undertaken as part of preliminary design to assess the feasibility of alternative layout options for M6 Junction 11 to provide a link between A460 and Junction 11. This would also enable Modified Option B(W) (excluding M6 Toll Link) to be constructed as motorway standard link.
- 4.3.3 The Motorway cross section would give an increase in overall width of 4.6m (of which 4.0m is paved) when compared to a dual carriageway both with a 2.5m verge width. The total width of D2AP is 26.1m of which 18.6m is paved. The total width of D2M is 30.7m of which 22.6m is paved.
- 4.3.4 In terms of geometric alignment, the design speed, used to check the horizontal and vertical curvature and Stopping Sight Distance (SSD), of a motorway and of an all-purpose road is the same (120kph) and there are no differences in Desirable Minimum radii to TD9/93 Highway Link Design. The principal difference in application of standards between a motorway and an all-purpose road are that a further one step relaxation is permissible for all-purpose roads that can be applied before a Departure from Standard is required; and the maximum gradient is limited to 3% instead of 4%.
- 4.3.5 Certain user classes are not permitted to use motorways, but are permitted on all purpose roads. These user classes are pedestrians, holders of provisional motorcycle or car licenses, riders of motorcycles under 50cc, cyclists, horse riders, certain slow-moving vehicles and those carrying oversized loads (except by special permission), agricultural vehicles and powered wheelchairs/powering mobility scooters. With the exception of Modified Option B(W) (excluding M6 Toll Link) , all options would provide a strategic route from the M54 to M6 and M6 Toll, with local traffic and non-permitted classes able to continue to use the existing A460 through Featherstone to Junction 11 and Junction T8.
- 4.3.6 There is potential that local users may be discouraged from using the route if it were a motorway, and would prefer an all-purpose road as a direct replacement for the A460 or A449 / A5 routes currently used.
- 4.3.7 A two lane all-purpose road (D2AP) would provide a 9.3m carriageway which could be used to provide a 1+1 lane arrangement in contraflow if one side of the carriageway was blocked or during a major maintenance intervention. A motorway (D2M) would provide 11.3m which would accommodate a 2+1 arrangement in contraflow, providing greater flexibility.
- 4.3.8 The provision of a 3.3m hard shoulder would provide an additional level of safety for broken down vehicles and a full level of service could continue on the carriageway with the emergency services operations continuing in the hard shoulder. Similarly, the hard shoulder would provide an additional level of safety for maintenance.
- 4.3.9 Those making strategic type journeys are likely to prefer a motorway standard link, with consistent signing and cross sectional provision for journeys from the M54, M6 and M6 Toll. A motorway option would provide consistency in directional signing, as it would provide more surety to the driver of the route from M54 to M6 / M6 Toll and vice versa.
- 4.3.10 The standard of the link road is to be confirmed as part of preliminary design.

5 SUMMARY OF TABLES OF TRAFFIC, ECONOMICS, COSTS

5.1 Introduction

- 5.1.1 The summary information included in this chapter has been taken from the latest draft economic assessment report produced by AECOM in July 2018 (PCF Stage 2: Option selection - Economic Assessment Report (EcAR).Economic Appraisal Report PCF Stage 2: Option Selection Ref HE514465-ACM-EGN-M54_SW_PR_Z-RP-TR-0002-P05).
- 5.1.2 The economic assessment of the modified options for the M54-M6/M6 Toll Link scheme has been undertaken using the TUBA economic appraisal program, the COBALT accident appraisal program, and the noise, air quality and carbon worksheets, for a 60-year appraisal period from 2024 to 2083 inclusive.
- 5.1.3 The economic assessment of the M54-M6/M6 Toll Link Road's modified options has been based upon the assignment of a core growth forecast scenario, with sensitivity tests using low growth and high growth forecast assumptions. The core growth forecast scenario is based upon what is deemed to be the most likely land use, infrastructure improvements, and traffic growth assumptions in the area local to the scheme.
- 5.1.4 The latest scheme programme has the construction beginning in March 2021 and ending in March 2024, with parts of the scheme open to traffic in December 2023. For the purposes of the EcAR it has been assumed that the scheme will open in 2024 (i.e. first full year of benefits).
- 5.1.5 The traffic flows, times and distances have been extracted from the traffic model for the forecast years of 2024, 2036 and 2041. These forecast model outputs have been used in the economic appraisal of the scheme to produce a monetised cost benefit analysis. The monetised cost benefit analysis of the scheme has included the assessment of scheme user benefits and changes in revenues (i.e. indirect taxes), accident costs, and costs during construction and maintenance, as well as carbon, noise, local air quality and journey time reliability.

5.2 Economic Assessment Results

- 5.2.1 The Core growth TEE benefits (2010 market prices discounted to a 2010 present value year) during the normal operation (i.e. excluding the times when construction and maintenance operations are being carried out), excluding accident benefits, carbon benefits and indirect tax revenue impacts, are:
- £779 million for Modified Option B(W)
 - £432 million for Modified Option C(E)
 - £558 million for Modified Option C(W)
 - £762 million for Modified Option B(W) (excluding M6 Toll Link)
- 5.2.2 In order to take into account the impacts during the scheme's construction, monetised construction and maintenance effects were carried forward from previous Stage 2 assessments. The TEE (dis)benefit during construction (excluding indirect tax revenue and carbon impacts; at 2010 market prices discounted to a 2010 present value year) has been taken as:
- -£7.7 million for Modified Option B,
 - -£7.7 million for Modified Option C(E)
 - -£7.7 million for Modified Option C(W)
 - -£15.4 million for Modified Option B(W) (excluding M6 Toll Link)

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- 5.2.3 Accident costs over the appraisal period have been established using the COBALT accident analysis program. Recorded accident data within the West Midlands area were used to establish observed accident rates for each significant link and junction within the study area. The observed accident rates were then applied within COBALT to the forecast traffic flows on most existing links. Where new links were constructed, i.e. for the scheme links, national average (default) accident rates were used by the program based upon the type of road.
- 5.2.4 The accident analysis shows that the implementation of the scheme would result in an accident savings benefit (2010 market prices discounted to a 2010 present value year) of:
- £53.7 million for Modified Option B(W)
 - £57.0 million for Modified Option C(E)
 - £65.1 million for Modified Option C(W)
 - £37.4 million for Modified Option B(W) (excluding M6 Toll Link)
- 5.2.5 Scheme costs were provided by Highways England in the form of mid-range estimates and are referred to as investment costs. The Present Value investment cost (PVC) of the modified options are (in 2010 market prices discounted to a 2010 present value year) are:
- £217.3 million for Modified Option B(W)
 - £206.7 million for Modified Option C(E)
 - £209.6 million for Modified Option C(W)
 - £150.6 million for Modified Option B(W) (excluding M6 Toll Link)
- 5.2.6 The cost benefit analysis of the modified options includes a monetisation of journey time reliability benefits based upon WebTAG guidance A1.3 S6.3 and C.3; however, this is included within the AST Table only and not the AMCB Table. The reliability benefit was calculated to be:
- £6.9 million for Modified Option B(W)
 - £6.6 million for Modified Option C(E)
 - £6.1 million for Modified Option C(W)
 - £6.9 million for Modified Option B(W) (excluding M6 Toll Link)
- 5.2.7 For the core growth scenario, the TUBA appraisals produced an overall NPV (Tables 5.55 to 5.58 in the Economic Assessment Report- 2010 market prices discounted to a 2010 present value year, including accident benefits, carbon benefits, maintenance cost and construction delay costs, noise, local air quality and indirect tax impacts) of:
- £586.9 million for Modified Option B(W)
 - £255.8 million for Modified Option C(E)
 - £391.8 million for Modified Option C(W)
 - £617.1 million for Modified Option B(W) (excluding M6 Toll Link)
- 5.2.8 The Benefit-Cost Ratio (BCR), in the Core forecast, for each Modified Option, is:
- 3.70 for Modified Option B(W)
 - 2.24 for Modified Option C(E)
 - 2.87 for Modified Option C(W)
 - 5.10 for Modified Option B(W) (excluding M6 Toll Link)

5.3 Traffic, Economics, Costs Scoring

5.3.1 A summary of the assessment along with a justification and scoring of route options against the scheme objectives can be seen below. Note: Scores are rankings where 1 = best and 4 = worst. The lowest total score is preferred.

Table 5: Traffic, Economics and Costs Assessment Scoring Matrix

Traffic and Economics Objective	Mod. B (West)	Mod. C (West)	Mod. C (East)	Opt. B(W) (exc M6T)
Improve Road Safety for all users - The total accident benefits of the Scheme indicate that Modified Option C(W) performs best with Options B(W) and Modified Option C(E) with lower but similar benefits followed by Modified Option B(W) (exc M6 Toll Link).	2	1	2	3
Improve Safety along A460 - Modified Option B(W) (exc M6 Toll Link) performs better than all other options in attracting more traffic away from the A460 followed by Modified Option B(W) therefore improving safety along the A460. Modified Options C(E) and Modified Option C(W) have similar anticipated flows for the A460 after the construction of the scheme.	2	3	3	1
Reduce severance and improve safety for NMU along A460 – All options are anticipated to significantly reduce the amount of traffic using the A460 therefore reducing severance and improving safety for NMU's.	1	1	1	1
Transport Economic Efficiency – Consumers & Business - These metrics contribute the most significant economic benefits and therefore rank the same as BCR.	2	3	4	1
Journey Reliability - The monetisation of journey time reliability benefits indicated that all options perform similarly.	1	1	1	1
Disruption during construction and maintenance - It is anticipated that Modified Option B(W) and Modified Option B(W) (exc M6 Toll Link) would be more disruptive during construction due to the new structure under the M54 at Junction 1 requiring significant traffic management. Modified Option C(E) and Modified Option C(W) would both require works along the M54 but this is anticipated to be significantly less disruptive.	2	1	1	2
Benefit-Cost Ratio (BCR) Modified Option B(W) provides the highest BCR, followed by Modified Option C(W) and then Modified Option C(E).	2	3	4	1
TOTAL	12	13	16	10
OVERALL RANK	2	3	4	1

6 SUMMARY OF ENGINEERING ASSESSMENT

6.1 Introduction

6.1.1 This chapter presents a summary of the implications of each of the Options on the safe and economic construction of the completed scheme.

6.2 Buildability Assessment

6.2.1 A very high-level review of construction issues has been undertaken, reflecting that the scheme is currently in the options selection phase.

6.2.2 Modified Option B(W), Modified Option C(E) and Modified Option C(W) would require new structures over the M6 and M6 Toll. These would be constructed by installing traffic management with narrow lanes to move traffic away from lane three to provide working space to install a central pier. The traffic management would then be moved close to the central reserve allowing the abutments to be constructed. The structural deck beams and temporary formwork would then be installed under night time road closures. Single span structures could also be considered in order to reduce traffic management requirements, but at increased construction cost.

6.2.3 Modified Option B(W) would require the construction of a new structure under the M54 at Junction 1. This will require significant traffic management to keep the M54 in service whilst construction takes place. Traffic management would be installed on the M54 to reduce the width of the carriageway as much as possible using a contraflow with lane closures and narrow lanes. The traffic would be moved to the south to provide working space to construct the northern half of the structure. Once the northern half of the structure is completed the M54 traffic would be moved onto the new structure to allow the southern half to be constructed in a similar manner. The final bridge construction may be wider than the existing carriageway requires, but this will be dictated by the requirement for the northern part of the structure to be wide enough to support the reduced M54 during construction. There may also be a need to reduce the number of lanes on the roundabout to facilitate construction. The high skew of this structure would introduce additional design constraints and increase construction costs.

6.2.4 For Modified Option C(E) and Modified Option C(W) it is proposed that the link will go under the current Hilton Lane in cutting approx. 8.0m deep – subject to geotechnical and structural considerations. This arrangement avoids the need to replace the existing Hilton Lane structure over the M6 motorway immediately east of the crossing. This alignment however will require significant amount of cutting in the area and a large amount of vehicle trips to transport excavated material.

6.2.5 As with Modified Option B(W), M54 Junction 1 would be rebuilt for Modified Option B(W) (excluding M6 Toll Link), with the existing junction no longer being used. New structures would be required at M6 Junction 11 due to the location of slip roads in both directions, which could be constructed offline to limit traffic disruption. Further assessment of the construction phasing at M6 J11 would need to be undertaken as part of preliminary design in order to limit disruption during construction.

6.3 Construction Programme

- 6.3.1 Preliminary construction programmes were provided by Carillion as part of Early Contractor Involvement (ECI).
- 6.3.2 The construction programme for Modified Option B(W) is 817 days, Modified Option C(W) is 798 days and Modified Option C(E) is 732 days.
- 6.3.3 A construction programme for Modified Option B(W) (excluding M6 Toll Link) has not been produced at this stage however it is anticipated that the construction programme will be significant shorter than the other options considered due to the shorter length of the link road and the removal of the significant structures over the M6 and M6 Toll required in all other options (although two new structures are required over the M6 at Junction 11, due to the reduction in size it is anticipated they the construction period will be less).

6.4 Engineering Assessment Summary and Scoring

- 6.4.1 A summary of the assessment along with a justification and scoring of route options against the scheme objectives can be seen below. Note: Scores are rankings where 1 = best and 4 = worst. The lowest total score is preferred.

Table 6: Engineering Safety Assessment Scoring Matrix

Engineering / Buildability Objective	Mod. B (West)	Mod. C (West)	Mod. C (East)	Opt. B(W) (exc M6T)
Buildability – Both Modified Option B(W) and Modified Option B(W) (excluding M6 Toll Link) are slightly more difficult to construct due to M54 J1, however all options are technically feasible to construct.	2	1	1	2
Construction Programme - Both Modified Option B(W) and Modified Option C(W) have very similar construction programmes (within 20 days) whereas Modified Option C(E) has a 66 day shorter programme. It is anticipated that the construction programme for Modified Option B(W) (excluding M6 Toll Link) will be significant shorter than the other options.	3	3	2	1
TOTAL	5	4	3	3
OVERALL RANK	3	2	1	1

7 SUMMARY OF OPERATIONAL SAFETY, TECHNOLOGY AND MAINTENANCE ASSESSMENT

7.1 Introduction

7.1.1 This chapter presents a summary of the implications of each of the Options on the safe and economic operation and maintenance of the completed scheme. Information on maintenance and technology has been extracted from the Maintenance and Repair Strategy Statement (MRSS) of August 2017 (HE514465-ACM-HGN-M54_SW_PR_Z-RP-CH-0004).

7.2 Summary of Modified Option B (W) Operation

7.2.1 M54 Junction 1 would be rebuilt with the existing junction no longer being used. The new arrangement will provide free flow movements between the M54 and the new link road in both directions. The free flow links would pass through the junction underneath the existing M54 and approximately at existing ground level. Three new smaller roundabouts connected by short dual carriageway link roads will replace the existing junction and maintain connectivity of the local road network at this location. The replacement of the existing M54 Junction 1 roundabout with three roundabout dumbbell arrangements has the potential to be off-putting to road users, and this junction would be developed further as part of preliminary design.

7.2.2 The route would cross Hilton Park passing to the west of the ponds, close to Dark Lane (approximate distance of 30m between the roads centreline and closest property). A bridge would connect Hilton Lane either side of the new link road and accommodation bridges and tracks would be required to serve severed properties and land.

7.2.3 The link would then continue to the east of Brookfield Farm, traverses the flood plain of the River Penk before crossing under the re-aligned A460 road to the west of M6 Junction 11. No changes would be proposed to the existing M6 Junction 11. A free flow slip would diverge to connect to the M6 northbound before crossing the M6.

7.2.4 A loop is provided for traffic from the M6 southbound to access the westbound carriageway of the link road. Traffic will divert from the M6 Southbound at the lane drop configuration for the access to M6 J11 junction and new link road. This section of the motorway has already been modified by the current Smart motorway works and various Departures from Standard are in place which will be amended – subject to approval by Highways England Safety and Engineering Standards (SES) team - to cater for the revised situation. Initial preliminary discussions with SES on the geometrical departures were positive, but further details would be required for consideration. Operational consideration and signing departures would also be required owing to the unusual double diverge arrangement and the close proximity of this revised junction to the current diverge from the M6T.

7.2.5 The proposed alignment of the new link continues over the M6 Toll on a new bridge where it connects to a modified M6 Toll Junction T8 arrangement. The current roundabout at JT8 is a 4 arm arrangement which will be enlarged and modified to a 5 arm roundabout to accommodate the new link. A dedicated free flow slip road will be provided from the link road to the eastbound carriageway of the M6T. This new link will also accommodate the slip road from the revised T8 junction, providing access to the M6T for local traffic.

7.2.6 The existing A460 overbridge crossing the M6 Toll would be retained for access to M6 Junction 11. In order to retain this overbridge the layout of the M6 Toll below would need to be amended to provide a lane drop from D3 to D2 westbound at Junction T8 with the nearside lane diverging to the proposed link. Engagement with Midland Expressway Limited is ongoing to approve this layout. Also the proposal depends on the exact geometry of the current structure of the A460 over bridge.

7.2.7 Departures and operations concerns will need to be addressed and in preliminary discussion with Highways England's SES concerns were raised. Subject to further preliminary design a revised layout may require the construction of a new under bridge for the link slip road and/or the re-modelling of the current A460 over bridge.

7.3 Summary of Modified Option C (E) Operation

7.3.1 The current carriageway configuration at M54 Junction 1 is Dual 2-Lane Motorway (D2M) standard with hard shoulder. From the current available forecast traffic flows the increase in traffic (diverted from the current A460 corridor), will result in the requirement to increase the number of traffic lanes to 3 in each direction. The existing lane gain / lane drop to the east of Junction 1 would be converted to a merge / diverge to tie into the existing D3M section between M54 J1 to J2 and new lane gain / lane drop will be provided to the west of the junction.

7.3.2 The existing M54 on the link to the M6 motorway is D2M with full hard shoulders. The current forecast traffic flow figures indicate that this section will be required to be widened to 4 lanes in each direction to accommodate the traffic flows and weaving manoeuvres of traffic wishing to access and diverge from the M54 to/from the proposed link road.

7.3.3 TD22 (Layout of Grade Separated Junction) provides guidance on the minimum weaving length for rural motorways (para 4.34- 4.37) which is 2Km and figure 4/9 indicates how this is measured. The available weaving distance is approx. 630m (east bound) and 435m (west bound) both of which are below the required standard. In preliminary discussion with Highways England SES they have verbally indicated that the submission for Departures from Standard would be considered but additional information and mitigation details would be required.

7.3.4 A two lane free flow link road will be provided for traffic to join the new link road northbound.

7.3.5 The proposed alignment of the southbound link to the M54 Westbound passes under the current link road from the M54 East to M6 Southbound to and under the re-aligned link from the M6 Northbound to M54 West. The current predicted traffic flows, subject to review and confirmation indicate that there is a greater flow in both the AM and PM peak on the M6 Northbound to M54 Westbound compared to the traffic on the new link road. On safety grounds and operational considerations the main flow has to be the dominant carriageway and hence the requirement to merge the traffic in the current layout.

7.3.6 The proposed alignment passes to the west of the Hilton Park motorway service area. The proposed route has no physical effect on the current services, but there will be some disruption during the construction work for the new underbridge on Hilton Lane. The lane will be closed at certain times during the works and arrangements will be made with the Operators and other businesses within the area during the detailed design and work stages. Close consultation will be required during the design, construction and operation with regard the potential increase in noise and other environmental aspects that may affect the hotel and businesses and their users.

7.3.7 The alignment continues northwards and traverses the flood plain of the River Penk before crossing under the re-aligned A460 road to the west of Junction 11. Beyond this point the alignment and tie in to the M6 and M6 Toll is identical to Modified Option B(W).

7.4 Summary of Modified Option C (W) Operation

- 7.4.1 As per Modified Option C(E) it is proposed to increase the number of traffic lanes through M54 Junction 1 to 3 lanes in each direction and the existing lane gain / lane drop to the west of Junction 1 would be converted to a merge / diverge to tie into the existing D3M section between M54 J1 to J2.
- 7.4.2 A new diverge will be provided from the M54 to the new link road northbound. The existing slip road will be realigned and a fork within interchange provided. One slip road lane will merge with the new link road northbound and the second will pass over the new link road diverge to merge with the M54 eastbound.
- 7.4.3 The proposed alignment of the southbound link to the M54 Westbound passes over the M54 before merging with the M54 westbound. The existing M54 J1 diverge slip road will be realigned upstream to avoid weaving issues. A new diverge will be provided from the link road that will merge with the re-aligned M54 J1 diverge and continue to the M54 J1 roundabout as existing.
- 7.4.4 Unlike Modified Option C(E), there are no operational issues caused by weaving as the existing slip roads to/from M54 Junction 1 do not merge with the M54 upstream of the new link road / M54 junction 1 diverge.
- 7.4.5 The route passes to the west of Keepers before heading north to cross under Hilton Lane. North of Hilton Lane the route of Modified Option C(W) is the same as that for Modified Option C(E) and north of the A460, the alignment and tie in to the M6 and M6 Toll is identical to Modified Option B(W).

7.5 Summary of Modified Option B (W) (excluding M6 Toll Link) Operation

- 7.5.1 The option would comprise of a new dual carriageway link road, approximately 2.5km (1.6 miles) in length between the M54 Junction 1 and M6 Junction 11, bypassing the villages of Featherstone and Shareshill to the east of the existing A460 and be sited to the west of Hilton Hall. This option would provide free flow links to and from the M54 and the proposed link road and connect into an improved M6 Junction 11.
- 7.5.2 The route would cross Hilton Park passing to the west of the ponds, close to Dark Lane (approximate distance of 30m from the closest properties). Mitigation measures have been included to minimise the effect on the setting of listed buildings at Hilton Hall including mounding / false cutting. If the A460 does not link into the M6 J11, a bridge would connect Hilton Lane either side of the new link road and accommodation bridges and tracks would be required to serve severed properties and land.
- 7.5.3 If the A460 does not connect into the M6 J11, there would be a single junction at Hilton Lane to provide access for the local communities to the link road. The A460 would be connected to Mill Lane to maintain access for local residents. The link would then continue to the east of Brookfield Farm before linking into M6 Junction 11 roundabout. Junction capacity improvements are proposed at M6 Junction 11.
- 7.5.4 M54 Junction 1 would be rebuilt with the existing junction no longer being used. The new arrangement would provide free flow movements between the M54 and the new link road in both directions. The free flow links would pass through the junction underneath the existing M54 and approximately at existing ground level. Three new smaller roundabouts connected by short link roads would replace the existing junction and maintain connectivity of the local road network at this location. The replacement of the existing M54 Junction 1 roundabout with three roundabout dumbbell arrangements has the potential to be off-putting to road users, and this junction would be developed further as part of preliminary design.

7.6 Departures from Standard, Operational and Safety Considerations

- 7.6.1 There are a small number of significant Departures from Standards that have been highlighted, mainly attributed to the constraints associated with work on the existing junctions and alignment. Departures from standard deemed significant have been identified and are listed in Table 7. Additional operational considerations regarding each option are detailed in Table 8. Additional safety considerations regarding each option are detailed in Table 9.

Table 7: Significant Departures from Standard

Option	Location	Departure
Modified Option B(W) and Modified Option B(W) (exc M6 Toll Link)	M54 Junction 1 - 2	Substandard weaving length between M54 Junction 2 and proposed free flow links at M54 Junction 1.
Modified Option C(W), Modified Option C(E) and Modified Option B(W)	M6 Southbound Diverge to Link Road and A460	Non-Standard Diverge Layout
Modified Option C(W), Modified Option C(E) and Modified Option B(W)	M6 Toll Northbound Diverge to New Link Road	Substandard SSD and no near straight due to obstruction from existing A460 overbridge
Modified Option B(W) and Modified Option B(W) (exc M6 Toll Link)	Hilton Lane overbridge	Combination of reduced Crest K value (2 steps) and stopping sight distance (2 steps below desirable).
Modified Option C(W), Modified Option C(E)	M54 Junction 1	Omission of Hard Shoulder for 1.0m emergency Access Route over existing M54 J1 Structures
Modified Option C(W), Modified Option C(E)	M54 Junction 1	Sub-standard Stopping Sight Distance on approach to merge due to existing alignment and proposed CSB
Modified Option C(E)	M54 Between J1 and Link Road	Substandard weaving length between proposed M54 links, services slip roads and the J11 merge and diverge slips.

Table 8: Operational Considerations

Option	Location	ID	Operational Departures / Considerations
Modified Option C(W), Modified Option C(E) and Modified Option B(W)	M6 Southbound Diverge to Link Road and A460	D1(S)	Diverge arrangements for both the M6 Southbound to the A460 / M54 meet geometric standards for successive diverges, however the relatively short distance between the diverge, and interchange fork makes directional signage potentially difficult. It would be ideal to increase the distance between the junctions to provide suitable signage in accordance with IAN 144/16 however this may not be possible due to the M6 / M6 Toll junction upstream. A further departure may be required; options will be investigated further during preliminary design.
Modified Option C(W), Modified Option C(E) and Modified Option B(W)	M6 Toll Northbound Diverge to New Link Road	D2(S)	Diverge arrangements for the M6 Toll northbound diverge to the A460 / M54 meet geometric standards for successive diverges, however, the relatively short distance between the first and second diverge makes directional signage potentially difficult. It may be necessary to increase the distance between the junctions to provide suitable signage in accordance with IAN 144/16. This may have implications on the Saredon Road over bridge as the carriageway may have to be widened under the structure. Alternative arrangements for the slip road will be investigated as part of preliminary design.
Modified Option C(E)	M54 Between Junction 1 and Link Road	D4 & D5(S)	The short weaving distance between the new link road and M54 Junction 1 in both directions makes directional signage potentially difficult. It may be necessary to provide 1/3 and 2/3 mile ADS signage in accordance with IAN 144/16 however vehicles joining at J1 would only see the 1/3 mile ADS sign. The operational and signage implications between the J1 on slip and the new link will have implications for the short weaving length departures. This will require further consideration and discussions.
Modified Option B(W) and Modified Option B(W) (excluding M6 Toll Link)	M54 Junction 1	D10	Although the diverge arrangements for the New Link Road Eastbound to the northern roundabout meets geometric standards for successive diverges, the relatively short distance between the first and second diverge would make directional signage potentially difficult. It may be necessary to increase the distance between the junctions to provide suitable signage in accordance with IAN 144/16.
Modified Option B(W) and Modified Option B(W) (excluding M6 Toll Link)	M54 Junction 1		The replacement of the existing M54 Junction 1 roundabout with a three roundabout dumbbell arrangement as shown on the current proposal would significantly increase the amount of decision points and turning manoeuvres required at this location. If the form of the junction is too complex then there is the potential that road users will avoid using the link road.

Table 9: Safety Considerations

Option	Item	Safety Considerations
All Options	Local accesses and junctions	Existing local junctions and accesses retained, however reduction in traffic on A460, A449 and A5 should improve safety for local accesses and turning movements.
All Options	Separation of strategic and local traffic	New link bypasses the A460 and M6 J11 providing good separation of strategic and local traffic. If constructed to motorway Standard it is likely to further discourage local traffic and will remove vulnerable users.
All Options	Hilton Park Services and / or Featherstone HGV park	No change to Hilton Park access. Featherstone HGV park may still attract HGV traffic as A460 remains as a through route directly connected to SRN.
All Options	Lighting	In line with current Highways England policy a strong evidence-based case for additional investment for any new lighting or replacement / relocation of existing lighting would be required. Further consideration will be given to lighting post options selection as the scheme enters detailed design. The current M54, M6, A460 and A449 are lit throughout the area in scope; the A5 is lit at major junctions.
All Options	Interchange Links Design Speed	The connector roads between the M54 and new link road as an Interchange Link with a reduction in design speed to 85kph as per TD22/06 Table 4/1. A reduction in speed for the slip roads may also be necessary.
All Options	Flood Zone 2	The proposed route traverses the flood plain of the River Penk and as such compensation flood plain land will be required. Similarly attenuation ponds their location will be subject to further investigation.
All Options	Traffic Officer Service (TOS)	The M6 and M54 currently benefit from full on-road Traffic Officer Service (TOS) capability; the A449 / A5 have limited coverage in exceptional circumstances. The new link road would be assessed by Customer Operations to determine the appropriate level of on-road resource coverage; full on-road TOS coverage is considered unlikely. If the link is motorway standard it is likely that the new link road would benefit from on-road TOS coverage as it will facilitate movement between existing TOS patrolled routes (the M6 and M54).

Option	Item	Safety Considerations
All Options	Design Standard	The design standard and cross section of the link road (D2AP or D2M) will have considerable implications on the future operation and maintenance of the scheme. This is to be determined as part of preliminary design taking consideration of all factors including operation, safety, maintenance and cost. The operation and maintenance strategies will vary depending on the cross section provided.
All Options	Slip Roads	The scheme will introduce several one or two lane entry and exit slip roads that include tight bends. The risks associated with these alignments will be recorded in the associated departures from standard. These alignments may have an impact on provision of traffic management on and around the slip roads and in some instances it may be necessary to undertake full carriageway closures for work at these locations. These risks will be further considered at the next Project Control Framework (PCF) Stage.

7.7 Operational Safety Assessment Summary and Scoring

7.7.1 A summary of the assessment along with a justification and scoring of route options against the scheme objectives can be seen below. Note: Scores are rankings where 1 = best and 4 = worst. The lowest total score is preferred.

Table 10: Operational Safety Assessment Scoring Matrix

Operational Safety Objective	Mod. B (West)	Mod. C (West)	Mod. C (East)	Opt. B(W) (exc M6T)
Number and severity of departures – Modified Option B(W) (excluding M6 Toll Link) has significantly less departures than all other options. Of the remaining 3 options, the only significant Departure from Standard not common to all options is for Modified Option C(E); therefore it is the worst performing under this objective. The Departure from Standard relates to the sub-standard weaving length on the M54 between Junction 1 and the link road merge and diverge in both directions. A minimum weaving distance of 2km is recommended in accordance with TD22/06 Paragraph 4.35.	2	2	3	1
Safety of Road Workers (construction) - Neither option is considered to result in unusual safety issues during construction, therefore this is considered to be neutral	1	1	1	1
TOTAL	3	3	4	2
OVERALL RANK	2	2	3	1

8 SUMMARY OF TECHNOLOGY AND MAINTENANCE ASSESSMENT

8.1 Introduction

8.1.1 This chapter presents a summary of the implications of each of the Options on the requirement for additional road side technology and the ability to provide maintenance in a safe manner on the completed scheme. Information has been extracted from the Maintenance and Repair Strategy Statement (MRSS) of August 2017 (HE514465-ACM-HGN-M54_SW_PR_Z-RP-CH-0004).

8.2 Technology Requirement

8.2.1 The M54 and M6 Toll both operate under a standard motorway operating regime and have limited technology (Emergency Roadside Telephones, gantry mounted lane signals and strategic Motorway Signals).

8.2.2 In 2015, the M6 was upgraded to a smart motorway with a significant amount of additional technology provided to allow the network to be managed and operated as an all-lane running scheme.

8.2.3 For all options, correctly placed technology will enhance the scheme, improving capacity, journey time reliability and incident management. The benefits of technology have not yet been quantified and must be balanced against the overall scheme requirements, budget, risks and the projected vehicular traffic volumes. Technology introduced over a larger area of the network could result in larger improvements in safety and journey reliability.

8.2.4 The Technology provision will be defined and designed according to appropriate standards and advice. For all options the final technology provision will comprise varying proportions of new Technology and enabling infrastructure, existing Technology incorporated into the scheme with or without modification and existing Technology removed from the scheme.

8.2.5 To define the extent of Technology deployment the benefits will need to be weighed against the cost of installation, maintenance and construction safety. Existing infrastructure will need to be assessed in order to determine the layout, extent and condition of the potential for reuse.

8.3 Maintenance

8.3.1 The scheme is located within Highways England's Area 9. The current Area 9 Maintenance Service Provider (MSP) is Kier who maintains the sections of the M54 and M6 within the scheme area. The technology is maintained by the RTMC contractors Balfour Beatty in the Midlands region. The scheme interfaces with the M6 Toll which is operated by Midlands Expressway Limited (MEL) on behalf of IFM Investors since June 2017. The existing A460 and local highway network are maintained by the local highway authority (Staffordshire County Council), with AMEY as the maintenance contractor.

8.3.2 The scheme will introduce new maintainable assets and there will be an additional maintenance requirement as a result. Although some existing assets will be retained, most will need to be replaced. It is anticipated that the majority of existing maintenance activities will still be required following the completion of this scheme.

8.3.3 None of the scheme options under consideration are anticipated to result in significantly higher risk maintenance activities. The main impacts of this scheme will be related to safe methods of access.

- 8.3.4 As the scheme is developed further, opportunities for activities to be carried out via Off Network Access (ONA) from overbridges, underbridges or local roads where they are adjacent to the new link road, will be explored. In providing such access, the risk of network intrusion will need to be considered and Staffordshire County Council (SCC) will be consulted in developing this approach. Where equipment cannot be accessed using alternative methods the provision of Maintenance Hard Standing (MHS) on the link road could be considered.

8.4 Technology and Maintenance Assessment Summary and Scoring

- 8.4.1 A summary of the assessment along with a justification and scoring of route options against the scheme objectives can be seen below. Note: Scores are rankings where 1 = best and 4 = worst. The lowest total score is preferred.

Table 11: Operational Safety Assessment Scoring Matrix

Operational Safety Objective	Mod. B (West)	Mod. C (West)	Mod. C (East)	Opt. B(W) (exc M6T)
Safety of Road Workers (maintenance) - Neither option is considered to have significant implications on the requirement for additional road side technology or considered to result in unusual safety issues during maintenance, therefore this is considered to be neutral.	1	1	1	1
OVERALL RANK	1	1	1	1

9 SUMMARY OF ENVIRONMENTAL ASSESSMENT AND ENVIRONMENTAL DESIGN

9.1 Introduction

- 9.1.1 This chapter provides a summary of the potential environmental effects associated with the four Scheme options during construction and operation as reported in the Environmental Assessment Report (EAR) Addendum dated September 2018 (HE514465-ACM-EGN-M54_SW_01_Z-RP-LE-001).
- 9.1.2 The EAR Addendum documents the environmental assessment process and how potential environmental impacts have been addressed as related to the Scheme options. Details of surveys and assessments undertaken to compile the baseline are provided for each technical topic. This baseline has then been used to identify potential changes arising as a result of Scheme construction and operation, the magnitude of environmental impacts and the significance of potential effects (taking into account mitigation measures where appropriate).

9.2 Air Quality

- 9.2.1 Temporary effects due to fugitive emissions of dust during construction of Scheme options are not expected to be significant with appropriate mitigation in place, however, as the exact locations of compounds, routes etc. are currently unknown, the total number of receptors affected by the Scheme options is not yet known.
- 9.2.2 Emissions from HGVs and traffic management have not been considered in detail - these emission sources will be considered at the next stage of assessment when further information is available. Although it is considered that there are a greater number of sensitive receptors within 200m of Modified Option B(W) and Modified Option B(W) (excluding M6 Toll Link) than Modified Option C(E) and C(W), specific details of construction are not yet known, and therefore the total number of receptors affected by each scheme option is unknown.
- 9.2.3 The results of the assessment suggest that the air quality effects of the Scheme are consistent with relevant national and local planning policy. Therefore, an overall evaluation of 'not significant' has been assigned to the air quality effects for all of the Scheme options.
- 9.2.4 Overall there are greater changes in concentration predicted at receptors with Modified Option B(W) and Modified Option B(W) (excluding M6 Toll Link) than with Modified Option C(E) and Modified Option C(W), in terms of improvement and deterioration in air quality. In addition, more receptors are affected by Modified Option B(W) and Modified Option B(W) (excluding M6 Toll Link), however, the number of properties affected is not considered to be significant.

9.3 Noise and Vibration

- 9.3.1 Given the very close proximity of receptors of high sensitivity (predominantly residential properties) there is the potential for construction noise effects of up to large adverse significance with all of the Scheme options, though the number of affected receptors is likely to be less with Modified Option C(E) and C(W) compared to Modified Option B(W) and Modified Option B(W) (excluding M6 Toll Link).
- 9.3.2 The risk of construction vibration induced building damage is considered to be very low for all of the Scheme options, whilst the risk of annoyance due to construction vibration would be limited to the very closest receptors to the Scheme options.

9.3.3 A comparison of Modified Option B(W) and Modified Option B(W) (excluding M6 Toll Link) with Modified Option C(E) indicates that considerably less residential buildings would experience a moderate or large adverse effect with Modified Option C(E) as the route of the Scheme would follow the route of existing major roads and is in close proximity to very few residential buildings. Conversely, as less traffic is predicted to use the Scheme with Modified Option C(E), the beneficial effects are much smaller on the A460 and other affected routes, compared to Modified Option B(W) and Modified Option B(W) (excluding M6 Toll Link). The effects of Modified Option C(W) are between Modified Option B(W) and Modified Option C(E), with less moderate and major adverse effects but also less beneficial effects on the A460 replaced by the scheme and other routes. Comparison of Modified Option B(W) and Modified Option B(W) (excluding M6 Toll Link) indicates that the termination of the Scheme at M6 Junction 11 would result in the loss of beneficial effects in the vicinity of the existing A460 between M6 Junction 11 and M6 Toll Junction T8. The Noise Important Area and receptors in this area experience a slight adverse effect with Modified Option B(W) (excluding M6 Toll Link) compared to all the other Scheme options.

9.4 Cultural Heritage

9.4.1 All of the Scheme options would have a residual moderate adverse effect on five heritage assets, including the Grade I listed buildings Hilton Hall and conservatory, and the Grade II listed coach house stable block and Portobello Tower, as well as the historic Hilton Park.

9.4.2 All of the Scheme options barring Modified Option B(W) (excluding M6 Toll Link), would impact upon seven recorded archaeological sites. Modified Option B(W) (excluding M6 Toll Link) would only affect two recorded archaeological sites. With mitigation in place these effects are not considered to be significant. There would also be the potential for the Scheme options to impact upon previously unrecorded archaeological sites.

9.5 Landscape and visual

9.5.1 Landscape effects generated by the Scheme options are broadly comparable and derived from the introduction of a new highway into the study area landscape which in the eastern section is already highway dominated.

9.5.2 Effects on landscape character in Year 1 would be broadly the same between the Scheme options. Each Scheme option would result in a slight adverse effect, although Modified Option B(W), Modified Option B(W) (excluding M6 Toll Link), and to a lesser extent Modified Option C(W), would all increase the influence of highway infrastructure into land away from the existing M6 corridor.

9.5.3 By Year 15 effects on landscape character arising from Modified Option C(E) and Modified Option C(W) would be reduced to a neutral/slight adverse effect as a result of mitigation and greater integration with the character of the eastern section of the study area which is already influenced by the M6 corridor. The effect on landscape character arising from Modified Option B(W) and Modified Option B(W) (excluding M6 Toll Link) would remain as a slight adverse effect.

9.5.4 Modified Option C(E) and Modified Option C(W) would both result in fewer/less significant visual effects at representative viewpoints in comparison with Modified Option B(W) and Modified Option B(W) (excluding M6 Toll Link) at Year 1 and Year 15.

9.6 Nature and Conservation

9.6.1 Based on the present understanding of the options and the baseline conditions it is considered that Modified Option C(E) would have a greater impact on biodiversity than

Modified Option B(W), Modified Option B(W) (excluding M6 Toll Link) and Modified Option C(W). Modified Option C(E) is anticipated to have a significant adverse effect on four areas of ancient woodland (Beech Head, Burns Wood, Keepers Wood, and Spring Coppice) as a result of the permanent loss of ancient woodland habitat.

- 9.6.2 Modified Option C(E) and Modified Option C(W) will have a moderate adverse effect on Brookfield Farm SBI and pond habitats, however, with mitigation this effect is expected to reduce. No other significant effects have been identified at this stage.
- 9.6.3 Modified Option B(W) and Modified Option B(W) (excluding M6 Toll Link) would have a moderate adverse effect on Lower Pool SBI and pond habitats. Option B(W) (excluding M6 Toll Link) would also have a moderate adverse effect on Brookfield Farm SBI. These significant effects are expected to be reduced to not significant with mitigation. No other significant effects have been identified at this stage.

9.7 Geology and Soils

- 9.7.1 All the Scheme options are anticipated to result in the loss of between 20 and 50ha of Grade 2 and 3a agricultural land. The loss of agricultural land would be unavoidable for all Scheme options. However, impacts upon soil resources could be minimised by suitable soil management.
- 9.7.2 The Scheme options pass through areas of potential contamination including a historic landfill site adjacent to the A460, areas used for mineral extraction and the historic Hilton Main Colliery. There is the potential for contamination within agricultural areas resulting in a major adverse effect during the construction phase. Following the implementation of the proposed mitigation measures, all other effects to the geology and ground conditions are not considered to be significant.

9.8 Materials

- 9.8.1 Environmental effects associated with material resources and waste arisings are anticipated to be moderate adverse during construction for Modified Option B(W) and Modified Option C(E) and minor adverse during construction for Modified Option B(W) (excluding M6 Toll Link) and Modified Option C(W).
- 9.8.2 All of the Scheme options are anticipated to have a minor adverse/negligible effect during operation which is not considered to be significant.

9.9 People and Communities

- 9.9.1 The Scheme options would directly impact a number of designated PRow. It is not possible to determine the residual effects until mitigation measures have been designed and agreed with consultees. However, it is anticipated that mitigation measures would be included in the Scheme design and therefore reduce the potential effect on NMUs to minor adverse.
- 9.9.2 Indirect impacts of the Scheme, resulting from a reduction in traffic flows along the A460 are considered to result in potential minor/moderate beneficial effects on non-designated NMU facilities.
- 9.9.3 All of the Scheme options would result in temporary increases in driver stress during the construction period as a result of reduced speed, traffic management and increased congestion. Such effects would be minimised given that sections of the Scheme options could be built offline.
- 9.9.4 The Scheme options would be designed in line with existing standards, ensuring that appropriate signing requirements and site lines are including making the route easy to navigate and reduce fear of potential accidents. The Scheme is anticipated to provide

a reduction in traffic on local roads and therefore reduce the conflict between local traffic and long-distance traffic/HGVs. This would improve the reliability of journey times and reduce fear of potential accidents. Therefore, it is considered that operation of the Scheme options would have a minor beneficial effect on driver stress.

9.9.5 All of the Scheme options are anticipated to have a major adverse effect on agricultural holdings with the loss of more than 20ha of BMV agricultural land as a national resource. Modified Option B(W) (excluding M6 Toll Link) would result in the least land-take and would not require the demolition of residential and commercial properties.

9.9.6 It is considered that the effects of the Scheme options on private properties and businesses are comparable, with potential major and moderate adverse effects anticipated for four receptors for Modified Option C(E) and Modified Option B(W). Modified Option B(W) (excluding M6 Toll Link) and Modified Option C(W) are anticipated to have a significant effect on three receptors.

9.10 Road Drainage and the Water Environment

9.10.1 All of the Scheme options would cross an area of Principal Aquifer (Triassic Sherwood Sandstone Group), however impacts to groundwater quality of the operational Scheme is not considered to be significant (a neutral effect).

9.10.2 The main sensitive receptor for all of the Scheme options is Latherford Brook, a tributary of the River Penk and WFD watercourse. A moderate adverse effect is anticipated on this watercourse should a culvert be utilised to cross the waterbody. Given appropriate design this impact would be reduced to slight adverse for all of the Scheme options. Following implementation of mitigation outlined in the EAR Addendum all other effects on surface water features and groundwater are anticipated to be neutral for all the Scheme options. All the Scheme options cross the indicative floodplain of Latherford Brook. It is therefore considered that flood compensation areas are likely to be required for all the Scheme options however Modified Option C(E) and C(W) would intersect a greater area of indicative floodplain and would therefore potentially require a greater area of flood storage compensation.

9.11 Assessment of Cumulative Effects

9.11.1 It is considered that all of the Scheme options have the potential to generate minor adverse cumulative effects during operation of the Scheme, although such effects are not considered to be significant. However, it is considered that Modified Option B(W) and Modified Option B(W) (excluding M6 Toll Link) have the potential to result in slightly greater cumulative effects (within the minor effects range) than Modified Option C(E) and C(W) due to the distance from potential receptors.

9.12 Summary of NNNPS compliance Issues

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

9.12.2 Given the NSIP status of the Scheme, there is a requirement to assess whether the Scheme accords with relevant national policy – namely the National Networks National Policy Statement (NN NPS) (Herein referred to as the ‘NPS’) as presented to Parliament pursuant to Section 9(8) and Section 5(4) of the Planning Act 2008 (December 2015). The assessment of compliance is provided in the PCF Stage 2 Planning Statement - National Policy Statement Accordance Report which considers initial compliance against key aspects of the NPS to identify any additional work or corrective action that may be needed to enable compliance and support the production of a robust DCO application package during PCF Stage 3. A summary of the compliance issues identified in the Planning Statement are summarised below:

- **Loss of Agricultural Land** - The Scheme options are all anticipated to result in the loss of more than 20 ha of best and most versatile agricultural land due to the location of the Scheme in a semi-rural area, as it does not use existing infrastructure corridors. The Scheme design will aim to reduce land-take where possible and minimise impacts on soil quality. Where loss of best and most versatile agricultural land is unavoidable the reasoning for this will be clearly presented within the Environmental Statement (ES). Compensation and mitigation measures will be put in place where appropriate and consideration of ‘need’ for the development will be presented in the Planning Statement.
- **Loss of Ancient Woodland** - Ancient woodland is a valuable resource protected by national planning policy. The NPS states that “The Secretary of State should not grant development consent for any development that would result in the loss or deterioration of irreplaceable habitats including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the national need for and benefits of the development, in that location, clearly outweigh the loss.” Modified Option C(E) is anticipated to have a significant adverse effect on ancient woodland through direct loss of the designated habitat. Where loss of ancient woodland is unavoidable the reasoning for this would be clearly presented within the ES. Compensation and mitigation measures will be agreed with key stakeholders and consideration of ‘need’ for the development will be presented in an updated version of the Planning Statement and NPS table. To demonstrate compliance with the NPS, this will have to demonstrate that the national need for and benefits of the development outweigh the loss.

9.13 Environmental Assessment Summary and Scoring

9.13.1 A summary of the assessment along with a justification and scoring of route options against the scheme objectives can be seen in Table 12. A summary of identified key significant (moderate or major/large) environmental effects for each of the Scheme options, as identified within the EAR is also provided. Note: scores for each EIA chapter are weighted to reflect the severity of impact (0 = negligible, 1 = slight/minor, 2 = moderate, 3 = large, 4 = very large). The lowest total score is preferred.

Table 12: Environmental Assessment Scoring Matrix

Environmental Objective	Mod. B (West)	Mod. C (West)	Mod. C (East)	Opt. B(W) (exc M6T)
Air Quality - The effect on air quality is not considered significant for all options during construction and operation of the Scheme.	1	1	1	1
Noise – Less residential buildings would experience a significant adverse effect with Modified Option C(E) as the route would follow the route of existing major roads, is in close proximity to very few residential buildings and is anticipated to be used by fewer vehicles.	3	3	2	3
Cultural Heritage - All of the Scheme options would have a residual moderate adverse effect on Cultural Heritage assets.	2	2	2	2
Landscape and visual - Modified Option C(E) and Modified Option C(W) would both result in fewer/less significant visual effects at representative viewpoints at Year 1 and 15.	2	1	1	2
Nature and Conservation - Modified Option C(E) would have a greater impact on ecology due to the loss of ancient woodland.	2	2	4	2
Geology and soils - Effects on geology and soils are considered to be broadly the same.	3	3	3	3
Materials - Environmental effects associated with material resources and waste arisings are anticipated to be greater for Modified Option B(W) and Modified Option C(E) during construction.	2	1	2	1
People and communities - All of the Scheme options are anticipated to have similar impacts on PRow and driver stress. All of the Scheme options are anticipated to have a major adverse effect on agricultural holdings however Modified Option B(W) (excluding M6 Toll Link) would result in the least land-take and would not require the demolition of residential and commercial properties.	3	3	3	2
Drainage - Effects on surface / ground water are considered to be broadly the same.	1	1	1	1
Cumulative - It is considered that all of the Scheme options have the potential to generate minor adverse cumulative effects during operation of the Scheme.	1	1	1	1
TOTAL	20	18	20	18
OVERALL RANK	2	1	2	1

10 SUMMARY OF PUBLIC CONSULTATION

10.1 Introduction

10.1.1 This Chapter presents a summary of the stakeholder engagement and public consultation exercise that has been undertaken.

10.2 The Consultation Process

10.2.1 A public consultation exercise was held during September and October 2017, which included consultation with the local community, road users and wider stakeholders including local businesses and land owners. The purpose of this consultation was to understand the views held locally and throughout the region which would help to inform the selection of a preferred option and to enable the further development of the proposals in a way to best meet the needs of those affected by the scheme.

10.2.2 It should be noted that Modified Option B(W) (excluding M6 Toll Link) was not under consideration during the September and October 2017 public consultation exercise. As Modified Option B(W) (excluding M6 Toll Link) is a variation of Modified Option B(W) and follows the same route for the majority of its length, for the purpose of the SAR it is assumed that scoring will be as per Modified Option B(W) as the majority of the route is similar.

10.3 Initial Results

10.3.1 Approximately 71% of respondents supported Modified Option B(W) as their preferred route. Modified Option C(W) attracted approximately 17% of the responses and Modified Option C(E) approximately 8%.

10.3.2 Reasons for support for Modified Option B(W) focused on convenience and directness, least disruptive and reducing congestion on A460.

10.3.3 Overall a large number of responses gave reasons against both Modified Option C(W) and Modified Option C(E) as impacting on the local horse / farming community, link road impacting negatively on wildlife / landscape and that they opposed Modified Option C(W) and East more than Modified Option B(W). These options badly affect several businesses in the area, such as a number of successful farms / equine businesses and a gun club.

10.4 Stakeholder Submissions

10.4.1 Meetings were held with a number of key stakeholders and local community groups that would be directly affected by the proposed routes. Details of preferred options of key stakeholders are indicated in Table 13.

Table 13: Key Stakeholder option preference

Preferred Option	Key Stakeholders
Modified Option B(W)	Staffordshire County Council; Transport for West Midlands; Nurton Developments; Vectos; Natural England
Option C(W)	Staffordshire County Council; South Staffordshire District Council, Shareshill Parish Council; Hatherton Parish Council; Hilton Parish Council; Cheslyn Hay Parish Council; Essington Parish Council; Natural England; Jaguar Land Rover;
Option C(E)	Jaguar Land Rover; Historic England
Support with no preferred Option	National Trust, Marches LEP, Four Ashes Limited

10.5 Public Consultation Summary and Scoring

10.5.1 A summary of the assessment along with a justification and scoring of route options against the scheme objectives can be seen below Table 14. Note: Scores are rankings where 1 = best and 3 = worst. The lowest total score is preferred.

Table 14: Public Consultation Assessment Scoring Matrix

Objective	Mod. B (West)	Mod. C (West)	Mod. C (East)	Opt. B(W) (exc M6T)
Preferred Option – Key Stakeholders	2	1	3	2
Natural England - Natural England had no concern with either Modified Option B(W) or Modified Option C(W). They had major concerns with Modified Option C(E).	1	1	2	1
Historic England - Historic England objected to both Modified Option B(W) and Modified Option C(W) on the grounds that they both impact on historic landscape. Therefore the scoring between the two options is neutral. Historic England preferred option would be Modified Option C(E).	2	2	1	2
Preferred option – local public	1	2	3	1
Preferred option – local businesses	1	2	3	1
TOTAL	7	8	12	7
OVERALL RANK	1	2	3	1

11 SOCIO-ECONOMIC IMPACT ASSESSMENT

11.1 Introduction

11.1.1 This chapter provides a summary of the potential Socio-Economic effects associated with the scheme during construction and operation.

11.2 Socio-Economic Impact Assessment

11.2.1 A high level socio-economic assessment has been undertaken to try and establish the respective implications on businesses and community groups along each of the routes that would be impacted.

11.2.2 At this stage in the process detailed quantitative information is not available so a qualitative assessment approach was chosen using consultation responses, information offered by consultees at individual landowner meetings and supplemented with readily available information, including details from Companies House and business websites, where available and applicable.

11.2.3 An economic impact assessment has been undertaken on affected businesses taking into consideration the number of jobs, value of the business and implications of the route options. Where applicable, potential mitigation has been included setting out means of reducing the impact of the option to the business/businesses.

11.2.4 Properties where there are no measurable job or business impacts have also been considered to understand if there are any significant other impacts that arise from the scheme that should still be considered as part of this process.

11.2.5 The significant socio-economic impacts of each route option are provided in Table 16.

11.3 Socio-economic impact Assessment Summary and Scoring

11.3.1 A summary of the assessment along with a justification and scoring of route options against the scheme objectives can be seen below Table 15. Note: Scores are rankings where 1 = best and 4 = worst. The lowest total score is preferred.

Table 15: Socio-economic impact Assessment Scoring Matrix

Objective	Mod. B (West)	Mod. C (West)	Mod. C (East)	Opt. B(W) (exc M6T)
Whilst all route options have implications on a number of businesses, the assessment shows that more 'high value' businesses will be impacted by Modified Option C(W) followed by Modified Option C(E). It is considered that Modified Option B(W) (excluding M6 Toll Link) will have the least socio-economic impact due to the shorter route and reduced land take.	2	4	3	1
OVERALL RANK	2	4	3	1

Table 16: Summary of socio-economic impacts

Property/Business	Mod. B (West) & Opt. B(W) (exc M6T)	Mod. C (West)	Mod. C (East)
Ride Farm – DIY livery equestrian facilities for a number of horses and stables	No impact	Would leave an unviable business due to severance and location. Some impact on landowner's home due to proximity.	Would require the removal of Ride Farm. However considered less damaging than Option C(W) as land is not severed therefore business could be relocated.
Yells Farm – 200 acre estate, stables for a number of horses, livery, shooting (gun club membership), fishing ponds, rental property.	Some agriculture land severance and affects fishing ponds.	Stables and livery unviable, loss of shooting, rental property desirability reduced. Impact on landowner's home due to proximity.	
Old Yells Farm – private house, barn with planning permission for conversion.	No impact	Out-buildings demolished with motorway passing very close to main property	
Brookfield Farm and leisure Centre – fishing lakes, horse riding, dog training, caravan storage, event facilities, embroidery business, motorcycle building business, AP wireless.	Loss of fishing ponds. Businesses are interconnecting and landowner would prefer all the land to be bought. Mitigation of impacts possible through slight route alignment.	No impact	
Essington Farm and Farm shop – agricultural food and livestock, award winning farm shop with emphasis on zero miles food, restaurant.	Some indirect impact during construction. No impact afterwards.	No impact on the shop buildings however reduces production of food by approximately 1/3. Currently employ 57 people, increasing seasonally.	
Tower House Farm – number of businesses	Impact during construction. Demolition of one or two buildings. Full impact and potential mitigation not yet known.	No impact	
Nationwide Paintball – paintballing games.	No impact	Loss of site.	
Houses on Dark Lane	Impact on 4 houses due to proximity.	No impact	

12 DELIVERABILITY/ RISK

12.1 Introduction

12.1.1 This chapter provides a summary of the keys risks to the delivery of the scheme. It is considered that the main threat to deliverability of the scheme is due to objections during the DCO examination. The consequence of failing at DCO is a very high impact on cost, programme, quality and reputation.

12.2 DCO Objection Risk Assessment

12.2.1 The affected landowners are statutory consultees and in order to compulsorily acquire land, there needs to be a compelling case in the public interest, which will be examined by PINS. The risk of objection to Modified Option B(W) or Modified Option B(W) (excluding M6 Toll Link) resulting in failure at DCO is considered to be very low as it can be demonstrated that it has a strong case and other options have greater impacts on statutory consultees. On the other hand, Modified Option C(W) and Modified Option C(E) have significantly greater impact on landowners, therefore, it is considered that there is a high likelihood that it could not be demonstrated that there is a compelling case in the public interest for these options.

12.2.2 It is expected that Historic England will object to Modified Option B(W), Modified Option B(W) (excluding M6 Toll Link) and Modified Option C(W), however, the impact on historic landscape can be justified with a sufficiently strong case for the scheme. Modified Option B(W) and Modified Option B(W) (excluding M6 Toll Link) are more robust and therefore the probability of failure at DCO due to this objection is considered to be very low. The case for Modified Option C(W) is not as strong, therefore there is a possibility that the probability of failure at DCO will increase (it is expected that objections of statutory bodies will be examined in detail by PINS).

12.2.3 Modified Option C(E) fails the NNNPS test for ancient woodland, therefore there is a high risk of significant objection during the DCO examination and there would need to be an overwhelming amount of evidence to support this option above the other options which do not result in the loss of ancient woodland.

12.3 Deliverability/ Risk Assessment Summary and Scoring

12.3.1 In order to assess and determine variance in risk, a 5x5 matrix has been used as shown in Table 17 below. This scores a hazard on likelihood and impact (cost, programme, quality and reputation), ultimately producing a total risk score.

Table 17 : 5x 5 Risk Matrixes

LIKELIHOOD	IMPACT (COST, PROGRAMME, QUALITY AND REPUTATION)				
	1 Minor	2 Moderate	3 Serious	4 Major	5 Catastrophic
1 Extremely Unlikely	1	2	3	4	5
2 Unlikely	2	4	6	8	10
3 Likely	3	6	9	12	15
4 Extremely Likely	4	8	12	16	20
5 Almost Certain	5	10	15	20	25

12.3.2 A summary of the assessment along with a justification and scoring of route options against the scheme objectives can be seen below. Note: Scores are rankings where 1 = best and 4 = worst. The lowest total score is preferred.

Table 18: Deliverability/ Risk Assessment Scoring Matrix

Risk		Mod. B (West)	Mod. C (West)	Mod. C (East)	Opt. B(W) (exc M6T)
Affected landowners object to scheme, resulting in failure at DCO examination	Probability	1	4	4	1
	Impact	5	5	5	5
	Risk Rating	5	20	20	5
Historic England object to scheme due to impact on historic landscape, resulting in failure at DCO examination	Probability	1	2	-	1
	Impact	5	5	-	5
	Risk Rating	5	10	-	5
Natural England object to scheme due to impact on Ancient Woodland, resulting in failure at DCO examination	Probability	-	-	5	-
	Impact	-	-	5	-
	Risk Rating	-	-	25	-
HIGHEST RISK		5	20	25	5
OVERALL RANK		1	2	3	1

13 THE RECOMMENDED ROUTE

13.1 Process for Selecting the Preferred Route

13.1.1 The completed matrix scoring of route options against the scheme objectives can be seen in Table 19 below. Note: Scores are rankings where 1 = best and 4 = worst. The lowest total score is preferred.

Table 19: Options comparison matrix

Category	Mod. B (West)	Mod. C (West)	Mod. C (East)	Opt. B(W) (exc M6T)
Traffic and Economics - Modified Option B(W) (excluding M6 Toll Link) scores highest overall in most of the traffic and economic objectives and also provides the greatest BCR.	2	3	4	1
Engineering/ Buildability – Both Modified Option B(W) options are more difficult to construct due to M54 Junction 1. However, it is anticipated that the construction programme for Modified Option B(W) (excluding M6 Toll Link) will be significantly shorter than the other options.	3	2	1	1
Operational Safety - Neither option is considered to result in unusual safety issues. Modified Option B(W) (excluding M6 Toll Link) has significantly less departures. Modified Option C(E) has the weaving length departure.	2	2	3	1
Technology And Maintenance - Neither option is considered to have significant implications on the requirement for additional road side technology or result in unusual maintenance safety issues.	1	1	1	1
Environment - Modified Option C(W) scores highest overall in most of the environmental assessment objectives. Modified Option C(E) would result in the permanent loss of ancient woodland habitat and fails the NNNPS test.	2	1	2	1
Public Consultation - The majority of consultation responses favoured Modified Option B(W). Natural England objects to Modified Option C(E). Historic England objects to both Modified Option B(W) and Modified Option C(W).	1	2	3	1
Socio-economic impact - Modified Option C(W) directly affects more landowners and businesses. It is considered that Modified Option B(W) (excluding M6 Toll Link) will have the least socio-economic impact due to the shorter route and reduced land take.	2	4	3	1
Deliverability/ Risk - It is considered that Modified Option C(E) has the greatest risk of DCO failure as it fails the NNNPS test for ancient woodland. The risk of objection from affected landowners during the DCO process is far greater with Modified Option C(W) and Modified Option C(E) than either Modified Option B(W) option.	1	2	3	1
TOTAL	14	17	20	8
OVERALL RANK	2	3	4	1

13.2 The Recommended Route

- 13.2.1 A comparative assessment between new Modified Option C(E) and Modified Option C(W) and Modified Option B(W) has been undertaken against the agreed criteria. The assessment indicates that the Modified Option B(W) route alignment is the optimal solution and should remain as the preferred route option for the scheme.
- 13.2.2 As a result of complications in securing third party funding contributions for the scheme, further assessment has been undertaken to review alternative cost saving options for the preferred route Modified Option B(W). Modified Option B(W) (excluding M6 Toll Link) was identified as a cost saving solution. This option is a variant of Modified Option B(W), connecting to M6 J11 rather than M6 Toll Junction T8. Based on further assessment Modified Option B(W) (excluding M6 Toll Link) has emerged as the preferred route option for the scheme based on the above scoring highlighting the fact that it is the best performing option in terms of:
- Traffic and economic
 - Socio Economic Impact
 - Stakeholders views (non -statutory)
 - Delivery Risk (DCO)
- 13.2.3 The conclusion from this PCF Stage 2 Option Selection Phase is to recommend that Modified Option B(W) (excluding M6 Toll Link) is taken forward into preliminary design.
- 13.2.4 It should be noted that the recommended preferred route 'Modified Option B(W) (excluding M6 Toll link)' has been referred to in material produced for the September 2018 preferred route announcement as 'Option B West' in order to prevent naming confusion when discussing the scheme with consultees.
- 13.2.5 The alignment should be further optimised to best utilise the existing topography and mature planting to minimise the impact on both Hilton Hall and the residents of Hilton.
- 13.2.6 Additional mitigation such as fencing, additional planting or the introduction of landscaping features such as mounding or false cuttings will be developed during the next stage of the project.
- 13.2.7 Whilst some assessment of the standard of the link provision has been given, this is not required to make an announcement of a preferred route and therefore it is recommended that the decision regarding the classification of the new road should be deferred to PCF Stage 3.