HS2

High Speed Rail (London – West Midlands)

Supplementary environmental information report

Temporary closure of A38 northbound and southbound slip roads at Streethay

November 2023

Department for Transport

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High Speed Two (HS2) Limited
Two Snowhill
Snow Hill Queensway
Birmingham B4 6GA

Telephone: 08081 434 434

General email enquiries: HS2enquiries@hs2.org.uk

Website: www.hs2.org.uk

A report prepared for High Speed Two (HS2) Limited:

Balfour Beatty VINCI Working in partnership with HS2

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Acronyms and abbreviations

Table 1: Acronyms and abbreviations

Acronym	Description
AADT	Annual Average Daily Traffic
AP	Additional Provision
AQMA	Air Quality Management Area
ARN	Affected Road Network
CFA	Community Forum Area
CoCP	Code of Construction Practice (Annex 1 of the EMRs)
DCA	Demographic Character Area
DEFRA	Department for Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges
EIA	Environmental Impact Assessment
EMR	Environmental Minimum Requirements
EPUK	Environmental Protection UK
ES	Environmental Statement
GHG	Greenhouse Gas
HGV	Heavy Goods Vehicle
HIA	Health Impact Assessment
IAQM	Institute of Air Quality Management
LDC	Lichfield District Council
LGV	Light Goods Vehicle
LNR	Local Nature Reserve
LTM	Lichfield Transport Model
NVQ4	National Vocational Qualification Level 4
SEI	Supplementary Environmental Information
SES	Supplementary Environmental Statement
SoS	Secretary of State for Transport
SMR	Scope and Methodology Report

1 Introduction

1.1 Background to High Speed Two

1.1.1 The hybrid Bill for High Speed Rail between London and the West Midlands ('the Bill') was submitted to Parliament together with an Environmental Statement (ES) in November 2013 ('the main ES'[1]). The Bill was amended a number of times following its submission resulting in five Additional Provisions (APs) which were each accompanied by Supplementary Environmental Statements (SESs).

1.1.2 Any new or different significant effects that were likely to result from changes to the design which did not require amendments to the Bill; changes to construction assumptions, new environmental baseline information and corrections to the main ES were reported in SESs. These were deposited alongside the APs.

1.1.3 The Bill was enacted in February 2017 to become the High Speed Rail (London-West Midlands) Act 2017 ('the HS2 Act). The HS2 Act confers the necessary powers required to construct, maintain, and operate the HS2 railway from London to the West Midlands.

1.1.4 HS2 comprises the construction of a new railway approximately 230km (143 miles) in length between London and the West Midlands. Passenger services will be provided by new high speed trains, which will travel at speeds of up to 360kph (225 mph).

1.2 Introduction to this supplementary environmental information and its purpose

1.2.1 The A38 Streethay interchange is a merge and diverge facility located approximately 3km east of Lichfield on the eastern extent of Streethay and provides the A38 with a southbound off slip (hereby referenced as the southbound slip road) and northbound on slip (hereby referenced as the northbound slip road) only. The main ES was amended by the AP2 and AP2 SES for this area. Acknowledging these later amendments, the approved works and relevant assessment for this asset are referred to in this supplementary environmental information (SEI) as the main ES (as amended)[2].

[1] High Speed Two Ltd (2013), High Speed Rail (London – West Midlands), *Environmental Statement: documents*. Available online at: HS2 Phase One environmental statement: documents - GOV.UK (www.gov.uk).

[2] High Speed Two Ltd (2015), High Speed Rail (London – West Midlands), *Supplementary Environmental Statement and Additional Provision 2 Environmental Statement. Volume 2, Community forum area report, CFA 22, Whittington to Handsacre.* Available online at: SES_and_AP2_ES_Volume_2_CFA22.pdf (publishing.service.gov.uk).

1.2.2 This SEI relates to the A38 Rykneld Street overbridge (within Community Forum Area (CFA), 22 Whittington to Handsacre and shown on map reference CT-05-125 and CT-06-125 of the main ES).

1.2.3 This SEI arises from the proposed temporary closure of the A38 Streethay interchange northbound and southbound slip roads ('the proposed works') including a period where both the northbound slip road and southbound slip road would be closed concurrently. The A38 will remain open throughout the works. The proposed works are being carried out in 3 stages. The closures, dates and durations of each stage can be seen in Table 2. The closure durations shown are the maximum anticipated and represent the worst case, although work is ongoing to reduce them further.

1.2.4 This SEI describes new or different likely significant effects during Stage 2 (closure of both slip roads) and Stage 3 (closure of northbound slip road only). Stage 1 is already underway and therefore the assessment of effects in Stage 2 supercedes those in Stage 1 (by assessing the combined effects of both Stages 1 and 2) and represents the worst case.

Table 2: Duration of closures for Stages 1, 2 and 3

Stage	Closure	Duration
1	Southbound slip road	August 2022 – October 2023 (14 months)
2	Southbound slip road and northbound slip road	October 2023 – April 2024 (7 months)
3	Northbound slip road	April 2024 – November 2025 (20 months)

1.2.5 The closures exceed the duration of those reported in the main ES (as amended) and, despite the implementation of the controls set out in the environmental minimum requirements (EMRs) and code of construction practice (CoCP), are temporary new significant effects during the construction period.

1.3 The environmental minimum requirements

1.3.1 The HS2 EMRs set out the high-level environmental and sustainability commitments that the Government has entered into through the hybrid Bill process.

1.3.2 The EMRs consist of a suite of framework documents which: (i) define the mechanisms by which the nominated undertaker will engage with communities and other key stakeholders; and (ii) implement environmental and sustainability management measures designed to protect communities and the environment during detailed design development and construction. The nominated undertaker is the body, appointed by the Secretary of State for Transport (SoS), responsible for delivering Phase One of HS2.

1.3.3 The nominated undertaker, taking forward the detailed design and implementation of Phase One of HS2, is required by the SoS to comply with the EMRs. The components of the EMRs are described in the EMR General Principles (CS755 02/17, February 2017).

1.3.4 The controls contained in the EMRs, along with powers contained in the HS2 Act and the Undertakings given by the Secretary of State, will ensure that impacts which have been

assessed in the main ES will not be exceeded, unless any new impact or impacts in excess of those assessed in the main ES:

- result from a change in circumstances which was not likely at the time of the main ES[3]; or
- would not be likely to be environmentally significant[4]; or
- result from a change or extension to the project, where that change or extension does not itself require environmental impact assessment (EIA) under either:
  - paragraph 24 of Schedule 1 to the Town and Country Planning (EIA) Regulations 2017[5]; or
  - section 13 of the table under paragraph 1 of Schedule 2 to the Town and Country Planning (EIA) Regulations 2017; or
- would be considered as part of a separate consent process (and therefore further EIA if required).

[3] In addition, Supplementary Environmental Statements and Additional Provision Environmental Statements were published and tabled by the Promoter in July 2015, September 2015, October 2015 and December 2015.

[4] i.e. a situation that could not reasonably have been anticipated at the time of the Environmental Statement. This covers all effects (both positive and adverse) where those effects are simply of no environmental significance.

[5] Town and Country Planning (2017), *The Town and Country Planning (Environmental Impact Assessment) Regulations 2017.* Available online at: The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (legislation.gov.uk).

2 Scope

2.1.1 This SEI describes new or different likely significant effects for the construction phase of the A38 Rykneld Street overbridge in Streethay (within CFA 22 Whittington to Handsacre) and shown on map reference CT-05-140 and CT-06-140 of the main ES (as amended)) arising from proposed temporary closure of the roads during Stage 2 and 3. These effects exceed those reported in the main ES (as amended) and despite the implementation of relevant mitigation, are new temporary significant effects.

2.1.2 Section 63(3) of the HS2 Act amends Regulation 9 (relating to subsequent applications) of the EIA Regulations. In particular Regulation 9, paragraph (1)(b)(ii) of the EIA Regulations is amended to specifically reference the HS2 Act.

2.1.3 Regulation 9(3) allows the relevant planning authority to request further environmental information (under Regulation 25) where they believe environmental information currently provided is deemed not adequate to assess the significant effects of the development on the environment.

2.1.4 In anticipation of a Schedule 25 Notice under the EIA Regulations by Lichfield District Council (LDC), this SEI has been written to provide such further environmental information to the main ES (as amended) as is required.

2.1.5 Additionally, paragraph 1.1.3 of the High Speed Rail (London – West Midlands) EMR General Principles states that:

"The controls contained within the Environmental Minimum Requirements (EMRs) [...] will ensure that impacts which have been assessed in the ES will not be exceeded, unless any new impact in excess of those assessed in the ES results from a change in circumstances which was not likely at the time of the ES..."

2.1.6 Furthermore, paragraph 3.1.8 states:

"In the circumstances in the first bullet point of paragraph 1.1.3, if the significant adverse impacts identified in the ES are likely to be exceeded, the nominated undertaker will take all reasonable steps to minimise or eliminate those additional impacts. If despite these reasonable steps, significant impacts remain the nominated undertaker will report them".

2.1.7 Consequently, this document provides a report to meet the requirements of paragraph 3.1.8 of the EMR General Principles.

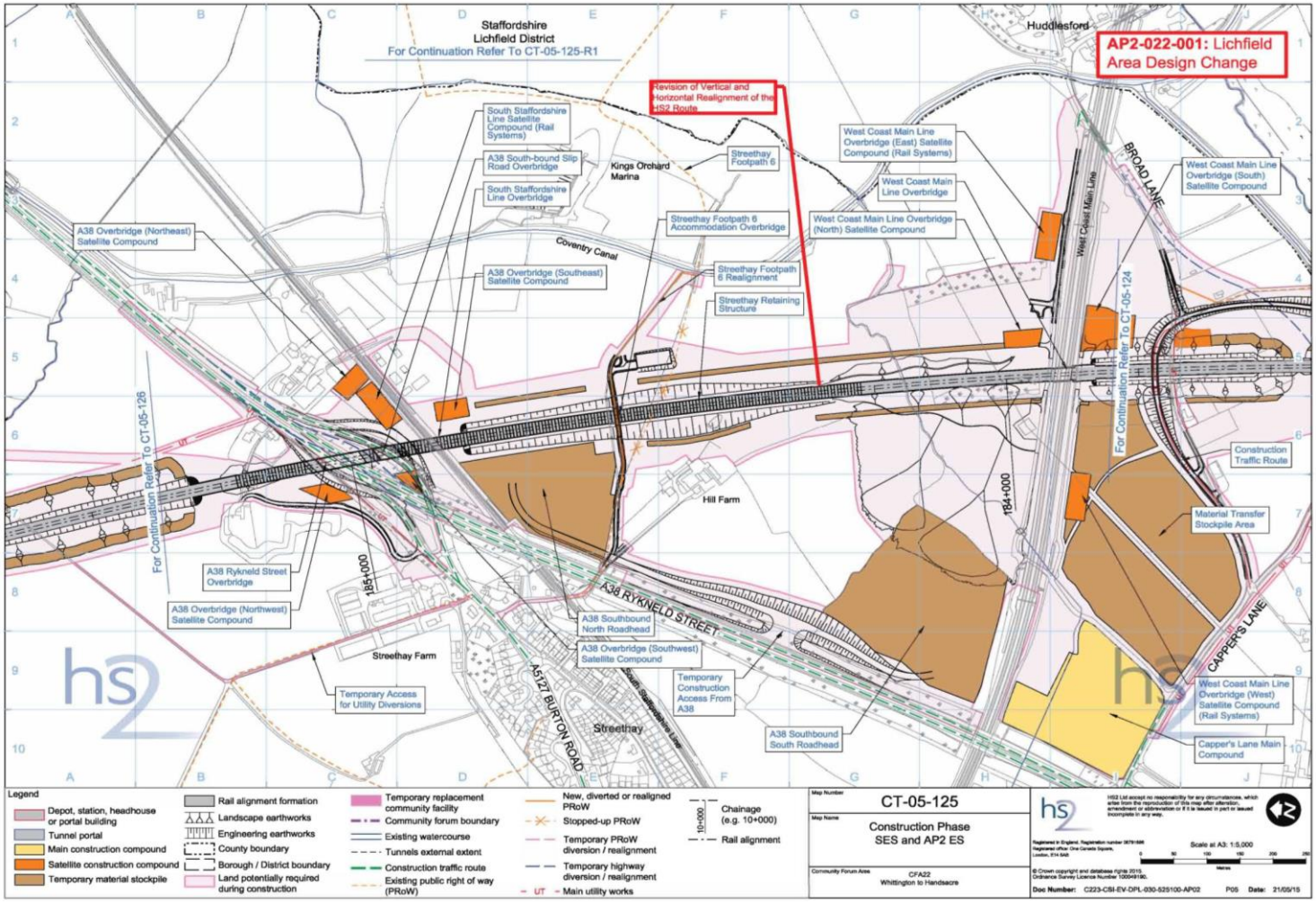
3 Overview of asset

3.1.1 The A38 Rykneld Street overbridge and associated aspects of HS2 are covered within the main ES (as amended). In Volume 3.2 “Plans” this element of work falls within two work numbers:

- Work No. 3/89A; and
- Work No. 3/89D.

3.1.2 The construction works associated with the overbridge are described in Section 4.3.6 and Section 6.3.26 - 6.3.29, 16.4.1, 16.4.8, and 16.4.13 of the SES and AP2 ES Volume 2 – CFA 22, Whittington to Handsacre.

Figure 1: Area context map showing A38 Rykneld Street overbridge (Source: SES and AP2 ES, CFA 22 Map Book)



3.1.3 The existing A38 Rykneld Street is a main road connecting Birmingham and Sutton Coldfield in the south to Lichfield and Fradley before continuing north to Burton upon Trent and Derby. It is a two-lane dual carriageway subject to the national speed limit. Adjacent to the northbound carriageway there is a footway, 1.8m in width, segregated with a grass verge of varying width. The A38 Streethay interchange is a merge and diverge facility located approximately 3km east of Lichfield on the eastern extent of Streethay and provides a southbound slip road and northbound slip road only. The nearest all movement junctions are located at Hilliard's Cross located approximately 1.2 km to the north, and Swinfen interchange located 4km to the south.

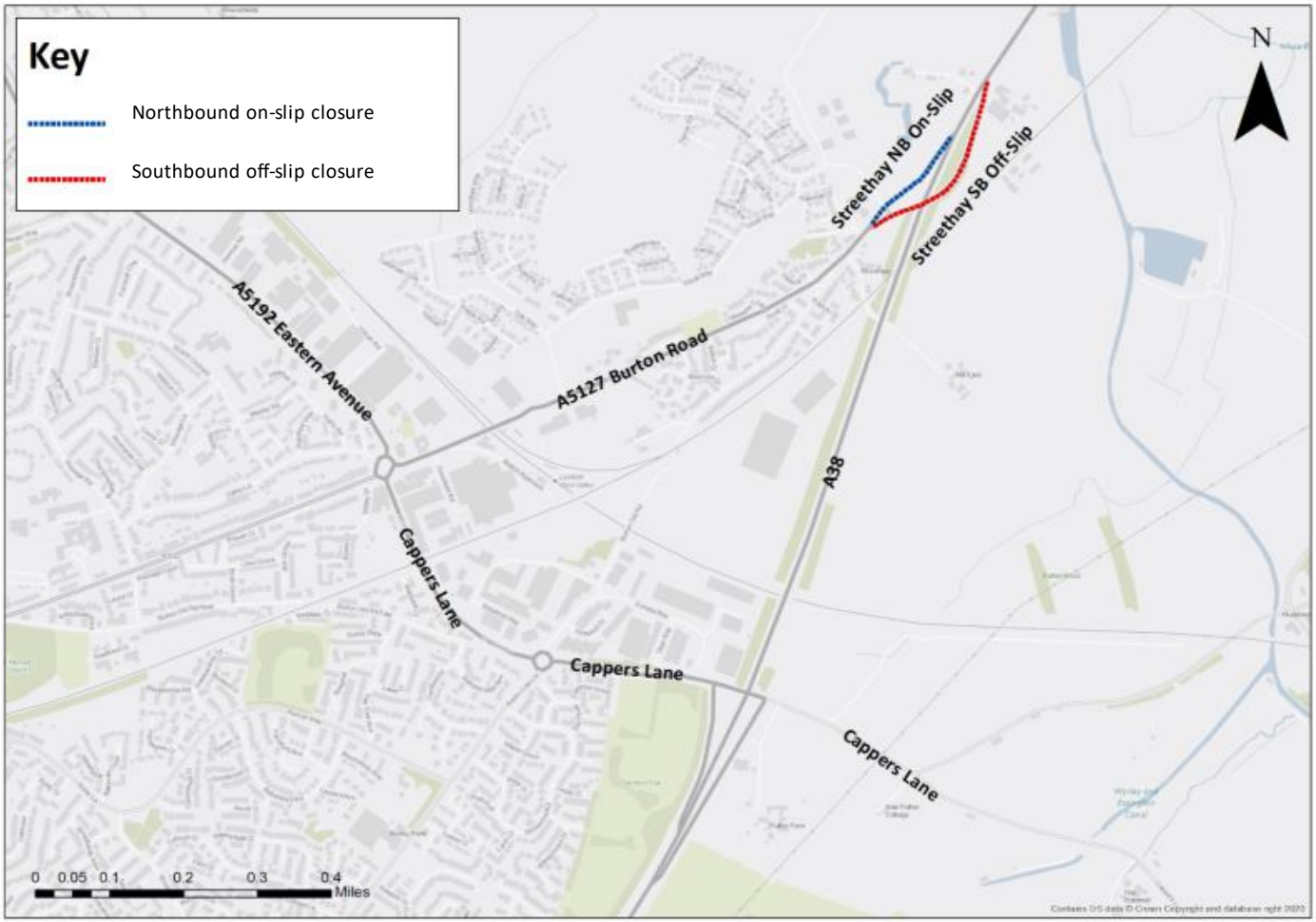
3.1.4 The highway network is fairly rural in nature and is situated north of the M6 Toll. The main ES (as amended) refers to a horse-riding equestrian centre situated directly east of the southbound slip road at Streethay Farm but this is understood to now be permanently closed. There are footpaths located along the western edge of the A38 Rykneld Street, adjoining Thompson Way with no other formal walking facilities within the vicinity of the works.

3.1.5 The area to the east of the site is rural in nature with land to the east being used by an airfield for recreational flying. The area to the southwest and west of the site is characterised by residential and light industrial land uses with the nearest settlement in Streethay and Renov8 Property Ltd located less than 500m west of the site. The area north of the site is characterised by light industrial uses and business parks in Hilliard's Cross. Signs & Vans Vehicle Graphics Co and Autographic Designs are located approximately 300m north-east of the site.

3.1.6 The main ES (as amended) proposed intermittent closures on the northbound slip road and the southbound slip road (limited to nights and weekends) during the 27 month construction period for the A38 Rykneld Street overbridge. Additionally, the main ES (as amended) proposed traffic management including reductions in lane widths for safety and temporary speed restrictions and the use of temporary slip roads.

3.1.7 The current proposed works require a full closure of the northbound slip road. This will initially be concurrent with the closure of the southbound slip road commencing October 2023. The southbound slip road will reopen in April 2024 while the northbound slip road will remain closed (see Table 2 for the duration of closures). The area affected is a stretch of the A5127 Burton Road, approximately 1.32km in length, located between the A5127 Burton Road/Cappers Lane/A5192 Eastern Avenue roundabout and the A38 Streethay interchange and shown in Figure 2.

Figure 2: Northbound slip road and southbound slip road closures



4 Summary of changes at A38 Rykneld Street overbridge

4.1 Changes to the engineering design since the publication of the main ES (as amended)

4.1.1 At detailed design, following review of the Ground Investigation data, parameters were identified that were worse than assumed in the main ES (as amended). Investigation showed that:

- the groundwater levels were higher;
- the Mercia Mudstone can act as a hydraulic barrier; and
- the rock head level was identified as lower than that in the main ES and therefore the developing track drainage design required greater excavation depth in front of the retaining wall.

4.1.2 These factors resulted in the depth of the piles to support the retaining wall increasing.

4.1.3 The geological conditions therefore increased the programme of works beyond what was assumed in the main ES (as amended).

4.2 Changes to the construction methodology since the publication of the main ES (as amended)

4.2.1 The main ES (as amended) assumed that road closures would be limited to overnight and/or weekends.

4.2.2 The proposed works as described in Section 1.2 are the temporary closure of the southbound slip road and northbound slip road and the northbound slip road for a further period. (For the durations of the closures please see Table 2). The A38 will remain open throughout the works. The original construction methodology (i.e., overnight and weekend road closures only, and construction of temporary slip roads) is no longer viable due to changes that have occurred since the main ES (as amended).

4.2.3 There are two key drivers, which drive the need for longer duration road closures compared to the 2015 SES and AP2 ES (the main ES (as amended)).

Table 3: Key northbound and southbound delivery drivers

Key driver	Consequence
Unforeseen ground conditions	The ground conditions, described in 4.1.5 above are different to what was expected in the main ES (as amended). Therefore, longer, and larger

Key driver	Consequence
	diameter piles are required resulting in an increased construction duration.
Changes to utility diversion strategy	Due to the increased construction footprint and the requirement from WPD for a 15m easement instead of the 10m assumed in the main ES; there is insufficient space to accommodate utility provider requirements without significant realignment of the slip road. This includes the number of departures from standard and road geometry under live conditions.

4.2.4 The two drivers highlighted in Table 3, and the complexity of these, require a change to the construction methodology as it is no longer viable in terms of the provisions listed in the main ES (as amended). This is due to their inability to be resolved safely within the existing constraints which include the Environmental Statement compliance, road closure duration, overall programme and safety for the workforce and road users.

4.2.5 The baseline solution is therefore no longer valid due to the updated parameters including pile length and diameter increases (current design) and utility alignment clash with the northbound slip road compared to the original traffic management design.

4.2.6 In addition to the above, restrictions in available space together with a new Western Power Distribution (WPD) substation close to the existing northbound slip road make the construction of temporary slip roads as proposed in the main ES (as amended) unviable.

4.3 Proposed closure details for northbound and southbound slip roads

4.3.1 Measures to control traffic are in place for Stage 1 and have been consulted upon widely locally and put into effect. The routing of diversionary routes for Stage 2 and 3 has been discussed with the Highway Authorities to agree suitable safe routes.

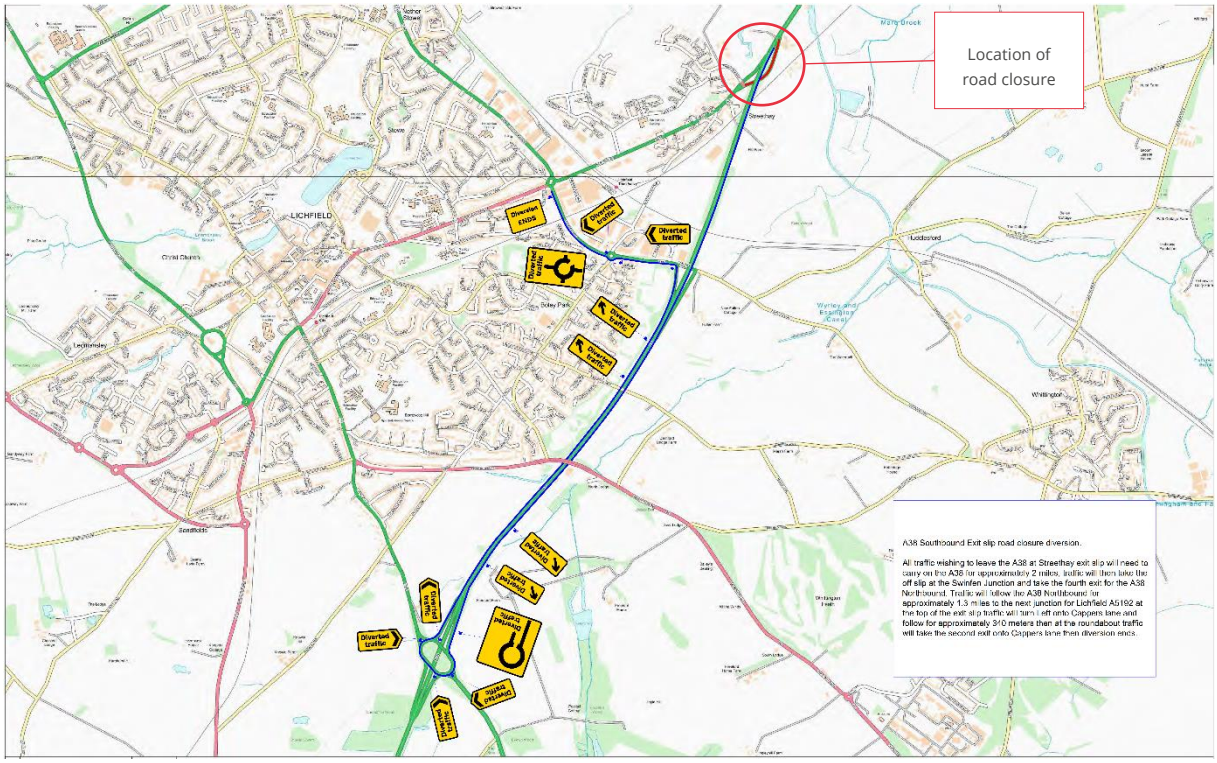
4.3.2 As a result of the above constraints and safety requirements it is necessary to close the northbound slip road and southbound slip road temporarily during construction. It is proposed that in Stage 2 the initial closure of the northbound slip road will be concurrent with the existing Stage 1 closure of the southbound slip road. This will mean that for a 7 month period there will be a temporary closure of both the northbound slip road and the southbound slip road with a diversion for vehicular traffic. This results in the total diversion route due to the southbound slip road closure being 9.3km. The total diversion route due to the northbound slip road closure totals 8km.

4.3.3 The southbound slip road diversion route is unchanged from Stage 1 and is described as follows and shown in Figure 3:

- traffic wishing to head south on the A38 shall continue straight on the Streethay exit/junction. Traffic shall continue along the A38 and be directed to leave the main carriageway at Swinfen interchange;

- at Swinfen interchange, traffic shall turn right, taking the fourth exit back onto the A38 (N). Traffic shall head north to the next junction – Lichfield A5192. Traffic shall be directed to leave the main carriageway at this junction. From the off slip at the T-junction, traffic shall turn left onto Cappers Lane; and
- traffic will continue straight on at the first roundabout. At the next roundabout, the diversion ends.

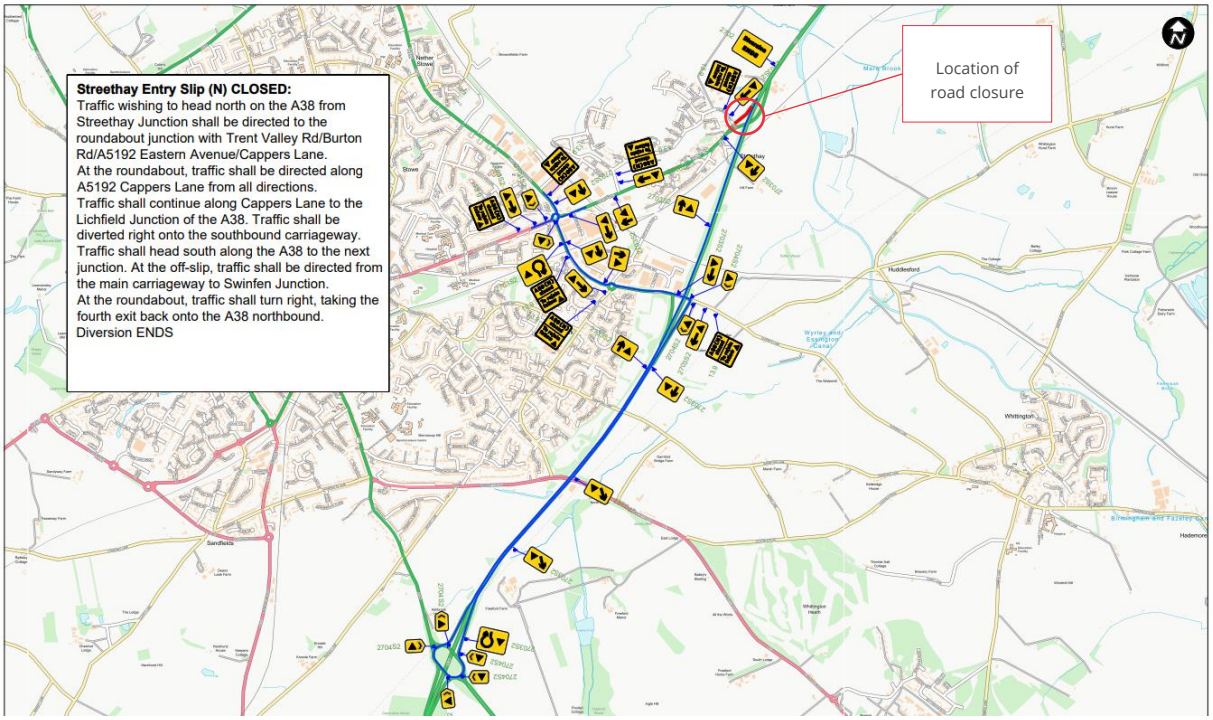
Figure 3: Southbound slip road diversion route



4.3.4 The northbound slip road diversion route is described as follows and shown in Figure 4:

- all traffic heading north on the A38 from Streethay junction will be diverted to the roundabout junction with Trent Valley Road/A5127 Burton Road/A5192 Eastern Avenue/Cappers Lane;
- traffic from all directions will be directed down Cappers Lane at the roundabout. Traffic must continue via Cappers Lane to the A38 Lichfield junction. Traffic will be diverted to the southbound carriageway. Traffic should proceed south on the A38 until the next intersection, where it will be diverted from the main road to Swinfen interchange; and
- at the roundabout, traffic shall complete a U-turn at the fourth exit back onto the A38 northbound.

Figure 4: Northbound slip road diversion route



4.3.5 The proposed closure of the northbound and southbound slip roads will impact public transport services. The routes affected by this diversion are the 12, 12E and X12 which travel between Burton and Lichfield, and the 817, 818, and 819 bus routes which are school routes.

4.3.6 As part of the Streethay works, a footpath located along the western edge of the A38 Rykneld Street, adjoining Thompson Way, will see approximately 200m of its length temporarily closed, with a diversion route of 220m to be implemented. This will divert pedestrian, cycle and horse-riding traffic further west away from the A38 Rykneld Street.

4.3.7 Access will be maintained to all private properties along this stretch as well as all businesses, this includes Autographic Designs, Signs & Vehicle Graphics Co Ltd and Renov8 Property Ltd.

4.3.8 The closure will be planned to avoid cumulative effects with other HS2 related road closures (i.e. proposed other works will be considered and rescheduled if logistic assessment indicates likelihood of cumulative effects with the proposed works detailed in this SEI).

4.3.9 Site working practices will be reviewed periodically and with relevant authorities to enable effective traffic management as part of our local traffic management plans.

4.4 Proposed closure details for closure of northbound slip road

4.4.1 In Stage 3, the southbound slip road will re-open, and the northbound slip road will remain closed with the same diversion for vehicular traffic as in Stage 2 (see Table 2 for the duration of the closures). The distance of the closure for vehicular traffic is approximately 250m from the beginning of the northbound on slip to the end joining with the A38 Rykneld Street; however the total diversion route due to the northbound slip road closure totals 8km.

4.4.2 The proposed closure of the northbound slip road will impact public transport services. The routes affected by this diversion are the 12, 12E and X12 which travel between Burton and Lichfield, and the 817, 818, and 819 bus routes which are school routes.

4.4.3 The diversion route for the northbound slip road and impacts on public transport, pedestrians, cyclists and horse riders are the same as stated above for Stage 2.

4.4.4 The closure will be planned to avoid cumulative effects with any other HS2 related road closures (i.e. proposed other works will be considered and rescheduled if logistic assessment indicates likelihood of cumulative effects with the proposed works detailed in this SEI).

4.4.5 Site working practices will be reviewed periodically and with relevant authorities to enable effective traffic management as part of our local traffic management plans.

4.5 Alternatives considered

4.5.1 Four options were considered with different approaches to construction, and these showed no other mitigation or avoidance was possible. The overview of these options can be seen in Table 4.

4.5.2 The proposed closure is demonstrated to be the safest option for the workforce and road users. It has not been possible to identify a safe design where the slip roads remain open and carriage remains at 40mph due to horizontal alignments, safe stopping distances and required sight lines, and the working area available. It is also the only option that is fully compatible with the utilities scope.

Table 4: Options overview

Name	Construction overview
Baseline*	**Slip roads:** all slip roads remain open, with the construction of a new northbound and southbound slip roads to facilitate the construction of the piles. **Traffic management:** based on a 5-phase traffic management approach, 4-phases of traffic management and a final traffic management to reinstate to original position. **Design:** based on outlined design which excluded chimney ventilation and retaining walls. The piles were 1.3m diameter with depths assumed at 22m and 13.5m. **Safety:** staff working adjacent to live carriageway, access and egress to site. **Customer/Stakeholders:** longer duration of impact, reduced speed limit, travelling adjacent to work area. **Utilities:** existing utilities not diverted prior to works starting, 18" water main exclusion zone required, as instructed by SSW. **EMR:** short term closures compliant with the statement within ES < 4 Week duration.
Short term slip road closures	**Slip roads:** utilises short term closures of the slip roads to allow for traffic to be realigned (<4 weeks), with the construction of a new northbound and southbound slip roads to facilitate the construction of the piles. **Traffic management:** based on a 4-phase approach, 3-phases of traffic management and a final traffic management to reinstate to original position. **Design:** based on the latest designed structure. The piles are 1.3m diameter. Depth is up to 35m and 20m. **Safety:** workforce fatigue during short intense bursts. Confusion and stress to road user with changing TM configuration. **Customer/Stakeholders:** confusion to road user with changing TM configuration, noise and disruption for evening works **Utilities:** SSW non contestable utilities scope can't be achieved during this option. **EMR:** short term closures compliant with the statement within ES < 4 Week duration. Potential negative impact on commuters in and out of Lichfield and Streethay during closures.
Short term slip road closures – accelerated	**Slip roads:** utilises short term closures of the slip roads to allow for traffic to be realigned (<4 weeks), with the construction of a new northbound and southbound slip roads to facilitate the construction of the piles. **Traffic management:** based on a 4-phase approach, 3-phase of traffic management and a final traffic management to reinstate to original position. **Design:** based on the latest designed structure. The piles are 1.3m diameter. Depth is up to 35m and 20m. **Safety:** workforce fatigue from day and evening works. Confusion and stress to road user with changing TM configuration. **Customer/Stakeholders:** confusion to road user with changing TM configuration, noise and disruption for evening works. **Utilities:** SSW non contestable utilities scope can't be achieved during this option.

Name	Construction overview
	EMR: short term closures compliant with the statement within ES < 4 Week duration. Potential negative impact on commuters in and out of Lichfield and Streethay during closures. Environmental impact of high impact work activities on an evening (i.e. piling).
Extended slip road closures	**Slip roads:** both slip roads will be closed for durations longer than 4 weeks. The southbound slip road proposed to be closed for up to 14 months, northbound slip road proposed to be closed for up to 20 months, up to 7 month overlap of both slip roads closed. **Traffic management:** based on a 4-phase traffic management approach, 3-phases of traffic management and a final traffic management to reinstate to original position. **Design:** based on the latest designed structure. The piles are 1.3m diameter. Depth is up to 35m and 20m. **Safety:** slip road closures provides segregation from the public (safety for workforce and general public), minimal evening working. **Customer/Stakeholders:** extended slip road closure, diversion 8km - 9 minutes increase journey time, disruption to bus routes, minimal confusion to road user with consistent road layout, reduced traffic management. **Utilities:** SSW non contestable utilities scope can be achieved during this option. **EMR:** closures non-compliant with the statement within ES < 4 Week duration. Potential negative impact on commuters in and out of Lichfield and Streethay during closures. Potential noise and air quality impacts from traffic on surrounding roads.

Note:

** The baseline solution is no longer valid due to updated parameters including pile length and diameter increases (current design) and utility alignment clash with the northbound slip road compared to the original traffic management design.*

4.6 Topics impacted

4.6.1 Following a review of the combined changes in circumstances detailed in the preceding paragraphs potential new significant effects have been identified with the following topics:

- air quality;
- community;
- health;
- socio-economics;
- sound, noise and vibration; and
- traffic and transport.

4.7 Construction programme

4.7.1 The scope of this assessment is limited to the impacts arising from the northbound slip road and southbound slip road and traffic diversion during Stage 2 and 3 which were not assessed as part of the main ES (as amended). These are temporary impacts during the construction phase only.

4.7.2 Construction phase impacts arising from construction of the A38 Rykneld Street overbridge (given that the construction of the bridge follows relatively standard methods assessed appropriately in the main ES (as amended)) are considered to be as reported in the main ES (as amended) and are not assessed in further detail in this SEI.

5 Assessment of changes at A38 Streethay interchange during slip road closures

5.1 Temporary effects

5.1.1 The proposed changes to the assumptions in the main ES (as amended) relate to the construction phase only and therefore effects will be temporary.

5.1.2 No operational effects are predicted to occur arising from the proposed changes and therefore operational effects are not considered further.

5.1.3 The proposed changes arising from the closure of northbound slip road and southbound slip road in Stage 2 and 3 are anticipated to give rise to the following temporary effects.

5.2 Air quality

Introduction

5.2.1 The assessment scope, key assumptions and limitations for the air quality assessment are as set out in Volume 1, the Scope and Methodology Report[6] (SMR) (Volume 5) and the SMR Addendum[7] (Volume 5) of the main ES (as amended), together with subsequent updates provided in the SES and AP ES. This chapter will review baseline conditions relative to the main ES (as amended), with focus on the existing Lichfield Air Quality Management Area (AQMA) No. 2.

5.2.2 This assessment scope is limited to the potential air quality impacts associated with changes to road traffic during construction as a result of the proposed temporary road closure and traffic diversion, using the Design Manual for Roads and Bridges (DMRB) screening tool in conjunction with the most up to date emission factors produced by the Department for Food and Rural Affairs (DEFRA). No assessment of dust from proposed construction activities have been considered within this assessment, as emissions to the atmosphere would be controlled and managed through the route-wide implementation of the CoCP.

5.2.3 Operationally, the proposed development will remain unchanged from the 2013 ES. As a result, the effect on local air quality from the operation of the proposed development has not changed from the 2013 ES where it was determined as not significant and therefore has not been considered further.

[6] High Speed Two Ltd (2013), High Speed Rail (London – West Midlands) Environmental Statement, *Volume 5 Technical Appendices, Scope and Methodology Report,* CT-001-000/1. Available online at: HS2_London_to_West_Midlands_EIA_Scope_Methodology_Report_revised_0.pdf (publishing.service.gov.uk).

[7] High Speed Two Ltd (2013), High Speed Rail (London – West Midlands) Environmental Statement, *Volume 5 Technical Appendices, Scope and Methodology Report Addendum,* CT-001-000/2. Available online at: Vol5_Scope_and_methodology_report_addendum_CT-001-000.2.pdf (publishing.service.gov.uk).

Scope, assumptions and limitations

Methodology

5.2.4 Applicable numerical limit values and objectives for the proposed development are summarised in Table 5, hereafter referred to as air quality objectives.

5.2.5 It should be noted that the UK air quality objectives only apply at locations where the members of the public might reasonably be exposed to pollutants for the respective averaging periods. Table 6 provides details of where the respective objectives should and should not apply and therefore the types of receptors that are relevant to the assessment.

Table 5: Relevant air quality standards

Pollutants	Averaging period	Air quality objectives and limit values		Attainment date
		Concentration	Allowance	
Nitrogen Dioxide (NO_2)	1-hour	200 µg/m^3	18 per calendar year[c]	31 December 2005[a] 1 January 2010[b]
	Annual	40 µg/m^3	-	31 December 2005[a] 1 January 2010[b]
Particulates (PM_{10})	24-hour	50 µg/m^3	35 per calendar year(d)	31 December 2004[a] 1 January 2005[b]
	Annual	40 µg/m^3	-	31 December 2004[a] 1 January 2005[b]
Particulates ($PM_{2.5}$)	Annual	25 µg/m^3	-	1st January 2015[b]
		20 µg/m^3	-	1st January 2020[b]
		10 µg/m^3	-	2040[e]

Notes:

(a) Air Quality (England) Regulations 2000 as amended.
(b) EU Directive 2008/50/EC on ambient air quality and cleaner air for Europe and The Air Quality Standards Regulations 2010. Derogations (time extensions) have been agreed by the EU for meeting the NO_2 limit values in some zones/agglomerations.

(c) Can be expressed as the 99.79th percentile of 1-hour means.

(d) Can be expressed as the 90.41st percentile of 24-hour means.

(e) Final Environmental Targets under the Environmental Act 2021.

Table 6: Locations where the air quality objectives apply

Averaging period	Objectives should apply at:	Objectives should not apply at:
Annual	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence.

Averaging period	Objectives should apply at:	Objectives should not apply at:
		Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short-term.
24-hour	All locations where the annual mean objective would apply, together with hotels. Gardens of residential properties.	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short-term.
1-hour	All locations where the annual mean and 24 mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend 1-hour or more. Any outdoor locations where members of the public might reasonably be expected to spend 1-hour or longer.	Kerbside sites where the public would not be expected to have regular access.

5.2.6 The assessment has been undertaken using DMRB[8] and Environmental Protection UK (EPUK) guidance in accordance with the SMRs. The latest guidance from EPUK and Institute of Air Quality Management (IAQM) released in 2017 is noted[9]. However, for the purpose of this assessment the EPUK Guidance 2010[10] has been adopted to present comparable results with the main ES (as amended).

Assumptions & limitations

5.2.7 The air quality modelling predictions are associated with an inherent level of uncertainty, primarily a result of:

- uncertainties with traffic data;
- uncertainties with vehicle emission predictions; and
- uncertainties with background air quality maps.

[8] Sustainability & Environment, 2019. Design Manual for Roads and Bridges LA 105 Revision 0.

[9] Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM), January 2017. Land-Use Planning & Development Control: Planning for Air Quality.

[10] Environmental Protection UK (EPUK), November 2010. Development Control: Planning for Air Quality. http://www.iaqm.co.uk/text/guidance/epuk/aq_guidance.pdf.

5.2.8 Model uncertainty can be addressed through the process of model verification. Model verification is a two-step process. Firstly, modelled concentrations are compared with monitored concentrations to identify any disparity. Where disparity occurs, the model inputs are revisited to identify any potential errors or opportunity for improvement of the model. Where disparity remains following the first step, model results can be adjusted to account for systematic bias.

5.2.9 A requirement of model verification is air quality monitoring data in a location that is similar, in terms of road traffic and layout, to the dispersion site and where traffic data for a proposed development is available. In this instance, traffic data, for an appropriate year, was not available for this assessment. On this basis, it has not been possible to carry out a quantitative model verification with the process described above. Following review of the main ES (as amended), analysis concluded that verification of the modelling was not required and therefore not applied. For the purposes of this assessment however, NO_2 model outputs, presented below, have been increased by a factor of 1.5. Applying an adjustment of 1.5 for the proposed development is considered highly conservative based on professional judgment and experience from previous similar assessments. It is likely to result in an overprediction of pollutant concentrations. This approach is considered robust and used for this assessment to determine the likely air quality risks.

5.2.10 In addition, it is assumed that Stage 2 will represent a full year of road closure of the northbound slip road and southbound slip road for DMRB calculation purposes. Results will therefore be considered to be an overestimation as the period of road closure in Stage 2 would only be up to seven months.

Environmental baseline

Overview

5.2.11 Information on air quality has been obtained from DEFRA[11] and LDC[12]. The most recent year of monitoring data available from LDC is for 2020. However, data from 2020 has the potential to be impacted by effects associated with the coronavirus pandemic, such as a reduction in traffic movements resulting in reduced monitored pollutant concentrations. 2020 data may not be representative of normal conditions (likely to be an underestimate) and therefore data from 2019 has been used to inform this assessment.

[11] Department for Environment Food and Rural Affairs. Air Quality Information Resource (Air) Website, available at: http://uk-air.defra.gov.uk/.

[12] Lichfield District Council, December 2021. Annual Status Report 2021. Available at: https://www.lichfielddc.gov.uk/downloads/download/47/air-quality-monitoring-reports.

Main ES Baseline

5.2.12 The main ES (as amended) used one diffusion tube site (A38 at Fradley, A38-2/2(1)). There is no permanent continuous monitoring site within Whittington to Handsacre area.

5.2.13 Measurements of annual mean NO_2 concentrations were above the air quality standard at the A38 at Fradley roadside diffusion tube monitor in 2010. There was no exceedance of annual mean NO_2 in 2008, 2009 or, between 2011 and 2020. However, data from 2020 has the potential to be impacted by effects associated with the coronavirus pandemic, such as a reduction in traffic movements resulting in reduced monitored pollutant concentrations.

Current baseline - local authority monitoring review

5.2.14 Following the monitoring locations presented in the main ES (as amended), continuous and diffusion monitoring operated by LDC have been reviewed based on the proposed development.

5.2.15 There are no automatic monitoring sites operated by LDC in 2019 for NO_2, PM_{10} and $PM_{2.5}$. LDC undertook diffusion tube monitoring at 32 sites (including nine additional sites being added in October 2019) in 2019 which monitored NO_2.

5.2.16 Of these sites, four diffusion tube (A38-2/2(1); LT2; LT3 and LT4) monitoring sites are considered representative of the proposed development. Table 7 presents the locations of these monitoring sites and the available data for NO_2 annual mean concentrations in 2017 and 2021.

Table 7: Representative LDC diffusion tube monitoring results

Site ID	Ordnance survey coordinates (X,Y)	Site type	Approximately distance from the proposed development	Averaging time	Pollutant	Concentration (µg/m³) (Data capture in bracket in %)			
						2017	2018	2019	2020*
A38-2/2(1)	416295, 313186	RS	3.1km north-east	Annual	NO_2	30.9 (>75)@	30.8 (100)	28.6 (100)	21.2 (100)
LT2#	412782, 309774	RS	1.7km south-east	Annual	NO_2	-	-	36.2 (25)#	21.9 (100)
LT3#	412991, 309869	RS	1.4km south-west	Annual	NO_2	-	-	29.3 (25) #	23.0 (94)
LT4#	413183, 309945	RS	1.3km south-west	Annual	NO_2	-	-	31.5 (25) #	20.5 (78)

Source: Lichfield District Council Air Quality Annual Status Report 2021

Note:

RS indicates that the site is classified as roadside.

Annual Air Quality Objective (AQO) of NO_2, PM_{10} and $PM_{2.5}$ are 40µg/m³, 40µg/m³ and 20µg/m³ respectively. 24-hour AQO of PM10 is 50µg/m³. 1-hour AQO of NO2 is 200µg/m³.

** 2020 data presented for information only as the data have the potential to be impacted by effects associated with national lockdowns, such as a reduction in traffic movements resulting in reduced monitored pollutant concentrations.*

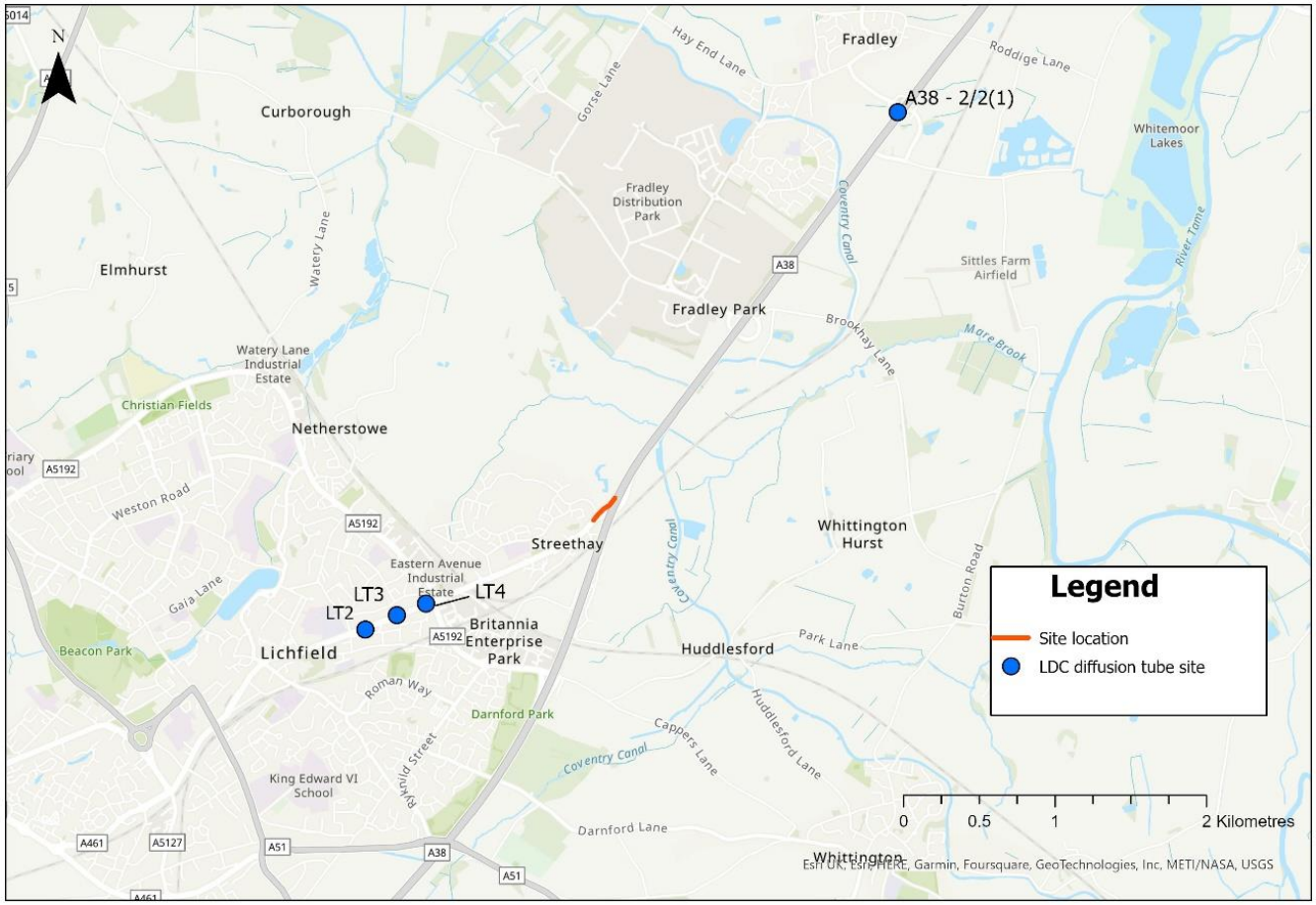
 # LT2, LT3 and LT4 are operated since October 2019.

@ No exact data capture of A38-2/2(1) in 2017 presented in the LDC Air Quality Annual Status Report 2019, which include both 2017 and 2018 data. It only mentioned only one site, B, fell below 75% data capture criteria in 2017 as presented in section 3.2.1 of LDC Air Quality Annual Status Report 2019. Therefore, data capture of A38-2/2(1) was greater than 75% in 2017.

Data capture of NO_2 at these monitoring sites are above 75% between 2017 and 2020, except LT2, LT3 and LT4 are below 75% in 2019.

Annual of NO_2 at these monitoring sites are below relevant AQO between 2017 and 2020.

Figure 5: LDC local authority monitoring sites



DEFRA projected background concentration

5.2.17 DEFRA provides estimates of background pollution concentrations for NO_X, NO_2, PM_{10} and $PM_{2.5}$ across the UK for each 1km grid square for every year from 2018 to 2030. The maps include a breakdown of future background concentrations by emission source, including road and industrial sources, which have been calibrated against 2018 UK monitoring data.

5.2.18 The background concentrations for the 1km grid square containing the proposed development in the current year 2023 are presented in Table 8. The data shows that the maximum background concentrations are all within the relevant objectives.

Table 8: Projected background concentrations (µg/m³) of pollutants (maximum concentrations across proposed development)

Ordnance survey coordinates (X,Y)	Year 2023			
	NOx	NO_2	PM_{10}	$PM_{2.5}$
414500, 310500	17.5	13.0	14.1	8.6

Summary

5.2.19 Monitoring demonstrates that concentrations are below the annual mean NO_2 concentrations within the study area. Annual NO_2 concentrations at A38-2/2(1) show decreasing trend between 2017 and 2019.

5.2.20 DEFRA's TG22[13] indicates that the hourly NO_2 air quality objective of 200µg/m³ (not to be exceeded more than 18 times per year) is unlikely to be exceeded at roadside locations where the annual mean concentration is less than 60µg/m³. The EPUK/IAQM guidance (2017) states that daily mean PM_{10} is unlikely to be exceeded where the annual mean PM_{10} concentrations are below 32µg/m³.

5.2.21 The DEFRA predictions indicate that background concentrations at the proposed development site do not exceed the relevant air quality objectives.

5.2.22 Although site A38-2/2(1) indicates that the NO_2 air quality standard was close to exceedance in 2017, annual NO_2 concentrations at this monitoring site show decreasing trend between 2017 and 2019.

5.2.23 Overall, at receptors affected by proposed development, air quality is considered to meet the relevant air quality objectives.

[13] Department for Environment Food & Rural Affairs (2022), 'Local Air Quality Management Technical Guidance (TG22)'.

Effects arising during construction during closure of northbound and southbound slip roads

Quantitative identification of impacts and effects

5.2.24 The proposed development would close the northbound slip road and southbound slip road (Stage 2), in the Streethay area of Lichfield, to through traffic. For the duration of the closure please see Table 2. The closure would redistribute local traffic around Lichfield and Swinfen areas. Sensitive human health receptors adjacent to A38 Rykneld Street, A5 Watling Street, A51 Upper St John Street and A5127 Birmingham Road are likely to see the largest increase in annual average daily traffic (AADT) traffic movement during the 7 month closure. AADT traffic movements along the northbound slip road and southbound slip road, and A5127 Burton Road would be expected to substantially reduce and only be subject to minor local traffic movements for access.

5.2.25 The DMRB Screening Tool has been used to assess the impacts associated with the predicted changes in traffic movements associated with the proposed development during construction in accordance with DMRB LA 105 screening criteria, Local Air Quality Management – Technical Guidance 2016, with assessment of significance carried out in accordance with the EPUK guidance, 2010. A commitment by HS2 to use only Euro VI heavy goods vehicles (HGVs), Euro 4 petrol and Euro 6 diesel cars and light goods vehicles (LGVs) during construction is noted, however for the purpose of this assessment the standard UK vehicle mix emission assumptions has been incorporated into calculations in order to present a worst-case assessment.

5.2.26 The 2013 ES assessed 14 sensitive human health receptors within 200m of road links which met the DMRB criteria for assessment, with all 14 receptors reported not to be significant. There were no national or European significant designated ecological receptors within the Lichfield and Swinfen areas.

5.2.27 A total of 12 sensitive human health receptors, including five receptors from the 2013 ES, were assessed as they are adjacent to affected road networks (ARNs) within Lichfield and Swinfen areas.

5.2.28 One designated local nature reserve (LNR; Christian Fields LNR) for ecology is within 200m of the ARN of the proposed development. The ARNs are along A5192 Eastern Avenue and during the closures would be subject to reduced AADT traffic movement around 1900. Therefore, the ARNs would cause beneficial effects on the LNR, therefore no further assessment of this ecological receptor is required. The predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations of Stage 2 are presented in Table 9 to Table 11.

Table 9: Projected impacts on NO_2 concentrations at the nearby human health receptors during construction– Stage 2

Receptor location and ID	Ordnance survey coordinates (X, Y)	Annual mean NO_2 concentration (µg/m^3) with background concentration			Impact descriptor	Significance
		Without proposed development	With proposed development	Change in concentration		
A38 Rykneld Street (A1)	414508, 310797	33.3	32.0	-1.3	Negligible	Not significant
Ash Tree Lane (A2)	414317, 310407	21.9	21.9	<0.1	Negligible	Not significant
A5127 Burton Road (A3)	414278, 310464	21.1	16.8	-4.3	Slight Beneficial	Not significant
Humpty Dumpty Day nurseries & pre-school on A5127 Burton Road (A4)	413311, 310000	23.2	16.1	-7.1	Slight Beneficial	Not significant
A38 Rykneld Street (A5)	414019, 309238	14.4	14.9	0.5	Negligible	Not significant
A51 Tamworth Road (A6)	413192, 308357	20.3	21.6	1.3	Negligible	Not significant
A5206 London Road (A7)	412095, 308360	17.9	20.1	2.2	Negligible	Not significant
A51 Birmingham Road (A8)	411500, 308669	18.7	21.1	2.4	Negligible	Not significant
A5127 Birmingham Road (A9)	411456, 307935	13.9	13.7	-0.2	Negligible	Not significant
Old London Road (A10)	412219, 306289	17.1	18.2	1.1	Negligible	Not significant
Watling Street (A11)	410162, 306492	12.4	14.1	1.7	Negligible	Not significant

Receptor location and ID	Ordnance survey coordinates (X, Y)	Annual mean NO_2 concentration (µg/m^3) with background concentration			Impact descriptor	Significance
		Without proposed development	With proposed development	Change in concentration		
A5 Watling Street (A12)	411155, 305894	17.8	18.1	0.3	Negligible	Not significant

Note:

Adjustment factor (1.5) has been applied to the predicted model road traffic outputs. Details refer to Section 5.2.7 to 5.2.8.

Table 10: Projected impacts on PM_{10} concentrations at the nearby human health receptors during construction – Stage 2

Receptor location and ID	Ordnance survey coordinates (X, Y)	Annual mean NO_2 concentration (µg/m^3) with background concentration			Impact descriptor	Significance
		Without proposed development	With proposed development	Change in concentration		
A38 Rykneld Street (A1)	414508, 310797	20.5	20.0	-0.5	Negligible	Not significant
Ash Tree Lane (A2)	414317, 310407	16.9	16.9	<0.1	Negligible	Not significant
A5127 Burton Road (A3)	414278, 310464	16.5	15.3	-1.2	Negligible	Not significant
Humpty Dumpty Day nurseries & pre-school on A5127 Burton Road (A4)	413311, 310000	15.7	14.2	-1.5	Negligible	Not significant
A38 Rykneld Street (A5)	414019, 309238	14.5	14.6	0.1	Negligible	Not significant
A51 Tamworth Road (A6)	413192, 308357	15.9	16.2	0.3	Negligible	Not significant
A5206 London Road (A7)	412095, 308360	13.6	14.0	0.4	Negligible	Not significant
A51 Birmingham Road (A8)	411500, 308669	13.6	14.1	0.5	Negligible	Not significant
A5127 Birmingham Road (A9)	411456, 307935	12.4	12.6	0.2	Negligible	Not significant
Old London Road (A10)	412219, 306289	15.8	16.0	0.2	Negligible	Not significant
Watling Street (A11)	410162, 306492	13.9	14.3	0.4	Negligible	Not significant

Receptor location and ID	Ordnance survey coordinates (X, Y)	Annual mean NO_2 concentration (µg/m^3) with background concentration			Impact descriptor	Significance
		Without proposed development	With proposed development	Change in concentration		
A5 Watling Street (A12)	411155, 305894	15.5	15.5	<0.1	Negligible	Not significant

Note:

Adjustment factor (1.5) has been applied to the predicted model road traffic outputs. Details refer to Section 5.2.7 to 5.2.8.

Table 11: Projected impacts on $PM_{2.5}$ concentrations at the nearby human health receptors during construction – Stage 2

Receptor location and ID	Ordnance survey coordinates (X, Y)	Annual mean $PM_{2.5}$ concentration (µg/m³) with background concentration			Impact descriptor	Significance
		Without proposed development	With proposed development	Change in concentration		
A38 Rykneld Street (A1)	414508, 310797	12.2	11.9	-0.3	Negligible	Not significant
Ash Tree Lane (A2)	414317, 310407	10.1	10.1	<0.1	Negligible	Not significant
A5127 Burton Road (A3)	414278, 310464	9.9	9.2	-0.7	Negligible	Not significant
Humpty Dumpty Day nurseries & pre-school on A5127 Burton Road (A4)	413311, 310000	9.5	8.6	-0.9	Negligible	Not significant
A38 Rykneld Street (A5)	414019, 309238	8.8	8.9	0.1	Negligible	Not significant
A51 Tamworth Road (A6)	413192, 308357	9.8	10.0	0.2	Negligible	Not significant
A5206 London Road (A7)	412095, 308360	8.7	8.9	0.2	Negligible	Not significant
A51 Birmingham Road (A8)	411500, 308669	8.8	9.1	0.3	Negligible	Not significant
A5127 Birmingham Road (A9)	411456, 307935	7.9	8.0	0.1	Negligible	Not significant
Old London Road (A10)	412219, 306289	9.5	9.6	0.1	Negligible	Not significant
Watling Street (A11)	410162, 306492	8.6	8.8	0.2	Negligible	Not significant

Receptor location and ID	Ordnance survey coordinates (X, Y)	Annual mean $PM_{2.5}$ concentration (µg/m³) with background concentration			Impact descriptor	Significance
		Without proposed development	With proposed development	Change in concentration		
A5 Watling Street (A12)	411155, 305894	9.4	9.4	<0.1	Negligible	Not significant

Note:

Adjustment factor (1.5) has been applied to the predicted model road traffic outputs. Details refer to Section 5.2.7 to 5.2.8.

5.2.29 NO_2, PM_{10} and $PM_{2.5}$ annual mean concentrations are predicted to be within the relevant air quality standards during the Stage 2 closure. As the annual mean NO_2 concentrations are predicted to be below 60µg/m^3, the hourly mean standard is also expected to be met. Similarly, since the annual mean PM_{10} concentrations are predicted to be below 32µg/m^3, the daily mean standard is also expected to be met as indicated by EPUK/IAQM guidance (2017).

5.2.30 Two slight beneficial impacts are predicted for annual mean NO_2 concentrations, on A5127 Burton Road (one residential and one nursery & pre-school). Negligible impacts are predicted at all remaining human receptors for annual mean NO_2 and for all PM_{10} and $PM_{2.5}$ concentrations.

Assessment of significant effects

5.2.31 No significant air quality effects are anticipated at any receptor in relation to NO_2, PM_{10} and $PM_{2.5}$ concentrations as a result of the proposed development.

Mitigation measures

5.2.32 Mitigation measures set out in the main ES (as amended) will be applied. No additional mitigation measures are required.

Effects arising during construction during closure of northbound slip road

Quantitative identification of impacts and effects

5.2.33 Stage 3 closure comprises closure of the northbound slip road only, in the Streethay area of Lichfield. For the duration of the closure please see Table 2. The closure would redistribute local traffic around the Lichfield and Swinfen areas. Sensitive human health receptors adjacent to A38 Rykneld Street, A5 Watling Street, A51 Upper St John Street and A5127 Birmingham Road are likely to see the largest increase in AADT traffic movement during the 20 month closure. AADT traffic movements along the southbound slip road and A5127 Burton Road would be expected to substantially reduce and only be subject to minor local traffic movements for access.

5.2.34 The DMRB Screening Tool has been used to assess the impacts associated with the predicted changes in traffic movements associated with the proposed development. Details are presented in Section 5.2.24.

5.2.35 The 2013 ES assessed 14 sensitive human health receptors within 200m of road links which met the DMRB criteria for assessment, with all 14 receptors reported not to be significant. There were no nationally or European significant designated ecological receptors within the Lichfield and Swinfen areas.

5.2.36 A total of 12 sensitive human health receptors, including five receptors from the 2013 ES, were assessed as they are adjacent to affected road networks within Lichfield and Swinfen areas. One designated LNR (i.e. Christian Fields LNR) for ecology is within 200m of the ARN of the proposed development. The ARNs are along A5192 Eastern Avenue and with reduced AADT movement around 1300. Therefore, the ARNs would cause beneficial effects on this LNR and therefore no further assessment of this ecological receptor is required. The predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations for Stage 3 are presented in Table 12 to Table 14.

Table 12: Projected impacts on NO_2 concentrations at the nearby human health receptors during construction – Stage 3

Receptor location and ID	Ordnance survey coordinates (X, Y)	Annual mean NO_2 concentration (µg/m³) with background concentration			Impact descriptor	Significance
		Without proposed development	With proposed development	Change in concentration		
A38 Rykneld Street (A1)	414508, 310797	33.3	32.9	-0.4	Negligible	Not significant
Ash Tree Lane (A2)	414317, 310407	21.9	21.9	<0.1	Negligible	Not significant
A5127 Burton Road (A3)	414278, 310464	21.1	18.8	-2.3	Slight Beneficial	Not significant
Humpty Dumpty Day nurseries & pre-school on A5127 Burton Road (A4)	413311, 310000	23.2	19.4	-3.8	Slight Beneficial	Not significant
A38 Rykneld Street (A5)	414019, 309238	14.4	14.7	0.3	Negligible	Not significant
A51 Tamworth Road (A6)	413192, 308357	20.3	20.9	0.6	Negligible	Not significant
A5206 London Road (A7)	412095, 308360	17.9	18.9	1.0	Negligible	Not significant
A51 Birmingham Road (A8)	411500, 308669	18.7	19.8	1.1	Negligible	Not significant
A5127 Birmingham Road (A9)	411456, 307935	13.9	12.6	-1.3	Negligible	Not significant

Receptor location and ID	Ordnance survey coordinates (X, Y)	Annual mean NO_2 concentration (µg/m^3) with background concentration			Impact descriptor	Significance
		Without proposed development	With proposed development	Change in concentration		
Old London Road (A10)	412219, 306289	17.1	17.6	0.5	Negligible	Not significant
Watling Street (A11)	410162, 306492	12.4	13.2	0.8	Negligible	Not significant
A5 Watling Street (A12)	411155, 305894	17.8	17.9	0.1	Negligible	Not significant

Note:

Adjustment factor (1.5) has been applied to the predicted model road traffic outputs. Details refer to Section 5.2.7 to 5.2.8.

Table 13: Projected impacts on PM_{10} concentrations at the nearby human health receptors during construction – Stage 3

Receptor location and ID	Ordnance survey coordinates (X, Y)	Annual mean PM_{10} concentration (µg/m³) with background concentration			Impact descriptor	Significance
		Without proposed development	With proposed development	Change in concentration		
A38 Rykneld Street (A1)	414508, 310797	20.5	20.3	-0.2	Negligible	Not significant
Ash Tree Lane (A2)	414317, 310407	16.9	16.9	<0.1	Negligible	Not significant
A5127 Burton Road (A3)	414278, 310464	16.5	15.8	-0.7	Negligible	Not significant
Humpty Dumpty Day nurseries & pre-school (A4)	413311, 310000	15.7	14.9	-0.8	Negligible	Not significant
A38 Rykneld Street (A5)	414019, 309238	14.5	14.6	0.1	Negligible	Not significant
A51 Tamworth Road (A6)	413192, 308357	15.9	16.0	0.1	Negligible	Not significant
A5206 London Road (A7)	412095, 308360	13.6	13.8	0.2	Negligible	Not significant
A51 Birmingham Road (A8)	411500, 308669	13.6	13.9	0.3	Negligible	Not significant

Receptor location and ID	Ordnance survey coordinates (X, Y)	Annual mean PM_{10} concentration (µg/m³) with background concentration			Impact descriptor	Significance
		Without proposed development	With proposed development	Change in concentration		
A5127 Birmingham Road (A9)	411456, 307935	12.4	12.4	<0.1	Negligible	Not significant
Old London Road (A10)	412219, 306289	15.8	15.9	0.1	Negligible	Not significant
Watling Street (A11)	410162, 306492	13.9	14.1	0.2	Negligible	Not significant
A5 Watling Street (A12)	411155, 305894	15.5	15.5	<0.1	Negligible	Not significant

Note:

Adjustment factor (1.5) has been applied to the predicted model road traffic outputs. Details refer to Section 5.2.7 to 5.2.8.

Table 14: Projected impacts on $PM_{2.5}$ concentrations at the nearby human health receptors during construction – Stage 3

Receptor location and ID	Ordnance survey coordinates (X, Y)	Annual mean $PM_{2.5}$ concentration (µg/m³) with background concentration			Impact descriptor	Significance
		Without proposed development	With proposed development	Change in concentration		
A38 Rykneld Street (A1)	414508, 310797	12.2	12.0	-0.2	Negligible	Not significant
Ash Tree Lane (A2)	414317, 310407	10.1	11.7	1.6	Negligible	Not significant
A5127 Burton Road (A3)	414278, 310464	9.9	9.6	-0.3	Negligible	Not significant
Humpty Dumpty Day nurseries & pre-school on A5127 Burton Road (A4)	413311, 310000	9.5	9.0	-0.5	Negligible	Not significant
A38 Rykneld Street (A5)	414019, 309238	8.8	8.8	<0.1	Negligible	Not significant
A51 Tamworth Road (A6)	413192, 308357	9.8	9.9	0.1	Negligible	Not significant
A5206 London Road (A7)	412095, 308360	8.7	8.8	0.1	Negligible	Not significant
A51 Birmingham Road (A8)	411500, 308669	8.8	8.9	0.1	Negligible	Not significant
A5127 Birmingham Road (A9)	411456, 307935	7.9	7.9	<0.1	Negligible	Not significant
Old London Road (A10)	412219, 306289	9.5	9.6	0.1	Negligible	Not significant
Watling Street (A11)	410162, 306492	8.6	8.7	0.1	Negligible	Not significant
A5 Watling Street (A12)	411155, 305894	9.4	9.4	<0.1	Negligible	Not significant

Note:

Adjustment factor (1.5) has been applied to the predicted model road traffic outputs. Details refer to Section 5.2.7 to 5.2.8.

5.2.37 NO_2, PM_{10} and $PM_{2.5}$ annual mean concentrations are predicted to be within the relevant air quality standards for Stage 3. As the annual mean NO_2 concentrations are predicted to be below 60µg/m^3, the hourly mean standard is also expected to be met. Similarly, since the annual mean PM_{10} concentrations are predicted to be below 32µg/m^3, the daily mean standard is also expected to be met as indicated by EPUK/IAQM guidance (2017).

5.2.38 Two slight beneficial impacts are predicted for annual mean NO_2 concentrations, on A5127 Burton Road (one residential and one nursery & pre-school). Negligible impacts are predicted at all remaining human receptors for annual mean NO_2 and for all PM_{10} and $PM_{2.5}$ concentrations.

Assessment of significant effects

5.2.39 No significant air quality effects are anticipated at any receptor in relation to NO_2, PM_{10} and $PM_{2.5}$ concentrations as a result of the proposed development.

Mitigation measures

5.2.40 Mitigation measures set out in the main ES (as amended) will be applied. No additional mitigation measures have been identified.

Summary of likely impacts and significant effects during closure of slip roads

5.2.41 Impacts associated with annual mean NO_2 are considered to be slight beneficial to negligible for the proposed development. Impacts due to PM_{10} and $PM_{2.5}$ concentrations are considered to be negligible for the proposed development.

5.2.42 In line with the 2013 ES, no significant air quality effects are anticipated at any receptor in relation to NO_2, PM_{10} and $PM_{2.5}$ concentrations as a result of the proposed development.

5.3 Community

Introduction

5.3.1 The environmental baseline relevant to the community assessment is described below. Any new or different likely significant environmental effects as a result of the changes introduced in Section 2 are then identified, compared to those reported in the main ES (as amended).

Scope, assumptions and limitations

5.3.2 The assessment scope and methodology for this section of the report is consistent with the method set out in Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2) of the main ES (as amended).

Methodology

5.3.3 The relevant CFA report for this area was reviewed to determine where significant effects were previously identified. The CFA report from the main ES (as amended), relevant to this assessment is CFA 22 (Whittington to Handsacre). The proposed temporary closure of the northbound slip road and southbound slip road was compared against the relevant aspects of the Phase One scheme to determine whether there would be new or different significant adverse effects on local communities.

5.3.4 Potential impacts relevant to the community assessment fall broadly within the following categories:

- demolition/construction, direct loss of land and impacts on property;
- intrusion/disturbance to communities and community resources caused by other environmental impacts; and
- physical and perceived isolation of community resources and communities as a result of construction activities and the route of the proposed works.

5.3.5 The study area for this assessment is 500m from the northbound and southbound slip roads.

5.3.6 The study area includes receptors or resources that could be affected by a combination of significant residual effects, such as noise, vibration, construction dust, poor air quality and visual intrusion. In addition, the study area has regard to the proposed diversion of traffic and takes account of catchment areas for community facilities which could be affected. Overall, the study area is taken as the area of land which encompasses the likely significant effects of the proposed works.

Assumptions & limitations

5.3.7 The assessment scope, key assumptions and limitations for the community assessment are set out in Volume 1, the SMR (see Volume 5: Appendix CT-001-000/1) and the SMR Addendum (see Volume 5: Appendix CT-001-000/2). This report follows the standard assessment methodology, with the addition of the following locally relevant assumption that due to the large number and relatively high density of cafes, restaurants, and public houses in the study area, impacts on these resources are only considered where the nearest alternatives are over 1km away.

5.3.8 The assessment scope and methodology for this section of the report is consistent with the method set out in Volume 1, the SMR (Volume 5: Appendix CT-001-000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2) of the main ES (as amended).

Environmental baseline

5.3.9 The study area is a mix of residential and light industrial land uses with the nearest settlement in Streethay located less than 500m west of the site. The area north of the site is

characterised by light industrial uses and business parks in Hilliard's Cross. Streethay Primary School and Roman Heights Playground are located to the west of the scheme and are beyond the area of land required for construction of the scheme. A number of residential properties on the edge of Streethay are situated within the boundary of land required for the scheme. Streethay falls within the catchment area for schools and health facilities at Lichfield which are beyond the study area for this assessment.

5.3.10 There are a number of recreational facilities to the east of the scheme at Streethay, including Streethay Wharf and the recently opened Kings Orchard Marina on the banks of the Coventry Canal.

5.3.11 The main ES (as amended) assumed that the northbound slip road and southbound slip road closures would be limited to overnight and/or weekend. The main ES (as amended) did not identify any significant effects for community in relation to the slip closures.

Effects arising during construction during closure of northbound and southbound slip roads

Avoidance and mitigation measures

5.3.12 The CoCP includes a range of provisions that will help mitigate community effects associated with construction within this area (see Volume 5: Appendix CT-003-000).

5.3.13 The re-routing of road traffic due to the proposed temporary closure of A38 northbound and southbound slip roads has considered alternative options and determined that the proposed route is the best option. There are no options to provide mitigation at source from the alternative routes used.

Assessment of significant effects

5.3.14 There is not expected to be any additional land take required as a result of the temporary closure of the northbound slip road and southbound slip road. There are also not expected to be any significant in-combination effects arising from a combination of air quality, sound, noise and vibration, traffic and transport and visual effects.

5.3.15 The total diversion route due to the southbound slip road closure is 9.3km, taking 11 minutes. The total diversion route due to the northbound slip road closure totals 8km, taking 8 minutes. There are community resources located to the west and south of the northbound and southbound slip roads, however since motor vehicles can use the diversion, no significant motorised user severance effects are expected. Moreover, Streethay Primary School is anticipated to be predominantly accessed by those living within Streethay, and therefore the slip road closures are not anticipated to impact access to the school.

5.3.16 During the closure of the northbound and southbound slip roads, bus routes will be rerouted. Buses will partially follow the diversion and will add approximately 6 minutes to the journey time. The community of Streethay will still be served by bus services and

therefore an isolation effect is not anticipated. A number of routes used by school children will also be impacted, however no additional severance effects are anticipated. Impacts on bus routes are assessed in traffic and transport, paragraphs 5.7.25 to 5.7.28 and 5.7.35.

5.3.17 For the northbound slip road closure, approximately 200m of the pedestrian footway will be temporarily closed. A temporary diversion of the footpath will be created west of the A38 and will be approximately 220m long. The journey length for pedestrians will increase by 20m. This footpath does not connect to any community resources and as such no significant non-motorised user severance effect is expected.

5.3.18 No community effects are anticipated as a result of the temporary closure of A38 northbound and southbound slip roads at Streethay.

Mitigation measures

5.3.19 Mitigation measures set out in the main ES (as amended) will be applied.

5.3.20 BBV will liaise with the local authority and bus company to monitor impacts on bus services.

Effects arising during construction during closure of northbound slip road

Avoidance and mitigation measures

5.3.21 The CoCP includes a range of provisions that will help mitigate community effects associated with construction within this area (see Volume 5: Appendix CT-003-000).

5.3.22 The re-routing of road traffic due to the proposed temporary closure of northbound slip road has considered alternative options and determined that the proposed route is the best option. There are no options to provide mitigation at source from the alternative routes used.

Assessment of significant effects

5.3.23 There is not expected to be any additional land take required as a result of the temporary closure of the northbound slip road. There are also not expected to be any significant in-combination effects arising from a combination of air quality, sound, noise and vibration, traffic and transport and visual effects.

5.3.24 The total diversion route due to the northbound slip road closure totals 8km, taking 8 minutes. There are community resources located to the west and south of the northbound and southbound slip roads, however since motor vehicles can use the diversion, no significant motorised user severance effects are expected. Moreover, Streethay Primary School is anticipated to be predominantly accessed by those living within Streethay, and therefore the slip road closures are not anticipated to significantly impact access to the school.

5.3.25 For the northbound slip road closure, approximately 200m of the pedestrian footway will be temporarily closed. A temporary diversion of the footpath will be created west of the A38 and will be approximately 220m long. The journey length for pedestrians will increase by 20m. This footpath does not connect to any community resources and as such no significant non-motorised user severance effect is expected.

5.3.26 No community effects are anticipated as a result of the temporary closure of A38 northbound and southbound slip roads at Streethay.

Mitigation measures

5.3.27 Mitigation measures set out in the main ES (as amended) will be applied. No additional mitigation measures have been identified.

5.4 Health

Introduction

5.4.1 The environmental baseline relevant to the health assessment is described below. Any new or different likely significant environmental effects as a result of the changes introduced in Section 2 are then identified, compared to those reported in the main ES (as amended).

Scope, assumptions and limitations

Methodology

5.4.2 The health assessment is based on a review of evidence linking changes in health determinants to potential health outcomes. The strength of evidence varies; for example, the evidence linking physical activity to health outcomes is strong, whereas the evidence linking social capital with health outcomes is moderate. The strength of evidence does not necessarily determine the importance of a health effect but is an indication of the level of certainty in the assessment. Additionally, there is greater certainty in the prediction of an impact on a health determinant than the consequent effect on health.

5.4.3 In the absence of a specific EIA SMR on health accompanying the main ES (as amended), the scope, methodology, assumptions, and limitations for this health assessment were drawn from the SMR for HS2 Phase 2b ("the Phase 2b SMR") [14].

5.4.4 The Phase 2b SMR sets out a methodology for describing the impacts on health determinants in terms of the magnitude and duration of the change and the extent of the

[14] High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester) Equality Impact Assessment, Scope and Methodology Report. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1049562/M351.pdf.

population exposed to this change. It also draws attention to the strength of evidence that links a change in health determinant with health effects. This framework permits the assessment to describe the impacts on determinants in a largely qualitative manner, with some structure to the relative scale of these impacts to give a sense of the importance of the potential health effects. This does not, however, provide a clear basis for drawing conclusions as to whether a health effect is likely to be 'significant'.

Assumptions & limitations

5.4.5 The health effects of the Phase One scheme were reported in a route-wide health impact assessment (HIA)[15] as there was no requirement for health impacts to be included within the main ES (as amended), at the time. Therefore, the HIA does not provide a directly comparable baseline for this SEI to be assessed against. Since then, the Town and Country Planning (EIA) Regulations 2017 set out a requirement for consideration of health impacts within EIA as a specific topic chapter.

5.4.6 This assessment considers the impacts of the proposed road closure and diversion on a range of environmental and socio-economic 'health determinants', which could result in adverse or beneficial effects on health and wellbeing. Based on this a professional judgement was made to identify those effects on population health and wellbeing that were sufficiently important to report within the health assessment sections found in this report.

5.4.7 The study area for this assessment is 500m from the A38 northbound and southbound slip roads.

5.4.8 The health determinants of relevance within the study area are neighbourhood quality; access to services, health, and social care; education; access to green space, recreation and physical activity and social capital.

Environmental baseline

5.4.9 The study area is a mix of residential and light industrial land uses with the nearest settlement in Streethay located less than 500m west of the site. The area north of the site is characterised by light industrial uses and business parks in Hilliard's Cross.

5.4.10 There is a public house, a primary school and a small play park at Streethay, both to the west of the scheme and beyond the area of land required for its construction. Streethay falls within the catchment area for schools and health facilities at Lichfield which are beyond the study area for this assessment.

5.4.11 Streethay Primary School and Roman Heights Playground are located to the west of the scheme and are beyond the area of land required for construction of the scheme. A number of residential properties on the edge of Streethay are situated within the boundary of the

[15] High Speed Two (2013) Health impact assessment for Phase One (London – West Midlands). Available at: Health_impact_assessment.pdf (publishing.service.gov.uk).

land required for the scheme. Streethay falls within the catchment area for schools and health facilities at Lichfield which are beyond the study area for this assessment.

5.4.12 There are a number of recreational facilities to the east of the scheme at Streethay, including Streethay Wharf and the recently opened Kings Orchard Marina on the banks of the Coventry Canal.

5.4.13 The 2013 HIA reported that changes to employment status and income associated with the revised scheme have the potential to influence the health of the local communities. This was assessed at a route wide level.

5.4.14 In relation to the local environment (encompassing changes to landscape character, access to open space and fear of crime) no specific health effects were expected to arise in the vicinity of the northbound slip road and southbound slip road at Streethay.

5.4.15 The 2013 HIA also reported no likely health effects in relation to air quality.

Effects arising during construction during closure of northbound and southbound slip roads

Avoidance and mitigation measures

5.4.16 The CoCP includes a range of provisions that will help mitigate health effects associated with construction within this area (see Volume 5: Appendix CT-003-000).

5.4.17 The re-routing of road traffic due to the proposed temporary closure of northbound slip road and southbound slip road has considered alternative options and determined that the proposed route is the best option. There are no options to provide mitigation at source from the alternative routes used.

Assessment of effects

5.4.18 There is not expected to be any additional land take required as a result of the temporary closure of the northbound slip road and southbound slip road. There are also not expected to be any significant adverse air quality, traffic and transport or visual effects which would typically combine to result in an effect for health receptors. There are anticipated to be new significant sound, noise and vibration effects on residential properties however these do not combine with any other effects to result in a neighbourhood quality effect.

5.4.19 The total diversion route due to the southbound slip road closure is 9.3km, taking 11 minutes. The total diversion route due to the northbound slip road closure totals 8km, taking 8 minutes. There are health receptors located to the west and south of the northbound and southbound slip roads, however since motor vehicles can use the diversion, no significant motorised user severance effects are expected.

5.4.20 For the northbound slip road closure, approximately 200m of the pedestrian footway will be temporarily closed. A temporary diversion of the footpath will be created west of the A38

and will be approximately 220m long. The journey length for pedestrians will increase by 20m and as such no significant non-motorised user severance effect is expected.

5.4.21 Based on the above information, no new significant health effects are anticipated as a result of the temporary closure of the northbound slip road and southbound slip road compared to the main ES (as amended).

Mitigation measures

5.4.22 Mitigation measures set out in the 2013 HIA will be applied. No additional mitigation measures have been identified.

Effects arising during construction during closure of northbound slip road

Avoidance and mitigation measures

5.4.23 The CoCP includes a range of provisions that will help mitigate health effects associated with construction within this area (see Volume 5: Appendix CT-003-000).

5.4.24 The re-routing of road traffic due to the proposed temporary closure of northbound slip road has considered alternative options and determined that the proposed route is the best option. There are no options to provide mitigation at source from the alternative routes used.

Assessment of effects

5.4.25 There is not expected to be any additional land required as a result of the temporary closure of the northbound slip road and southbound slip road. There are also not expected to be any significant adverse air quality, traffic and transport or visual effects which would typically combine to result in an effect for health receptors. There are anticipated to be new significant sound, noise and vibration effects on residential properties however these do not combine with any other effects to result in a neighbourhood quality effect.

5.4.26 For the northbound slip road closure, approximately 200m of the pedestrian footway will be temporarily closed. A temporary diversion of the footpath will be created west of the A38 and will be approximately 220m long. The journey length for pedestrians will increase by 20m and as such no significant non-motorised user severance effect is expected.

5.4.27 Based on the above information, no new significant health effects are anticipated as a result of the temporary closure of the northbound slip road compared to the 2013 HIA (as amended).

Mitigation measures

5.4.28 Mitigation measures set out in the 2013 HIA will be applied. No additional mitigation measures have been identified.

5.5 Socio-economics

Introduction

5.5.1 The environmental baseline relevant to the socio-economics assessment is described below. Any new or different likely significant environmental effects as a result of the changes introduced in Section 2 are then identified, compared to those reported in the main ES (as amended).

Scope, assumptions and limitations

Methodology

5.5.2 The CFA report and route-wide assessment were reviewed to determine where significant effects were previously identified for the main ES (as amended). The proposed closure and diversion was compared against the relevant aspects of the Phase One scheme to determine whether there would be new or different significant adverse effects on socio-economic receptors. The baseline information has also been reviewed to include up to date available data (data sources are provided).

5.5.3 The need for socio-economic assessment results from the potential for the proposed works to affect:

- existing businesses and community organisation and thus the amount of local employment;
- local economies, including employment; and
- planned growth and development.

5.5.4 The assessment of impact on existing buisnesses is based on professional judgement and guidance from section 13.5 of the SMR.

Assumptions & limitations

5.5.5 In the main ES (as amended), the socio-economic effects of the Phase One scheme were reported at two different levels: a route-wide level reported in Volume 3 of the main ES (as amended), and a localised level, which reported on businesses and observations on potential local economic effects within each CFA report. The CFA report from the main ES (as amended) relevant to this section is CFA 22 (Whittington to Handsacre).

5.5.6 The assessment scope, key assumptions and limitations for the screening of potential significant effects on socio-economic reports as a result of the proposed road closure and diversion is consistent with the method set out in Volume 1, the SMR (Volume 5, Appendix: CT-001-000/1) and the SMR Addendum (Volume 5, Appendix: CT-001-000/2) of the main ES (as amended).

Environmental baseline

5.5.7 Where possible, baseline data has been gathered on demographic character areas (DCA)[16] to provide a profile of local communities. The study area contains Lichfield East and Whittington DCA.

5.5.8 Approximately 7,000 people work in the Lichfield East and Whittington DCA[17].

5.5.9 Within the Lichfield East and Whittington DCA, the top sector of employment was business administration and support services (19%).

5.5.10 In 2021, the unemployment rate in Lichfield East and Whittington DCA was 5% which was lower than for the West Midlands (9%) and England (7%).

5.5.11 According to the 2021 census, in Lichfield East and Whittington DCA 36% had National Vocational Qualification Level 4 (NVQ4) and above, compared to 23% in the West Midlands and 27% in England. In Lichfield East and Whittington DCA, 17% of residents had no qualifications, compared to 27% in the West Midlands and 23% in England.

5.5.12 The area north of the site is characterised by light industrial uses and business parks in Hilliard's Cross. Signs & Vehicle Graphics Co and Autographic Designs are located approximately 300m north-east of the site.

Effects arising during construction during closure of northbound and southbound slip roads

Avoidance and mitigation measures

5.5.13 The CoCP includes a range of provisions that will help mitigate socio-economic effects associated with construction within this area (see Volume 5: Appendix CT-003-000).

5.5.14 The re-routing of road traffic due to the proposed temporary closure of northbound slip road and southbound slip road has considered alternative options and determined that the

[16] DCAs have been determined through an understanding of local context and aim to be aligned as closely as possible to groups of lower super output areas (LSOAs).

[17] Office for National Statistics (2012), *Business Register and Employment Survey 2011.* Available online at: Business Register and Employment Survey (BRES) provisional results - Office for National Statistics (ons.gov.uk).

proposed route is the best option. There are no options to provide mitigation at source from the alternative routes used.

Assessment of significant effects

5.5.15 There is not expected to be any additional land required as a result of the closure and diversion of the northbound slip road and southbound slip road. There are also not expected to be any significant in-combination effects arising from a combination of air quality, sound, noise and vibration, traffic and transport and visual effects. The total diversion route due to the southbound slip road closure is 9.3km, taking 11 minutes. The total diversion route due to the northbound slip road closure totals 8km, taking 8 minutes. There are businesses located to the west and south of the northbound and southbound slip roads, however since motor vehicles can use the diversion, no significant motorised user severance effects are expected.

5.5.16 Autographic Designs and Signs & Vehicle Graphics Co Ltd are located to the north of the southbound slip road closure. Access to these businesses is via the A38 and will be maintained during the period of the road closure.

5.5.17 Due to the closure of the northbound slip road and southbound slip road during construction, customers accessing Signs & Vehicle Graphics Co Ltd and Autographic Designs approaching from Streethay (to the west and south of the closure) who may ordinarily use the northbound slip road proceed to Hillard's Cross and re-join the A38 Southbound to access these businesses will be required to follow the diversion. The ability of Signs & Vehicle Graphics Co Ltd and Autographic Designs to attract new customers may be impaired by the increased journey length. The total diversion route due to the northbound slip road closure totals 8km, taking 8 minutes. The diversion will add 8 minutes to a journey that currently takes 5 minutes. In addition, the return journey will add 11 minutes on to a journey that currently takes 5 minutes. The additional journey time as a result of the diversion will almost triple the existing time it takes to access these businesses from Streethay. For the reasons stated above, the disruption as a result of the proposed works is considered to represent a temporary moderate adverse isolation effect on these businesses. This is a new significant effect.

5.5.18 Renov8 property Ltd is located adjacent to the northbound slip road. Customers accessing the business from Streethay are unlikely to be affected by the closure and therefore no effects are expected on this business.

Mitigation measures

5.5.19 Mitigation measures set out in the main ES (as amended) will be applied. No additional mitigation measures have been identified.

Effects arising during construction during closure of northbound slip road

Avoidance and mitigation measures

5.5.20 The CoCP includes a range of provisions that will help mitigate socio-economics effects associated with construction within this area (see Volume 5: Appendix CT-003-000).

5.5.21 The re-routing of road traffic due to the proposed temporary closure of northbound slip road has considered alternative options and determined that the proposed route is the best option. There are no options to provide mitigation at source from the alternative routes used.

Assessment of significant effects

5.5.22 There is not expected to be any additional land required as a result of the closure and diversion of the northbound slip road and southbound slip road. There are also not expected to be any significant in-combination effects arising from a combination of air quality, sound, noise and vibration, traffic and transport and visual effects.

5.5.23 Autographic Designs and Signs & Vehicle Graphics Co Ltd are located adjacent to the southbound slip road. Access to these businesses is via the A38 and will be maintained during the period of the road closure.

5.5.24 Due to the closure of the northbound slip road and southbound slip road during construction, customers accessing Signs & Vehicle Graphics Co Ltd and Autographic Designs approaching from Streethay (to the west and south of the closure) who may ordinarily use the northbound slip road proceed to Hillard's Cross and re-join the A38 Southbound to access these businesses will be required to follow the diversion. The ability of Signs & Vehicle Graphics Co Ltd and Autographic Designs to attract new customers may be impaired by the increased journey length. The total diversion route due to the northbound slip road closure totals 8km, taking 8 minutes. The diversion will add 8 minutes to a journey that currently takes 5 minutes. In addition, the return journey will add 11 minutes on to a journey that currently takes 5 minutes. The additional journey time as a result of the diversion will almost triple the existing time it takes to access these businesses from Streethay. For the reasons stated above, the disruption as a result of the proposed works is considered to represent a temporary moderate adverse isolation effect on these businesses. This is a new significant effect.

Mitigation measures

5.5.25 Mitigation measures set out in the main ES (as amended) will be applied. No additional mitigation measures have been identified.

5.6 Sound, noise and vibration

Introduction

5.6.1 The environmental baseline relevant to the sound, noise and vibration assessment is described below. Any new or different likely significant environmental effects as a result of the changes introduced in Section 2 are then identified, compared to those reported in the main ES (as amended).

Scope, assumptions and limitations

Methodology

5.6.2 The relevant CFA report for this area was reviewed to determine where significant effects were previously identified. The CFA report from the main ES and AP2 SES relevant to this assessment is CFA 22 (Whittington to Handsacre). The proposed temporary closure of the northbound slip road and southbound slip road was compared against the relevant aspects of the AP2 SES scheme to determine whether there would be new or different significant adverse effects on local communities.

5.6.3 The SMR (Volume 5: Appendix CT-001-000/1) specifies temporary effects as those arising from the construction of, and permanent effects as those from the operation of HS2. These effects may be direct, resulting from the construction or operation of HS2, and/or indirect resulting from, for example, changes in traffic patterns on existing roads or railways that result from the construction or operation of HS2.

5.6.4 The assessment set out in this section has been undertaken in accordance with the relevant methodologies (relating to construction) set out in the SMRs.

5.6.5 This section reports on the likely significant effects on people, primarily where they live ('residential receptors') in terms of a) individual dwellings and b) on a wider community basis, including any shared community open areas as a result of the noise impacts caused by the closure of A38 Rykneld Street and rerouting of road traffic.

5.6.6 In this section 'sound' is used to describe the acoustic conditions which people experience as a part of their everyday lives. The assessment considers how those conditions may change through time and how sound levels and the acoustic character of community areas is likely to be modified through the changes outlined in Section 2. Noise is taken as unwanted sound.

Assumptions & limitations

5.6.7 The calculation of predicted noise levels associated with changes in traffic has included the following assumptions and limitations:

- road traffic noise changes have been calculated using a traffic model;

- construction traffic noise predictions have been presented for receptors within a radius of 50m from affected road links;
- road links of radius of 500m from affected road links have been included in the prediction;
- receptor locations have been based on OS AddressBase Core and in each case where applicable the results presented represent the levels at the façade with the highest noise impact;
- building height information has been derived from OS MasterMap;
- the existing ground height profile has been taken from the DEFRA digital terrain model survey data; and
- a fully reflective (G=0.0) ground assumption has been made given the urban environment.

Environmental baseline

5.6.8 The study area of the traffic noise assessment includes the area bounded at the north by A5192 Eastern Avenue, bounded at the east by A38 Rykneld Street between the northbound slip road and southbound slip road and Swinfen interchange, bounded at the south by A5 Watling Street and bound at the west by Walsall Road/A51 Western Bypass. The study area includes major settlements of residential area mainly at Lichfield, Dimbles, Nether Stowe, Stowe, Boley Park and Darwin Park. The rest of the study area is predominantly rural and characterised by small villages and individual properties.

5.6.9 In most cases, the noise sensitive receptors within the study area the main sources of noise are from the traffic on A38 Rykneld Street, A5127 Burton Road, A5127 Trent Valley Road, A5127 Birmingham Road, A5192 Eastern Avenue, Cappers Lane, Ryknild Street, A51 Upper St John Street, A51 Tamworth Road, Lichfield Southern Bypass, Falkland Road and A416 Sainte Foy Avenue. In some cases, the main source of noise is from traffic on the local roads.

5.6.10 There is no change to the future baseline for construction as reported in the main ES and AP2 SES Appendix SV-003-022[18].

[18] High Speed Two Ltd (2013), High Speed Rail (London – West Midlands) Environmental Statement, Volume 5 Technical Appendices, CFA22 Whittington to Handsacre, Construction assessment, SV-003-022. Available online at: SV-003-022.pdf (nationalarchives.gov.uk)

Effects arising during construction during closure of northbound and southbound slip roads

Avoidance and mitigation measures

5.6.11 Road traffic will be re-routed due to the temporary closure of the northbound slip road and southbound slip road. Alternative options have been considered; however it was determined that the proposed route is the best option.

Quantitative identification of impacts and effects

5.6.12 The SES and AP2 ES indicates there is no significant temporary noise effects from construction traffic impacts in Sections 3.3.9 to 3.3.13, and 3.3.15 of SES and AP2 ES Appendix SV-003-022.

5.6.13 The criteria for determining impact classification derives from the SMR paragraphs 14.3.30 and 14.3.31 that listed the factors that for determination of the significant effects, and the main ES (Volume 5: Appendix SV-003-022) paragraphs 4.3.7 and 4.3.8. Table 15 lists the impact classification.

Table 15: Impact classification for changes in traffic flows

Impact	High existing sound level [1]	Other existing sound level
Minor impact	between 1.0 to 2.9 dB	between 3.0 to 4.9 dB
Moderate impact	between 3.0 to 4.9 dB	between 5.0 to 9.9 dB
Major impact	5.0 dB or more	10.0 dB or more

Note: [1] during the day and night a high existing sound level shall be equal or above $L_{pAeq,16hr}$ 65 dB and equal or above $L_{pAeq,8hr}$ 55 dB respectively.

5.6.14 The change in traffic noise level has been predicted at a reference distance of 10m from the edge of the nearside carriageway resulting from the presence of diverted traffic during the construction phase for a given road based upon traffic information for the proposed works.

5.6.15 The results for all road links considered are presented in Table 16:

- where the potentially significant effect column is highlighted, then a potentially significant effect is identified on nearby communities or individual receptors;
- yellow denotes a minor impact, orange denotes a moderate impact, and red denotes a major impact;
- 'Day' columns refer to Daytime $L_{pAeq,16hr}$ 07:00-23:00 free-field; and
- 'Night' columns refer to Night-time $L_{pAeq,8hr}$ 23:00-07:00 free-field.

Table 16: Assessment of diverted traffic noise levels during construction at Stage 2

Road name	Link	Future baseline sound level (dB)		Stage 2 diverted traffic (dB)		Stage 2 construction road change (dB)		Potentially significant effect	New Potential significant effect ****
		Day	Night	Day	Night	Day	Night		
A38 Rykneld Street between Cappers Lane junction and Swinfen interchange	1069_1081	74.7	65.7	73.4	64.5	-1.3	-1.2	***	Yes
northbound slip road	1021_1401	64.3	56.3	N/A*	N/A*	N/A	N/A	N/A	N/A
northbound slip road	1401_1025	61.6	53.9	N/A*	N/A*	N/A	N/A	N/A	N/A
A38 Rykneld Street southbound between Streethay and Cappers Lane	1701_1702	72.0	63.2	75.4	66.3	+3.4	+3.1	***	Yes
A38 Rykneld Street southbound between Streethay and Cappers Lane	1702_1069	72.0	63.2	75.3	66.2	+3.3	+3.0	***	Yes
A38 southbound slip road	1024_1401	64.8	56.8	N/A*	N/A*	N/A	N/A	N/A	N/A
A38 southbound slip road at A5192 Cappers Lane junction	1029_1069	64.4	56.4	61.3	53.7	-3.0	-2.7	***	Yes
A461 Sainte Foy Avenue between roundabout at Deykin Road/Burwaye Close and The Whytmore	1309_1426	63.4	55.6	64.6	56.6	+1.1	+1.0	SV-A38-S2-C01	Yes
A461 Sainte Foy Avenue between The Whytmore and roundabout at Deykin Road/Burwaye Close	1198_1309	63.2	55.4	64.3	56.4	+1.1	+1.0	SV-A38-S2-C01	Yes
A51 Upper St John Street between access road at King Edward VI School	1323_1524	63.6	55.7	65.0	57.0	+1.4	+1.2	SV-A38-S2-C02	Yes
A51 Upper St John Street between Chapel Lane and King Edward VI School	1052_1323	63.7	55.8	65.0	57.0	+1.3	+1.2	SV-A38-S2-C02	Yes
A51 Upper St John Street between Cherry Orchard and Chapel Lane	1051_1052	63.8	55.9	65.1	57.1	+1.3	+1.1	SV-A38-S2-C02	Yes

Road name	Link	Future baseline sound level (dB)		Stage 2 diverted traffic (dB)		Stage 2 construction road change (dB)		Potentially significant effect	New Potential significant effect ****
		Day	Night	Day	Night	Day	Night		
A51 Upper St John Street between King Edward VI School and Borrowcop Lane	1142_1524	63.9	56.0	65.1	57.1	+1.2	+1.1	SV-A38-S2-C02	Yes
A51 Upper St John Street between King's Hill Road and junction at Shortbutts Lane/A51 Tamworth Road/A5206 London Road	1053_1142	63.5	55.7	64.9	56.9	+1.4	+1.2	SV-A38-S2-C02	Yes
A5127 Birmingham Road between Barlow Street and Co-op Food Store	1622_1639	66.6	58.4	68.1	59.8	+1.5	+1.4	***	Yes
A5127 Birmingham Road between Barlow Street and Knowle Lane	1145_1622	67.5	59.2	68.7	60.3	+1.1	+1.0	***	Yes
A5127 Birmingham Road between Fosseway and roundabout at Falkland Road/Lichfield Southern Bypass	1062_1144	64.7	56.7	65.8	57.7	+1.1	+1.0	SV-A38-S2-C03	Yes
A5127 Birmingham Road between roundabout at Sainte Foy Avenue/The Friary and Fosseway	1144_1287	64.5	56.6	65.7	57.6	+1.1	+1.0	SV-A38-S2-C03	Yes
A5127 Birmingham Road between roundabout at Falkland Road/Lichfield Southern Bypass and Co-op Food store	1062_1639	65.6	57.5	66.9	58.7	+1.3	+1.2	***	Yes
A5127 Burton Road between the northbound slip road and Burton Old Road	1021_1140	67.9	59.6	33.8	28.9	-34.1	-30.7	SV-A38-S2-C04	Yes
A5127 Burton Road between Crossfield Road and Station Approach	1246_1247	66.3	58.2	62.5	54.7	-3.8	-3.4	SV-A38-S2-C04	Yes
A5127 Burton Road between Meadow Croft and Holland Close	1140_1306	65.6	57.5	54.1	47.2	-11.5	-10.3	SV-A38-S2-C04	Yes
A5127 Burton Road between Oak Way and Meadow Croft	1306_1615	65.6	57.5	54.2	47.3	-11.3	-10.2	SV-A38-S2-C04	Yes

Road name	Link	Future baseline sound level (dB)		Stage 2 diverted traffic (dB)		Stage 2 construction road change (dB)		Potentially significant effect	New Potential significant effect ****
		Day	Night	Day	Night	Day	Night		
A5127 Burton Road between roundabout and Crossfield Road	1017_1246	66.4	58.3	62.5	54.8	-3.9	-3.5	SV-A38-S2-C04	Yes
A5127 Burton Road between roundabout and Streethay Primary School	1530_1615	66.0	57.9	60.7	53.1	-5.4	-4.9	SV-A38-S2-C04	Yes
A5127 Trent Valley Road between roundabout and Witley Drive	1017_1250	63.1	55.3	61.7	54.0	-1.4	-1.2	SV-A38-S2-C05	Yes
A5127 Trent Valley Road between Wissage Road and Rowan Close	1302_1467	63.1	55.3	61.7	54.0	-1.5	-1.3	SV-A38-S2-C05	Yes
A5127 Trent Valley Road between Witley Drive and Rowan Close	1250_1467	63.6	55.7	62.1	54.4	-1.5	-1.4	SV-A38-S2-C05	Yes
A5192 Eastern Avenue between Brownsfield Road and Hermes Road	1020_1252	67.6	59.3	66.2	58.1	-1.4	-1.2	SV-A38-S2-C06	Yes
A5192 Eastern Avenue between Curborough Road and Watery Lane	1008_1172	68.5	60.1	67.5	59.2	-1.0	-0.9	SV-A38-S2-C06	Yes
A5192 Eastern Avenue between Gilbert Road and Brownsfield Road	1020_1499	67.5	59.2	66.1	58.0	-1.3	-1.2	SV-A38-S2-C06	Yes
A5192 Eastern Avenue between Netherstowe and Lincoln Close	1009_1431	68.5	60.1	67.2	59.0	-1.2	-1.1	SV-A38-S2-C06	Yes
A5192 Eastern Avenue between Netherstowe and Netherstowe Lane	1009_1324	67.1	58.8	65.8	57.7	-1.3	-1.2	SV-A38-S2-C06	Yes
A5192 Eastern Avenue between Netherstowe and Netherstowe Lane	1267_1324	66.8	58.6	65.4	57.4	-1.4	-1.2	SV-A38-S2-C06	Yes
A5192 Eastern Avenue between Netherstowe Lane and Gilbert Road	1267_1499	67.5	59.2	66.1	58.0	-1.4	-1.2	SV-A38-S2-C06	Yes
A5192 Eastern Avenue between Vulcan Road and roundabout at A5127 Burton Road	1017_1174	67.0	58.8	66.0	57.9	-1.0	-0.9	SV-A38-S2-C06	Yes

Road name	Link	Future baseline sound level (dB)		Stage 2 diverted traffic (dB)		Stage 2 construction road change (dB)		Potentially significant effect	New Potential significant effect ****
		Day	Night	Day	Night	Day	Night		
A5192 Eastern Avenue between Hermes Road and Vulcan Road	1174_1252	67.4	59.1	66.3	58.2	-1.0	-0.9	SV-A38-S2-C06	Yes
A5192 Eastern Avenue between Watery Lane and Lincoln Close	1172_1431	68.5	60.1	67.2	58.9	-1.3	-1.1	SV-A38-S2-C06	Yes
A5206 London Road between A51 Tamworth Road and Lichfield Southern Bypass	1053_1528	65.4	57.4	66.9	58.7	+1.4	+1.3	***	Yes
Claypit Lane between Falkland Road and Fosseway Lane roundabout	1147_1148	58.4	51.0	61.6	53.9	+3.2	+2.9	SV-A38-S2-N01	Yes
Claypit Lane between Fosseway Lane roundabout and Wall Lane	1148_1152	58.7	51.3	63.2	55.4	+4.5	+4.0	SV-A38-S2-N01	Yes
Falkland Road between Agincourt Road and Claypit Lane	1147_1428	66.1	58.0	64.8	56.8	-1.3	-1.2	SV-A38-S2-C12	Yes
Overbridge at A5127 Burton Road to roundabout at Oak Way	1530_1614	66.1	58.0	61.1	53.5	-5.0	-4.5	***	Yes
Overbridge of A5127 Burton Road between Station Approach and roundabout at Oak Way	1247_1614	66.3	58.2	62.1	54.4	-4.2	-3.8	***	Yes
Park Lane between Cappers Lane and Huddlesford Lane	1030_1705	N/A**	N/A**	47.5	41.2	N/A	N/A	***	Yes
Roundabout at A51 Birmingham Road /A461 Sainte Foy Avenue / A5127 Birmingham Road	1046_1287	64.0	56.1	65.2	57.2	+1.2	+1.1	***	Yes
Ryknild Street between Darnford Lane and Heritage Court	1058_1487	63.2	55.4	64.4	56.4	+1.2	+1.0	SV-A38-S2-C07	Yes
Ryknild Street between Gorse Lane and Heritage Court	1176_1487	63.3	55.4	64.5	56.6	+1.2	+1.1	SV-A38-S2-C07	Yes

Road name	Link	Future baseline sound level (dB)		Stage 2 diverted traffic (dB)		Stage 2 construction road change (dB)		Potentially significant effect	New Potential significant effect ****
		Day	Night	Day	Night	Day	Night		
Slip road between A5206 London Road to Cricket Lane	1416_1417	47.7	41.4	42.3	36.5	-5.4	-4.8	***	Yes
Slip road from A38 southbound at Swinfen interchange roundabout	1423_1077	59.0	51.6	62.3	54.5	+3.3	+2.9	***	Yes
Swinfen interchange roundabout	1076_1077	63.6	55.7	62.2	54.5	-1.4	-1.3	***	Yes
Swinfen interchange roundabout at northbound slip road	1076_1618	70.1	61.6	68.6	60.2	-1.5	-1.4	***	Yes
The Friary between Franciscan View/Lichfield Telephone Exchange and roundabout at Swan Road/Monk Close	1155_1535	63.4	55.6	64.7	56.7	+1.2	+1.1	***	Yes
The Friary between slip road at The Friary roundabout and Franciscan View/Lichfield Telephone Exchange	1117_1535	64.8	56.8	65.9	57.8	+1.2	+1.0	SV-A38-S2-C08	Yes
Thompson Way between Yoxall Way and the northbound slip road	1401_1617	42.3	36.6	28.2	23.8	-14.2	-12.8	***	Yes
A51 Upper St John Street between A5127 Birmingham Road and Robert Davies Walk	1048_1294	63.5	55.6	64.8	56.8	+1.3	+1.2	SV-A38-S2-C09	Yes
Wall Lane between Fosseway Lane and Claypit Lane	1152_1153	45.8	39.7	49.9	43.4	+4.1	+3.7	***	Yes
Walsall Road / Queen Street between Lower Sanford Street and Swan Road	1044_1160	42.3	36.5	38.3	33.0	-4.0	-3.6	SV-A38-S2-C10	Yes
Watling Street between A5 Watling Street and Green Lane	1154_1194	55.5	48.4	61.1	53.5	+5.6	+5.1	SV-A38-S2-C11	Yes
Watling Street between Claypit Lane and A5127 Birmingham Road	1150_1425	51.4	44.7	55.8	48.7	+4.4	+4.0	***	Yes

Road name	Link	Future baseline sound level (dB)		Stage 2 diverted traffic (dB)		Stage 2 construction road change (dB)		Potentially significant effect	New Potential significant effect ****
		Day	Night	Day	Night	Day	Night		
Watling Street between Green Lane and Claypit Lane	1150_1194	55.5	48.4	61.3	53.7	+5.8	+5.2	SV-A38-S2-C11	Yes

Note:

** road closure.*

*** no baseline traffic data.*

**** limited number of properties within 50m of the affected road.*

***** justification of the determination of new potential adverse/beneficial significant effect is given in below sections.*

Assessment of significant effects

5.6.16 This section considers the potential new significant effects identified in Table 16 and applies the significance criteria in the SMR to determine if a new significant effect is predicted.

5.6.17 Construction phase diverted traffic is likely to cause beneficial effects on residential receptors along the following local roads:

- A5127 Burton Road between roundabout at A5192 Eastern Avenue and northbound slip road (SV-A38-S2-C04). Approximately 60 residential dwellings and buildings located along this street are forecast to experience moderate to major decrease in traffic noise level for both daytime and night-time periods due to the road closure of both northbound and southbound slip roads. Therefore, a significant beneficial effect is considered to be likely.
- Residential dwellings and buildings on the following streets are forecast to experience a minor decrease in traffic noise levels of between 1 and 2 dB due to the road closure of both northbound and southbound slip roads.
  - A5127 Trent Valley Road between Cappers Lane and Rowan Close (SV-A38-S2-C05). There are approximately 10 non-residential and 110 residential properties located adjacent to the affected road links, therefore, due to the number of properties, a new significant beneficial effect is likely during night-time period.
  - A5192 Eastern Avenue between roundabout at Cappers Lane/A5127 Burton Road and Curborough Road (SV-A38-S2-C06). Approximately 15 non-residential and 350 residential properties including apartments at Ridware House, Shenstone House, Whittington House and Armitage House are located along the affect road links. Due to the number of properties a new significant beneficial effect is likely during both daytime and night-time periods.
  - Falkland Road between Agincourt Road and Claypit Lane (SV-A38-S2-C12). Approximately 9 residential properties are located along the affect road links. Due to the distance (approximately 25m) of the road to the receptor buildings, a new significant beneficial effect is unlikely for both daytime and night-time periods.
- Walsall Road / Queen Street between Lower Sanford Street and Swan Road (SV-A38-S2-C10). Approximately 30 residential dwellings on this street are forecast to experience minor beneficial impacts of between 3 and 5 dB due to localised re-routing of traffic. The receptors on this road would be expected to be dominated by the busy A51 Western by-pass and other road links such as The Friary, hence, taking account of the low magnitude of the predicted traffic noise levels, a new significant beneficial effect is unlikely.

5.6.18 Construction phase diverted traffic is likely to cause adverse effects on residential receptors along the following local roads:

- Residential dwellings and buildings on these streets are above the high existing baseline level of 55 dB(A) for night-time and are forecast to experience a minor increase in traffic

noise levels of between 1 and 2 dB during the night-time period due to localised re-routing of traffic:

- A461 Sainte Foy Avenue between roundabout at Deykin Road/Burwaye Close and roundabout at Limburg Avenue/Falkland Road (SV-A38-S2-C01). Only 1 property is predicted to experience a minor increase in traffic noise level, therefore, a new significant adverse effect is unlikely;
- A51 Upper St John Street between Cherry Orchard and A51 Tamworth Road/A5206 London Road (SV-A38-S2-C02). There would be a new significant adverse effect for 112 residential properties on this road due to the increased noise level due to diverted traffic affecting this number of receptors;
- A5127 Birmingham Road between roundabout at Falkland Road/Lichfield Southern Bypass and roundabout at Sainte Foy Avenue/The Friary (SV-A38-S2-C03). No property is predicted to have a minor increase in traffic noise level during the night-time period, therefore, a new significant adverse effect is unlikely;
- Ryknild Street between Darnford Lane and Gorse Lane (SV-A38-S2-C07). The noise modelling shows 8 properties are predicted a minor increase in traffic noise level during the night-time period, hence, a new significant adverse effect is likely;
- The Friary between slip road at The Friary roundabout and Franciscan View/Lichfield Telephone Exchange (SV-A38-S2-C08). Approximately 10-15 apartments at Franciscan View face to the road are predicted a minor increase in traffic noise level during the night-time period, hence, a new significant adverse effect is likely;
- A51 Upper St John Street between A5127 Birmingham Road and Robert Davies Walk (SV-A38-S2-C09). 13 properties are predicted a minor increase in traffic noise level during night-time period, hence, a new significant adverse effect is likely; and
- Watling Street between A5 Watling Street and Claypit Lane (SV-A38-S2-C11). Residential dwellings and buildings on this street are forecast to experience moderate increases in traffic noise levels of between 5 and 6 dB for both daytime and night-time periods due to localised re-routing of traffic. A new significant adverse effect is likely due to the magnitude of the impact.

5.6.19 The diverted traffic is likely to cause adverse effects for approximately 10 non-residential/residential receptors along the Claypit Lane between Falkland Road and Wall Lane (SV-A38-S2-N01), which at the time of the diversion are likely to be under construction/unoccupied. Although a moderate increase in traffic noise levels of about 5 dB for both daytime and night-time will occur due to the localised re-routing of traffic, taking account of the limited number of receptors, a new significant effect is unlikely.

5.6.20 It has been assessed that the following road links identified in Table 16 are predicted to have no new significant effects:

- A38 Rykneld Street between Cappers Lane junction and Swinfen interchange;
- A38 Rykneld Street southbound between Streethay and Cappers Lane;
- A38 southbound slip road at A5192 Cappers Lane junction;

- A5127 Birmingham Road between roundabout at Falkland Road/Lichfield Southern Bypass and Knowle Lane;
- A5206 London Road between A51 Tamworth Road and Lichfield Southern Bypass;
- Overbridge at A5127 Burton Road to roundabout at Oak Way;
- Overbridge of A5127 Burton Road between Station Approach and roundabout at Oak Way;
- Park Lane between Cappers Lane and Huddlesford Lane;
- Roundabout at A51 Birmingham Road/A461 Sainte Foy Avenue/A5127 Birmingham Road;
- slip road between A5206 London Road to Cricket Lane;
- slip road from A38 southbound at Swinfen interchange;
- Swinfen interchange;
- The Friary between Franciscan View/Lichfield Telephone Exchange and roundabout at Swan Road/Monk Close;
- Thompson Way between Yoxall Way and the northbound slip road;
- Wall Lane between Fosseway Lane and Claypit Lane; and
- Watling Street between Claypit Lane and A5127 Birmingham Road.

5.6.21 Following the application of the significance criteria, there are predicted to be new significant effects in Stage 2 for receptors adjacent to the following road links:

- a moderate beneficial effect at A5127 Burton Road between roundabout at A5192 Eastern Avenue and northbound slip road (SV-A38-S2-C04);
- a minor beneficial effect at A5127 Trent Valley Road between Cappers Lane and Rowan Close (SV-A38-S2-C05);
- a minor beneficial effect at A5192 Eastern Avenue between roundabout at Cappers Lane/A5127 Burton Road and Curborough Road (SV-A38-S2-C06);
- a minor adverse effect at A51 Upper St John Street between Cherry Orchard and A51 Tamworth Road/A5206 London Road (SV-A38-S2-C02);
- a minor adverse effect at Ryknild Street between Darnford Lane and Gorse Lane (SV-A38-S2-C07);
- a minor adverse effect at The Friary between slip road at The Friary roundabout and Franciscan View/Lichfield Telephone Exchange (SV-A38-S2-C08);
- a minor adverse effect at A51 Upper St John Street between Birmingham Road and Robert Davies Walk (SV-A38-S2-C09); and
- a moderate adverse effect at Watling Street between A5 Watling Street and Claypit Lane (SV-A38-S2-C11).

Mitigation measures

5.6.22 Mitigation measures set out in the main ES (as amended) will be applied. No additional mitigation measures have been identified. All adverse effects identified in the Stage 2

assessment are of short-term minor and moderate impact, therefore, no additional mitigation will be required.

Effects arising during construction during closure of northbound slip road

Avoidance and mitigation measures

5.6.23 Road traffic has been re-routed due to the temporary closure of the northbound slip road. Alternative options have been considered, however it was determined that the proposed route is the best option.

Quantitative identification of impacts and effects

5.6.24 The SES and AP2 ES indicates there is no significant temporary noise effect from construction traffic impacts in Sections 3.3.9 to 3.3.13, and 3.3.15 of SES and AP2 ES Appendix SV-003-022.

5.6.25 The criteria for determining impact classification derives from the SMR paragraphs 14.3.30 and 14.3.31 that listed the factors that for determination of the significant effects, and the main ES (Volume 5: Appendix SV-003-022) paragraphs 4.3.7 and 4.3.8. Table 15 lists the impact classification.

5.6.26 Note: [1] during the day and night a high existing sound level shall be equal or above $L_{pAeq,16hr}$ 65 dB and equal or above $L_{pAeq,8hr}$ 55 dB respectively.

5.6.27 The change in traffic noise level has been predicted at a reference distance of 10m from the edge of the nearside carriageway resulting from the presence of diverted traffic during the construction phase for a given road based upon traffic information for the proposed works.

5.6.28 The results for all road links considered are presented in Table 17:

- where the significant effect column is highlighted, then a significant effect is identified on nearby communities or individual receptors;
- yellow denotes a minor impact, orange denotes a moderate impact, and red denotes a major impact;
- ‘Day’ columns refer to Daytime $L_{pAeq,16hr}$ 07:00-23:00 free-field; and
- ‘Night’ columns refer to Night-time $L_{pAeq,16hr}$ 23:00-07:00 free-field.

Table 17: Assessment of diverted traffic noise level during construction at Stage 3

Road name	Link	Future baseline sound level (dB)		Stage 3 construction traffic (dB)		Stage 3 construction road change (dB)		Potentially significant effect	Potential New significant effect ****
		Day	Night	Day	Night	Day	Night		
northbound slip road	1401_1025	61.6	53.9	N/A*	N/A*	N/A	N/A	N/A	N/A
A38 slip road exit to Cappers Lane	1068_1028	63.1	55.3	60.6	53.0	-2.6	-2.3	***	Yes
A38 southbound between Streethay and Capper's Lane	1701_1702	72.0	63.2	75.1	66.0	+3.1	+2.8	***	Yes
A38 southbound between Streethay and Capper's Lane	1702_1069	72.0	63.2	75.0	66.0	+3.1	+2.7	***	Yes
A5127 Burton Road between the northbound slip road and Burton Old Road	1021_1140	67.9	59.6	64.7	56.7	-3.2	-2.9	SV-A38-S3-C01	Yes
A5127 Burton Road between Crossfield Road and Station Approach	1246_1247	66.3	58.2	64.3	56.4	-2.0	-1.8	SV-A38-S3-C01	Yes
A5127 Burton Road between Meadow Croft and Holland Close	1140_1306	65.6	57.5	62.6	54.8	-3.0	-2.7	SV-A38-S3-C01	Yes
A5127 Burton Road between Oak Way and Meadow Croft	1306_1615	65.6	57.5	62.6	54.8	-3.0	-2.7	SV-A38-S3-C01	Yes
A5127 Burton Road between roundabout and Crossfield Road	1017_1246	66.4	58.3	64.7	56.7	-1.8	-1.6	SV-A38-S3-C01	Yes
A5127 Burton Road between roundabout and Streethay Primary School	1530_1615	66.0	57.9	64.1	56.1	-2.0	-1.8	SV-A38-S3-C01	Yes
A5192 Cappers Lane between roundabout at Austin Cote Lane/Europa Way and A38	1028_1059	65.4	57.3	64.3	56.4	-1.1	-0.9	SV-A38-S3-C02	Yes
Claypit Lane between Fosseway Lane roundabout and Wall Lane	1148_1152	58.7	51.3	62.0	54.3	+3.3	+2.9	SV-A38-S3-N01	Yes
Overbridge at A5127 Burton Road to roundabout at Oak Way	1530_1614	66.1	58.0	64.3	56.3	-1.9	-1.7	***	Yes

Road name	Link	Future baseline sound level (dB)		Stage 3 construction traffic (dB)		Stage 3 construction road change (dB)		Potentially significant effect	Potential New significant effect ****
		Day	Night	Day	Night	Day	Night		
Overbridge of A5127 Burton Road between Station Approach and roundabout at Oak Way	1247_1614	66.3	58.2	64.3	56.4	-2.0	-1.8	***	Yes
Park Lane between Cappers Lane and Huddlesford Lane	1030_1705	N/A**	N/A**	47.0	40.8	N/A	N/A	N/A	N/A
Swinfen interchange roundabout	1076_1077	63.6	55.7	62.0	54.3	-1.6	-1.4	***	Yes
Swinfen interchange roundabout at northbound slip road	1076_1618	70.1	61.6	68.7	60.3	-1.4	-1.3	***	Yes
Wall Lane between Fosseway Lane and Claypit Lane	1152_1153	45.8	39.7	48.9	42.5	+3.1	+2.8	***	Yes
Watling Street between A5 Watling Street and Green Lane	1154_1194	55.5	48.4	59.5	52.0	+3.9	+3.5	SV-A38-S3-C03	Yes
Watling Street between Green Lane and Claypit Lane	1150_1194	55.5	48.4	59.7	52.2	+4.2	+3.8	***	Yes

Note:

** road closure.*

*** no baseline traffic data.*

**** limited number of properties within 50m of the affected road.*

***** justification of the determination of new potential adverse/beneficial significant effect is given in below sections.*

Assessment of significant effects

5.6.29 This section considers the potential new significant effects identified in Table 17 and applies the significance criteria in the SMR to determine if a new significant effect is predicted during Stage 3.

5.6.30 The diverted traffic is likely to cause beneficial effects on residential/non-residential receptors along the following local roads:

- A5127 Burton Road between roundabout at A5192 Eastern Avenue and northbound slip road (SV-A38-S3-C01). Approximately 60 residential dwellings and buildings located along this street are forecast to experience moderate to major decrease in traffic noise level for both daytime and night-time periods due to the road closure of northbound slip road. Therefore, there would be a significant beneficial effect; and
- A5192 Cappers Lane between roundabout at Austin Cote Lane/Europa Way and A38 Rykneld Street (SV-A38-S3-C02). Approximately 20 residential dwellings and 5 non-residential buildings on this street are forecast to experience a minor decrease in traffic noise levels of 1.1 dB during daytime due to the road closure of both northbound slip road. However, as the distances between the receptor buildings and the road are mostly more than 10m, taking account of the low magnitude of the predicted traffic noise levels, a significant beneficial effect is unlikely.

5.6.31 The diverted traffic is likely to cause adverse effects on residential receptors along the following local roads:

- Watling Street between A5 Watling Street and Green Lane (SV-A38-S3-C03). Approximately 15 residential dwellings and 3 non-residential building on this street are forecast to experience minor increases in traffic noise levels of between 3 and 4 dB for both daytime and night-time periods due to the localised re-routing of traffic. A potentially significant effect is likely.

5.6.32 The diverted traffic is likely to cause adverse effects on approximately 10 non-residential/residential receptors that the area is likely under construction/unoccupied along the Claypit Lane between Falkland Road and Wall Lane (SV-A38-S3-N01) where the area is under construction. It is expected that a minor increase in traffic noise levels of about 3 dB during the daytime due to the localised re-routing of traffic will occur, taking account of the limited number of receptors, a potentially significant effect is unlikely.

5.6.33 It has been assessed that the following road links identified in Table 17 will experience no new significant effects:

- A38 Rykneld Street slip road exit to Cappers Lane;
- A38 southbound between Streethay and Capper's Lane;
- Overbridge at A5127 Burton Road to roundabout at Oak Way;
- Overbridge of A5127 Burton Road between Station Approach and roundabout at Oak Way;

- Swinfen interchange roundabout;
- Wall Lane between Fosseway Lane and Claypit Lane; and
- Watling Street between Green Lane and Claypit Lane.

5.6.34 Following the application of the significance criteria, there are predicted to be new significant effects in Stage 3 for receptors adjacent to the following road links:

- a minor to moderate beneficial effect at A5127 Burton Road between roundabout at A5192 Eastern Avenue and northbound slip road (SV-A38-S3-C01); and
- a minor adverse effect at Watling Street between A5 Watling Street and Green Lane (SV-A38-S3-C03).

Mitigation measures

5.6.35 Mitigation measures set out in the main ES (as amended) will be applied. No additional mitigation measures have been identified. All adverse effects identified in the Stage 3 assessment are short-term minor and moderate impact; therefore, no additional mitigation will be required.

5.7 Traffic and transport

Introduction

5.7.1 The environmental baseline relevant to the traffic and transport assessment is described below. Any new or different likely significant environmental effects as a result of the changes introduced in Section 2 are then identified, compared to those reported in the main ES (as amended).

Scope, assumptions, and limitations

5.7.2 The assessment scope, key assumptions and limitations for traffic and transport are as set out in Volume 1, the SMR (Volume 5: Appendix CT-001 -000/1) and the SMR Addendum (Volume 5: Appendix CT-001-000/2) of the main ES (as amended). There is no change to the scope, assumptions and limitations as reported in the main ES (as amended).

5.7.3 The scope for this assessment is limited to the effects arising from the temporary closure of the southbound and northbound slip roads of the A38 Streethay interchange under Stage 2 and Stage 3 of the works.

5.7.4 The Stage 2 works will require full closure of the northbound slip road and southbound slip road, while the Stage 3 works will only require closure of the northbound slip road, thus incurring associated vehicle diversions in both instances.

Assumptions & limitations

5.7.5 The assessment was primarily based on traffic flow information presented as part of the Lichfield Transport Model (LTM). Updated traffic survey data for the 2020 year was unavailable due to the COVID-19 pandemic, although it was subsequently agreed with Staffordshire County Council (SCC) that 2020 flows derived directly from the LTM strategic model were appropriate for use.

5.7.6 In light of the COVID-19 Pandemic of 2020, growth factors have not been applied to 2020 modelled traffic flow information, as in consideration of the downturn in travel caused by the pandemic, 2020 flow levels (pre-pandemic) have been maintained for the purpose of providing a robust assessment, as it was considered that these traffic flow levels would exceed those for 2022.

Environmental baseline

5.7.7 The baseline and future baseline for traffic and transport is as described in Volume 2, CFA Report 22 Section 12 of the main ES (as amended). There is no change to the future baseline for construction as reported in the main ES (as amended).

5.7.8 A number of significant impacts were identified in the main ES (as amended) due to various construction works in the CFA 22 area. No major impacts were associated with the A38 Rykneld Street overbridge construction at Streethay, with minor impacts being identified as a result of restricted access arrangements and temporary, overnight and/or weekend closures on Lichfield Road (Whittington), Darnford Lane, Cappers Lane, Broad Lane, A38 Rykneld Street, A515 Lichfield Road and Wood End Lane. The effects of these measures on traffic flows and delays to vehicle occupants, as a result of the diversions or traffic congestion, were considered not significant.

Effects arising during construction during closure of northbound and southbound slip roads

Quantitative identification of impacts and effects

5.7.9 Under the criteria stated within Section 3.4 (traffic flow and delay to vehicle occupants assessment) of the SMR Addendum Annex I: Traffic and Transport Technical Note, the closure of the A38 Streethay interchange, based on the reassignment of traffic as outlined within the LTM strategic model, is expected to affect approximately 14,000 two-way vehicular movements per day on the A5127 Burton Road slip roads.

5.7.10 HGV movements at these locations have not been assessed as part of the strategic modelling exercise. It is expected that potential HGV increases on diversionary routes will be negligible as the A5127 Burton Road does not form a major construction route (no significant effect). HS2 related HGV trip movements are expected to utilise designated haul

roads and have been provided with a dedicated road head onto the A38 south of the A38 Streethay interchange.

5.7.11 Based on AADT traffic flows as output from the strategic model, HS2 related interventions will result in changes in flows across the surrounding road network as highlighted in Table 18.

Table 18: Traffic data summary (Stage 2)

Road corridor	Future baseline AADT	Streethay Stage 2 construction	+/- Change
A38 North of Streethay	64,815	61,756	-3,059
A38 South of Streethay	50,129	61,748	11,619
Cappers Lane	11,936	11,042	-894
A5127 Burton Road	14,517	6	-14,511
London Road	14,189	15,789	1,600
A5127 Birmingham Road	12,662	17,170	4,508

5.7.12 Based on the criteria of Table 9 (Criteria for Stage 2 assessment – traffic flows and delays to vehicle occupants (traffic severance)) within the SMR Addendum Annex I note, the increase in AADT traffic flows is between 30-60% on the A5127 Birmingham Road. Therefore, the magnitude of impact expected on the A5127 Birmingham Road is minor.

5.7.13 Use of the diversion routes is expected to cause an increase of over 4,500 two-way AADT movements on the A5127 Birmingham Road. The traffic flows on A5127 Birmingham Road is approximately 715 two-way vehicular movements per hour during Stage 2 works based on a flat-average 24-hour period. As per SMR Addendum Table 9, this falls into the category of 250-750 vehicles per hour and is therefore considered a medium impact. Therefore, as the Stage 2 falls into the category of '4 months or more', this results in a moderate adverse effect in traffic severance.

5.7.14 All other road corridors fall into the <30% change in traffic flow category and impacts are therefore considered not significant.

5.7.15 Further to the above conclusion, as the A5127 Birmingham Road comprises a major interregional route with little provision for pedestrian or cycle traffic, it is considered unlikely that there would be significant numbers of non-vehicular movements on this road that would be severed by an increase in traffic caused by the Stage 2 scheme.

5.7.16 Routes for the diversion of vehicular movements, as illustrated in Table 18, were considered as part of the strategic modelling exercise, with a minimum margin of traffic change upon certain corridors (>100 additional two-way vehicular movements per day) being used as a means of determining whether these diversionary routes required further assessment. The diversion of vehicular movements also contributed to journeys on other surrounding roads, but as this level of traffic change fell below the minimum margin, they did not warrant further assessment (i.e., no significant effect on traffic severance).

5.7.17 The closure of the A38 Streethay interchange as part of the Stage 2 works will result in a southbound diversion length of 9.3km and a northbound diversion of 8km, affecting approximately 14,000 two-way vehicular movements per day on the A5127 Burton Road.

5.7.18 Based on the criteria of Table 10 (Criteria for Stage 2 assessment – traffic flows and delays to vehicle occupants (traffic diversions)) within the SMR Addendum Annex I note, as the length of the proposed southbound and northbound diversion is expected to be up to 9.3km and 8km respectively, while affecting roads carrying >100 vehicles per day (14,000 two-way AADT vehicular movements), the magnitude of impact is expected to be major. As the number of travellers diverted is expected to affect >10,000 vehicles per day (14,000 two-way AADT vehicular movements)) for a period of '4 months or more', this will result in a new temporary major adverse effect for journey times along the diversion route.

5.7.19 Junction impact assessments have been undertaken in order to consider Streethay Stage 2 construction impacts on key junctions. The junctions assessed were identified through strategic modelling and are summarised in Table 19. This includes a comparison between Future Baseline and Streethay Stage 2 Construction saturation levels expressed as percentage of change.

Table 19: Local junction impact assessment summary

Road	Degree of saturation (%)							
	Future baseline		Streethay Stage 2 construction		% DoS Change		% Change over SMR Criteria (> 85%)	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
A51/Cricket Lane								
A51 (E)	3%	20%	4%	22%	1%	2%	0%	0%
Cricket Lane (S)	53%	63%	58%	70%	5%	7%	0%	0%
A51 (W)	3%	9%	4%	11%	1%	2%	0%	0%
Quarry Hill (N)	28%	17%	30%	20%	2%	3%	0%	0%
A5206/Lichfield Southern Bypass/A51/A5206/Shortbutts Lane/A51 Upper St John Street								
A51 (E)	53%	76%	82%	83%	29%	7%	0%	0%
A5206 (S)	52%	66%	67%	73%	15%	7%	0%	0%
Lichfield southern bypass (W)	60%	38%	70%	46%	10%	8%	0%	0%
Shortbutts Lane (W)	31%	15%	33%	12%	2%	-3%	0%	0%
A51 Upper St John St (N)	61%	76%	84%	86%	23%	10%	0%	1%
A5127 Birmingham Road/Falkland Road/Lichfield Southern Bypass								
A5127 Birmingham Road (N)	51%	44%	62%	67%	11%	23%	0%	0%
Lichfield Southern Bypass (E)	56%	81%	67%	83%	11%	2%	0%	0%
A5127 Birmingham Road (S)	27%	41%	48%	58%	21%	17%	0%	0%
Falkland Road (W)	57%	37%	45%	41%	-12%	4%	0%	0%
A5127 Birmingham Road/Shortbutts Lane								
A5127 Birmingham Road (N)	40%	39%	54%	60%	14%	21%	0%	0%
Shortbutts Lane (E)	12%	15%	13%	11%	1%	-4%	0%	0%
A5127 Birmingham Road (S)	54%	67%	68%	77%	14%	10%	0%	0%
Fosseway (W)	29%	32%	28%	26%	-1%	-6%	0%	0%
A5127 Birmingham Road/Sainte Foy Avenue/Friary Road roundabout								
A5127 Birmingham Road (E)	28%	49%	37%	53%	9%	4%	0%	0%

Road	Degree of saturation (%)							
	Future baseline		Streethay Stage 2 construction		% DoS Change		% Change over SMR Criteria (> 85%)	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
A5127 Birmingham Road (S)	55%	81%	78%	92%	23%	11%	0%	7%
Saint Foy Avenue (W)	43%	36%	53%	39%	10%	3%	0%	0%
Friary Road (N)	49%	43%	72%	51%	23%	8%	0%	0%
A5127 Birmingham Road/A51 Upper St John Street/St John Street								
A5127 Birmingham Road (E)	55%	79%	60%	90%	5%	11%	0%	5%
A51 Upper St John Street (S)	76%	72%	79%	87%	3%	15%	0%	2%
A5127 Birmingham Road (W)	77%	68%	78%	68%	1%	0%	0%	0%
St John Street (N)	78%	79%	67%	77%	-11%	-2%	0%	0%
The Friary arm of the Bowling Green gyratory								
Bowling Green Gyratory (E)	54%	78%	58%	80%	4%	2%	0%	0%
The Friary (S)	55%	76%	60%	82%	5%	6%	0%	0%

5.7.20 As illustrated in Table 19, with the exception of the A5127 Birmingham Road/A416 Sainte Foy Avenue/Friary Road roundabout and the A5127 Birmingham Road/A51 Upper St John Street/St John Street signalised crossroads (as indicated in red in Table 19) the implementation of diversions as part of the Streethay Stage 2 construction works is unlikely to result in significant impacts on the current traffic conditions within the Lichfield area.

5.7.21 Under the criteria of Table 12 (Criteria for Stage 2 assessment – traffic flows and delays to vehicle occupants (traffic congestion), urban) within the SMR Addendum Annex I note, based on the local junction assessments, it was noted that in both the AM and PM Peaks, all of the junctions specified, with the exception of the A5127 Birmingham Road/Sainte Foy Avenue/Friary Road roundabout and the A5127 Birmingham Road/A51 Upper St John Street/St John Street signalised crossroads, operate within capacity with diverted traffic.

5.7.22 The congestion indicators presented at the A5127 Birmingham Road/A416 Sainte Foy Avenue/Friary Road roundabout show that in the PM peak, capacity is at 92-98% and the change is between 5-10%. This is a moderate adverse effect**.**

5.7.23 The congestion indicators presented at A5127 Birmingham Road/A51 Upper St John Street/St John Street signalised crossroads show that in the PM peak, capacity is at 87-92% and the change is between 2-5%. This is a minor adverse effect.

5.7.24 The local highway network currently operates with no significant highway safety issues that will need to be addressed as part of the route diversion. There will be no significant effect for accidents and safety.

5.7.25 There are currently a number of Public Transport bus services, most notably the 12, 12E, 817, 818, 819 and 'X12 Flyer', that travel along the A5127 Burton Road and A38 Rykneld Street via the Streethay junction. These routes travel northbound and southbound on the A38 Rykneld Street between the industrial park at Hilliard's Cross and Lichfield bus station. A summary of these routes is provided in Table 20.

Table 20: Bus service summary

Service number	Route	Frequency		
		Mon - Fri	Saturday	Sunday
12/12E	Burton – Lichfield	2 per hour	2 per hour	N/A
817	Fradley South – Friary School	2 per day (school service)	N/A	N/A
818	Alrewas – Fradley – Friary School	2 per day (school service)	N/A	N/A
819	Hill Ridware – Kings Bromley – Fradley – Lichfield	2 per day (school service)	N/A	N/A
X12	Burton – Lichfield	2 per hour	2 per hour	N/A

5.7.26 The closure of the A38 Streethay interchange as part of the Stage 2 works will result in bus services following the same diversionary routing as vehicular traffic, with a southbound diversion length of 9.3km and a northbound diversion of 8km.

5.7.27 Based on the criteria of Table 6 (Criteria for Stage 2 assessment – public transport delay, urban) SMR Addendum within the Annex I note, as the length of the proposed southbound and northbound diversion is expected to be up to 9.3km and 8km respectively, the magnitude of impact is expected to be major.

5.7.28 As the number of buses diverted is expected to be <8 buses per hour for a period of '>4 weeks', this will result in a new moderate adverse effect for public transport journey times along the diversion route. No rail services are to be affected by the works relating to the A38 Streethay interchange.

5.7.29 As part of the Streethay works, a footpath located along the western edge of the A38 Rykneld Street, adjoining Thompson Way, will see approximately 200m of its length temporarily closed, with a route diversion of approximately 220m to be implemented that will route pedestrian, cycle and horse-riding traffic further west away from the A38 Rykneld Street.

5.7.30 Based on the criteria of Table 19 (Criteria for Stage 2 assessment – severance) within the SMR Addendum Annex I note, as the increase in journey times is expected to be approximately 20m, the magnitude of impact is considered not significant.

Assessment of significant effects

5.7.31 The increase in AADT traffic flows is between 30-60% on the A5127 Birmingham Road. This will have an impact on traffic flows and delays to vehicle occupants (traffic severance) affecting 250-750 vehicles per hour for 4 months or more. This is a moderate adverse effect for traffic severance.

5.7.32 The southbound diversion length of 9.3km and a northbound diversion of 8km will have an impact on traffic flows and delays to vehicle occupants (traffic diversions). As the number of travellers diverted is >10,000 vehicles per day for a period of 4 months or more, there will be a major adverse effect on vehicle delay.

5.7.33 The A5127 Birmingham Road/A416 Sainte Foy Avenue/Friary Road roundabout will experience a moderate adverse effect for traffic flows and delays to vehicle occupants (traffic congestion).

5.7.34 The A5127 Birmingham Road/A51 Upper St John Street/St John Street signalised crossroads will each experience a minor adverse effect for traffic flows and delays to vehicle occupants (traffic congestion).

5.7.35 Five bus services are currently scheduled to operate via the A38 Streethay interchange, although only two of these services are regular operations (2 times per hour) while the remainder are school buses that run twice daily. As per vehicular traffic, bus services are to be diverted via the same route for regular traffic, thus resulting in a diversion length of 9.3km and 8km, which constitutes a major magnitude of effect. However, due to the number of bus services being diverted being <8 buses per hour for a period of '>4 weeks', this will

result in a **moderate adverse effect** for public transport journey times along the diversion route.

5.7.36 These effects are temporary, and only occur during Stage 2 (7 month closure of the A38 Streethay interchange northbound slip road and southbound slip road) and traffic/public transport diversion.

5.7.37 No new or different significant effects are anticipated for vulnerable road users or accidents and safety.

Mitigation measures and residual effects

5.7.38 In addition to the local junction modelling assessments illustrated in the above sections, operational microsimulation modelling has also identified areas where cumulative changes in traffic flow caused by the closures of Stage 2 will result in congestion impacts - the A38 Wall Island, the A38 Hilliard's Cross and the Swinfen interchange.

As such, mitigation measures have been suggested below that can be implemented if required throughout the closure period. It should be noted that these mitigation measures have been developed as a direct response to the Stage 2 closures and are intended only as temporary measures throughout the works period – these mitigation measures have not been created to address any pre-existing congestion concerns at these locations:

Wall Island

- number of lanes increased from 2 to 3 at A5148 approach;
- adjusting northbound flare on A5 Watling Street between roundabouts; and
- removal of left turning traffic from A5 Watling Street West to A5127 Birmingham Road North at Wall Island. This traffic should be diverted along Watling Street to reduce congestion at Wall Island.

Swinfen

- temporary signals on A38 southbound slip road and circulatory movement.

Hilliard's Cross

- close right turn into Wood End Lane.

5.7.39 The mitigation recommended has shown success in alleviating the impact but not eliminating it. It is recommended that the measures suggested are prepared such that they can be used during this closure if required.

5.7.40 As illustrated in Table 19, the diversion of vehicular movements related to the Stage 2 closure are expected to see increases in the congestion indicators for the A5127 Birmingham Road/A416 Sainte Foy Avenue/Friary Road roundabout and the A5127 Birmingham Road/A51 Upper St John Street/St John Street signalised crossroads.

5.7.41 However, in both cases, as the A5127 Birmingham Road/A416 Sainte Foy Avenue/Friary Road roundabout and the A5127 Birmingham Road/A51 Upper St John Street/St John Street signalised crossroads are only pushed marginally over capacity in the Streethay Stage 2 Construction PM Peak, together with physical constraints caused by their location and the use of pre-COVID traffic demand that likely overestimates the current traffic levels, physical mitigation has not been suggested at these junctions.

Effects arising during construction during closure of northbound slip road

Quantitative identification of impacts and effects

5.7.42 Under the criteria stated within the SMR Addendum Section 3.4 (traffic flow and delay to vehicle occupants assessment) of the Annex I: Traffic and Transport Technical Note, the closure of the A38 Streethay interchange, based on the reassignment of traffic as outlined within the LTM strategic model, is expected to affect approximately 7,600 vehicular movements per day on the A5127 Burton Road slip roads.

5.7.43 HGV movements at these locations have not been assessed as part of the strategic modelling exercise, it is expected that potential HGV increases on diversionary routes will be negligible as the A5127 Burton Road does not form a major construction route (no significant effect). HS2 related HGV trip movements are expected to utilise designated haul roads and have been provided with a dedicated road head onto the A38 south of the A38 Streethay interchange.

Based on AADT traffic flows as output from the strategic model, HS2 related interventions will result in the changes in flows across the surrounding road network as highlighted in Table 21.

Table 21: Traffic data summary (Stage 3)

Road corridor	Future baseline AADT	Streethay Stage 3 construction	+/- Change
A38 North of Streethay	64,815	62,909	-1,906
A38 South of Streethay	50,129	55,951	5,822
Cappers Lane	11,936	11,193	-743
A5127 Burton Road	14,517	6,896	-7,621
London Road	14,189	14,861	672
A5127 Birmingham Road	12,662	13,987	1,325

5.7.44 Based on the criteria of Table 9 (Criteria for Stage 2 assessment – traffic flows and delays to vehicle occupants (traffic severance)) within the SMR Addendum Annex I note, the increase in traffic is <30%. Therefore, the magnitude of impact expected on the road corridors outlined in Table 21 is not significant.

5.7.45 Routes for the diversion of vehicular movements, as illustrated in Table 21, were considered as part of the strategic modelling exercise, with a minimum margin of traffic change upon

certain corridors (>100 additional two-way movements per day) being used as a means of determining whether these diversionary routes required further assessment. The diversion of vehicular movements also contributed to journeys on other surrounding roads, but as this level of traffic change fell below the minimum margin, they did not warrant further assessment (i.e. no significant effect on traffic severance).

5.7.46 The closure of the northbound on-slip at the A38 Streethay interchange as part of the Stage 3 works will result in a northbound diversion of 8km, affecting approximately 7,600 vehicular movements per day.

5.7.47 Based on the criteria of Table 10 (Criteria for Stage 2 assessment – traffic flows and delays to vehicle occupants (traffic diversions)) within the SMR Addendum Annex I note, as the length of the proposed northbound diversion is expected to be up to 8km, while affecting roads carrying >100 vehicles per day (over 7,600 vehicles per day), the magnitude of impact is expected to be major.

5.7.48 As the number of travellers diverted is expected to effect is between 1,000 and 10,000 vehicles per day (7,600 vehicles per day) for a period of '4 months or more', this will result in a major adverse effect for journey times along the diversion route.

5.7.49 Junction impact assessments have been undertaken in order to consider Streethay Stage 3 construction impacts on key junctions. The junctions assessed were identified through strategic modelling and are summarised in Table 22. This includes a comparison between Future Baseline and Streethay Stage 3 Construction saturation levels expressed as percentage of change.

Table 22: Local junction impact assessment summary

Road	Degree of saturation (%)							
	Future baseline		Streethay Stage 3 construction		+/- Change		% Change over SMR Criteria (> 85%)	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
A51 Tamworth Road/Cricket Lane								
A51 (E)	3%	20%	4%	22%	1%	2%	0%	0%
Cricket Lane (S)	53%	63%	56%	66%	3%	3%	0%	0%
A51 (W)	3%	9%	2%	10%	-1%	1%	0%	0%
Quarry Hill (N)	28%	17%	29%	19%	1%	2%	0%	0%
A5206/Lichfield Southern Bypass/A51 Tamworth Road/A5206/Shortbutts Lane/A51 Upper St John Street								
A51 (E)	53%	76%	81%	87%	28%	11%	0%	2%
A5206 (S)	52%	66%	69%	66%	17%	0%	0%	0%
Lichfield Southern Bypass (W)	60%	38%	68%	45%	8%	7%	0%	0%
Shortbutts Lane (W)	31%	15%	50%	12%	19%	-3%	0%	0%
A51 Upper St John Street (N)	61%	76%	81%	87%	20%	11%	0%	2%
A5127 Birmingham Road/Falkland Road/Lichfield Southern Bypass								
A5127 Birmingham Road (N)	51%	44%	53%	64%	2%	20%	0%	0%
Lichfield Southern Bypass (E)	56%	81%	56%	91%	0%	10%	0%	6%
A5127 Birmingham Road (S)	27%	41%	30%	44%	3%	3%	0%	0%
Falkland Road (W)	57%	37%	39%	40%	-18%	3%	0%	0%
A5127 Birmingham Road/Shortbutts Lane								
A5127 Birmingham Road (N)	40%	39%	47%	55%	7%	16%	0%	0%
Shortbutts Lane (E)	12%	15%	12%	16%	0%	1%	0%	0%
A5127 Birmingham Road (S)	54%	67%	55%	68%	1%	1%	0%	0%
Fosseway (W)	29%	32%	29%	32%	0%	0%	0%	0%

Road	Degree of saturation (%)							
	Future baseline		Streethay Stage 3 construction		+/- Change		% Change over SMR Criteria (> 85%)	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
A5127 Birmingham Road/A416 Sainte Foy Avenue/Friary Road roundabout								
A5127 Birmingham Rod (E)	28%	49%	33%	53%	5%	4%	0%	0%
A5127 Birmingham Road (S)	55%	81%	60%	82%	5%	1%	0%	0%
Saint Foy Ave (W)	43%	36%	47%	36%	4%	0%	0%	0%
Friary Road (N)	49%	43%	62%	52%	13%	9%	0%	0%
A5127 Birmingham Road/A51 Upper St Johns Street/St Johns Street								
A5127 Birmingham Road (E)	55%	79%	53%	79%	-2%	0%	0%	0%
Upper St John St (S)	76%	72%	79%	75%	3%	3%	0%	0%
A5127 Birmingham Road (W)	77%	68%	78%	64%	1%	-4%	0%	0%
St John St (N)	78%	79%	78%	78%	0%	-1%	0%	0%
The Friary arm of the Bowling Green gyratory								
Bowling Green Gyratory (E)	54%	78%	55%	75%	0%	-3%	0%	0%
The Friary (S)	55%	76%	55%	78%	0%	2%	0%	0%

5.7.50 As illustrated in Table 22, with the exception of the A5206/Lichfield Southern Bypass/A51 Tamworth Road/A5206/Shortbutts Lane/A51 Upper St John Street signalised crossroads and the A5127 Birmingham Road/Falkland Road/Lichfield Southern Bypass roundabout, the implementation of diversions as part of the Streethay Stage 3 construction works is unlikely to result in significant impacts on the current traffic conditions within the Lichfield area.

5.7.51 Under the criteria of Table 12 (Criteria for Stage 2 assessment – traffic flows and delays to vehicle occupants (traffic congestion), urban) within the SMR Addendum Annex I note, based on the local junction assessments, it was noted that in both the AM and PM Peaks, all of the junctions specified, with the exception of the A5206/Lichfield Southern Bypass/A51 Tamworth Road/A5206/Shortbutts Lane/A51 Upper St John Street signalised crossroads and A5127 Birmingham Road/Falkland Road/Lichfield Southern Bypass roundabout, operate within capacity with diverted traffic.

5.7.52 The congestion indicators presented at the A5206/Lichfield Southern Bypass/A51 Tamworth Road/A5206/Shortbutts Lane/A51 Upper St John Street signalised crossroads show that in the PM peak, capacity is at 87-92% and the change is between 2-5%. This is a minor adverse effect.

5.7.53 The congestion indicators presented at A5127 Birmingham Road/Falkland Road/Lichfield Southern Bypass roundabout show that in the PM peak, capacity is at 87-92% and the change is between 5-10%. This is a minor adverse effect.

5.7.54 The local highway network currently operates with no significant highway safety issues that will need to be addressed as part of the route diversion. There will be no significant effect for accidents and safety.

5.7.55 There are currently a number of Public Transport bus services, most notably the 12, 12E, 817, 818, 819 and 'X12 Flyer', that travel along the A5127 Burton Road and A38 Rykneld Street via the Streethay junction. These routes travel north and southbound on the A38 Rykneld Street between the industrial park at Hilliard's Cross and Lichfield bus station. A summary of these routes is provided in Table 23:

Table 23: Bus service summary

Service Number	Route	Frequency		
		Mon – Fri	Saturday	Sunday
12/12E	Burton – Lichfield	2 per hour	2 per hour	N/A
817	Fradley South – Friary School	2 per day (school service)	N/A	N/A
818	Alrewas – Fradley – Friary School	2 per day (school service)	N/A	N/A
819	Hill Ridware – Kings Bromley – Fradley – Lichfield	2 per day (school service)	N/A	N/A
X12	Burton – Lichfield	2 per hour	2 per hour	N/A

5.7.56 The closure of the A38 Streethay interchange as part of the Stage 3 works will result in bus services following the same diversionary routing as vehicular traffic, with a northbound diversion of 8km.

5.7.57 Based on the criteria of Table 6 (Criteria for Stage 2 assessment – public transport delay, urban) SMR Addendum within the Annex I note, as the length of the proposed northbound diversion is expected to be up to 8km, the magnitude of impact is expected to be major.

5.7.58 As the number of buses diverted is expected to be <8 buses per hour for a period of '>4 weeks', this will result in a moderate adverse effect for public transport journey times along the diversion route. No rail services are to be affected by the works relating to the A38 Streethay interchange.

5.7.59 As part of the Streethay works, a footpath located along the western edge of the A38 Rykneld Street, adjoining Thompson Way, will see approximately 200m of its length temporarily closed, with a route diversion of approximately 220m to be implemented that will route pedestrian, cycle and horse-riding traffic further west away from the A38 Rykneld Street.

5.7.60 Based on the criteria of Table 19 (Criteria for Stage 2 assessment – severance) within the SMR Addendum Annex I note, as the increase in journey times is expected to be approximately 20m, the magnitude of impact is considered not significant.

Assessment of significant effects

5.7.61 The northbound diversion of up to 8km will have an impact on traffic flows and delays to vehicle occupants (traffic diversions), affecting the journey times of approximately 7,600 vehicular movements per day. As the number of travellers diverted is expected to be between 1,000 and 10,000 vehicles per day for a period of over 4 months, there will be a major adverse effect on vehicle delay.

5.7.62 There will be a minor adverse effect on traffic congestion at A5206/Lichfield Southern Bypass/A51 Tamworth Road/A5206/Shortbutts Lane/A51 Upper St John Street signalised crossroads and the A5127 Birmingham Road/Falkland Road/Lichfield Southern Bypass roundabout.

5.7.63 Five bus services are currently scheduled to operate via the A38 Streethay interchange, although only two of these services are regular operations (2 times per hour) while the remainder are school buses that run twice daily. As per vehicular traffic, bus services are to be diverted via the same route for regular traffic, thus resulting in a diversion length of 8km, which constitutes a major magnitude of effect. However, due to the number of bus services being diverted being <8 buses per hour for a period of '>4 weeks', this will result in a moderate adverse effect for public transport journey times along the diversion route.

5.7.64 As stated, these effects are temporary, and only occur during the 20 month closure of the northbound slip road and traffic/public transport diversion.

5.7.65 No new or different significant effects are anticipated for traffic severance, vulnerable road users or accidents and safety.

Mitigation measures

5.7.66 In addition to the local junction modelling assessments illustrated in the above sections, operational microsimulation modelling has also identified areas where cumulative changes in traffic flow caused by the closures of Stage 3 will result in congestion impacts - the A38 Wall Island junction.

As such, mitigation measures have been suggested below that can be implemented if required throughout the closure period. It should be noted that these mitigation measures have been developed as a direct response to the Stage 3 closures and are intended only as temporary measures throughout the works period – these mitigation measures have not been created to address any pre-existing congestion concerns at these locations:

Wall Island

- additional Lane on A5148 approach to Wall Island roundabout; and
- flare change along A5127 Birmingham Road.

5.7.67 The mitigation recommended has shown success in alleviating the impact but not eliminating it. It is recommended that the measures suggested are prepared such that they can be used during this closure if required.

5.7.68 As illustrated in Table 22, the diversion of vehicular movements related to the Stage 3 closure are expected to see increases in the congestion indicators for the A5206/Lichfield Southern Bypass/A51 Tamworth Road/A5206/Shortbutts Lane/A51 Upper St John Street signalised crossroads and the A5127 Birmingham Road/Falkland Road/Lichfield Southern Bypass roundabout.

5.7.69 However, as the A5206/Lichfield Southern Bypass/A51 Tamworth Road/A5206/Shortbutts Lane/A51 Upper St John Street signalised crossroads and the A5127 Birmingham Road/Falkland Road/Lichfield Southern Bypass roundabout are only pushed marginally over capacity in the Streethay Stage 3 Construction PM Peak, together with physical constraints caused by their locations and the use of pre-COVID traffic demand that likely overestimates the current traffic levels, physical mitigation has not been suggested at these junctions.

6 Summary of changes to significant effects

6.1 Air quality

Closure of northbound and southbound slip roads

6.1.1 No new significant air quality effects are anticipated at any receptor in relation to NO_2, PM_{10} and $PM_{2.5}$ concentrations as a consequence of the proposed road closure and traffic diversions for Stage 2.

Closure of northbound slip road

6.1.2 No new significant air quality effects are anticipated at any receptor in relation to NO_2, PM_{10} and $PM_{2.5}$ concentrations as a consequence of the proposed road closure and traffic diversions for Stage 3.

6.2 Community

Closure of northbound and southbound slip roads

6.2.1 No new significant community effects are anticipated as a consequence of the proposed road closure and traffic diversions for Stage 2.

Closure of northbound slip road

6.2.2 No new significant community effects are anticipated as a consequence of the proposed road closure and traffic diversions for Stage 3.

6.3 Health

Closure of northbound and southbound slip roads

6.3.1 No new significant health effects are anticipated as a consequence of the proposed road closure and traffic diversions for Stage 2.

Closure of northbound slip road

6.3.2 No new significant health effects are anticipated as a consequence of the proposed road closure and traffic diversions for Stage 3.

6.4 Socio-economics

Closure of northbound and southbound slip roads

6.4.1 A new moderate adverse socio-economic effect is anticipated for Autographic Designs and Signs & Vehicle Graphics Co Ltd due to an increase in journey length for customers.

Closure of northbound slip road

6.4.2 A new moderate adverse socio-economic effect is anticipated for Autographic Designs and Signs & Vehicle Graphics Co Ltd due to an increase in journey length for customers.

6.5 Sound, noise and vibration

Closure of northbound and southbound slip roads

6.5.1 Several new significant sound noise and vibration effects are anticipated as a consequence of the proposed road closure and traffic diversions for Stage 2:

- a **moderate beneficial effect** at A5127 Burton Road between roundabout at A5192 Eastern Avenue and northbound slip road (SV-A38-S2-C04);
- a **minor beneficial effect** at A5127 Trent Valley Road between Cappers Lane and Rowan Close (SV-A38-S2-C05);
- a **minor beneficial effect** atA5192 Eastern Avenue between roundabout at Cappers Lane/A5127 Burton Road and Curborough Road (SV-A38-S2-C06);
- a **minor adverse effect** at A51 Upper St John Street between Cherry Orchard and A51 Tamworth Road/A5206 London Road (SV-A38-S2-C02);
- a **minor adverse effect** at Ryknild Street between Darnford Lane and Gorse Lane (SV-A38-S2-C07);
- a **minor adverse effect** at The Friary between slip road at The Friary roundabout and Franciscan View/Lichfield Telephone Exchange (SV-A38-S2-C08);
- a **minor adverse effect** at A51 Upper St John Street between Birmingham Road and Robert Davies Walk (SV-A38-S2-C09); and
- a **moderate adverse effect** at Watling Street between A5 Watling Street and Claypit Lane (SV-A38-S2-C11).

Closure of northbound slip road

6.5.2 Several new significant sound noise and vibration effects are anticipated as a consequence of the proposed road closure and traffic diversions for Stage 3:

- a **minor to moderate beneficial effect** at A5127 Burton Road between roundabout at A5192 Eastern Avenue and northbound slip road (SV-A38-S3-C01); and

- a **minor adverse effect** at Watling Street between A5 Watling Street and Green Lane (SV-A38-S3-C03).

6.6 Traffic and transport

Closure of northbound and southbound slip roads

6.6.1 There will be a **moderate adverse effect** on traffic severance on the A5127 Birmingham Road during Stage 2.

6.6.2 There will be a **major adverse effect** on traffic delay during Stage 2.

6.6.3 There will be new significant effects on vehicle congestion at two junctions during Stage 2 (closure of northbound and southbound slip roads):

- the A5127 Birmingham Road/A416 Sainte Foy Avenue/Friary Road roundabout will experience a **moderate adverse effect**; and
- the A5127 Birmingham Road/A51 Upper St John Street/St. John Street signalised crossroads will experience a **minor adverse effect**.

6.6.4 There will be a **moderate adverse effect** for public transport journey times along the diversion route during stage 2.

6.6.5 These effects are temporary, and only occur during the Stage 2 road closure and traffic/public transport diversion. For the duration of the closure please refer to Table 2.

6.6.6 No new or different significant effects are anticipated for vulnerable road users or accidents and safety.

Closure of northbound slip road

6.6.7 There will be a **major adverse effect** on traffic delay during Stage 3 (closure of northbound slip road only).

6.6.8 There will be new significant effects on vehicle congestion at two junctions during Stage 3.

- the A5206/Lichfield Southern Bypass/A51 Tamworth Road/A5206/Shortbutts Lane/A51 Upper St John Street signalised crossroads will experience a **minor adverse effect**; and
- the A5127 Birmingham Road/Falkland Road/Lichfield Southern Bypass roundabout will experience a **minor adverse effect**.

6.6.9 There will be a **moderate adverse effect** for public transport journey times along the diversion route during stage 3.

6.6.10 These effects are temporary and occur during the northbound slip road closure and traffic/public transport diversion. For the duration of the closure please refer to Table 2. No new or different significant effects are anticipated for traffic severance, vulnerable road users, or accidents and safety.

6.6.11 No new or different significant effects are anticipated for traffic severance, vulnerable road users, or accidents and safety.

6.7 Other aspects descoped for this assessment

6.7.1 **Accidents and major disasters:** Scoped out as there is no increase in risk of accidents and major disasters compared to the main ES (as amended) assessment as a result of the proposal.

6.7.2 **Agriculture, forestry and soils**: Scoped out as there will be no increase in impact or effect caused by the diversion compared to the main ES (as amended) assessment as a result of the proposal.

6.7.3 **Archaeology and Heritage**: Scoped out. After a review of the proposed changes, it is recommended that the cultural heritage topic be scoped out of the SEI. This is because, though the proposed changes impact on the setting of the scheduled monument and listed buildings, these will not amount to cumulative changes such that the impact could be considered as significant, given the existing context of HS2 and the A38. Therefore, it is unlikely that the proposed changes would result in significant impacts on cultural heritage. It is therefore proposed that the Cultural Heritage topic be scoped out of the SEI.

6.7.4 **Climate:** Scoped out. The impact of Greenhouse Gas (GHG) emissions is scoped because the main predicted impact of the scheme pertains to emissions from temporarily disrupted transport. However, these emissions are not explicitly part of the original scope of the HS2 route-wide effects on GHG emissions. Similarly, diverted traffic is not part of the off-route effects requiring management as part of the construction. Furthermore, given the initial Environment Statement (ES) did not capture emissions arising from disrupted traffic, it would not be possible to compare the current scheme to the original ES. Additionally, it can be reasonably assumed that the additional GHG emissions from traffic diversion in this area are likely to be minimal and therefore not significant to the scheme as a whole. Finally, the route identified minimises the effects of diverted traffic. It is thus unlikely that further mitigation measures can be implemented.

6.7.5 **Climate and in-combination climate impacts:** Scoped out. Climate resilience and in-combination climate impacts (ICCIs) are scoped out because the scheme involves a temporary, short-term diversion which is unlikely to result in any significant climate resilience effects. Climate change projections show little change in climate variables over the period of the scheme and as such, no significant effects of climate change or in-combination climate impacts are expected. Mitigation for potential impacts relating to current weather events, such as flooding and storms, during the lifetime of the scheme are anticipated to be addressed through a Construction Management Plan.

6.7.6 **Cultural Heritage:** Scoped out. After a review of the proposed changes, it is recommended that the cultural heritage topic be scoped out of the SEI. This is because, though the proposed changes impact on the setting of the scheduled monument and listed buildings, these will not amount to cumulative changes such that the impact could be considered as

significant, given the existing context of HS2 and the A38. Therefore, it is unlikely that the proposed changes would result in significant impacts on cultural heritage. It is therefore proposed that the Cultural Heritage topic be scoped out of the SEI.

After a review of the proposed changes, it is recommended that the archaeology topic be scoped out of the SEI. This is because, although the proposed changes impact on the setting of the scheduled monument, this will not amount to cumulative changes such that the impact could be considered as significant, given the existing context of HS2 and the A38. Trial trenching carried out by EWC identified no significant archaeological remains within the vicinity of the proposed changes, as such there will be no additional impacts to buried archaeological remains. Therefore, it is unlikely that the proposed changes would result in significant impacts on archaeology. It is therefore proposed that the archaeology topic be scoped out of the SEI.

6.7.7 **Ecology and biodiversity**: Scoped out as there will be no impact to habitats or species above that already accounted for within the main ES. Any works are within the LLAU, which is considered to have been cleared of all vegetation.

6.7.8 **Electromagnetic interference**: Scoped out as this topic is not relevant to the scope of the proposal.

6.7.9 **Historic Environment:** Scoped out as there will be no increase in impact or effect caused by the diversion compared to the main ES (as amended) assessment as a result of the proposal.

6.7.10 **Land quality:** Scoped out. After a thorough review of the proposed changes, it is recommended that the land quality topic be scoped out of the SEI. This is because the proposed changes are not unlikely to create any new potential sources or pathways that are relevant to the assessment of land quality. Therefore, it is unlikely that the proposed traffic rerouting would result in significant impacts on land quality. It is therefore proposed that the Land Quality topic be scoped out of the SEI.

6.7.11 **Landscape and visual**: Scoped out. There is no change to the vegetation within the affected area caused by the diversion. Visual impacts of increased traffic volumes are negligible.

6.7.12 **Waste and material resources:** Scoped out as this topic is not relevant to the scope of the proposal. No additional waste or resources will be required as a result of the traffic diversion along existing roads.

6.7.13 **Water Resources and Flood Risk (WRFR):** Scoped out. It is recommended that the WRFR section of the SEI has been scoped out of this report due to the limited potential impact of the proposed changes. The closure of a particular lane is a temporary diversion along existing roads, and as such, it is unlikely that there will be any significant impacts to the principal groundwater aquifer at the site. Furthermore, no sensitive surface water receptors have been identified along the proposed works. It is therefore considered unlikely that an increase in traffic as a result of the changes to the scheme will have a significant impact on the food risk or water resources at the site. It is therefore recommended that the WRFR topic is scoped out of the SEI.

6.8 Permanent effects

6.8.1 No permanent effects are identified. The proposed changes to the assumptions in the main ES (as amended) relate to the construction phase only and therefore effects will be temporary.

6.8.2 No operational effects are predicted to occur arising from the proposed changes and therefore operational effects are not considered further.

6.9 Summary of likely significant effects

Closure of northbound and southbound slip roads

6.9.1 A new moderate adverse socio-economic effect is anticipated for Autographic Designs and Signs & Vehicle Graphics Co Ltd due to an increase in journey length for customers.

6.9.2 The following new significant effects have been identified for sound, noise and vibration;

- a moderate beneficial effect at A5127 Burton Road between roundabout at A5192 Eastern Avenue and northbound slip road (SV-A38-S2-C04);
- a minor beneficial effect at A5127 Trent Valley Road between Cappers Lane and Rowan Close (SV-A38-S2-C05);
- a minor beneficial effect atA5192 Eastern Avenue between roundabout at Cappers Lane/A5127 Burton Road and Curborough Road (SV-A38-S2-C06);
- a minor adverse effect at A51 Upper St John Street between Cherry Orchard and A51 Tamworth Road/A5206 London Road (SV-A38-S2-C02);
- a minor adverse effect at Ryknild Street between Darnford Lane and Gorse Lane (SV-A38-S2-C07);
- a minor adverse effect at The Friary between slip road at The Friary roundabout and Franciscan View/Lichfield Telephone Exchange (SV-A38-S2-C08);
- a minor adverse effect at A51 Upper St John Street between Birmingham Road and Robert Davies Walk (SV-A38-S2-C09); and
- a moderate adverse effect at Watling Street between A5 Watling Street and Claypit Lane (SV-A38-S2-C11).

6.9.3 There will be a minor adverse effect on traffic severance on the A5127 Birmingham Road during Stage 2.

6.9.4 There will be a major adverse effect on traffic delay during Stage 2.

6.9.5 There will be new significant effects on vehicle congestion at two junctions during Stage 2 (closure of northbound and southbound slip roads):

- the A5127 Birmingham Road/A416 Sainte Foy Avenue/Friary Road roundabout will experience a moderate adverse effect; and

- the A5127 Birmingham Road/A51 Upper St John Street/St. John Street signalised crossroads will experience a minor adverse effect.

6.9.6 There will be a moderate adverse effect for public transport journey times along the diversion route during stage 2.

Closure of northbound slip road

6.9.7 A new moderate adverse socio-economic effect is anticipated for Autographic Designs and Signs & Vehicle Graphics Co Ltd due to an increase in journey length for customers.

6.9.8 The following new significant effects have been identified for sound, noise and vibration;

- a minor to moderate beneficial effect at A5127 Burton Road between roundabout at A5192 Eastern Avenue and northbound slip road (SV-A38-S3-C01); and
- a minor adverse effect at Watling Street between A5 Watling Street and Green Lane (SV-A38-S3-C03).

6.9.9 There will be a major adverse effect on traffic delay during Stage 3 (closure of northbound slip road only).

6.9.10 There will be new significant effects on vehicle congestion at two junctions during Stage 3.

- the A5206/Lichfield Southern Bypass/A51 Tamworth Road/A5206/Shortbutts Lane/A51 Upper St John Street signalised crossroads will experience a minor adverse effect; and
- the A5127 Birmingham Road/Falkland Road/Lichfield Southern Bypass roundabout will experience a minor adverse effect.

6.9.11 There will be a moderate adverse effect for public transport journey times along the diversion route during stage 3.

6.10 Mitigation and avoidance

6.10.1 BBV will liaise with the local authority and bus company to monitor impacts on bus services during Stage 2.

6.10.2 Temporary mitigation measures that can be implemented if required during the closure period have been suggested for Wall Island, Swinfen and Hilliard's Cross during Stage 2 and for Wall Island during Stage 3. These temporary mitigations measures are intended to be implemented if required throughout the works period and have not been created to address any pre-existing congestion concerns at these locations. These mitigation measures may lessen the overall effect but do not remove any of the new significant effects identified.

7 Conclusion

7.1.1 For the reasons outlined in this report (ground conditions and utilities diversion) a construction methodology is required which differs from that previously assumed in the main ES (as amended). The proposed solution overcomes the constraints relating to the key drivers and minimises the environmental impacts the construction of this asset will have.

7.1.2 The proposed solution is to close the northbound slip road and southbound slip road temporarily during construction in Stage 2 and to close only the northbound slip road temporarily during construction in Stage 3. Stage 2 requires a diversion whereby the northbound and southbound slip roads are closed. The distance of the northbound slip road diversion route is 8km (taking 8 minutes) and the distance of the southbound slip road diversion route is 9.3km (taking 11 minutes). Stage 3 requires a diversion for only the northbound slip road with the same diversion for vehicular traffic as in Stage 2 (see Table 2 for the duration of the closures).

7.1.3 The proposed closure of the northbound slip road and southbound slip road during Stage 2 and associated traffic diversion gives rise to new significant beneficial effects for sound, noise and vibration; and significant adverse effects for socio-economics; sound noise and vibration; and traffic and transport.

7.1.4 The proposed closure of the northbound slip road during Stage 3 and associated traffic diversion gives rise to new significant beneficial effects for sound, noise and vibration; and significant adverse effects for socio-economics; sound noise and vibration; and traffic and transport.

8 References

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