

D2 JOINT COMMITTEE FOR ECONOMIC PROSPERITY

**East Midlands HS2 Mitigation Board
Proposed Response to
Working Draft Environmental Statement**

1.0 Purpose

1.1 The purpose of this report is advise the D2 Joint Committee of the issues and draft response being proposed by the HS2 Mitigation Board to the Government's recent consultation on the Working Draft Environmental Statement (WDES) on Phase 2b which was published on 11th October 2018.

2.0 Discussion/ Decision Required by the Mitigation Board

2.1 The Board is asked to:

- **Note the update contained in this report and in particular the extent of potential opportunities, issues and impacts resulting from Phase 2b of the route.**
- **Consider any further opportunities for debate or action to ensure the D2 area maximises the benefit from HS2 and minimises any negative impact.**

3.0 Information and Analysis

3.1 The Working Draft Environmental Statement (WDES) on Phase 2b of the project from the West Midlands to Leeds was released for consultation by HS2 Ltd on the 11th October 2018. This WDES consists of a large series of documents including:

- Volume 1 which provides an introduction to the project and the methodology used on the WDES,
- Volume 3 which deals with route wide effects,
- Volume 4 that covers the off route effects.

3.2 These volumes deal with all of the areas covered in phase 2b of the project.

3.3 There are also 11 separate community area reports that form Volume 2. These cover all the areas in Derbyshire, Nottinghamshire, Nottingham City and Leicestershire which will be directly affected by the project. The community area reports consist of:

- An overview of the area;
- A description of the construction and operation of the line in that area;

- A summary of the local alternatives considered;
 - A description of the environmental baseline;
 - A description of the likely significant effects of the project on twelve specific topics areas including air quality, community, health, historic environment, socio economics and traffic and transport;
 - The proposed means of avoiding, reducing or managing the likely significant adverse effects.
- 3.4 Stakeholders, including local authorities and other interested parties, have until December 21st to provide a response to the consultation.
- 3.5 A significant number of officers from local authorities across the region have examined the various documents in detail. Fundamentally, concerns have been expressed regarding the lack of detail on a number of critical issues, factual errors in the information and the systematic downplaying of the likely social, economic and environmental impacts of the project.
- 3.6 There are also concerns that the information provided in the documents in some cases is six months out of date and no meaningful consideration has been given of the cumulative effects of the project or the impacts it will create. This means that any response to the consultation draft of the WDES is based on limited, inaccurate and poorly evidenced information. For this reason, the Board – and its constituent members – should reserve its position to provide additional comments at a later date, once the appropriate information has been made available.
- 3.7 The proposed response of the HS2 Mitigation Board is set out in the appendix attached to this report and will be discussed at its meeting on 28 November – an update of the Board’s discussion will be shared with the D2 Joint Committee. The response of the Mitigation Board is designed to be consistent with, and complementary to, more detailed responses being developed by individual local authorities in the region and does not in any way prejudice their ability to provide separate, substantive responses to Government on issues which relate to their specific areas.
- 3.8 Following comments made by the Mitigation Board, an amended version of the draft response will be considered by the Executive Board on the 14th December 2018.
- 3.9 In addition to the WDES, a separate consultation is taking place on the Working Draft Equality Impact Assessment. Responses to this also need to be returned to HS2 by the 21st December

4.0 Recommendations

- 4.1 The Joint Committee should note the content and tone of the proposed response to Government on HS2 Phase 2b and also the verbal update presented at the Committee meeting.

Appendix 1

Proposed response of the East Midlands HS2 Mitigation Board to the HS2 Phase 2b Working Draft Environmental Statement

1.0 Introduction

- 1.1 The East Midlands HS2 Executive Board oversees all matters relating to HS2 in the East Midlands, including delivery of the East Midlands HS2 Growth Strategy. It comprises the leaders of the relevant local transport authorities and local planning authorities and senior representatives of the D2N2 and Leicester & Leicestershire LEPs and East Midlands Chamber of Commerce (Derby, Leicester & Nottingham). The HS2 Executive Board is chaired by Cllr Jon Collins, Vice Chair of East Midlands Councils and Leader of Nottingham City Council.
- 1.2 The HS2 Mitigation Board provides advice to the Executive Board on mitigation issues and gives political direction to the work of the Mitigation Officer Group. It comprises leading members from the relevant Local Transport Authorities and Local Planning Authorities as well as representatives from East Midlands Councils and HS2 Ltd. The HS2 Mitigation Board is chaired by Cllr Simon Spencer Deputy Leader of Derbyshire County Council.
- 1.3 This response was discussed by the Mitigation Board on the 28th November 2018 and endorsed by the Executive Board on the 14th December 2018.

A) General Issues

- 1.4 There are a number of specific general concerns with the WDES and the consultation process more generally. These are -
- The lack of detail in the documentation on a variety of issues such as transport assessment, which has made it difficult to draw meaningful conclusions on parts of the proposals.
 - The number of broad assumptions made in the documentation and the lack of evidence to support them.
 - The use of out of date or wrong baseline information.
 - The systematic downplaying of the impacts of the project generally.
 - The lack of meaningful consideration of the cumulative effects the project will generate in the communities directly affected.
 - The extent to which comments made during previous consultation on phase 2b have not been considered and addressed in this documentation such as the proposals for the reinstatement of Chesterfield Canal.
 - The lack of meaningful consultation with key stakeholders such as Local Transport Authorities

- The preference, where different options are proposed at a location, to choose the one with the lowest cost rather than those which may lessen the impact on the surrounding *area*.
 - The complexity and format of the documents which makes it extremely difficult for the average person to understand or make a meaningful comment on.
 - The limited amount of time given for responses to the consultation particularly as the Hybrid Bill process has been put back a year.
- 1.5 From informal discussions with local authorities involved in earlier phases of the HS2 project it is clear that similar comments were made by them at the same stage of the process. The Mitigation Board are therefore very disappointed that HS2 Ltd appears not to have learnt from this previous experience to make the consultation on the WDES in phase 2b a more transparent and productive process.

B) Delivering the East Midlands HS2 Growth Strategy

1) East Midlands Hub Station Growth Zone

- 1.6 The East Midlands HS2 Growth Strategy sets out a compelling vision for the combined HS2 and conventional rail hub station at Toton, supported by excellent local transport links. There is potential for major development adjacent to the Hub Station, including a mixed use Innovation Campus that could generate up to 11,000 jobs and Garden Village proposals at nearby Chetwynd and Stanton. However, all the evidence underpinning the Growth Strategy suggests the majority of the economic benefits associated with HS2 are likely to arise in and around Derby, Leicester, Nottingham, Loughborough, Mansfield/Ashfield and East Midlands Airport. There is therefore a clear need to ensure the full economic, social and environmental benefits of the Hub Station are realised through a supported complimentary strategy for improved transport connectivity, skills and supply chain development across the sub region.
- 1.7 To fully realise the economic potential described in the Growth Strategy, the Hub Station must be both a world class multimodal public transport interchange and a new high quality place. Whilst the Hub Station scheme described in the consultation documentation is a welcome evolution of that published back in 2013, it is considered to fall well short of what is required to deliver the Growth Strategy. In particular, the current proposals are deficient in the following areas:
- 1.8 Car Parking Provision - the proposed scheme includes provision for 4,000 car parking spaces split between the east and west of the Hub Station. The scale of car parking set out in the consultation draft is fundamentally incompatible with the agreed vision and strategy for the Hub Station as a multi-modal public transport interchange and is likely to induce unsustainable levels of car use on road surrounding networks. The amount of land taken up by surface car parking provision significantly reduces the scope for economic development activity associated with the proposed 'Innovation Campus' and undermines the potential for high quality place-making.

- 1.9 Transport Assessment – no assessment has been undertaken by HS2 Ltd to justify the level of car parking currently proposed, nor has any account been taken of the potential for public transport interventions (or changes in technology) liable to reduce car dependency. This is considered to be a significant deficiency in the current work and needs to be addressed by HS2 Ltd before any further, substantive comment can be provided by the Board.
- 1.10 Working with Midlands Connect, local partners have funded the development of a transport model covering an area including Derby, Nottingham and East Midlands Airport with the Hub Station at its centre. The model provides a sound basis of HS2 Ltd's Transport Assessment. It will also be used by local partners to test the impact and viability of a package of public transport interventions that will reduce car dependency and spread the economic benefits of HS2 connectivity across the wider sub-region. This work, known as the East Midlands Gateways Connectivity Study, will be completed and made available to HS2 Ltd by the end of April 2019.
- 1.11 Public transport access and east-west connectivity - the importance of public transport access to the success of the Hub Station has been significantly underplayed in the consultation documents and the design is considered to be inconsistent with the aspirations set out in Growth Strategy. Whilst there are proposals for bus stops immediately outside the Hub Station and reference to the NET line being extended, there is no clarity about the function and/or quality of multimodal interchange facilities, including bus, NET, active travel choices, taxi and other vehicular interfaces. For a major 21st Century transport infrastructure project, this is lack of joined up thinking and limited vision is considered to be inadequate and short sighted.
- 1.12 Whilst there has some good local dialogue on the technical requirements at the Hub Station of extending the NET (or an alternative mode of mass transit) west of the Hub Station to potentially serve Long Eaton, Derby and East Midlands Airport, there appears to be no provision for such connectivity in the proposed scheme. There is also only limited provision and detail about safe and attractive east-west links across the railway line for active travel, which will reinforce existing severance and undermine place-making.
- 1.13 Highway access: without a transport assessment, there is no evidence to suggest that the proposed highway access to the Hub Station from the A52 will address either the scale of the development associated with the Growth Strategy or the scale of likely consequential growth on the A52 and M1 J25 over the next 25 years. Both Transport for the East Midlands (TfEM) and Midlands Connect have recommended that Government makes available development funding in RIS2 (2020-25) to enable Highways England and HS2 Ltd to work together on an integrated scheme for the A52/M1 that will meet long term growth pressures in the context of the multi-modal strategy developed through the East Midlands Gateways Connectivity study. This is essential if the impacts of growth are to be appropriately mitigated and the full economic and social benefits to be fully realised.

- 1.14 In terms of local highway access, the East Midlands HS2 Growth Strategy highlights the importance of a through route for buses and taxis serving the Hub Station and for local highway access from Long Eaton, Sandiacre and Stapleford, particularly for public transport, walking and cycling. The proposed scheme does not appear to provide for this local connectivity and as a result will disadvantage and marginalise local communities. It is strongly argued that HS2 Ltd undertakes further work in this regard, in dialogue with local highway authorities.
- 1.15 Conventional Compatible Link (Leicester-Leeds Direct Services): the current design for the Hub Station does not include any provision for a conventional compatible link between the HS2 line and the Midland Main Line, which would enable direct conventional compatible services between Leicester and Leeds.
- 1.16 The Chancellor has previously announced up to £300 million to support the provision of additional links between HS2 and the conventional rail network, including at the Hub Station at Toton. Midlands Connect has undertaken two economic assessments of the benefits of such a link that have demonstrated a positive business case. These have been shared with both HS2 Ltd and the Department for Transport and it is disappointing this work is not evidenced or accounted for in the proposals of the draft WDES.
- 1.17 We understand that HS2 Ltd is currently working on a detailed design for a conventional compatible link within the Hub Station trace and look forward to receiving more detailed information in due course. We fully expect that provision for this will be included within the Phase 2b Hybrid Bill. Whilst our work has demonstrated that the economic base for such a link is not dependent on the electrification of the Midland Main Line between Leicester and Nottingham via Toton, electrification would certainly increase the economic value of the services that can make use of the connection.
- 1.18 Given that at least 62% of the MML will be electrified by 2033 (see below), we would request that the electrification of the line between Leicester and Nottingham via Toton be added to the Phase 2b Hybrid Bill (approximately 24 miles of track or 15% of the total MML).
- 1.19 Partial Opening of the Hub Station by 2030: local leaders, Midlands Connect and the Secretary of State for Transport has previously highlighted the potential for early partial opening of the Hub Station. Midlands Connect undertook initial work in 2017 (previously submitted DfT and HS2 Ltd) that demonstrated the potential for additional economic benefits from early opening and identified no engineering 'show stoppers'. Further work has now been completed into the costs and benefits of interim HS2 services to the Hub Station from Birmingham and Old Oak Common (set out in **Annex 1**), which demonstrates the potential for a positive business case. This option should be developed further by HS2 Ltd and any implications reflected in the final version of the Environmental Statement and Phase 2b Hybrid Bill.

2) Northern Derbyshire Growth Zone

- 1.20 The East Midlands HS2 Growth Strategy also sets out a compelling vision and economic case for the inclusion of Chesterfield as a HS2 compatible station. The WDES shows four conventional compatible trains per hour operating on the spur line towards Sheffield rather than the two originally proposed. However only one of these trains is shown as actually stopping at Chesterfield.
- 1.21 An economic assessment of the benefits of an additional stop has been undertaken jointly with Sheffield City Region which demonstrated a positive economic case. Evidence of the economic case is provided at **Annex 2** of this response. The doubling of HS2 services to 4 trains an hour proposed in the WDES further reinforces the strategic case for more of these services to stop at Chesterfield. However sufficient additional capacity needs to be included in any changes to the Midland Mainline north of Clay Cross to accommodate HS2 as well as the existing local and regional services, plus any future enhancements to these or to local infrastructure. Both North East Derbyshire District Council and Derbyshire County Council have also identify a new station at Clay Cross in their relevant plans. Without due recognition of local needs there is the potential for Chesterfield to be significantly worse off in terms of rail access after HS2's arrival than it is now, however this is an issue which the WDES fails to cover.
- 1.22 Significant work has been undertaken to prepare a Masterplan for Chesterfield Station, to which HS2 Ltd has been party. This Masterplan sets out an ambitious but achievable vision to fully capture the benefits of HS2 through a combination of infrastructure and regeneration projects. This meshes with the ongoing development of Chesterfield's adjacent Northern Gateway and Waterside regeneration projects, and will have significant synergies with the Chesterfield College and University of Derby campus. It seeks to maximise the important role of Chesterfield as a visitor destination and as a gateway to a wide variety of others across the north Midlands, including the Peak District, Clumber Park and Sherwood Forest. A Local Development Framework document covering the Station Area is being proposed as a policy for inclusion in the Chesterfield Local Plan Core Strategy to be issued for consultation in January 2019. Supporting site development appraisals and phasing plans have been produced, and steps have already been taken towards the assembly of key parcels of land required in order to put this vision into practice. Derbyshire County Council has already taken an 'in principle' decision to exercise compulsory purchase powers in pursuit of the Masterplan if required.
- 1.23 Partners in the Chesterfield Station Masterplan are investing substantial resources in this, and through the D2N2 Local Enterprise Partnership's Local Growth Fund programme already have access to committed resources for delivery. These resources make provision for the Station Link Road, which would provide a high-standard access to the Station and its car parking avoiding the need for traffic to pass through the town centre. This would also

allow for re-routing of a number of existing bus services to provide much better integration with the Station and rail services. The Link Road, though, follows an alignment close to the Midland Main Line, and it is a matter of concern that the safeguarding requirements of HS2 Ltd for electrification and for Station modifications are, at present, unknown.

- 1.24 It is extremely disappointing that none of the economic potential of growth in and around Chesterfield has been reflected in the consultation document, and equally that the likely visual and environmental impacts of the proposed line as it approaches the town centre have been completely underplayed.
- 1.25 Notwithstanding the above, the incorporation of the electrification of the Midland Main Line between Clay Cross and Sheffield into the Phase 2b Hybrid Bill is welcomed and will give much needed certainty to local partners (meaning that, taking account of existing plans to electrify as far as Market Harborough, at least 62% of the Midland Main Line will be fully electrified by 2033). However, it is to be understood that electrification of the MML is not to be considered at the expense of delivering HS2 East and fully mitigating its impacts.
- 1.26 Alongside the Chesterfield Station Masterplan the Northern Growth Zone is designed to accommodate and complement the Infrastructure Maintenance Depot (IMD) at Staveley and connectivity improvements between here and Chesterfield Station delivered through the Chesterfield-Staveley Regeneration Route (CSRR). This is a major intervention, facilitating significant housing and employment development, and is receiving significant current investment towards design and business case preparation. The major landowners along this corridor are fully engaged in this work. The IMD, though, places significant constraints on both the quantum of development achievable and on the alignment of the CSRR. These are issues are acknowledged by HS2 Ltd, which is welcome, but much remains to be done through further engagement to ensure that the needs of all parties can be met in full.
- 1.27 At this stage, the operational impacts of the IMD are not fully understood. Inevitably, though, maintenance activities will be concentrated within off-peak periods for passenger services, mostly at night. It is anticipated that lighting at the IMD, movement of maintenance trains and vehicular traffic associated with its workforce shift changes could all be significant impacts on adjacent communities.

C) Line of Route Priority Areas

- 1.28 Building on the work in the SNC Lavalin report the following sites have been identified as the priority areas where the mitigation proposals in the WDES need significant further work to make them acceptable to the Board.

Impact on the Trent Valley (ref Community Area LA05) LTA Derbyshire County Council, Nottinghamshire County Council LPA Erewash Borough Council, Rushcliffe Borough Council

- 1.29 The SNC Lavalin study closely examined the proposed viaduct across the Trent Valley and also its impact on the long term planning and development proposals set out in the agreed Trent Valley Vision. The report concluded that whilst there were no feasible opportunities to alter the proposed route because of the need to align the approach to Toton along the existing rail corridor, and to maintain the existing flood plain, there were clear opportunities to mitigate some of its visual impact. This would involve detailed consideration of the positioning of the structural supports and careful design of the viaduct deck creating a more bespoke solution rather than the generic design used elsewhere on the HS2 route.
- 1.30 The proposals in the WDES itself make no mention of this type of detailed design issues and include only very generic viaduct design diagrams and information on the height of the viaduct which has increased slightly from that in the initial proposes to 16m. There is also very limited information on the impact of the project on the Trent Valley Vision proposals including the construction of a causeway across West Lake to carry the viaduct.
- 1.31 Given the highly sensitive nature of this location and the degree of visual impact of the proposed viaduct, it is the strong view of the Mitigation Board that there is clear need for a high quality, bespoke solution at this location.

Impact in Long Eaton (Ref Community Area LA05) LTA: Derbyshire County Council, LPA: Erewash Borough Council

- 1.32 The principle of taking HS2 on a viaduct through the east side of Long Eaton was supported in the SNC Lavalin report. Whilst tunnelling through the area was seen as potentially feasible from an engineering perspective the problems of potential flooding and the cost were felt to be prohibitive. The viaduct will have a considerable visual impact both in terms of the structure itself and by the exposure of other elements of the urban fabric due to the demolition of a large number of existing buildings in the area adjacent to the line. The mitigation that can be put into place would require the careful design and detailing of the viaduct to provide an acceptable appearance and ensure that the positions of the supports are optimised. The treatment of the land beneath the new viaduct would present opportunities for mitigation either in terms of landscaping to create a linear park or for appropriate business use which should be fully explored. The WDES makes no mention of this type of detailed design issues and includes only very generic viaduct design diagrams and information on the proposed height of the viaduct.
- 1.33 There are significant concerns that the WDES underestimates the profound effect that the viaduct and associate work will have on the urban fabric of Long Eaton. The development will have a huge intrusive impact on the town centre and residential areas which are adjacent with people living nearby experience additional noise and poorer air quality. There will also be a considerable loss of residential and commercial properties in the area. Yet the WDES maintains that no cumulative effects have been identified on the community in the area during either the construction or operation of the line.

At locations such as Bonsall Street it even suggests that the long-term effects would be 'beneficial' in some respects.

- 1.34 The proposed design of the Hub Station assumes conventional rail services are located on the west side of the trace. This has the impact of increasing rail movements along the low level rail corridor within Long Eaton and through the level crossings on Main Street and Station Street. This will increase severance in the town and create safety and environmental problems – the very impacts that the HS2 viaduct solution is designed to address.
- 1.35 A study undertaken by Midlands Connect (available as **Annex 3** of this response) has concluded that it is both technically feasible and economically viable to remove the low level rail corridor within the town including the level crossings, and to replace this alignment with a new chord connecting to the high level line. This option will fully address the rail severance issues in the town and improve access from the Town Centre, remove the level crossings and enable the redevelopment of the former low level corridor for more economically valuable uses.
- 1.36 Given the urban nature of this location and the degree of visual impact of the proposed viaduct, it is the strong view of the Mitigation Board that there is clear need for a high quality, bespoke solution at this location. It is also the Boards view that the wider impacts of the project on the local community needs to be addressed in more sensitive manner with more honesty on the long term effects it is likely to have on residents and stronger proposals on how this can mitigated in a meaningful way. Finally the Boards requests that the proposals for the existing low level rail be taken forward by HS2 Ltd and Network Rail and incorporated into the Phase 2b Hybrid Bill.

Impact in Sandiacre/Trowell (Ref Community Area LA06) LTA Derbyshire County Council and Nottinghamshire County Council, LPA Erewash Borough Council and Broxtowe Borough Council

- 1.37 The principal of a taking HS2 through the area on a viaduct was again supported by the SNC Lavalin report. As in Long Eaton whilst tunnelling through the area was seen as potentially feasible from an engineering perspective the problems of potential flooding and the cost were felt to be prohibitive. The viaduct will have a significant impact on the surrounding areas some of which could be mitigated through the careful design of the viaduct deck and consideration of where the supports should be positioned. The proposals in the WDES itself make no mention of this type of detailed design issues and includes only very generic viaduct design diagrams and information on the proposed height of the viaduct in this area.
- 1.38 There are concerns that the WDES significantly underestimates the impact of the proposal particularly in relation to the viaduct. Its route to the north of Sandiacre and Stapleford through Stanton Gate and Stanton by Dale is largely rural. Much of the area which was formerly industrial has been turned

over to recreational use, and this land will be particularly adversely affected by the project limiting access for local people.

- 1.39 Given the sensitive nature of this location and the degree of visual impact of the proposed viaduct, it is the strong view of the Mitigation Board that there is clear need for a high quality, bespoke solution at this location. It is also the Boards view that the wider impacts of the project on the local community needs to be addressed in more sensitive manner with more honesty on the long term effects it is likely to have on residents and stronger proposals on how this can mitigated in a meaningful way.

Impact on Hardwick Hall (Ref Community Area LA10) LTA Derbyshire County Council LPA Bolsover District Council

- 1.40 HS2 passes approximately 1.1km west of Hardwick Hall with the route in a cutting towards the south but emerging onto an embankment approximately mirroring the alignment of the adjacent M1. The line will be seen on the far side of the motorway when viewed from the Hall which would result in increased visual impact. However the SNC Lavalin study concluded that an alternative horizontal or vertical alignment at this point would not improve the situation.
- 1.41 The proposed impacts proposed in the WDES for this area would be substantial. The large 'Hardstoft North' and 'Astwith' cuttings would be doubled by additional cuttings for the Hawking Lane diversion upslope to the west. Further impacts would also arise from the proposed material stockpiles, compounds and further disruption to the historic road network including diversion of the main visitor approach to the hall. The landscape and visual assessment for this section assesses impacts in and around the Hardwick estate as a 'high' magnitude of change and 'major adverse' effect. Yet the historic environment assessment in the WDES finds a 'low' magnitude of change leading to a 'moderate adverse' effect which hardly seems creditable.
- 1.42 Given the sensitive location and the international importance of the Hardwick Hall group of heritage assets it is the strong view of the Mitigation Board that there is clear need for a high quality solution at this location to mitigate the impact of the project. HS2 needs to work with all the various interested parties to bring forward such a solution.

Impact on McArthur Glen Designer Outlet and the A38 (Ref Community Area LA8) LTA Derbyshire County Council, Nottinghamshire County Council LPA Ashfield District Council, Bolsover District Council

- 1.43 The HS2 line passes immediately to the east of McArthur Glen Designer Outlet in a cutting before travelling under a new bridge carrying the A38. Some of this land had previously been identified as a potential site for an extension to the outlet or its car park. The SNC Lavalin study concluded that the adoption of an alternative horizontal or vertical alignment in this area was

not a practical option because of the impacts it would create on other adjacent locations.

- 1.44 There are significant concerns that the WDES underestimates the impact on the Outlet and on the surrounding area. The disruption to the road network in the area and particularly the A38 could have a major impact on footfall at the Designer Outlet. As could the large scale works compounds immediately adjacent to the site. This coupled with the loss of the potential location for expanding the site may affect the sites long term viability.
- 1.45 The Mitigation Board ask that HS2 come forward with meaningful measures to mitigate the impact at this site.

Impact on Chesterfield Canal (Ref Community Area LA11) LTA Derbyshire County Council, LPA Chesterfield Borough Council

- 1.46 HS2 impacts the project to reinstate the Chesterfield Canal in two locations with the site adjacent to the proposed Infrastructure Maintenance Depot particularly badly affected. The HS2 link line to the depot crosses the route for the proposed canal at this point and the proposed vertical alignment is not compatible.
- 1.47 There are significant concerns that the WDES underestimates the impact on the long term project to reinstate the Chesterfield Canal from Staveley. The current proposals are not compatible with the infrastructure already in place and if there is no alternative design a different route for the canal will be required.
- 1.48 The Mitigation Board ask that HS2 come forward with meaningful measures to mitigate the impact on the proposed reinstatement of the Chesterfield Canal.

D) Cross Cutting issues

- 1.49. In additional to the major site specific concerns a number of important cross cutting issues which will have impacts along the whole line have also been identified. Whilst these have been recognised in the WDES there is a concern that insufficient measures are proposed to deal with them effectively. It is the view of the Mitigation Board that all of these need urgent consideration by HS2.
 - **The impact on the strategic road network e.g. the M1, M42, A38, A52 during construction** - A number of realignments of the existing strategic road network as well as new bridges are proposed to carry the new railway over or under it. There are real concerns at the impact this could have on the operation of these roads during the construction phase and the wider effect of this on the economy of the region due to congestion and delays. The WDES currently contains no quantitative assessment on the impact of the works or the final scheme on the strategic network. It is therefore impossible for any meaningful conclusions to be drawn. HS2 urgently need to undertake further detailed work with Highways England and the relevant

Local Transport Authorities to assess the impact of the proposals and come forward with meaningful mitigation to limit the impact.

- **Impact on local highway network during and after construction** - The project will result in the closure of numerous local roads during construction some of which will remain permanently closed or diverted following the completion of the railway. As with the strategic network there are real concerns about the impact this will have on the operation of these roads and the wider economy due to congestion. However the lack of any Transport Assessment with the WDES makes it impossible for Local Transport Authorities to truly evaluate the impact the proposals will have on their network. Where information has been provided there are grave concerns about its reliability and an alarming lack of detail on the alterations to the highway network proposed. Serious consideration also needs to be given to travel planning measures to mitigate the direct impact of when the works are taking place and how alternative modes of transport such as the proposed Maid Marion rail line could be used to lessen the impacts on the local highway network.
- **Rights of Way** - The HS2 alignment crosses a significant number of existing and proposed public rights of way and multiuser trails. For the purposes of the SNC Lavalin study the consultants looked at a selection of routes in the Derbyshire area to understand the potential impacts and possible mitigation. The study concluded that providing new infrastructure in terms of bridges or underpasses for all of the current rights of ways was unlikely to be practical so some rationalisation was likely. However low and moderate cost alternatives were potentially available in many of the examples looked at in Derbyshire and a similar approach could be available elsewhere. The approach taken in the WDES is in the main disappointing with many of the alternatives proposed requiring significant diversions on the route. There were also a considerable number of routes which appear to have been missed or ignored altogether.
- **Demolition of business properties as a result of construction** - In the 11 community areas in the East Midlands it is anticipated that a total of 145 commercial properties will be demolished to make way for the project. The area which experiences the worst impact is the section from Radcliffe on Soar to Long Eaton where 52 properties will be demolished which have a significant impact on the business community in that area. There are serious concerns that this process may result in businesses closing down permanently or moving to other areas, which will have an impact on local employment opportunities and the amount of business rates collected. HS2 Ltd need to work with local councils and Local Enterprise Partnerships to put in place active measures that will support business continuity and relocation.
- **Effect of demolition on residential communities** - In the 11 community areas in the east midlands it is anticipated that a total of 342 residential properties will be demolished to make way for the project. The area which

experiences the worst impact is the section from Radcliffe on Soar to Long Eaton where 183 properties will be demolished which have a significant impact on the community in that area. Apart of the direct impacts of the construction once the project is completed the ongoing operation of the line will inevitably continue to have an impact on a large number of residential properties which remain. Further detailed dialogue with local communities and local councils will be required to come forward with meaningful ways of mitigating the impact.

- **Severance and visual impact of the line on communities** - The line will result in certain parts of existing communities experiencing severance from the rest of their immediate area. For example although the viaduct through Long Eaton will help to address some of the severance issues, the eastern side of the town will be further isolated from the town centre by its construction and the demolition of properties. Other areas such as Newton and Old Blackwell will also experience severance and significant visual impact as they become effectively sandwiched between the new line and the M1. HS2 Ltd should work with councils to help re-plan and redesign the urban fabric of areas most affected by the railway.
- **Noise and air pollution during construction** - During the construction of the line there will inevitably be localised noise and air pollution due to the work being undertaken. The length of time which the work will take to complete this will have a significant impact on the communities adjacent to the line particularly those close to the proposed works compounds. Effective local mitigation and monitoring of these impacts will be required, working closely with local councils.
- **Maintenance of new infrastructure** - Following the completion of the line the WDES proposes that a number of new assets such as highway infrastructure or balancing ponds will be transferred by HS2 to local council to maintain. Given ongoing funding constraints, local councils will need be assured that these extra maintenance costs are reflected in future funding settlements from central government.

1.50 A number of supporting annexes are proposed to be submitted to HS2 along with the substantive response outlined above.



SNC • LAVALIN

East Midlands Consortium - HS2 Route Mitigation Study

Jon Hall

RTUKR-T40125-001

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   snclavalin.com

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NOTICE

This document contains the expression of the professional opinion of SNC-Lavalin Rail & Transit Limited (SNC-Lavalin) as to the matters set out herein, using its professional judgment and reasonable care. It is to be read in the context of the agreement dated 20/12/2017 (the "Agreement") between SNC-Lavalin and Derbyshire County Council (the "Client"), and the methodology, procedures and techniques used, SNC-Lavalin's assumptions, and the circumstances and constraints under which its mandate was performed. This document is written solely for the purpose stated in the Agreement and for the sole and exclusive benefit of the Client, whose remedies are limited to those set out in the Agreement. This document is meant to be read as a whole, and sections or parts thereof should thus not be read or relied upon out of context.

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1 Executive Summary

In November 2016, the Secretary of State for Transport confirmed part of the Phase 2b route, whilst also announcing a consultation on seven route refinement areas. On 17 July 2017, the Secretary of State for Transport announced his decisions on these refinements and published the route of the West Midlands to Leeds section of the HS2 Phase 2b route.

SNC-Lavalin was commissioned by the consortium of East Midlands councils to examine the potential to reduce or remove the adverse impact of the new HS2 eastern route on residential and commercial properties at a number of specified locations included in the tender schedule. This study considers the alignment of the route, examines the anticipated impacts of the route on the identified key areas, considers the scope for the mitigation of property and environmental impacts and makes recommendations.

Considering each of the locations in turn, the study reached the following conclusions:

1. Measham area

Little can be done to mitigate the impact of the HS2 route on the proposed Measham Waterside Development. Discussions would be needed to determine whether a reduced size development would still be viable.

Local mitigation in the form of noise and environmental screening may alleviate some of the noise and visual impact of the new route. Further detailed study would be needed to confirm the feasibility of lowering the proposed reinstated canal beneath the HS2 alignment.

2. Packington area

The horizontal alignment of the proposed route is constrained due to the proximity to the A42. Although there may be an opportunity for a slight lowering of the route to reduce its intrusion, this would be dependent on not obstructing the flood plain of the Gilwiskaw Brook.

Local noise mitigation may be possible where the route emerges from cutting onto viaduct but this may in turn present visual intrusion.

3. Kegworth area

Although the impact of the new route on Kegworth is mitigated by the cutting to the west of the village, there will be some local visual impact to the north.

Further discussions would be required to determine whether the area of land to the west of the village identified for development would remain feasible given its location bounded by the rail alignment and the motorway.

4. Trent Valley Vision

The presence of the new viaduct carrying the HS2 route across the River Trent and its floodplain will have a significant visual impact. With respect to the terms of the Trent Valley Vision, the impact of the route may be mitigated somewhat by the careful design of both the viaduct and the means of construction. The positioning of the viaduct supports and the appearance of the viaduct deck will be crucial due to the structure's prominent position in the local landscape. It will be more difficult to mitigate the appearance of the overhead electrification equipment mounted on the viaduct.

Early engagement with HS2 will be essential to confirm the detailed proposals of the viaduct structure.

5. Long Eaton

The viaduct running through the eastern side of Long Eaton will have a considerable impact. There is little effective mitigation that can be put into place beyond the careful design and

detailing of the viaduct to provide an acceptable appearance and ensure that the positions of the supports are optimised.

The treatment of the land beneath the new viaduct would present opportunities for mitigation either in terms of landscaping or for appropriate business use.

The option for the provision of a tunnel would prove costly due to the constraints in locating transition structures from the surface/elevated route to the tunnel within the floodplains. The tunnel would need to be approximately 7km long at a cost in excess of £900m. The new transition structures would also introduce impacts in the floodplains.

6. Sandiacre and Trowell

The presence of the HS2 alignment and supporting viaduct will have a significant impact on Sandiacre and Trowell. This location represents a transition from a route following the existing railway corridor to a route following closely to the M1 motorway. Inevitably this introduces impacts due to its deviation from both established corridors.

The impacts associated with the construction of the route and its supporting viaduct should be largely mitigated. Similarly the viaduct may be engineered to minimise obstructions to the usage of existing leisure facilities by the positioning and choice of appropriate intermediate supports. However the mitigation of the visual impact will depend on the careful design to achieve an acceptable appearance of the viaduct and its intermediate supports.

The suggestion of the adoption of a tunnel or embankment in place of the viaduct would be hard to justify due to the significantly greater cost of either option.

7. Strelley and Nuthall

The HS2 route passes through Strelley via a new tunnel. The latest information from HS2 indicates that this will be a bored tunnel, which will minimise construction impacts on the village compared to other options. With respect to the permanent impacts the route would introduce visual and noise impacts that would require local mitigation.

At Nuthall the HS2 route passes immediately adjacent to and at the same level as the M1 motorway. There will be incremental visual and noise impacts that will require local mitigation.

8. Newton and Blackwell

Although the proposed HS2 route would sever a number of local roads crucial for east-west movement from Newton and Blackwell it is understood that these would be maintained by HS2.

There would be impacts on the housing ribbon development between Newton and Blackwell but greater impact on the settlement of Old Blackwell on the B6026 Huthwaite Lane / Cragg Lane. Although some local mitigation could be achieved, the scale of the works would make it difficult to reduce the visual impact.

9. Cultural Heritage: Annesley Hall

The setting of Annesley Hall is unlikely to be significantly impacted by the presence of the new HS2 route. Although the section of the route closest to this location is on embankment, this section of the HS2 route is screened from the Annesley Hall by the existing mature trees close to the Hall. Although longer views of the route across the landscape are possible, the HS2 route is in cutting in these locations and is unlikely to have a significant impact.

Views from Annesley Lodge may have greater impacts from the section of route on embankment but this is over 1km away.

10. Cultural Heritage: Hardwick Hall, Sutton Scarsdale Hall and Bolsover Castle

Hardwick Hall will experience visual impact. The HS2 route would be visible on the far side of the M1 motorway from the Hall approximately 1km distant. Access to the Hall via local roads needs to be confirmed during the next design stage.

Sutton Scarsdale Hall will experience visual impact. Although the HS2 route is 1.0 km away on the far side of the M1 motorway when viewed from the Hall, it is on a higher alignment and is unlikely to be significantly shielded from view.

Bolsover Castle will experience visual impact. Although the HS2 route 1.2km away is on embankment and viaduct, there is a screen of existing trees adjacent to the HS2 route which should make view of the route from the Castle intermittent.

11. Nature Conservation:

River Mease SSSI: The HS2 alignment crosses the River Mease SSSI just to the south of Measham. The railway crosses the floodplain via a new viaduct. There will be significant impact on the setting although at this location the north bank of the Mease is used for industrial and storage purposes. Local mitigation will be required.

Selston SSSI: At its closest to the SSI the HS2 route runs 500m away on shallow embankment which is likely to make the route viewable from the SSSI. However due to the rolling nature of the local topography, views are likely to be intermittent and impacts are not considered to be severe.

Carr Vale: As for Bolsover Castle the HS2 alignment passes approximately 1.2km to the west of Bolsover Castle. The impacts on Carr Vale can be considered to change from the north to the south.

At the northern end of Carr Vale the route at this point is elevated on the viaduct over the River Doe Lea floodplain. Although this elevated alignment is likely to make the new route visible from the Hall, the lower elevation of Carr Vale may experience greater screening from the existing trees adjacent to the highest part of the viaduct and this should serve to reduce visual impact further. Any view of the route should be intermittent. Consequently it is not thought to be highly intrusive.

At the southern end of Carr Vale, the HS2 alignment is on shallow embankment following the existing topography. There is less screening from mature trees and consequently the route is likely to be more visible. This is likely to introduce visual intrusion.

12. Chesterfield Canal – Norwood / Wales Bar

Although the new HS2 route will cross the proposed alignment of the reinstated Chesterfield Canal, the railway is on embankment at this location allowing sufficient space for a new structure over the proposed canal. However space between the motorway and HS2 embankments is limited and a further detailed study would be required to consider the options for the reinstatement of the canal infrastructure.

13. Chesterfield Canal – Staveley

The proposed vertical alignment for the HS2 IMD link is not compatible with the aspirations of the restoration of the Chesterfield canal on its current alignment. The design principles for the IMD link need to be established to validate the alignment adopted by HS2.

Should the alternative suggested by the Chesterfield Canal Trust be considered then the feasibility of the operation of engineering works trains on a tight radius on a 2% grade would need to be established.

In the event that no feasible vertical alignment option exists then a viable alternative for the canal crossing along with its associated infrastructure would be require investigation.

14. Business Impacts – Westminster Industrial Estate:

The new HS2 route will have significant effects on the existing Huntingdon Court industrial units within the Westminster Industrial Estate. Similarly there will be significant impacts on units to the south of Repton Road. However the Plastic Omnium plant would not be directly affected by the HS2 viaduct structure although it would receive significant visual and noise impacts. The existing units west of this would be largely unaffected apart from an increase in visual and noise impacts.

15. Business Impacts – Saw Pit Industrial Estate

The adoption of an alternative horizontal alignment in this area would introduce increased impacts on other sensitive locations and should not therefore be considered feasible. There is little mitigation that could be put in place for the western industrial units in the Saw Pit Industrial Estate. Instead alternative sites should be considered to enable the businesses to relocate. Noise mitigation measures would be required for the units that remain on the eastern side of the industrial estate.

16. Business Impacts – McArthurGlen Designer Outlet

The HS2 route is currently optimised to reduce impacts elsewhere. There will be noise and visual impacts on this location together with possible severance impacts on the Castlewood Industrial Park. The construction of the bridge beneath the A38 will impact the traffic in the area; the choice of form of construction will be key to minimising the duration of this impact. Impacts on local roads are likely to be minor.

17. Nottingham Business Park

The HS2 horizontal alignment is constrained in this area and adopts a route close to the M1 motorway. There is some potential for a minor modification to the vertical alignment and the extension to the proposed tunnel to lessen the acquisition of units on the Nottingham Business Park. However the benefit gained from this would need to be balanced against the additional cost of an extension to the tunnel. Should this not prove to be affordable then local mitigation for noise and visual impacts would be required.

18. Impact on Transport Links – M1 Junction 27 / A608

The construction of the HS2 alignment will impact traffic flows on the A608 during construction. However this may be mitigated to some degree by the careful design of the temporary carriageways to maintain flows on this road. Although the slip roads on the east side of the motorway are largely unchanged, amendments to the gyratory are likely to result in congestion for southbound traffic leaving the motorway.

19. Impact on Transport Links – M1 Junction 29 / A617 / A6175

The number of roads accessing Junction 29 will result in a complicated realignment during construction for the continued use of the junction, which may result in vehicles on the A6175 to divert and increased congestion on the A617. The extent of these impacts will depend largely on how the temporary road alignment is implemented and managed.

20. Impact on Transport Links – M1 Junction 30 / A6135 / A616

The construction of the HS2 alignment will impact traffic flows on the A6135 during construction. This may be mitigated to some extent by the temporary realignment of the western section of the gyratory. Although the slip roads on the west side of the motorway are largely unchanged, amendments to the gyratory are likely to result in congestion for traffic leaving and joining the northbound M1.

21. Impact on Transport Links – Kirkby-in-Ashfield and Sutton-in-Ashfield

The construction of the HS2 alignment will impact traffic flows to and from Kirkby-in-Ashfield and Sutton-in-Ashfield via the M1 Junctions 27 and 28. Local roads would also be affected

for routes to and from the West. However these may be mitigated by a staged approach to the construction of the HS2 to ensure that these routes are not all disrupted at the same time.

22. Impact on Public Rights of Way and Multi User Trails – Major Issues Advised By Derbyshire CC

The cost of providing new infrastructure to maintain minor rights of way is likely to lead to the rationalisation of these rights of way. A debate will inevitably be forthcoming with HS2 to determine the extent of any rationalisation and infrastructure provision.

However in the examples identified by Derbyshire County Council low and moderate cost alternatives would appear to be available at most locations providing that minor diversions of the existing and existing proposed routes can be contemplated.



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2 Glossary of Abbreviations and Acronyms

Abbreviation	Description
ADC	Ashfield District Council
BBC	Broxtowe Borough Council
BDC	Bolsover District Council
CBC	Chesterfield Borough Council
DCC	Derbyshire County Council
EBC	Erewash Borough Council
EMC	East Midland Consortium
HS2	High Speed 2
LCC	Leicestershire County Council
NCC	Nottinghamshire County Council
NEDDC	North East Derbyshire District Council
PRoW	Public Right of Way
SoW	Scope of Works

3 Introduction

In November 2016, the Secretary of State for Transport confirmed part of the Phase 2b route, whilst also announcing a consultation on seven route refinement areas. On 17 July 2017, the Secretary of State for Transport announced his decisions on these refinements and published the route of the West Midlands to Leeds section of the HS2 Phase 2b route.

SNC-Lavalin was commissioned by the consortium of East Midlands councils (Leicestershire, Nottinghamshire and Derbyshire) to examine the potential to reduce or remove the adverse impact of the new HS2 eastern route on residential and commercial properties at a number of specified locations included in the tender schedule. This study considers the alignment of the route, examines the anticipated impacts of the route on the identified key areas, considers the scope for the mitigation of property and environmental impacts and makes recommendations.

4 Objective

Derbyshire County Council (DCC) requested the support of SNC-Lavalin to quantify the impact that the revised HS2 Route will have to the East Midlands areas and to identify opportunities for mitigation of the adverse impact. The scope of works provided by the DCC on the 24th November 2017 included the assessment of the HS2 Route on:

- Homes and communities, including the social and health impacts of HS2;
- Existing businesses and other activities, including relocation;
- Development proposals;
- Landscape, including strategic infrastructure, green infrastructure and sites of historic, cultural or leisure interest;
- Severance on transport and recreational routes (highways, PRoW, canals);
- Design principles to mitigate noise, visual impact and loss of amenity.

DCC also provided a list of areas and the area specific concerns. Table 1 presents the revised list of areas as was formed following the meeting that took place on 25th January 2018.

No.	Description	Nature of impact	Location
1	Effects of the scheme on the Measham area where the current proposals impact on a residential development that is key to the regeneration of the town	Economic/ regeneration/ environmental/ planning	Measham area (Ashby Canal restoration to the east of Measham)
2	Impact on the western side of Kegworth where the route is on an elevated viaduct	Environmental - loss of amenity	Kegworth area (north side of Kegworth and passes through land that has been identified for housing development on the west side of the village)
3	Implications and impact of HS2 on the Trent Valley Vision	Environmental/ planning/ economic	Trent Valley
4	Effects of the proposed viaduct through Long Eaton where the route passes through a built-up area close to the town centre	Economic/ environmental/ planning	Long Eaton
5	Impact of the proposed spur, including the loss of residential amenity and concerns about severance among communities in the Newton and Blackwell areas	Environmental - loss of amenity	Newton / Blackwell
6	Impact of the route on sensitive areas north of Sandiacre and the Trowell area – loss of habitats, loss of rural amenity, disruption to recreational routes	Environmental - loss of amenity	Sandiacre area
7	Impact of the route on the cultural	Environmental incl.	Hardwick Hall, Bolsover

	heritage, and associated issues for the visitor economy, notably in the area around Hardwick Hall	historic and cultural heritage, visitor economy	Castle, Sutton Scarsdale Hall
8	Impact on nature conservation interests e.g. Carr Vale, Peter Fidler Nature Reserve	Environmental/ visitor economy	<ul style="list-style-type: none"> • Carr Vale, west of Bolsover • Selston – impact on SSSI. • Junction 27 – including the impact on Annesley Hall and historic park and garden
9	Impact on plans for the restoration of the Chesterfield Canal	Environmental/ economic/ planning	Staveley area
10	Impact on businesses – both current operations and future expansion plans	Economic/ planning	Small business units on The Westminster Industrial Estate, which includes a number of starter units
11	Implications for specific development sites	Economic/ planning	Various locations e.g. Coalite site near Bolsover
12	Impact on residential areas and other sensitive land uses	Environmental/ social	Hucknall –Ashfield
13	Impact on the health and well-being of people who live or work in the vicinity of HS2 during the construction and operational phases	Health/social	Various locations
14	Financial implications for local authorities – business rates, development proposals	Financial/ economic	All areas
15	Disruption during the construction phase of the project – severance, noise, loss of business	Economic/ environmental/ health/ social	Various locations
16	Impact on the local highway and public rights of way network	Severance	All areas

Taking account of the above listed items SNC-Lavalin was requested to provide advice on:

- priorities for further action
- the nature of interventions to mitigate the impact of the scheme
- areas/impacts where there is little or no scope for effective mitigation or further action
- further studies or investigations that may be required
- identification of any areas that should be developed through separate work streams

The areas to be considered was subsequently extended by the request from Leicestershire County Council in an email dated 22 March 2018 to consider the impact on Packington to the north of Measham.

Similarly an email from Derbyshire County Council on 16 March 2018 requested that the Coalite site be removed pending the outcome of a review and that the Saw Pit Industrial Estate be considered in addition.

The HS2 Mitigation Committee meeting on 12th June resulted in further areas being included in the scope. These were confirmed in the email dated 14th June 2018 from Derbyshire County Council.

The HS2 Mitigation Group Officers meeting on 22 August 2018 brought up further comments on the issues considered and raised new issues. These were summarised in emails dated 11th, 12th and 13th September 2018.

5 Meetings

A start up meeting was held in Long Eaton on the 25th January 2018 attended by Jon Hall of SNC-Lavalin and by representatives of the following Councils:

- Ashfield District Council
- Broxtowe Borough Council
- Bolsover District Council
- Chesterfield Borough Council
- Derbyshire County Council
- Erewash Borough Council
- East Midland Consortium
- Leicestershire County Council
- Nottinghamshire County Council
- North East Derbyshire

During this meeting SNC-Lavalin described the potential gains from carrying out a HS2 Route mitigations assessment. It was highlighted that the ultimate target of a detailed study would be to identify minor alterations to the HS2 Route vertical alignment that could reduce the local impact of the Route. The conclusion of such a study could be put forward to HS2 for consideration.

In addition, the representatives of each council presented the issues relevant to their areas. The issues raised are listed on the “HS2 Mitigation group meeting 25th Jan 2018” Minutes. This provided background for the six local study areas and the perceived impact at each. It also confirmed the programme, identified the reporting lines and provided points of contact within the organisations concerned.

A further meeting was held on 16th March 2018 at which the draft report was presented to the representatives of the East Midlands Councils. Representatives from HS2 also attended the meeting. The notes of the meeting are included in Appendix B

A further meeting was held on 23rd May 2018 with a presentation of the findings to the representatives of the East Midlands Councils; this was attended by representatives from HS2. The notes of the meeting are included in Appendix B. At this meeting it was confirmed by HS2 that the proposed alignment had undergone some optimisation and a revised alignment was to be published soon. A meeting with HS2 engineers has been arranged for 15th June 2018 to examine this revised alignment against the issues raised in the mitigation assessment.

In advance of the meeting with HS2, a full meeting of the HS2 Mitigation Committee took place in Matlock. The meeting went through the content of the report and discussed the impacts and potential mitigation. This resulted in the addition of further areas for coverage in the study.

A meeting took place with the HS2 Engineering team at Birmingham on 15th June 2018. This went through areas of potential mitigation and outlined the approach to be adopted by HS2.

6 Sources of Information

The alignment proposed by HS2 was confirmed from the drawings available on the HS2 website. These comprised the following drawings:

- C321-MMD-RT-DPP-110-590602 P03 - HSL 06 2017 Preferred Route Sheet 2 of 5
- C321-MMD-RT-DPP-110-590603 P02 - HSL 06 2017 Preferred Route Sheet 3 of 5
- C321-MMD-RT-DPP-110-590604 P02 - HSL 06 2017 Preferred Route Sheet 4 of 5
- C321-MMD-RT-DPP-110-590901 P02 - HSL 09A 2017 Preferred Route Sheet 1 of 1
- C321-MMD-RT-DPP-110-590902 P02 - HSL 09B 2017 Preferred Route Sheet 1 of 2
- C321-MMD-RT-DPP-110-590903 P02 - HSL 09B 2017 Preferred Route Sheet 2 of 2
- C321-MMD-RT-DPP-170-581201 P04 - HSL 12 2017 Preferred Route Sheet 1 of 2
- C321-MMD-RT-DPP-170-591202 P02 - HSL 12 2017 Preferred Route Sheet 2 of 2
- C321-MMD-RT-DPP-120-591301 P02 - HSL 13A 2017 Preferred Route Sheet 1 of 4
- C321-MMD-RT-DPP-120-591303 P02 - HSL 13A 2017 Preferred Route Sheet 3 of 4
- C321-MMD-RT-DPP-120-591304 P02 - HSL 13A 2017 Preferred Route Sheet 4 of 4
- C321-MMD-RT-DPP-120-591305 P02 - HSL 13B 2017 Preferred Route Sheet 1 of 4
- C321-MMD-RT-DPP-120-591306 P02 - HSL 13B 2017 Preferred Route Sheet 2 of 4
- C321-MMD-RT-DPP-120-591307 P02 - HSL 13B 2017 Preferred Route Sheet 3 of 4
- C321-MMD-RT-DPP-120-591308 P02 - HSL 13B 2017 Preferred Route Sheet 4 of 4
- C321-MMD-RT-DPP-120-591401 P02 - HSL 14 2017 Preferred Route Sheet 1 of 3
- C321-MMD-RT-DPP-120-591501 P03 - HSL 15A 2017 Preferred Route Sheet 1 of 2
- C321-MMD-RT-DPP-120-591502 P03 - HSL 15A 2017 Preferred Route Sheet 2 of 2
- C321-MMD-RT-DPL-190-581301 P01 – Staveley Depot M18 / Eastern Route Sheet 1 of 3
- C321-MMD-RT-DPL-190-581302 P01 – Staveley Depot M18 / Eastern Route Sheet 2 of 3
- C321-MMD-RT-DPL-190-581303 P01 – Staveley Depot M18 / Eastern Route Sheet 3 of 3

7 HS2 Route Assessment

7.1 General Route Considerations

7.1.1 Horizontal Alignment

The key locations identified by the East Midlands Councils consortium cover a length of the HS2 route extending from Measham in Leicestershire to Bolsover in Derbyshire. The HS2 route through this section adopts a route that aims to minimise overall impacts by following a series of existing transport corridors.

From Measham the route follows closely to the eastern side of the M42 motorway to its junction with the M1. Here it moves eastwards away from the motorway crossing the River Trent to join the Erewash Valley railway corridor through Long Eaton and Toton to Sandiacre. At this point the route rejoins the M1 motorway and follows to the east of this passing Trowell, Hucknall and Sutton-in-Ashfield. North of here the HS2 route crosses briefly to the western side of the M1 before returning to run on the eastern side of the motorway close to Bolsover. A spur line to serve Chesterfield and Sheffield diverges from the main route adjacent to the village of Hilcote. This then joins the existing Erewash Valley rail line just south of Clay Cross to continue further north.

7.1.2 Vertical Alignment

The HS2 vertical alignment adopts a common approach to the various topographical and route constraints.

The HS2 route crosses a number of watercourses and associated flood plains. At each the route is shown to be carried on viaduct across the entire flood plain in order to avoid any impact on these. This has been adopted throughout, whether the flood plain is in rural or urban areas.

Elsewhere the route aims to adopt an alignment that generally follows the existing topography. This will still require cuttings and embankments due to the undulating nature of the land.

7.2 Categorisation of Impacts and Mitigation

The potential impacts at each of the locations included in the assessment have been allocated to the following four tiers in order to confirm the actions going forward:

- Tier 1 – Significant impacts where active engagement is required with HS2 to develop mitigation
- Tier 2 – Impacts where representation to HS2 during the next design phase may achieve reductions in impacts
- Tier 3 - Major impacts with little opportunity for mitigation where alternative proposals may be required from the appropriate developer in addition to local mitigation proposals
- Tier 4 - Major local impacts where local mitigation proposals need to be developed with HS2

7.3 Measham

C321-MMD-RT-DPP-110-590603 P02 - HSL 06 2017 Preferred Route Sheet 3 of 5

7.3.1 Description

The HS2 alignment between Tamworth and Kegworth follows closely to the east of the M42 alignment. The choice of this alignment would appear to be driven by the need to avoid impact on the East Midlands Airport to the north of this section and on various settlements to the west of the M42. However the route runs immediately between the west side of Measham and the M42. Due to the difference in design speed between the motorway and the HS2, the rail alignment takes a straighter alignment on the south side of Measham impacting this part of the village.

Due to the proximity of the M42 to the western edge of Measham, a local realignment of the motorway is proposed to provide sufficient space to allow the HS2 route to adopt an alignment within the same corridor.

7.3.2 Alignment

The horizontal alignment in the area follows a 12,800m radius curve approaching Measham from the south straightening as it runs north from Measham. This allows the full design speed of 400km/h to be maintained.

Vertically the route south of Measham follows the existing ground level falling at 1.183% towards junction 11 of the M42 adjacent to Appleby Magna. Approaching the junction the rail alignment enters a cutting passing beneath the A444, Rectory Lane and Tamworth Road. It then starts to climb at 0.684% continuing through the 10m deep cutting before emerging to pass over the River Mease floodplain via a viaduct. This also passes over Repton Road, Huntingdon Way and Burton Road. Beyond this the rail alignment continues to follow approximately the existing ground level at a similar level to the adjacent M42. It would pass beneath New Street which currently crosses the M42 via an overbridge.

7.3.3 Route Alternatives

The HS2 proposed horizontal and vertical alignments are considered to have minimised property impacts and no improvements are envisaged by adopting an alternative alignment.

7.3.4 Impact on Proposed Measham Waterside Development

Details of the proposed development have been taken from the North West Leicestershire District Council Planning Application 13/00141/OUTM.

The rail alignment would initially cross Burton Road on the southern extremity of the development on a 10m high embankment. The alignment would return to existing levels at the approximate location of the reinstated canal before entering a shallow cutting that would continue to the north western corner of the development site.

The HS2 alignment would effectively split approximately one third of the development from the remainder. Although this area would still be available, the shape and location of the site, a triangular area bordered by the M42 and the HS2 cutting could compromise the feasibility of this section.

The elevation of the HS2 alignment crossing Burton Road is likely to increase impacts on the adjacent area of the development. Suitable noise and environmental barriers would be required to reduce this impact.

The proposed canal reinstatement would need re-engineering. Although the rail alignment would cross the canal at approximate ground level, the canal already needs to reduce in level to pass beneath the adjacent M42. It could be feasible to relocate the proposed locks from the west to the east of the HS2 alignment to reduce the level to that required to pass beneath the M42.

7.3.5 Conclusions

Little can be done to mitigate the impact of the HS2 route on the proposed Measham Waterside Development. Discussions would be needed to determine whether a reduced size development would still be viable.

There are significant concerns in regard to the noise and visual impacts caused by the proposed line, where it crosses the River Mease, which is both a SSSI and a SAC. These concerns relate to design considerations, construction impacts and longer term operation of HS2. Local mitigation in the form of noise and environmental screening may alleviate some of the noise and visual impact of the new route.

Further detailed study would be needed to confirm the feasibility of lowering the proposed reinstated canal beneath the HS2 alignment.

This is considered to be categorised as requiring **Tier 3** mitigation.

7.4 Packington

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7.4.1 Description

As described in section 7.3.1 the HS2 alignment between Tamworth and Kegworth follows closely to the east of the M42 alignment. The route runs immediately between the west side of Packington and the M42. Adjacent to Packington the HS2 alignment and the motorway run roughly parallel.

7.4.2 Alignment

North of Measham the horizontal alignment initially follows a 12,800m radius curve before straightening and continues passing junction 12 on the A42. As the route approaches Packington it enters a 16,880m radius. The full design speed of 400km/h is maintained through this section of the route.

Vertically initially the route continues to follow the existing ground climbing at 0.684%. It then passes through a 15m deep cutting south of the B4116 Measham Road before emerging to briefly follow the existing ground level east of the M42 junction. The route then falls briefly at 0.434% and enters a further 10m deep cutting as it approaches Packington from the south, emerging from this north west of the village to pass over Gilwiskaw Brook via a short length of viaduct. North of Packington the alignment rises at 0.200% running in a shallow 4m deep cutting.

7.4.3 Route Alternatives

The HS2 proposed horizontal and vertical alignments are considered to have minimised property impacts and no improvements are envisaged by adopting an alternative alignment.

7.4.4 Impact on Packington

The proposed line is within close proximity of listed buildings and the conservation area of Packington village.

Concerns have been raised in regard to the visual impacts and noise caused by the proposed line on the village, particularly where the HS2 line emerges from cutting south west of Vicarage Lane, and then crosses the Gilwiskaw Brook (an upstream tributary of The Mease - the SSSI / SAC) and associated flood plain, on viaduct. There are also concerns that HS2 Ltd. may not have assessed the cumulative noise impact.

The receptors of these impacts include the Primary School, the conservation area, listed buildings both during construction and operation, and properties in general across Packington village that look toward Gilwiskaw Brook.

It is thought that there is a balance to be struck between the height of the Gilwiskaw Brook Viaduct and the existing level of the adjacent A42, along with screening work to minimise the 'burst' impact of high speed trains emerging from the hillside cutting south-west of Packington.

7.4.5 Conclusions

There is little opportunity to achieve any horizontal realignment of the HS2 route to move the alignment further from Packington due to the closeness of the M42. With respect to the vertical alignment, a lowering of the viaduct over Gilwiskaw Brook would yield a reduction in noise and visual intrusion. However this needs to be balanced against the requirements for HS2 not to obstruct the existing flood plain. This would be a subject for detailed examination during the detailed design stages.

There may be opportunities for the introduction of local noise mitigation measures both on the transition from cutting to viaduct and on the viaduct itself. However these may introduce visual intrusion and would need engagement between the local authority and HS2 during the design stage to achieve the best balance between these potential impacts.

This is considered to be categorised as requiring **Tier 2** mitigation.

7.5 Kegworth

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7.5.1 Description

The HS2 alignment approached Kegworth from the south running immediately to the south of the M42 and the west of the M1 alignments. After passing over the A453 adjacent to the M1 junction 24, the route turns to run in a norther eastern direction, passing over the Midland Main Line railway close to East Midlands Parkway Station. Beyond this it turns towards the North to pass towards the eastern extremity of Long Eaton.

The route threads its way through a number of significant constraints including the M1 alignment, Kegworth and the Ratcliffe-on-Soar power station.

7.5.2 Alignment

Horizontally the alignment runs to the south of the M42 following a 3905m radius, crossing the M1 and Diseworth Brook floodplain via a viaduct. The curve continues to the west of Kegworth where it reverses following another 3905m radius to the crossing of the A453. Here the alignment straightens to pass to the north of the East Midlands Parkway Station.

The design speed for this section of the route is a reduced 275km/h.

Vertically the route initially descends at 1.455% alongside the M42 approximately at existing ground level. It then rises at 0.656% to pass over the M1 and Diseworth Brook floodplain via a viaduct. As the route runs parallel to the M1 it enters a length of cutting that continues towards Kegworth. The route then descends at 1.420% again in cutting passing to the west of Kegworth and passing under Ashby Road. The rail alignment emerges from the cutting and becomes flat crossing the A6 as it runs to the northwest and passes over the A453, the River Soar floodplain and the Midland Main Line railway on a viaduct.

7.5.3 Route Alternatives

The HS2 proposed horizontal and vertical alignments are considered to have minimised property impacts and no improvements are envisaged by adopting an alternative alignment.

7.5.4 Impact on Kegworth

The route passing Kegworth is predominantly in cutting to the south and immediately to the west. The depth of cutting varies to a maximum of 15m but is approximately 8m deep passing closest to Kegworth. However once emerged from the cutting, the initial embankment to the north west of Kegworth would introduce visual impacts. This would be difficult to mitigate as the route across the floodplain requires it to be on an extensive viaduct. This is potentially exacerbated by the generally flat nature of the land. However the receptors are predominantly to the west of Kegworth viewing the embankment rather than to the north where the viaduct would be viewed.

Additionally the route severs the area west of Kegworth bounded by the M1 that has been identified for housing development. Although the area between Kegworth and the proposed route could be developed, the narrow strip of land remaining between the route and the M1 may not prove feasible for development.

7.5.5 Conclusions

Although the impact of the new route on Kegworth is mitigated by the cutting to the west of the village, there will be some local visual impact to the north.

Further discussions would be required to determine whether the area of land to the west of the village identified for development would remain feasible given its location bounded by the rail alignment and the motorway.

This is considered to be categorised as requiring **Tier 3** mitigation.

7.6 Trent Valley

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7.6.1 Description

The HS2 alignment through the Trent Valley is constrained by two main factors:

- The need to align the approach to the Toton area along the existing railway corridor
- The elevation of the route to maintain the existing flood plain

From Kegworth the route heads in a north easterly direction, turning as it passes to the north of East Midlands Parkway station and over the River Trent floodplain to pass the eastern side of Long Eaton on the existing low level Erewash Valley Line railway corridor. The route straightens to pass through the Toton railway lands, heading towards the gap between Sandiacre and Stapleford.

7.6.2 Alignment

The horizontal alignment continues straight from the crossing of the A453 and continues north eastwards to pass over the River Soar and its floodplain. On the approach to East Midland Parkway station the alignment turns towards the north on a 3815m radius curve. It continues on this curve passing over the Midland Main Line and entering a short tunnel through Wood Hill. As the route emerges onto the viaduct crossing the River Trent and its floodplain, the radius of the curve eases to 4270m for a short distance before tightening again to a 3280m radius as the alignment passes over the Cranfield Canal. This curve continues as the route joins the existing westerly railway corridor passing Long Eaton

The design speed for this section of the route is a reduced 275km/h.

Vertically the alignment is level from the A453 crossing to the Trent Junction to Nottingham railway. The alignment then rises on a 0.343% gradient to pass over Golden Brook before descending at 0.454% towards the Toton railway lands.

This section of route runs almost entirely on viaduct due to the presence of the various floodplains and the need to cross existing railways and road corridors. The viaduct runs at a height of approximately 15m above existing ground levels. There is also a short 200m section of cut and cover tunnel where the route runs through Wood Hill on the southern side of the River Trent floodplain.

7.6.3 Route Alternatives

As described in Section 7.6.1 above, the HS2 proposed horizontal and vertical alignments are constrained by the need to align the approach to the Toton area along the existing railway corridor and to maintain the existing flood plain. There are not considered to be any feasible alternative alignments in this area.

7.6.4 Trent Valley Vision

Objectives of the Trent Valley Vision

The Trent Valley Vision study area covers the entire Trent Valley within Derbyshire, as well as the lower reaches of the River Dove and River Derwent, spanning the area bound by Long Eaton, Derby, Burton on Trent, and Uttoxeter.

The Trent Valley Vision essentially proposes a coordinated approach to the future planning and development of the area in terms of commercial/industrial development, leisure and tourism development and nature conservation, and the benefits of this approach have been evaluated in an economic assessment undertaken by consultants. The economic assessment identified a number of key sectors contributing to the economic activity of the area including:

- Aggregate extraction
- Agriculture
- Construction
- Health and wellbeing
- Heritage
- Physical infrastructure
- Manufacturing, research and development
- Tourism, recreation, retail and leisure
- Water
- Wider economy
- Wildlife and biodiversity

The HS2 alignment crosses the study area at its extreme eastern end where it crosses from the south side of the valley close to the Ratcliffe-on-Trent power station to join the existing railway corridor through Long Eaton. Although the impact of the new route is limited in geographical terms it does have impact on several aspects covered by the study. Principally the impacts include:

- **Heritage:** The most significant heritage impact would be on Thrumpton Hall. Although the property is shielded from the nearest views by established trees, it will receive wider views of the viaduct as it enters Long Eaton. The setting of Thrumpton Hall would also be affected.
- **Wildlife and biodiversity:** There are likely to be impacts on wildlife and biodiversity, predominantly temporary impacts during construction. The construction of the extensive viaduct carrying the HS2 route across the River Trent floodplain will require the construction of intermediate supports across the floodplain. It is anticipated that the supports would require piled foundations which will serve to limit the volume of material to be excavated during construction. Additionally temporary routes will be required to provide access for construction. However comprehensive precautions will be required to ensure that impacts on watercourses, flora and fauna are avoided in this sensitive area.

7.6.5 Conclusions

The presence of the new viaduct carrying the HS2 route across the River Trent and its floodplain will have a significant visual impact. With respect to the terms of the Trent Valley Vision, the impact of the route may be mitigated somewhat by the careful design of both the viaduct and the means of construction. The positioning of the viaduct supports and the appearance of the viaduct deck will be crucial due to the structure's prominent position in the local landscape. It will be more difficult to mitigate the appearance of the overhead electrification equipment mounted on the viaduct.

Early engagement with HS2 will be essential to confirm the detailed proposals of the viaduct structure; the engagement of HS2 with a specialist bridge architect for this section, as they have done with the Colne Valley viaduct for Phase 1 of HS2, would help ensure that the visual impact of the viaduct is minimised

This is considered to be categorised as requiring **Tier 1** mitigation.

7.7 Long Eaton

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7.7.1 Description

The HS2 alignment over the River Trent floodplain and onto the western rail corridor adjacent to Long Eaton is described in Section 7.5.1 above. The route follows the existing western low level Erewash Valley Line railway corridor through into the Toton railway lands where the HS2 East Midlands Hub Station is located. Beyond the station the route continues to follow the existing railway alignment through the corridor between Sandiacre and Stapleford.

7.7.2 Alignment

The horizontal alignment continues on a viaduct on a 3280m radius as it joins the existing westerly railway corridor passing Long Eaton. This continues to Station Street where it straightens to run through the existing railway corridor to the location of the HS2 East Midlands Hub Station. Beyond the station the route turns towards the northeast on a 4500m radius curve, passing beneath the A52 bridge.

The design speed for this section of the route is a reduced 275km/h.

The route continues on a level vertical alignment on the initial section of route through Long Eaton. It rises briefly at 0.343% over Golden Brook before falling at 0.454% through the HS2 station to a low point beneath the A52 bridge. It returns to meet existing ground levels shortly before the A52 bridge. The viaduct carrying the route through Long Eaton is some 15m above existing ground level. This reduces in height beyond the A6005 bridge continuing until it ends at approximately the northern end of the HS2 station platform.

The level of the viaduct on the southern approach to Long Eaton appears to be dictated by the need to maintain the River Trent floodplain. The floodplain is indicated on the HS2 plans as extending along the railway corridor and into Long Eaton. The height of the viaduct also appears to be dictated by the crossing of the Golden Brook. However shortly beyond this the route also crosses the A6005 which in turn crosses the existing railway.

7.7.3 Route Alternatives

A number of route alternatives have previously been considered including a tunnel, surface route and route on embankment. These have been rejected with the current option of a viaduct selected for the route through Long Eaton. It was not the original objective of this report to re-examine these alternatives or to suggest alternatives; instead impacts and potential means of mitigations were to be addressed.

However following the meeting of the HS2 Mitigation Committee on 12 June 2018 it was requested that mention be made of the feasibility or otherwise of the provision of a tunnel beneath Long Eaton. This is covered in Section 7.7.5.

The current route alignment does not provide details of the works required to maintain existing highway routes. HS2 has confirmed to the Local Authorities that existing routes are to be maintained. Careful attention to the design would be required to ensure that sufficient clearance is maintained between the A6005 crossing and the HS2 viaduct without needing an increase in height of the viaduct.

7.7.4 Impact of the Viaduct Structure

The viaduct will inevitably introduce a major visual impact on properties to the west of Long Eaton. However many of the properties bordering the existing railway corridor are commercial and industrial rather than residential.

South of the A6005 bridge, the properties on Bonsall Street would receive the largest impacts with both sides of the road shown as being acquired for the HS2 alignment. The removal of the properties on Bonsall Street would also result in the area under the viaduct and the rear elevations of retail properties on Cross Street coming into view, resulting in further visual impact on nearby properties. The properties on East Street and Conway Street would have direct views of the viaduct. Other properties on the east side of the route on New Tythe Street and Meadow Lane would be impacted. Similarly the properties on Trafalgar Terrace on the west side of the corridor, although further set back from the corridor, are likely to receive uninterrupted views of the viaduct. It is unlikely that these views could be mitigated in any appreciable way. It is key therefore that the design of the viaduct and the equipment carried on the viaduct is carefully considered to provide an acceptable appearance. There are opportunities to provide local mitigation beneath the viaduct but it should be acknowledged that the existing railway occupies an alignment to the west of the viaduct and would offer little opportunities for mitigation from that side.

It has been suggested by Erewash Borough Council that local severance could be reduced by the removal of the existing Erewash Valley Low Level line and transferring the rail traffic onto the eastern rail corridor. Although this may require some modification to the existing junctions south of Long Eaton and a possible change to the proposed layout of the existing railway to the south of the proposed East Midlands Hub Station, this would bring benefits by the reduction in local severance.

The use of the space beneath the new viaduct would provide opportunities for various forms of mitigation although any use would also need to accommodate HS2's maintenance requirements for the structure. Landscaping would provide a simple and potentially attractive solution, and while this would require ongoing maintenance it would help combat the negative visual impacts of the HS2 viaduct. The environment, with the HS2 structure above and immediately adjacent to the existing railway, may not encourage general usage, so careful consideration of the design of the landscaped park and viaduct would be required. An alternative would be to use this space for appropriate business purposes; this would mirror the traditional uses of arches below railway viaducts that are common in inner urban areas. However, considering the proximity of the viaduct to residential properties, measures should be taken to ensure that the businesses have a positive impact on local residents.

Immediately north of the A6005 bridge, the residential properties on Cranmer Street, although further removed from the railway corridor, may receive intermittent views of the viaduct where not shielded by commercial properties such as the extensive retail unit adjacent to the railway corridor. Properties on Howard Close, Olive Avenue, Worrall Avenue and Willow Avenue may also receive views but have the benefit of extensive tree cover between these locations and the railway. These may benefit in the longer term by strategic planting of further trees.

Further north the extensive row of residential properties on Bennett Street are likely to receive distant uninterrupted views of the viaduct over the River Erewash. There is little effective mitigation that could be provided for these properties.

7.7.5 Tunnel Alternative

Although a tunnel through the Long Eaton section of the route would mitigate the impacts of the route, there are significant issues that surround the provision of a tunnel.

The most significant issue would be the costs associated with the provision of a tunnel. The cost of construction, using a cost model appropriate to HS2, would be £61,600 per metre of tunnel length. Although the length of tunnel through Long Eaton would be limited, the transition from surface or elevated route to tunnel imposes a major constraint on the positioning of the tunnel portals due to the total length required. The section of route both through Long Eaton and either side is located on the River Trent floodplain. In order to protect the tunnel from future flooding, a transition structure would be required that extended above future flood levels for the entire transition from surface or elevated route to tunnel. This would effectively require an artificial island. Due to the limitations on the gradient for

such a transition initial estimates would be that the transition structure would be in excess of 600m in length. The positioning of such structures would be limited by the local constraints. To the south, the transition structure would need to be south of the River Trent and then south of the existing Midland Main Line railway so that it would be located immediately to the north of A453 crossing. To the north, the location of the East Midlands Gateway station would preclude the transition structure from being located within the Toton railway lands. This is due to the requirement to only provide platforms on straight, level track. Consequently it would need to move to the north of the proposed station approximately at the A52 bridge. The total length of the tunnel would be approximately 7.1km long which, with a cost rate of £61,600 per metre length, would result in an unfactored cost of £437m. This would rise to £964m once preliminaries, design, overheads and optimism bias had been added. The length of tunnel could be reduced by positioning the transition within the Toton railway land but this is likely to preclude the provision of the East Midlands Gateway HS2 station at that location. The cost of a viaduct of the same length would be in the region of £275m.

The transition structures would be located within the floodplains of the River Trent and River Erewash. These lengthy structures would need to extend vertically to the maximum flood level and would therefore introduce significant visual impacts across a flat landscape.

A further issue is the construction of the tunnel. Due to the local environmental constraints a cut and cover tunnel would not be feasible in this location. It is not known how suitable the geological profile of the local geology of the River Trent floodplain would be for the construction of a bored tunnel. This would need to be the subject of a specialist constructability study if the tunnel option was to be pursued.

7.7.6 Conclusions

The requirement for the viaduct through Long Eaton has been the subject of considerable scrutiny and has not been included in this report. The local mitigation is therefore particularly important.

The viaduct running through the eastern side of Long Eaton would have a considerable impact, both in terms of the viaduct itself, and by the visual exposure of other elements of the urban fabric by removal of existing properties and buildings. The mitigation that can be put into place would require the careful design and detailing of the viaduct to provide an acceptable appearance and ensure that the positions of the supports are optimised. The treatment of the land beneath the new viaduct would present opportunities for mitigation either in terms of landscaping to create a linear park or for appropriate business use.

The removal of the existing Erewash Valley Low Level railway would bring benefits by the reduction in local severance and creating more space for mitigation. This should be discussed further with the Stakeholders.

Although a tunnel beneath Long Eaton would avoid the impacts of a viaduct, the constraints associated with this alternative would require the tunnel to extend considerably beyond the section of route through the centre of the town. Although the engineering may be feasible, the costs of a tunnel would be likely to be in excess of £900m as compared to £275m for a viaduct.

This is considered to be categorised as requiring **Tier 1** mitigation.

7.8 Sandiacre / Trowell

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7.8.1 Description

The HS2 alignment through the western rail corridor adjacent to Long Eaton to the A52 overbridge is described in Section 7.7.1 above. Beyond this the route follows the existing western railway corridor from the Toton railway through the River Erewash floodplain before turning towards the northwest to follow the alignment of the M1 past Trowell towards Nuthall and Hucknall.

7.8.2 Alignment

Horizontally, north of the A52 overbridge the alignment continues to turn towards the northeast on a 4500m radius curve. This continues until the route meets the M1 alignment where the curve eases to a 7110m radius for a short distance before easing further to a 14220m radius. This continues to Strelley Hall where the route straightens to pass through a short section of tunnel.

The vertical alignment north of the A52 overbridge initially rises at 1.602% on the viaduct carrying the route over the River Erewash floodplain and the Erewash canal. This reduces to 0.695% until the route meets the M1 alignment where the gradient reduces further to 0.010%. The viaduct continues to the crossing of the existing Radford and Trowell railway after which it returns to an embankment. The gradient increases to 1.562% approximately following the existing ground level on a series of embankments and cuttings. Once past the Trowell service area the gradient reduces slightly to 1.033% which continues through the tunnel beneath Strelley.

7.8.3 Route Alternatives

The HS2 proposed horizontal and vertical alignments are considered to have minimised property impacts and no improvements are envisaged by adopting an alternative alignment.

An alternative has been put forward that the route should either pass beneath the area in a tunnel or for the viaduct to be replaced by embankments. Briefly considering these in turn:

Tunnelled Option

One key feature of this section of the route between Kegworth and Trowell is the near continuous presence of the River Trent and River Erewash floodplains. As described in Section 7.7.5 in order to safeguard a tunnel from the risk of flooding, any tunnel would need to either pass beneath the entire floodplain or transition from tunnel to viaduct via an artificial island where the entrance to the tunnel could be protected from floodwater.

It is unlikely that a tunnel would be viable for only the section of route through Sandiacre and Trowell and that any tunnel would be a continuation of a tunnel beneath Long Eaton. In order to avoid the need for a transition structure, the tunnel would extend from the East Midlands Gateway HS2 station towards Trowell. North of Trowell the tunnel would need to pass beneath the Radford and Trowell railway before rising to meet the proposed alignment. However in this location the proposed HS2 alignment is rising at 1.562% so that the tunnel rising at a desirable maximum of 2.5% would extend some distance to the north approximately adjacent to the Trowell motorway services before meeting the original alignment. Consequently the additional length of tunnel would be over 7km. Using the same cost model as described in Section 7.7.5 the cost of such a tunnel would be a further £400m (unfactored) / £900m (including preliminaries, design, overheads and optimism bias) in addition to the costs of £437m / £964m identified in Section 7.7.5.

The provision of a tunnel would also avoid the need to realign a short section of the M1 motorway. However the resulting cost saving would be minor in comparison to the cost of the tunnel.

Although a tunnel option would significantly reduce impacts, it is unlikely to be affordable.

Embankment

As noted previously, the HS2 route runs almost entirely through the Trent Valley flood plain in this section of route. Consequently any embankment within this area would require the provision of extensive, continuous flood relief culverts beneath to mitigate the obstruction to the flood plain. In view of the need for any embankment to be supported on a continuous structure, the costs of doing so would be substantially greater than supporting the HS2 alignment on a viaduct structure.

7.8.4 Potential Impacts

General Description

A number of impacts have been put forward by local groups. These mainly relate to the 1km length of route at the northern end of Sandiacre between the HS2 alignment leaving the existing railway corridor and meeting the M1 motorway alignment. Here the existing railway initially curves sharply right then left to adopt a northerly alignment whilst the HS2 route curves to join the M1 alignment. In this area the new HS2 route travels across the fields between Ilkeston Road and the Erewash canal.

Rather than address the particular points made, it would be preferable to consider the general points made by category.

- Construction
- Health and wellbeing
- Heritage
- Physical infrastructure
- Recreation and leisure
- Wildlife and biodiversity

Considering each of these in turn:

Construction

The construction of the extensive viaduct carrying the HS2 route through this area will require the construction of intermediate supports across the fields to the west of the Erewash canal and the River Erewash floodplain. It is anticipated that the supports would require piled foundations which will serve to limit the volume of material to be excavated during construction. Additionally temporary routes will be required to provide access for construction. However comprehensive precautions will be required to ensure that impacts on watercourses, flora and fauna are avoided in this sensitive area.

Health and Wellbeing

The issues that could be categorised as having direct health effects from the presence of the new HS2 route are likely to be visual intrusion from the viaduct carrying the route and any noise from passing trains.

With regard to visual impact, the need for the viaduct to be clear of the floodplain requires it to traverse the floodplain some 15m above the existing ground level. This together with the presence of overhead electrification equipment on the viaduct will introduce a significant impact. Those impacted most will be the properties and commercial premises on Ilkeston Road in Sandiacre and the properties in Stanton Gate. The properties on the western edge of Stapleford on the eastern side of the River Erewash would also experience visual impact, initially distant at the south but becoming closer as the HS2 alignment moves to follow the M1 alignment. Properties on the western side of Trowell would also experience significant visual impact. The design of the viaduct and intermediate supports would require the careful

design and detailing to provide an acceptable appearance. In particular it will be important to optimise the positions of the supports in order to reduce the potential visual intrusion and severance at existing ground level.

Users of the Erewash canal and towpath would also experience visual impact.

With regard to noise intrusion, this will inevitably rise. However the significance of this has to be balanced against the existing baseline conditions as the route is in close proximity to both the M1 motorway and the four track railway running through the Erewash valley.

Mitigation is likely to be limited to the adoption of a suitable form of structure for the viaduct.

Heritage

There will be impacts on two listed features in this area, St Giles Church in Sandiacre and Bridge 12 over the Erewash Canal. The settings of both of these will be affected by visual impacts in the local area.

The local ridge and furrow formations in the fields will be impacted at the viaduct supports. Elsewhere construction activities will need to protect these features from permanent damage.

Physical Infrastructure

The new HS2 route has been designed to avoid impacts on the existing physical infrastructure. The viaduct carrying the route will span the existing river, canal, roads and railways and associated infrastructure. There are likely to be local alignment changes to the Erewash Canal but these will maintain future use. Existing links are to be maintained.

Recreation and leisure

The proposed location of the HS2 route and its supporting viaduct across the Erewash Canal, the River Erewash and its floodplain will have some impact on the amenity of leisure facilities. Although access to facilities will be maintained, users will experience visual impacts.

Wildlife and biodiversity

There are likely to be impacts on wildlife and biodiversity, predominantly temporary impacts during construction. The construction of the extensive viaduct carrying the HS2 route across the Erewash Canal, the River Erewash and its floodplain will require the construction of intermediate supports across the floodplain. It is anticipated that the supports would require piled foundations which will serve to limit the volume of material to be excavated during construction. Additionally temporary routes will be required to provide access for construction. However comprehensive precautions will be required to ensure that impacts on watercourses, flora and fauna are avoided in this sensitive area.

7.8.5 Conclusions

The presence of the HS2 alignment and supporting viaduct will have a significant impact on Sandiacre and Trowell. This location represents a transition from a route following the existing railway corridor to a route following closely to the M1 motorway. Inevitably this introduces impacts due to its deviation from both established corridors. The new route will ultimately adopt an alignment close to and at a similar level to the adjacent M1 motorway. The longer view visual intrusion is unlikely to change significantly from the existing.

The impacts associated with the construction of the route and its supporting viaduct should be largely mitigated. Similarly the viaduct may be engineered to minimise obstructions to the usage of existing leisure facilities by the positioning and choice of appropriate intermediate supports. However the mitigation of the visual impact will depend on the careful design to achieve an acceptable appearance of the viaduct and its intermediate supports.

The alternative suggestions of a tunnel or embankment instead of a viaduct would not be cost effective and are unlikely to receive further consideration.

This is considered to be categorised as requiring **Tier 1** mitigation.

7.9 Strelley / Nuthall

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7.9.1 Description

The HS2 alignment through the western rail corridor from Long Eaton to Trowell is described in Section 7.7.1 above. The primary constraints within this route section are for the route to pass through the relatively narrow corridor between the M1 motorway and the western sides of Broxtowe and Hucknall whilst minimising the impacts on Strelley and Nuthall.

Consequently North of Trowell the route follows the M1 motorway corridor on its eastern side. The M1 follows a relative tortuous alignment so that the HS2 route runs immediately adjacent to it to the south of Strelley and north of Junction 26 passing Nuthall. North of Nuthall the HS2 alignment runs a short distance east of but parallel to the motorway passing Hucknall before returning to immediately adjacent to the M1 at Junction 27.

7.9.2 Alignment

Horizontally, north of the viaduct over the River Erewash floodplain the alignment continues to turn towards the northeast on a 14220m radius curve passing close to the east of the Trowell service area on the M1. This curve continues to Strelley Hall where the route straightens to pass through a short section of tunnel beneath Strelley. Emerging from the tunnel the route curves towards the north on a 3810m radius, following the curve of the motorway north of Junction 26 before straightening to run to the west of Hucknall.

The vertical alignment north of the River Erewash viaduct continues to rise at 1.562% approximately following the existing ground level on a series of embankments and cuttings. Once past the Trowell service area the gradient reduces slightly to 1.033% which continues through the tunnel beneath Strelley. Beyond the tunnel the route emerges onto embankment descending at 2.458% and crossing the A610 adjacent to Junction 26. The gradient starts to lessen as the route crosses the B600 before starting to climb at 1.300% on a series of shallow embankments running west of Hucknall.

7.9.3 Route Alternatives

Strelley

The HS2 proposed horizontal alignment is considered to have minimised property impacts by running as close to the M1 motorway as the alignment constraints would allow; no improvements are envisaged by adopting an alternative alignment.

With respect to the vertical alignment an alternative has been put forward that the extent of the tunnel should be increased to reduce impacts on Strelley.

The current HS2 proposal is for the route to enter a cutting to the south of Strelley, entering a tunnel a short distance to the south of Main Street. It would emerge some distance to the north of Strelley within the Nottingham Business Park. The structure is indicated as being a bored tunnel with a depth below existing ground varying from an approximate average of 10m up to a maximum of 20m. This is the preferred tunnel construction method, as it would have considerably reduced construction impacts compared to a cut and cover tunnel.

Section 7.19 describes the impact to the north of Strelley and the opportunity to reduce the impacts on the Nottingham Business Park by the adoption of a minor change to the route's vertical alignment to increase the length of the tunnel.

Nuthall

The route would directly impact the housing adjacent to the east side of the M1 motorway with a number of properties needing to be acquired. However this residential area is effectively a ribbon development along the B600 so that there is no benefit to be gained by adopting an alternative horizontal alignment at this location.

The vertical alignment is constrained by the need for the route to cross both the A610 and the B600 roads. The route would adopt an elevation similar to that of the adjacent M1 motorway. The lowering of the route to pass beneath these roads via an underpass or tunnel would require the alignment to reduce in level by approximately 25m. As the gradient descending from Strelley is already approximately 2.5%, any further increase in gradient is not feasible.

Consequently the HS2 proposed vertical alignment is considered to have reasonably minimised property impacts.

7.9.4 Potential Impacts

Strelley

The impact on Strelley would vary between the sections of the route north and south of the village and should be considered as construction and permanent impacts.

As described in Section 7.9.3 above, the route enters a tunnel immediately to the south of the village, which would reduce the permanent impacts. The latest information from HS2 states that the tunnel will be bored, meaning that the existing Strelley Hall business units could be retained. The boring of the tunnel may result in ground settlement above the tunnel, which could affect the business units and surrounding buildings. Monitoring of ground levels would mean that the impact of the settlement could be assessed. Despite potential settlement, the construction impacts of the bored tunnel would be considerably less than those of a cut and cover tunnel.

Once the works have been completed the permanent impacts would be markedly less although the proximity of the tunnel mouth may require careful mitigation to reduce noise.

South of the village the route approaches via a 10m deep cutting. Here the construction and permanent impacts would be much the same. Due to the ground falling away from the village to the south, the route would be visible on its approaches or a considerable distance. A local landscaping and mitigation scheme would be required although this would reduce the existing views from the south of Main Street.

Nuthall

The proposed route would adopt an alignment close to the east side of the M1 motorway passing Nuthall, crossing the B600 via new bridge adjacent to the existing motorway bridge. Apart from the property impacts, there would be an incremental increase in noise and visual intrusion relative to the existing impacts from the adjacent motorway.

7.9.5 Conclusions

There will be significant impacts on both Strelley and Nuthall from the HS2 alignment.

At Strelley the longer term impacts would be noise and visual impact from the cutting immediately to the south of Strelley Hall. Some degree of screening and noise mitigation could be implemented by HS2. Use of a bored tunnel in the section of route through Strelley will result in minimised construction and long-term impacts. For this reason it is considered to be categorised as requiring **Tier 2** mitigation for the construction and **Tier 4** post construction.

At Nuthall the proposed alignment has lessened the impact by adopting a similar alignment to the existing M1 motorway. Little mitigation can be achieved other than the provision of screening and noise barriers. This is considered to be categorised as requiring **Tier 4** mitigation.

7.10 Newton / Blackwell

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7.10.1 Description

7.10.2 The HS2 spur to Sheffield deviates towards the northwest from the main route as it passes South Normanton. North of the A38 the route enters a junction and turns towards Newton, passing to the north of Hilcote and passing beneath the M1 to run immediately south of Newton and a distance to the north of Blackwell.

The route is initially in cutting approaching the A38 before emerging onto embankment and viaduct to cross the Normanton Brook floodplain before returning into cutting at Hilcote. This cutting continues beneath the M1 and south of Newton before emerging to existing ground level west of Newton. A short section of embankment carries the route over the disused railway Tibshelf to Westhouses railway before the route enters a further cutting that continues until the route joins the Midland Main Line close to Morton.

7.10.3 Alignment

The proposed alignment of the Sheffield spur deviates from the main alignment on a 2250m radius curve. This continues until close to the crossing beneath the M1 where the alignment straightens running to the south of Newton.

The design speed through this section of the route is reduced to 200 km/h.

At the Alfreton road the route curves towards the north on a 1500m curve to join the existing Midland Main Line alignment.

The design speed through this section of route is further reduced to 160km/h.

Vertically the route adopts a relative tortuous alignment to best fit the local topography. Initially from the junction the spur rises at a gradient of 0.679%, the same gradient as the main line, through the cutting beneath the A38 overbridge. Once clear of the man line, the spur falls at 0.355% to emerge out of the cutting and pass over the embankment and viaduct over the Normanton Brook floodplain. As the route reaches the B6406 New Lane it ascends again on a short section of 2.054% gradient passing beneath the M1 and the B2026 Huthwaite Lane in cutting. The route falls again at 1.034%, still in cutting, to pass beneath the B2026 Cragg Lane and Alfreton Road. Beyond here the gradient eases to 0.200% and passes out of cutting west of Newton to run approximately at grade crossing the disused Tibshelf to Westhouses railway on a short section of embankment. The gradient then increases to 1.497% as the route descends through a cutting to join the alignment of the Midland Main Line.

7.10.4 Severance and loss of residential amenity

Although the spur runs in cutting through much of this area, the cuttings are generally 7m deep, consequently reducing the visual impact on the villages of Newton and Blackwell. However the route of the spur severs a number of local roads in the area. We understand that HS2 has confirmed to the Local Authorities that existing routes are to be maintained. The reinstated crossings over the route may introduce some local visual intrusion to the south of Newton and minor visual impact from Blackwell.

The two areas that would experience most effects are the ribbon development of housing on Alfreton Road between Newton and Blackwell and the houses on Huthwaite Lane and Cragg Lane.

The crossing beneath Alfreton Road is sufficiently deep to allow a cut/cover tunnel which would reduce both visual and noise impact. There would however still be a need to acquire

properties where the route crosses the road in order to construct the tunnel. Additionally the generally flat topography means that the cuttings would be visible to both east and west.

The collection of properties to the west of the M1 motorway will however suffer a greater impact. The cutting passes immediately to the north of the settlement on the B6026 Huthwaite Lane / Cragg Lane approximately on the line of the former Tibshelf to Westhouses railway. Again the cutting would be approximately 7m deep through this area. Although, providing that the existing roads are maintained, there would be relatively little severance, the visual intrusion of the new cutting would be severe. With regard to noise, there would be an increase. This has to be considered in the context of the existing base noise levels from the adjacent M1 motorway. Although the noise could be mitigated by barriers or local earthworks, this is likely to introduce further visual intrusion. There is little opportunity for the cutting to be replaced by a cut and cover tunnel due to the very shallow depth of the HS2 route beneath existing ground level.

7.10.5 Conclusions

The proposed HS2 route crosses the area between Newton and Blackwell via an extensive length of cutting. Provided that local roads are maintained then the local severance would not be generally major. However the route would have severe effects on the local settlement on the B6026 with few opportunities for mitigation beyond local noise and visual mitigation. There is little opportunity for this to be mitigated by using a cut and cover tunnel due to the limited depth of the route beneath existing ground levels.

Where the route crosses beneath Alfreton Road the construction of a cut and cover tunnel would however be feasible due to the difference in level between the existing road and the HS2 route alignment. It should be noted however that properties would need to be acquired regardless of whether a cut and cover tunnel or a cutting is built beneath the road.

This is considered to be categorised as requiring **Tier 2** mitigation.

7.11 Cultural Heritage Impacts – Annesley Hall

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7.11.1 Description

The HS2 alignment in the section between Hucknall and Annesley passes an example of notable cultural heritage, Annesley Hall.

Considering the route north from Hucknall, the HS2 alignment runs generally parallel to the east side of the M1. It passes through a series of cuttings before emerging onto an embankment to pass over Weavers Lane before entering a further cutting to pass beneath the M1 Junction 27. It is at its closest to Annesley Hall where it passes over Weaver's Lane

7.11.2 Alignment

Horizontally, as the HS2 route passes north of Hucknall it curves towards the north west on a 3616m radius curve easing to a 6400m radius curve. This continues until passing over Weaver's Lane where the curve reverses on a 6405m radius which takes the route towards the M1 Junction 27.

The design speed for this section of route is a reduced speed of 360km/h.

The vertical alignment north of Hucknall rises at 0.860% through a succession of cuttings and the embankment over Weaver's Lane. The route falls at 0.708% beyond Junction 27 on the M1.

7.11.3 Route Alternatives

The HS2 proposed horizontal and vertical alignments are considered to have minimised property impacts and no improvements are envisaged by adopting an alternative alignment.

7.11.4 Cultural Heritage Impacts

The HS2 alignment passes approximately 1.1km to the west of Annesley Hall. The route at this point is elevated having crossed over Weaver's Lane via a new bridge. Although elevated the alignment is screened from the Hall by an existing screen of trees close to the Hall. It may be visible on its approach to Weavers Lane but is unlikely to be intrusive as it will be in cutting for much of its approach.

The route may be more visible from Annesley Lodge, the cottages and gatehouse on the approach to Annesley Hall.

7.11.5 Conclusions

The setting of Annesley Hall is unlikely to be significantly impacted by the presence of the new HS2 route. Although the section of the route closest to the Hall is on embankment, this section of route is screened from the Hall by the existing mature trees close to the Hall. Although longer views are possible, the HS2 route is in cutting in these locations and is unlikely to have a significant impact.

Views from Annesley Lodge may have greater impacts from the section of route on embankment but this is over 1km away.

This is considered to be categorised as requiring **Tier 4** mitigation.

7.12 Cultural Heritage Impacts – Hardwick Hall, Bolsover Castle and Sutton Scarsdale Hall

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7.12.1 Description

The HS2 alignment in the section between Tibshelf and Bolsover passes three examples of notable cultural heritage, Hardwick Hall, Sutton Scarsdale Hall and Bolsover Castle, with Hardwick Hall being of national significance.

Considering the route north from Tibshelf, the HS2 alignment passes beneath the M1 alignment to run on its western side. It passes through a series of cuttings before emerging onto a shallow embankment to pass over the River Doe Lea floodplain via a short viaduct. Here the route is approximately west of Hardwick Hall. Beyond this the route re-enters a cutting to pass beneath the western side of the M1 junction 29 roundabout.

Beyond the roundabout the HS2 route emerges onto embankment and crosses the M1 via a high skew bridge, moving away from the motorway towards the north east. As the route crosses the M1, the alignment is approximately east of Sutton Scarsdale Hall.

The HS2 route then descends to run at approximately existing ground level on a series of shallow embankments before crossing two successive floodplains on viaducts. At this point the alignment is approximately west of Bolsover Castle

7.12.2 Alignment

Horizontally, as the HS2 route passes through the tunnel beneath the M1 it curves towards the north on a 9035m radius curve. This continues until opposite Hardwick Hall where the curve reverses on a 15800m radius which takes the route towards the M1 Junction 29. Here the curve reverses again onto a 12645m radius which continues past Sutton Scarsdale Hall to the viaduct opposite Bolsover Castle

The design speed for this section of route remains at the full speed of 400km/h.

The vertical alignment north of bridge beneath the M1 falls for a short distance at 2.49% before easing to 1.263% as it continues through successive cuttings. As it emerges onto embankment it starts to rise initially at 0.200% towards the cutting beneath the M1 Junction 29. Here it starts to fall again at 0.518% running onto embankment to cross the M1. Beyond this it falls for a short distance at 2.403% before rising at 0.727% as it crosses the viaducts over the River Doe Lea floodplain.

7.12.3 Route Alternatives

The HS2 proposed horizontal and vertical alignments are considered to have minimised property impacts and no improvements are envisaged by adopting an alternative alignment.

7.12.4 Cultural Heritage Impacts

Hardwick Hall

The HS2 alignment passes approximately 1.1km to the west of Hardwick Hall. The route is in cutting towards the south but emerges onto embankment approximately mirroring the alignment of the adjacent M1 motorway. The line of the HS2 would be visible to the far side of the motorway when viewed from the hall. While the added impact of the HS2 route would be incremental to the existing impact from the motorway, the HS2 route would result in increased visual intrusion.

The existing main access to Hardwick Hall from the M1 is indicated as from the A6175 via Mill Lane/Hodmire Lane. A one way system operates on the roads to the Hall; vehicles exit via Deep Lane. The HS2 proposals are understood to block the A6175 but to provide an

alternate access via a new route to the east of the M1 motorway. This would need to be assessed once the proposals have been confirmed.

Sutton Scarsdale Hall

The HS2 alignment passes approximately 1.0km to the east of Sutton Scarsdale Hall, which is at an elevated position relative to the route. The route at this point is also elevated having crossed over the M1 via a new bridge. This elevated alignment is likely to make the new route visible from the Hall and as it continues towards Bolsover.

There is little mitigation that could be employed at this location. One option would be to provide visual screening with the planting of trees, however this would block the existing view from the hall. Consequently there would be an impact on the situation of the Hall which would remain unmitigated.

Bolsover Castle

The HS2 alignment passes approximately 1.2km to the west of Bolsover Castle. The route at this point is on shallow embankment following the local topography before running onto viaduct over the River Doe Lea floodplain. This elevated alignment is likely to make the new route visible from the castle although an existing screen of trees adjacent to the highest part of the viaduct may serve to make this view intermittent; while not fully obscuring the view of the viaduct, its visual impact would be reduced. There would overall be some intrusion.

7.12.5 Conclusions

Hardwick Hall

Hardwick Hall will experience an impact on its situation. The HS2 route would be visible on the far side of the M1 motorway from the Hall approximately 1km distant.

Proposals for the realignment of local roads are still to be confirmed. Access to Hardwick Hall would need to be assessed once the road layout is known.

This is considered to be categorised as requiring **Tier 1** mitigation.

Sutton Scarsdale Hall

Sutton Scarsdale Hall will experience moderate impact. Although the HS2 route is 1.0 km away on the far side of the M1 motorway when viewed from the Hall, it is on a higher alignment and is unlikely to be significantly shielded from view.

This is considered to be categorised as requiring **Tier 4** mitigation.

Bolsover Castle

Bolsover Castle will experience an impact on its situation. Although the HS2 route 1.2km away is on embankment and viaduct, there is a screen of existing trees adjacent to a section of the HS2 route which should make view of the route from the Castle intermittent.

This is considered to be categorised as requiring **Tier 4** mitigation.

7.13 Nature Conservation Interests – River Mease SSSI, Selston SSSI (Annesley Woodhouse Quarry), Carr Vale (west of Bolsover)

River Mease SSSI

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Selston SSSI

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Carr Vale

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7.13.1 Description

River Mease SSSI

The HS2 route at this location is as described for Measham in Section 7.3.1. It crosses the River Mease SSSI immediately to the south of the Westminster Industrial Estate on a shallow embankment.

Selston SSSI

The HS2 route in this location runs closely to the east of the M1 motorway following the local topography via shallow cuttings and embankments. The alignment passes approximately 500m from the nearest point of the SSSI.

Carr Vale

The HS2 route at this location is as described for Bolsover Castle and described in Section 7.12.1.

7.13.2 Alignment

River Mease SSSI

The HS2 route at this location is as described for Measham in Section 7.3.27.3.1.

Selston SSSI

The horizontal alignment in the vicinity of the SSI follows a curve towards the north on a radius of 6405m.

Vertically the route descends on a gradient of 0.708% following the existing topography on a series of shallow cuttings and embankments. At Salmon Lane the route is in cutting with embankments either side.

Carr Vale

The HS2 route at this location alignment is as described for Bolsover Castle and described in Section 7.12.2.

7.13.3 Route Alternatives

River Mease SSSI and Selston SSSI

The HS2 proposed horizontal and vertical alignments are considered to have minimised property impacts and no improvements are envisaged by adopting an alternative alignment at the River Mease SSSI or the Selston SSSI.

Carr Vale

The adoption of a low embankment in place of the viaduct at Carr Vale is a possible alternative, however this would conflict with HS2's current approach to provide viaducts over flood plains in order not to exacerbate potential flooding. There may be opportunities for mitigation do be developed in collaboration with Derbyshire CC in the detailed design.

7.13.4 Nature Conservation Impacts

River Mease SSSI

At the location where the HS2 route crosses the River Mease, the south bank of the river is bounded by agricultural land whereas the north bank is bounded by predominantly industrial premises and open storage. With the HS2 alignment the entire flood plain of the River Mease by viaduct, the setting of its riverbanks is unlikely to be changed. The major impact would be the introduction of the viaduct over the river and the approach embankment to the south of the river. There is only scope for local mitigation.

This is considered to be categorised as requiring **Tier 4** mitigation.

Selston SSSI

At its closest to the SSI the HS2 route runs 500m away on shallow embankment which is likely to make the route viewable from the SSSI. However due to the rolling nature of the local topography, views are likely to be intermittent and impacts are considered to be minor.

This is considered to be categorised as requiring **Tier 4** mitigation.

Carr Vale

As for Bolsover Castle the HS2 alignment passes approximately 1.2km to the west of Bolsover Castle. The impacts on Carr Vale can be considered to change from the north to the south.

At the northern end of Carr Vale the route at this point is elevated on the viaduct over the River Doe Lea floodplain. Although this elevated alignment is likely to make the new route visible from the castle, the lower elevation of Carr Vale may experience greater screening from the existing trees adjacent to the highest part of the viaduct and this should serve to reduce visual impact further. Any view of the route should be intermittent.

At the southern end of Carr Vale, the HS2 alignment is on shallow embankment following the existing topography. There is less screening from mature trees and consequently the route is likely to be more visible. This is likely to introduce some degree of visual intrusion.

This is considered to be categorised as requiring **Tier 2** mitigation.

7.14 Cultural Heritage Impacts – Chesterfield Canal (Norwood / Wales Bar)

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7.14.1 Description

The HS2 alignment in the section between Staveley and Wales Bar runs closely to the west side of the M1 motorway. It deviates slightly to the west in the Killamarsh / Norwood area due to the difference in design speed between the road and railway.

The existing disused Chesterfield Canal alignment passes beneath the M1 between Norwood and Wales Bar. Although the canal is not operational there is an aspiration to restore this westwards from its current end of operation close to Kiveton Park station.

7.14.2 Alignment

Horizontally, as the HS2 route passes north of Killamarsh it curves towards the north west on a 5925m radius curve. This continues to the north of Norwood where the route straightens on its approach to Wales Bar. The canal route would be located at the transition from radius to straight alignment.

The design speed for this section of route is reduced to 360km/h.

The vertical alignment north of Killamarsh falls at 1.902% initially through a cutting and then on embankment towards the viaduct carrying the route over the County Dike tributary. The route then rises gently at 0.290% towards Wales Bar, continuing on embankment before running into a cutting as the route passes Wales.

The proposed canal is located within the section of embankment on the approach to Wales.

7.14.3 Route Alternatives

The HS2 proposed horizontal and vertical alignments are considered to have minimised property impacts and no improvements are envisaged by adopting an alternative alignment.

7.14.4 Impacts on Proposed Canal Alignment

Originally the canal passed through this section of route via the Norwood Tunnel. This collapsed in 1907 and the remains of the tunnel partially infilled. The remains of the tunnel beneath the M1 motorway were pressure grouted prior to the construction of the motorway. A study into the feasibility of the reopening of this section of the Chesterfield Canal concluded that an existing farm accommodation underpass beneath the motorway could be used to provide a surface route with a new channel and locks to the west of the motorway.

Consequently the proposed reinstated canal route would need to cross beneath the embankment carrying the HS2 alignment. At this location the embankment is approximately 12m deep which should provide sufficient clearance for a structure to carry the proposed HS2 route over the canal. However the separation between the M1 embankment and the HS2 embankment is only approximately 100m which may not provide sufficient space for a series of locks to be located between the motorway and rail embankments.

A technical note 5001-UA008621-UP31 R-0A has been produced by Arcadis for the Canal and River Trust confirming the HS2 impacts on the Norwood Tunnel and outlining the potential options for the re-establishment of the canal route. This note confirms the feasibility of the options although at some cost.

A further detailed study would be required to consider the feasibility of the options and the funding of preparatory work that would need to be undertaken at the same time as the construction of the HS2 alignment, and to achieve a suitable horizontal alignment to permit use of the farm underpass structure for future navigation use.

7.14.5 Conclusions

Although the new HS2 route will cross the proposed alignment of the reinstated Chesterfield Canal, the railway is on embankment at this location allowing sufficient vertical space for a new structure over the proposed canal. The horizontal spacing between the motorway and HS2 embankments is however limited for the canal infrastructure to include a series of locks.

A further detailed study would be required to consider the feasibility of the options and the funding of preparatory work that would need to be undertaken at the same time as the construction of the HS2 alignment.

This is considered to be categorised as requiring **Tier 4** mitigation.

7.15 Cultural Heritage Impacts – Chesterfield Canal (Staveley)

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7.15.1 Description

The proposed Staveley Infrastructure Maintenance Depot is located on the site of the former Staveley chemical works. It is accessed from the main HS2 route via a new connection that follows the former mineral railway from Barrow Hill to the former Oxcroft Colliery. Although the route follows the horizontal alignment of the former mineral railway, the vertical alignment has been modified in places.

7.15.2 Alignment

Horizontally, as the IMD passes beneath the A619 overbridge to the east of Staveley, the route enters a 401m radius turning towards the west. This continues until beyond the B6053 overbridge where the alignment straightens to run into the depot area.

The design speed for the IMD link remains at 50km/h throughout.

Vertically the alignment climbs from beneath the A619 overbridge on a 0.590% gradient, passing through a shallow cutting which continues beneath the B6053 overbridge. The route then emerges from the cutting to pass over the River Rother and Hall Lane on a viaduct before becoming level as it runs into the depot site.

7.15.3 Route Alternatives

The IMD link proposed horizontal and vertical alignments are considered to have minimised property impacts. However the vertical alignment has been lowered beneath existing overbridges. This has introduced the impact described in Section 7.15.4.

7.15.4 Impacts on Proposed Canal Alignment

The restoration of the Chesterfield Canal has included the construction of the new Staveley Town Basin (opened in 2012), a short distance to the south of the IMD link. The basin incorporates a lock to facilitate crossing beneath the existing disused mineral railway with adequate clearance to the soffit of the proposed bridge. The proposed vertical alignment of the IMD link is some 2.5m lower to allow for the increased clearances required for potential electrification. This however would still need to be confirmed in the next design stage. The most recent advice from HS2 suggests the installation of a drop lock to enable the canal to cross under the IMD link.

The lower level of the new alignment appears to be driven by the clearance required beneath the A619 overbridge immediately east of Staveley. In an email dated 15 July 2016 Derbyshire County Council, the suggestion was included that an alternative alignment be considered with the new IMD vertical alignment following that of the existing disused railway between the depot area and the proposed canal crossing then falling at 2% to a low point beneath the A619 overbridge. This also cites an example of the proposed IMD link alignment that descends at 2.110% from its junction with the main HS2 alignment.

Several factors need to be established with HS2 before this alternative should be considered.

It is not clear whether the IMD link would either be electrified or have provision for future electrification. Should either of these be required then the clearances between the existing bridges and the new alignment would need to increase.

It is also not stated what gauge the IMD has been designed for. It is likely that the trains using the depot would need to haul trains from the national network and would therefore not be subject to HS2 gauge. However there may be a proposal to make the route available for the haulage of larger gauged vehicles in an exceptional circumstance.

If the larger clearances are not required then the currently proposed alignment could be re-examined as part of the detailed design.

If however the currently proposed alignment is based on the need for greater clearances then the examination of the Chesterfield Canal Trust proposed amended vertical alignment would be required. There are two considerations here.

The overbridge carrying the B6053 Eckington Road may not provide sufficient clearance for an enlarged gauge. Therefore replacement could be required with the associated increased intrusion and cost.

Additionally, although a gradient of 2.110% is employed elsewhere on the IMD link, this is in a location where the horizontal alignment adopts a 1000m radius. The use of a similar grade at Staveley where a significantly tighter radius of 401m is adopted would need to be considered against the haulage capacity of conventional heavy engineering trains carrying ballast, spoil and rails. The feasibility of this would need to be established in discussion with HS2.

In the event that no vertical alignment option exists then a viable alternative for the canal crossing along with its associated infrastructure will require investigation.

7.15.5 Conclusions

The proposed vertical alignment for the HS2 IMD link is clearly not compatible with the aspirations of the restoration of the Chesterfield Canal on its current alignment beneath the disused former branch line to the former Oxcroft Colliery. The design principles for the IMD link need to be established to validate the alignment adopted by HS2.

Should the alternative suggested by the Chesterfield Canal Trust be considered then the feasibility of the operation of engineering works trains on a tight radius on a 2% grade would need to be established.

In the event that no vertical alignment option exists then a viable alternative for the canal crossing along with its associated infrastructure will require investigation.

This is considered to be categorised as requiring **Tier 1** mitigation.

7.16 Impact on Businesses – Westminster Industrial Estate

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7.16.1 Description

The outline of the HS2 alignment in the section is as described for the Measham development in Section 7.3.1.

7.16.2 Alignment

The details of the HS2 alignment in the section are as described for the Measham development in Section 7.3.2.

7.16.3 Route Alternatives

The HS2 proposed horizontal and vertical alignments are considered to have minimised property impacts and no improvements are envisaged by adopting an alternative alignment.

7.16.4 Impacts on Westminster Industrial Estate

As described in Section 7.3.4 the HS2 alignment approaches Measham from the south on viaduct, crossing Burton Road before entering a shallow cutting as the route crosses the development site to the north of Burton Road. The route alignment will cross the industrial site south of Repton Road diagonally, passing over the junction of Repton Road with Huntingdon Way and then crossing the existing area containing the Huntingdon Court industrial units.

Although the HS2 route is on viaduct through this section, it is likely that the intermediate supports may directly impact both the existing units in Huntingdon Court and the properties in the area south of Repton Road. The detail of the impacts may not yet be defined until the form and means of construction of the viaduct have been confirmed. However the impacts are likely to be significant.

With regard to the viability of the areas remaining once the viaduct is in place, although the shape of the remaining sites may not be regular, access would still be available from Repton Road and Huntingdon Way. Therefore some form of industrial, distribution or storage use would be possible. However the site is bounded to the south by the River Mease floodplain; this would prevent expansion of the site to the south to compensate for land lost to the HS2 construction.

The viaduct through this section would vary in elevation between 8m and 15m above existing ground level. Due to maintenance constraints it is unlikely that replacement unit could be provided beneath the new viaduct.

The Plastic Omnium automotive plant would not appear to be directly affected by the viaduct but would experience significant visual and noise impacts. The distribution centres to the west of the Plastic Omnium site would also experience visual and noise impacts but these should be balanced against the current impacts from the adjacent A42 dual carriageway.

7.16.5 Conclusions

The new HS2 route will have significant effects on the existing Huntingdon Court industrial units within the Westminster Industrial Estate. Similarly there will be significant impacts on units to the south of Repton Road. However the Plastic Omnium plant would not be directly affected by the HS2 viaduct structure although it would receive significant visual and noise impacts. The existing units west of this would be largely unaffected apart from an increase in visual and noise impacts.

This is considered to be categorised as requiring **Tier 4** mitigation.

7.17 Impact on Businesses – Saw Pit Industrial Estate

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7.17.1 Description

The route north of the HS2 spur to Sheffield continues to run to the east of the M1 motorway. It passes to the west of Sutton-in-Ashfield, skirting the west sides of Huthwaite and Woodend, running on embankment as it continues northwards. East of Tibshelf the alignment passes immediately to the east of the motorway service area in cutting before crossing beneath the motorway.

7.17.2 Alignment

Horizontally, north of the junction with the HS2 branch to Sheffield, the alignment curves northwards on a 9,035m radius which continues to beyond the crossing beneath the M1 motorway.

The design speed for this section of route is maintained at the full 400km/h.

Vertically, the route initially climbs at 0.676%, increasing to 1.580%, on a series of embankments. East of Tibshelf the route starts to descend, entering a 15m deep cutting which continues until the route passes beneath the motorway on a gradient of 2.490%.

7.17.3 Route Alternatives

The HS2 proposed horizontal and vertical alignments are highly constrained in this area. Any realignment to avoid impacting the Saw Pit Industrial Estate is likely to increase impacts elsewhere. A movement of the route eastwards would impact both the County and South Fulwood Industrial Estates and would potentially increase the impacts on some residential areas of Huthwaite. It would also move the route significantly closer to Hardwick Hall with associated impacts.

A movement of the route westwards would impact the Tibshelf Motorway Services and the west side of Tibshelf.

Consequently the HS2 proposed horizontal and vertical alignments are considered to have minimised property impacts and no significant improvements are envisaged by adopting an alternative alignment.

7.17.4 Impacts on Saw Pit Industrial Estate

The HS2 route passes through the western side of the Saw Pit Industrial Area in a 15m to 20m deep cutting. This removes all of the units to the west of the central road through the industrial estate.

There is little effective mitigation that could be employed. The tunnel to the north of the industrial estate passes beneath the M1 motorway via a cut and cover tunnel. If this measure was to be extended towards the south, the method of construction would still require the removal of the western industrial units. It is unlikely that a bored tunnel would offer a cost effective alternative.

Consequently the relocation of the businesses occupying the western premises should be considered.

With respect to the remaining premises on the eastern side of the industrial estate, noise mitigation measure should be put in place at the top of the cutting.

7.17.5 Conclusions

The adoption of an alternative horizontal alignment in this area would introduce increased impacts on other sensitive locations and should not therefore be considered feasible.

There is little mitigation that could be put in place for the western industrial units in the Saw Pit Industrial Estate. Instead alternative sites should be considered to enable the businesses to relocate.

Noise mitigation measures would be required for the units that remain on the eastern side of the industrial estate.

This is considered to be categorised as requiring **Tier 3** mitigation.

7.18 Impact on Businesses – McArthurGlen Designer Outlet

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7.18.1 Description

North of J27 of the M1 the alignment initially closely follows to the east of the motorway alignment. The motorway diverges somewhat to the west approaching J28 from the south whilst the HS2 alignment passes through the corridor between Hilcote to the west and Huthwaite to the east. The railway alignment meets the M1 corridor again close to Tibshelf continuing to its east before crossing the motorway north of the B6014.

The HS2 spur to Sheffield diverges to the west of the main alignment as it crosses beneath the A38 road adjacent to J28. The spur turns towards the north west passing north of Hilcote and crossing beneath the M1 before passing between Blackwell and Newton.

The alignment passes immediately to the east of the Designer Outlet at Junction 28

7.18.2 Alignment

Horizontally, the alignment curves towards the north on a 9,035m radius crossing the River Erewash. It straightens briefly passing over Maghole Brook before curving towards the north west on a 6,400 m radius curve. It is at this point that the branch to Sheffield diverges, curving towards the west. Beyond the junction the alignment curves northwards on a 9,035m radius which continues to pass to the east of the M1 service area and then beyond to cross beneath the M1 motorway.

The design speed for this section of route is maintained at the full 400km/h.

Vertically, the route initially climbs at 0.676%, increasing to 1.580%, on a series of embankments and viaducts over Maghole Brook, Brookhill Lane and Farmwood Lane. Approaching the A38 from the south, the ground rises so that the railway runs into a cutting and passes beneath the A38. The railway continues to climb over Normanton Brook where there is sufficient height to allow the grade separated junction with the Sheffield Spur to pass beneath. Approaching east of Tibshelf the route starts to descend, entering a 15m deep cutting which continues until the route passes beneath the motorway on a gradient of 2.490%.

7.18.3 Route Alternatives

The HS2 proposed horizontal and vertical alignments are constrained in this area. The HS2 alignment runs close to the M1 motorway either side of J28 and the A38. Here however the motorway deviates to the west, passing to the west of Hilcote. The area around the A38 is highly developed with a gap in development only between Hilcote to the west and Huthwaite to the east. The horizontal alignment successfully passes runs through this gap.

Vertically the HS2 alignment also needs to pass over the various watercourses and transport corridors on the approach to the A38. It passes over the River Erewash and Maghole Brook floodplains as well as Brookhill Lane and Farmwood Lane. The local topography rises as the route approaches the A38 so that the HS2 route passes beneath the road.

Consequently the proposed HS2 alignment would seem to offer the least overall impact running through this area. Any change to the horizontal alignment would impact residential and commercial/industrial areas, whilst any reduction in the vertical profile would be likely to impact flood plains and local roads.

7.18.4 Impacts on McArthurGlen Designer Outlet

The McArthurGlen Designer Outlet is located to the south of the A38 to the east of the M1 Junction 28. The local topography slopes to the south to that the Designer Outlet is at a lower level than the A38. The HS2 alignment passes immediately to the east of the Designer Outlet at the same level. The HS2 route enters a cutting as it passes before crossing beneath the A38.

The Castlewood Business Park is also located in this area extending from Pinxton Lane to the east to the M1 in the west and bounded to the south by Brookhill Lane. In the western section of the Business Park, there are two large distribution centres, the Coop Castlegate Distribution Centre and Alloga UK, accessed via Farmwell Lane to the south of the Designer Outlet. Due to the local topography, the HS2 alignment passes over Farmwell Road allowing access to remain unchanged.

Due to the route passing at the same approximate level as the Designer Outlet, the route would preclude any extension of the Designer Outlet to the east. It would still be possible to use the land to the east of the HS2 route for additional parking, a connection over the HS2 would be required to provide pedestrian access. An elevated parking area over the HS2 route would be feasible although this would introduce a significant visual impact.

Extension of the Designer Outlet to the west would remain feasible.

There is little that can be achieved beyond the provision of permanent local mitigation of the visual and noise impacts. These would be in the form of landscaping and noise barriers.

There would inevitably be some impact on the access from the A38 during construction. The new bridge carrying the A38 over the railway would need to be constructed on the existing line of the road. Consequently the road would need to be diverted around the site of the bridge construction, returning to its original alignment on completion of construction. Although the access roads from the A38 are relatively remote from the line of the HS2, the local diversions would inevitably reduce speeds and potentially increase congestion. This is also likely to exacerbate any existing air quality issues due to the deceleration/acceleration of traffic as it passes through the extent of the temporary diversion. However this would only occur during the construction phase provided that the existing road alignments are reinstated on completion of construction.

Therefore the form of construction for the bridge would be critical to ensure that the diversions are in place for a minimum period.

7.18.5 Impacts on Local Roads

Due to the location of the crossing of the HS2 alignment across the A38, there are few local east-west roads to the north of the A38. The only local road serving the immediate area is Huthwaite Lane approximately 1.5km to the north of the A38 crossing. This is understood to be maintained – see Section 7.10.4. South of the A38 Farmwell Road serving the Castlewood Business Park and Pinxton Road would be crossed by the HS2 alignment. These are understood to be maintained.

The impact on local roads would therefore be limited to construction. Provided that these roads or temporary alignments are maintained during construction then impacts will be mitigated.

7.18.6 Conclusions

The adoption of an alternative horizontal or vertical alignment in this area would introduce increased impacts on other locations and should not therefore be considered feasible.

There is little mitigation that could be put in place for the McArthurGlen Designer Outlet other than the provision of local mitigation of the visual and noise impacts.

The form of construction of the bridge carrying the A38 over the HS2 route would need careful consideration to ensure that the duration of construction is kept to a minimum.

This is considered to be categorised as requiring **Tier 1** mitigation.

7.19 Impact on Businesses – Nottingham Business Park

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7.19.1 Description

The proposed HS2 alignment through this location is described in Section 7.9.1 Strelley / Nuthall.

7.19.2 Alignment

The alignment through this location is described in Section 7.9.2.

7.19.3 Route Alternatives

As described in Section 7.9.1 the HS2 proposed horizontal alignment is constrained in this area and adopts a horizontal alignment that minimises the impacts on Strelley and Broxtowe by maintaining an alignment close to the M1 motorway. There is not considered to be a feasible alternative horizontal alignment.

Vertically the HS2 alignment enters a tunnel to the south of Strelley, emerging from the tunnel close to the centre of the Nottingham Business Park. This would require the acquisition of a number of businesses.

However an examination of the vertical alignment shows that the alignment does not reduce until it exits the tunnel and emerges onto an embankment that then falls towards the A610 at Junction 26 of the M1 motorway. There is an opportunity to amend the alignment and introduce a vertical curve within the tunnel. This would lower the alignment slightly so that the tunnel would extend beyond the Nottingham Business Park. Additionally a lower alignment would serve to reduce the descending gradient as the route falls towards the A610. However the benefit gained from the maintenance of the Business Park would need to be balanced against the additional cost of an extension to the tunnel.

7.19.4 Impacts on Nottingham Business Park

The Nottingham Business Park is located to the west of the A6002 which forms the western edge of Broxtowe. The Business Park comprises twelve business units with a variety of occupiers. The proposed alignment cuts through the western side of the Business Park and would require the removal of approximately five units, two on Orchard place and three on Lawrence Drive. Additionally it would limit further expansion of the business park.

Should an alternative vertical alignment not prove to be feasible then alternative locations would need to be sought for replacement units to accommodate the displaced businesses. There may be an opportunity to consider using the land between the M1 motorway and the A6002 road that would be significantly reduced in size and may prove uneconomical for agricultural purposes. However that would require the agreement of the planning authority.

There is little that can be achieved beyond the provision of permanent local mitigation of the visual and noise impacts. These would be in the form of landscaping and noise barriers.

7.19.5 Conclusions

The adoption of an alternative horizontal alignment in this area would introduce increased impacts on other locations and should not therefore be considered feasible. An alternative vertical alignment could reduce the impacts on the Nottingham Business Park but the cost of an increase in the length of tunnel may make this option uneconomical.

Alternatively the locations for replacement business units should be considered by the local planning authority.

This is considered to be categorised as requiring **Tier 2** mitigation.

7.20 Impact on Transport Links – M1 Junction 27 / A608

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7.20.1 Description

As the HS2 route runs north from Hucknall it turns to pass immediately adjacent to the eastern side of Junction 27 of the M1 motorway. It continues to run north close to the motorway until the M1 alignment deviates towards the west as it approaches Junction 28.

7.20.2 Alignment

Horizontally, north of the Hucknall the alignment continues to run straight in a northerly direction before turning towards the north on a 6,400m radius curve. As the route turns it passes immediately adjacent to the east side of the M1 Junction 27. Beyond the junction the curve continues with the route passing to the west of Annesley Woodhouse where route curves back towards the north on a 6405m radius. This continues to the junction with the Sheffield branch.

The vertical alignment north of Hucknall continues to rise on a 0.860% gradient on a series of cuttings and embankments. As the route passes beneath the A608 the route starts to descent on a 0.708% gradient again on a series of cuttings and embankments.

7.20.3 Route Alternatives

The route aims to avoid impact on west side of Hucknall and the western side of Annesley Woodhouse. As it passes adjacent to the M1 motorway at Junction 27 it adopts a similar profile to pass beneath the A608. Consequently the horizontal and vertical alignments are considered to be optimal in this location

7.20.4 Construction Impacts on Junction 27

The HS2 alignment passes beneath the A608 immediately adjacent to the east of the motorway slip roads. Although the gyratory systems at the junction would be largely unchanged, the construction of the bridges to carry the east and west bound lanes of the A608 over the HS2 route will inevitably affect the flow of traffic on this road.

At this location the motorway and HS2 alignments would both be in cutting. In order to maintain traffic flows on the A608 and Junction 27 gyratory a temporary road alignment would need to be built either side of the existing eastbound and westbound carriageways to allow traffic flows to be maintained. Once built, the existing roads would be removed, the cuttings formed through this area and the new bridges over the HS2 alignment constructed. Although these temporary roads would be built to full highway standards their alignments are unlikely to be optimal due to the need to avoid the bridge construction sites. Consequently speeds would be reduced. This however may have a limited effect on traffic flows as this section of the A608 is on the short link between Junction 27 and the roundabout providing access to Sherwood Park where full design speeds would not normally be reached in this short section.

Additionally, the layout of the gyratory on the eastern side of the junction may require temporary alterations to allow construction. Although the on and off slip roads on the southbound M1 are unlikely to be changed, any change to the gyratory may reduce traffic flows and introduce additional congestion.

The temporary works to form the carriageway diversions, their alignment and the working space required to construct the overbridges will be critical to maintaining flows and would require careful assessment by HS2, their Contractors and local highway authority.

7.20.5 Conclusions

The construction of the HS2 alignment will impact traffic flows on the A608 during construction. However this may be mitigated to some degree by the careful design of the

temporary carriageways to maintain flows on this road. Although the slip roads on the east side of the motorway are largely unchanged, amendments to the gyratory are likely to result in congestion for southbound traffic leaving the motorway.

This is considered to be categorised as requiring **Tier 2** mitigation.

7.21 Impact on Transport Links – M1 Junction 29 / A617 / A6175

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7.21.1 Description

As the route passes Tibshelf, the track passes from the east side of the M1 to the west side via a cut and cover tunnel. It continues to run north for 5km until it reaches Junction 29, where it passes underneath the junction and continues to run north, until it crosses back over to the eastern side of the M1 via a bridge.

7.21.2 Alignment

As the route passes through a tunnel by Tibshelf, it curves to the east on a 9035m radius. As the route passes Deep Lane it then curves to the west on a radius of 15,800m, before curving to the east again on a radius of 12,645m just before it passes under Junction 29, and continues on this curve through the tunnel and the bridge crossing back over the M1.

Leading up to the tunnel under Junction 29, the vertical alignment descends at a gradient of 1.263% and then starts to rise as it passes Stanley Lane at a gradient of 0.2%. At the crossing under Junction 29, it starts to fall at a gradient of 0.518%.

7.21.3 Route Alternatives

By remaining on the western side of the M1 for this section, the route avoids Hardwick Hall and the surrounding parkland, and the proposed horizontal and vertical alignments are considered optimal.

7.21.4 Construction Impacts on Junction 29

The HS2 route passes under Junction 29 to the west of the M1, immediately adjacent to the slip roads. The junction provides access between the M1 motorway and two main roads: the A617, a dual carriageway, and the A6175, a single carriageway. This results in a congested circulation area at the interchange level. In order to continue to allow vehicles to use the junction while construction of the tunnel is taking place, a temporary road alignment would need to be built on the western side of the junction which provides sufficient space for the construction area. Both the A617 and the A6175 will need to be incorporated into this temporary alignment and it is likely that an extension of the gyratory to the west will be required to maintain adequate circulation. Should the gyratory not function adequately then traffic may attempt to divert between the A617 and A6175 via the B6039 or unsuitable local roads.

The design of the temporary gyratory alignment will be critical to the avoidance of undue delays at the junction during construction.

7.21.5 Conclusions

The number of roads accessing Junction 29 will result in a complicated realignment during construction for the continued use of the junction, which may result in vehicles on the A6175 to divert and increased congestion on the A617. The extent of these impacts will depend largely on how the temporary road alignment is implemented and managed.

This is considered to be categorised as requiring **Tier 2** mitigation.

7.22 Impact on Transport Links – M1 Junction 30 / A6135 / A616

C321-MMD-RT-DPP-120-591307 P02 - HSL 13B 2017 Preferred Route Sheet 3 of 4

7.22.1 Description

As the route runs north after the connection with the line to the HS2 depot, it passes under the A619, just to the west of the M1, and then passes under the A6135, just to the west of the Junction 30 roundabout. It then continues north adjacent to the M1.

7.22.2 Alignment

The horizontal alignment of this section of the route is completely straight.

From the depot line connection, the vertical alignment rises at a gradient of 1.852%, which reduces to a gradient of 0.2% as the route approaches the crossing under the A6135.

7.22.3 Route Alternatives

The alignment at this section avoids the need to acquire a large number of buildings, and the majority of this section runs through cuts, which will reduce the visual and noise impact of the route, especially as it passes the village of Barlborough, therefore this alignment is considered optimal.

7.22.4 Construction Impacts on Junction 30

The HS2 route passes under the A6135 just to the west of the Junction 30 gyratory. The location of the crossing would potentially allow the gyratory to remain open while the bridge under the A6135 is being constructed. However an extensive temporary realignment would be necessary to the A6135 and the adjacent slip roads at the gyratory in order to allow traffic to circulate without undue delays. This would also serve to reduce traffic diverting onto Sheffield road through residential areas of Barlborough.

Where the HS2 route passes under Sheffield Road, a temporary realignment of the road would be necessary to allow the construction of the HS2 overbridge. Due to its proximity to the M1 bridge a relatively tortuous alignment would be required. However this would also serve to reduce the volume of traffic diverting onto this road from the A6135.

7.22.5 Conclusions

The construction of the HS2 alignment will impact traffic flows on the A6135 during construction. This may be mitigated to some extent by the temporary realignment of the western section of the gyratory. Although the slip roads on the west side of the motorway are largely unchanged, amendments to the gyratory are likely to result in congestion for traffic leaving and joining the northbound M1.

This is considered to be categorised as requiring **Tier 2** mitigation.

7.23 Impact on Transport Links – Kirkby-in-Ashfield and Sutton-in-Ashfield

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7.23.1 Description

As the HS2 route runs north from Hucknall it runs between the M1 motorway to the west and Kirkby-in-Ashfield and Sutton-in-Ashfield to the east. This crosses several of the roads that provide links to these towns and a preliminary assessment of the impact on the traffic serving the town centres is required.

7.23.2 Alignment

The HS2 alignment passing Kirkby-in-Ashfield and Sutton-in-Ashfield is described in Sections 7.11.2 and 7.18.2.

The area under consideration extends from Junction 27 on the M1 motorway to north of Junction 28 to Tibshelf. The HS2 alignment in this area is initially immediately adjacent to Junction 27 and runs close to the M1 passing Annesley Woodhouse. North of here the motorway deviates to the west whilst the motorway continues to run north passing immediately to the west of the McArthur Glen outlet and crossing the A38 before continuing between Hilcote and Huthwaite. The HS2 and motorway alignments rejoin at Tibshelf.

7.23.3 Impacts on Road Links

Although the HS2 route does not largely affect the routes serving Kirkby-in-Ashfield and Sutton-in-Ashfield, it does cross several key east-west roads. In particular it would affect the A609 at Junction 27 and the A38 at Junction 28, both of which are key routes.

The HS2 alignment passes beneath the A608 immediately adjacent to the east of the motorway slip roads. Although the gyratory systems at the junction would be largely unchanged, the construction of the bridges to carry the east and west bound lanes of the A608 over the HS2 route will inevitably affect the flow of traffic on this road.

The roads and routes that serve the centre of Kirkby-in-Ashfield can be summarised as follows:

Route to Kirkby-in-Ashfield Town Centre from	Route	Section Affected by HS2 Route	Maintained	Construction or Permanent Impact
M1 from North	M1 J28 - A38 - B6018 - B6020	A38	Yes	Construction
M1 from South	M1 J27	A608	Yes	Construction
West	B6018 – B6022	B6018	Assumed but unconfirmed	Construction
	B6019 – B6022	B6019	Assumed but unconfirmed	Construction
South	A611 – B6021	n/a		
East	B6020	n/a		

North East	Low Moor Road – Kirkby Folly Road	n/a		
North	Kings Mill Road East / A38 / B6018 – B6020	n/a		

Inevitably the routes that provide links to the M1, the A608 at Junction 27 and the A38 at Junction 28, are likely to be the busiest and the most affected. However the disruption will occur during construction.

The impact of the work at Junction 27 is described in Section 7.20.4.

The impact of the work at Junction 28 is described in Section 7.18.4.

The sequence for the works on the A608 and the A38 would have a considerable impact on the potential disruption. Should the works be sequential then this would allow any traffic disruption to relocate to the next unaffected junction. This would not be possible if the works at these two locations are undertaken simultaneously.

The HS2 route also crosses two local roads that provide routes to and from Kirkby-in-Ashfield, the B6018 and B6019. The HS2 plans do not confirm that these roads are to be maintained. This should be confirmed in the next design stage. However these roads should be able to be maintained during the construction of the HS2 route. Temporary offline diversions may be constructed in advance of the construction of the permanent crossings.

The roads and routes that serve the centre of Sutton-in-Ashfield can be summarised as follows:

Route to Sutton-in-Ashfield Town Centre from	Route	Section Affected by HS2 Route	Maintained	Construction or Permanent Impact
M1 from North / South	M1 J28 - A38 - B6023	A38	Yes	Construction
West	B6018 – B6022	B6018	Assumed but unconfirmed	Construction
	B6019 – B6022	B6019	Assumed but unconfirmed	Construction
South	B6018 – B6023 Kirkby Road	n/a		
East	A617 – A38	n/a		
North West	Mansfield Road - Chesterfield Road – Huthwaite Road	Mansfield Road	Assumed but unconfirmed	Construction
	Huthwaite Lane – Blackwell Road	Huthwaite Lane	Assumed but unconfirmed	Construction

North East	A617 Dalesworth Road	–	n/a		
North East	A6075 Dalesworth Road	–	n/a		
East	A617 Sherwood Way South – A38 Kings Mill Road East		n/a		
South East	B6139 – Garden Lane		n/a		

As with Kirkby-in-Ashfield, the route that provides the link to the M1, the A38 at Junction 28, is likely to be the busiest and the most affected. However the disruption will occur during construction.

The impact of the work at Junction 28 is described in Section 7.18.4.

The HS2 route also crosses two local roads that provide routes to and from Sutton-in-Ashfield, Mansfield Road and Huthwaite Lane; these have been covered in Sections 7.9.4. These roads should be able to be maintained during the construction of the HS2 route. Temporary offline diversions may be constructed in advance of the construction of the permanent crossings.

7.23.4 Conclusions

The construction of the HS2 alignment will impact traffic flows to and from Kirkby-in-Ashfield and Sutton-in-Ashfield via the M1 Junctions 27 and 28. Local roads would also be affected for routes to and from the West. However this impact may be mitigated to some extent by a staged approach to the construction of the HS2 to ensure that these routes are not all disrupted at the same time.

This is considered to be categorised as requiring **Tier 2** mitigation.

7.24 Impact on Public Rights of Way and Multi User Trails – Major Issues Advised By Derbyshire CC

Derbyshire County Council officers have considered the proposed HS2 alignment against public rights of way, existing and proposed multi user trails and the Derbyshire Key Cycle Network. This summary has been included as Appendix D.

The summary has examined the impact at each crossing of the HS2 alignment and proposed methods of mitigation at each crossing. The engineering feasibility of these mitigation proposals is considered below.

7.24.1 Proposed County Boundary Greenway – Killamarsh to Barlborough

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The HS2 cutting severs the opportunity for a continuous off road route to the M1 underpass, allowing provision only via Mansfield Road and footway.

DCC Mitigation proposal – allow for a 3m wide shared path alongside Mansfield Road

Assessment - It would be feasible to widen the current path alongside Mansfield Road to provide the proposed greenway. Should the alternative be considered of a dedicated underpass to allow the greenway to cross under the HS2 alignment, the cost implication would be greater.

This is considered to be categorised as requiring Tier 2 mitigation.

7.24.2 Planned Clowne Branch Greenway – Staveley IMD Line

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The HS2 route will utilise a section of the disused Clowne Branch Line for the link to the IMD. This line is currently under development as a major section of the Derbyshire Key Cycle Network and as a multi user greenway, connecting with the Trans Pennine Trail and Poolsbrook County Park.

DCC Mitigation proposal – an alternative route alignment be identified for the Greenway with connectivity to Poolsbrook and delivered as part of the IMD line development, with the facilitation of a multi user crossing at the point or in the vicinity of the Staveley Footpath 30, either by ramped over bridge or by an underpass.

Assessment - There would be sufficient room to realign the greenway to the south of the IMD line, however there would be complications in the area around the M1 and Bolsover Road, as a solution to cross both these roads, and the HS2 main line which runs adjacent to the M1 would be required. The most practical option would be connecting the greenway to the disused Oxcroft Line to the east of the M1, which passes under the M1 and Bolsover Road. This option would be a lot more cost efficient, as there would be no need to construct additional underpasses. An alternative option would be realigning the greenway close to the original route, which could be feasible but very costly, due to the need to construct multiple underpasses.

The construction of an underpass at Staveley Footpath 30 would be more practical than an over bridge, due to the IMD line being on an embankment of 5m at that point; an underpass would be more convenient to those using it as there would be no need to go up a lengthy ramp.

This is considered to be categorised as requiring **Tier 1** mitigation.

7.24.3 Markham Vale Employment Growth Area – Seymour & Oxcroft

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The current HS2 maps do not show the updated highway and path network which has been delivered as part of the MEGZ (Markham Employment Growth Zone) programme, resulting in many being severed and not mitigated for, including farm accommodation underpasses under the Oxcroft and Staveley lines and ramps to the recently constructed Seymour Link Road

DCC Pre-mitigation assessment - It is required that the current mapping is updated to show the as-built routes of the highway and path networks to ensure that connectivity is not lost.

Assessment - Using the most recent maps available showing the new developments will enable HS2, along with DCC, to decide on appropriate mitigation measures.

This can only be defined once the effects on the MEGZ have been confirmed. However this is considered to be categorised as potentially requiring **Tier 1** mitigation.

7.24.4 Trans Pennine Trail and Cuckoo Way – Staveley IMD Line

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The Trans Pennine Trail crosses the current disused railway line (to be used by the IMD line) via a ramped multi-user bridleway bridge. This is an existing route on the Derbyshire Key Cycle Network and part of a significant long distance trail.

DCC Pre-mitigation assessment – It is required that detailed discussion and plans are forthcoming to prevent major losses in this area.

Assessment - The HS2 alignment passes under the multi-user bridge at a lower level than that of the current line, so there should be sufficient clearance to retain the bridge. However this has still to be confirmed. Should there be a need to remove the multi-user bridge, the adjacent Eckington Road bridge would allow a local deviation of the Trans Pennine Trail for walkers, however this option would be less accommodating for cyclists.

This is considered to be categorised as requiring **Tier 2** mitigation.

7.24.5 Bolsover Branch Line – Proposed Key Cycle Network

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The disused Bolsover Branch line is a proposed Key Cycle Network route to complete a section between Bolsover and Chesterfield, which is intersected by the HS2 route. The HS2 route is shown on an embankment where it crosses the Bolsover Branch line.

DCC Mitigation proposal – This is a strategically important desired route and it would be favourable to provide an underpass for the future development of the trail.

The embankment is at a height of about 10m above the level of the Bolsover Branch Line at this level, so there should be sufficient clearance for construction of an underpass. However, there is a viaduct over the River Doe Lea floodplain adjacent to the line of the former railway and a local diversion of the line of the cycleway would maintain access. Another option would be shortening the embankment and extending the length of the viaduct by about 300m to allow for the current alignment of the proposed cycle route. However, this would likely have a significant cost implication.

This is considered to be categorised as requiring **Tier 2** mitigation.

7.24.6 Peter Fidler Reserve, Bolsover – Proposed Key Cycle Network

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A dismantled railway within the countryside site is a proposed section of the Key Cycle Network and a multi-user trail, which the HS2 route crosses via an embankment.

DCC Mitigation proposal - The proposed HS2 alignment is shown as a viaduct over the wetlands at the point where it crosses the former rail line. A sufficient and appropriate land space should be made available for future trail development.

Assessment - This section of the dismantled railway runs on an embankment, where the clearance between this and the viaduct is only a few metres, therefore the existing embankment may need to be lowered to provide enough clearance. This will depend on the exact level of the viaduct when the design is developed and the required vertical clearance of the cycle path, with sufficient vertical clearance for a mounted horse rider. The lateral separation between viaduct supports should provide sufficient space for the development of the proposed cycle path.

This is considered to be categorised as requiring **Tier 2** mitigation.

7.24.7 M1 Junction 29 Interchange Modifications – Proposed Key Cycle Network

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There is a proposed Key Cycle Network route between Heath and Doe Lea running east west across the M1, carried by the southern part of the flyover interchange. There are currently cycle and pedestrian routes also running in underpasses through the interchange.

DCC Mitigation proposal – Ensure east-west connectivity is maintained across the M1/HS2 corridor to prevent community severance.

Assessment - The impact of the route at Junction 29 is detailed in section 7.21.

The HS2 vertical alignment runs about 10m below the level of the Heath Interchange. Depending on the required vertical clearance for the route and the structural requirements of the overbridges, it is unlikely that there would be sufficient clearance to extend the existing underpasses beneath the HS2 alignment. Instead the southern bridge crossing over the HS2 alignment could be widened to provide a footway/cycleway crossing over HS2. This would require some remodelling of the existing footways and underpasses.

This is considered to be categorised as requiring **Tier 2** mitigation.

7.24.8 Hardwick Hall and Stainsby Mill – Proposed Key Cycle Network

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The effect of the HS2 route alignment on the highways in this area and the mitigation proposals are covered in Section 7.12.4.

The HS2 route runs through a section of Mill Lane, which will be realigned on the east side of the M1. This will also sever two footpaths that lead onto Mill Lane, reducing access to Hardwick Estate by foot.

DCC Mitigation proposal – develop a shared path alongside the realignments of Mill Lane and Hawking Lane as well as vulnerable user provision into Hardwick estate, either across the HS2/M1 corridor alongside Deep Lane or by underpass through the embankment at the intersection of footpath 17 with a shared use pavement alongside Hawking Lane beneath the M1 and suitable access connectivity into the Hardwick Park by Great Pond. Discussion required with National Trust to agree suitable alignments and designs.

Assessment - The development of vulnerable user provision along Deep Lane would require about 2km of road to be fitted with a pavement, which may prove costly and

difficult to implement along the narrow, hedge-bound lane. An underpass at footpath 17 would also be difficult to implement considering the HS2 route is only on an embankment of about 1m at that point.

A shared path alongside the realignment of Mill Lane would be easy to implement as the design of the path can be built into the design of the new road.

However a new bridge carrying the HS2 route over the River Doe Lea floodplain close to Stainsby Mill would provide an opportunity to route a new footpath beneath the HS2 alignment. This could also be used to provide a section of the Key Cycle Network between Doe Lea and Stainsby Mill.

This is considered to be categorised as requiring **Tier 2** mitigation.

7.24.9 Silverhill Trail and Blackwell Trail (Phoenix Greenways) – Key Cycle Network

C321-MMD-RT-DPP-120-591304 P02 - HSL 13A 2017 Preferred Route Sheet 4 of 4

The HS2 route crosses two trails, the Silverhill Trail at a cutting and the Blackwell Trail via an embankment. The Clay Cross Spur crosses the Blackwell Trail via a viaduct.

Mitigation proposal – Interface opportunities should be maximised at these trail intersections. Underpasses would be necessary to accommodate the future development of the southern spur of the Blackwell Trail.

Assessment –

Blackwell trail:

800m north of the A38, the alignment crosses Normanton Brook and the River Amber floodplain via a viaduct. The Blackwell Trail runs next to Normanton Brook, although the proposed viaduct ends immediately after it crosses the brook and the route is supported by an embankment of depth approx 22m, which covers the trail. By extending the viaduct past the trail, which would lengthen it by about 40m from 140m to 180m, the trail could be preserved. The trail could still be preserved while lengthening the viaduct by a lesser amount by re-routing the trail around the embankment, although the viaduct would need to be lengthened sufficiently so that there is space for the trail between the brook and the embankment. Depending on the cost of lengthening the viaduct, an underpass may prove more cost efficient.

Silverhill Trail:

The Silverhill Trail is a recreational trail that runs along a former mineral railway. The HS2 alignment passes through the trail 400m to the west of the M1, in a cutting of depth 4m. In order to preserve the trail, a bridge would need to be built over the HS2 route. This may require the raising of the trail on approach to the bridge to achieve the sufficient height clearance.

This is considered to be categorised as requiring **Tier 1** mitigation.

7.24.10 Long Eaton & Toton – Key Cycle Network

C321-MMD-RT-DPP-110-591201 P02 - HSL 12 2017 Preferred Route Sheet 1 of 2

The vulnerable user connectivity to the main station site and through the area to the county boundary crossing of the River Erewash will be significant for the population in this area.

Mitigation proposal – The new road to the station with additional connecting routes to the community should accommodate a 3m wide shared pedestrian and cycle path for car free journeys to the station, with sufficient secure and weather proof cycle parking provision at the station. In addition, it is vital that pedestrians and cyclists can access

the station from the southern communities in Long Eaton. To this end Long Eaton footpath 4 could be upgraded with a multiuser river crossing across the River Erewash to link the Nutbrook Trail also the National Cycle Route 67 directly to the station site and improve connectivity to Toton.

Assessment - There should be sufficient space for a shared path alongside the new road and cycle parking at the station. There are currently multiple bridges over the River Erewash in the area around Long Eaton footpath 4, servicing the footpaths in the area and also the current sidings at Toton, so one of them could be used as a multiuser river crossing leading to access to the station.

This is considered to be categorised as requiring **Tier 2** mitigation.

7.24.11 Conclusion

The HS2 alignment crosses numerous existing and proposed public rights of way and multi-user trails. The cost of providing new infrastructure to maintain minor rights of way is likely to lead to the rationalisation of these rights of way. A debate will inevitably be forthcoming with HS2 to determine the extent of any rationalisation and infrastructure provision.

However in the examples identified by Derbyshire County Council low and moderate cost alternatives would appear to be available at most locations providing that minor diversions of the existing and existing proposed routes can be contemplated.

Consultation with HS2 will be required to ensure that the connectivity of the right of way network and the Derbyshire Key Cycle Network is maintained as much as possible.

8 Conclusion

The examination of the preferred HS2 alignment at the locations identified in the scope document has revealed that the local impacts arise predominantly from the need to fulfil a greater objective of minimising the scheme wide impacts whilst still delivering a functioning railway. The potential of providing mitigation by means of alignment modification appears to be limited as such changes generally introduce greater impacts in other locations.

It should be noted however that the current preferred alignment will be refined as it progresses through the next stages of design. This would present opportunities for the alignment to be reviewed with respect to the key areas identified by the East Midlands Councils to establish whether any reduction in impacts can be achieved. One particular factor is that HS2 has taken a particular stance with regard to the crossing of flood plains that result in the need for extensive, high viaducts at each crossing. Further design refinement should demonstrate whether these are strictly necessary or whether local flood alleviation works could result in a reduction in elevation of these structures.

At some locations there would be opportunities to consider tunnels in place of viaducts. However, although potentially feasible from an engineering viewpoint, these are not likely to be affordable. As an example a tunnel beneath the Long Eaton area would cost in excess of £900m as compared to £275m for a viaduct. This is exacerbated in areas of flood plain where the transition from ground or elevated structure to tunnel would require extensive flood defence works around the tunnel portal.

It is recommended that the East Midlands Councils review the following key locations with HS2 to ensure that they are considered in the design progression.

Considering each of the key areas identified in the scope:

Location	Impact	Mitigation Options	Categorisation
<u>Measham area</u>	<ul style="list-style-type: none"> Severance of Waterside Development 	<ul style="list-style-type: none"> Examine feasibility of reduced development Local noise and environmental screening 	Tier 3
<u>Packington Area</u>	<ul style="list-style-type: none"> Noise/visual intrusion where route emerges from cutting onto viaduct 	<ul style="list-style-type: none"> Lowering of alignment to minimise intrusion Local screening to reduce noise 	Tier 2
<u>Kegworth area</u>	<ul style="list-style-type: none"> Visual intrusion to North Kegworth Severance of development to West Kegworth 	<ul style="list-style-type: none"> Local noise and environmental screening Examine feasibility of reduced development 	Tier 3
<u>Trent Valley Vision</u>	<ul style="list-style-type: none"> Visual impact of viaduct across River Trent and floodplain 	<ul style="list-style-type: none"> Design of viaduct and intermediate supports 	Tier 1

Location	Impact	Mitigation Options	Categorisation
<u>Long Eaton</u>	<ul style="list-style-type: none"> Visual and noise impact of viaduct through East side of Long Eaton 	<ul style="list-style-type: none"> Design of viaduct and intermediate supports Use of space beneath viaduct 	Tier 1
<u>Long Eaton - Tunnel</u>	<ul style="list-style-type: none"> Reduces impact within town centre but introduces impacts within flood plains 	<ul style="list-style-type: none"> Sympathetic design of transition structures in floodplains 	Tier 1
<u>Sandiacre and Trowell</u>	<ul style="list-style-type: none"> Impact of viaduct, particularly during construction 	<ul style="list-style-type: none"> Mitigation of construction impacts in consultation with HS2 Design of viaduct and intermediate supports 	Tier 1
<u>Strelley – (Construction)</u>	<ul style="list-style-type: none"> Ground settlement and noise 	<ul style="list-style-type: none"> Monitoring of ground levels and mitigation of construction noise 	Tier 2
<u>Strelley</u>	<ul style="list-style-type: none"> Visual impact 	<ul style="list-style-type: none"> Limited options other than local mitigation 	Tier 4
<u>Nuthall</u>	<ul style="list-style-type: none"> Incremental visual and noise impacts 	<ul style="list-style-type: none"> Limited options other than local mitigation 	Tier 4
<u>Newton and Blackwell</u>	<ul style="list-style-type: none"> Severance of local roads Noise and visual intrusion 	<ul style="list-style-type: none"> Retention of existing roads Local noise and environmental screening 	Tier 2
<u>Cultural Heritage: Annesley Hall</u>	<ul style="list-style-type: none"> Visual impact on outlook 	<ul style="list-style-type: none"> Existing environmental screening otherwise limited options 	Tier 4
<u>Cultural Heritage: Hardwick Hall</u>	<ul style="list-style-type: none"> Visual impact on outlook Possible impact on access arrangements 	<ul style="list-style-type: none"> Limited options Proposals for the realignment of local roads to be confirmed 	Tier 1
<u>Cultural Heritage: Sutton Scarsdale Hall</u>	<ul style="list-style-type: none"> Visual impact on outlook 	<ul style="list-style-type: none"> Limited options 	Tier 4
<u>Cultural Heritage: Bolsover Castle</u>	<ul style="list-style-type: none"> Visual impact on outlook 	<ul style="list-style-type: none"> Existing environmental screening otherwise limited options 	Tier 4

Location	Impact	Mitigation Options	Categorisation
<u>Nature Conservation: River Mease SSSI</u>	<ul style="list-style-type: none"> Crossing of SSSI – direct impact and visual impact on setting 	<ul style="list-style-type: none"> Limited options 	Tier 4
<u>Nature Conservation: Selston SSSI</u>	<ul style="list-style-type: none"> Visual impact on outlook 	<ul style="list-style-type: none"> Natural topography otherwise limited options 	Tier 4
<u>Nature Conservation: Carr Vale - North</u>	<ul style="list-style-type: none"> Visual impact on outlook 	<ul style="list-style-type: none"> Existing environmental screening otherwise limited options 	Tier 2
<u>Nature Conservation: Carr Vale - South</u>	<ul style="list-style-type: none"> Visual impact on outlook 	<ul style="list-style-type: none"> Limited options 	Tier 2
<u>Chesterfield Canal – Norwood / Wales Bar</u>	<ul style="list-style-type: none"> Severance of existing canal route 	<ul style="list-style-type: none"> Provision of crossing beneath HS2 and approach works 	Tier 4
<u>Chesterfield Canal – Staveley</u>	<ul style="list-style-type: none"> Severance of existing canal route 	<ul style="list-style-type: none"> Check HS2 clearance requirements for existing bridges Examine feasibility of alternative IMD link vertical alignment In the event that no vertical alignment option exists then a viable alternative for the canal crossing along with its associated infrastructure will require investigation 	Tier 1
<u>Business Impacts – Westminster Industrial Estate</u>	<ul style="list-style-type: none"> Loss of units on Huntingdon Court and Repton Road 	<ul style="list-style-type: none"> Reprovision of units at alternate location 	Tier 4
<u>Business Impacts – Saw Pit Industrial Estate</u>	<ul style="list-style-type: none"> Loss of units on west side of industrial estate 	<ul style="list-style-type: none"> Reprovision of units at alternate location 	Tier 3

Location	Impact	Mitigation Options	Categorisation
<u>Business Impacts – McArthurGlen Designer Outlet</u>	<ul style="list-style-type: none"> Noise and visual impacts Potential severance of Castlewood Industrial Park 	<ul style="list-style-type: none"> Local noise and environmental screening 	Tier 1
<u>Business Impacts – Nottingham Business Park</u>	<ul style="list-style-type: none"> Loss of units on north side of business park 	<ul style="list-style-type: none"> Potential for minor change to vertical alignment requiring extension to the proposed tunnel. Otherwise local noise and visual mitigation if tunnel extension not affordable. 	Tier 2 or Tier 4
<u>Impacts on Transport Links – M1 J27/A608</u>	<ul style="list-style-type: none"> Traffic disruption during construction 	<ul style="list-style-type: none"> Construction of temporary carriageways for use during construction of bridges carrying A608 over HS2 alignment. 	Tier 2
<u>Impact on Transport Links – M1 Junction 29 / A617 / A6175</u>	<ul style="list-style-type: none"> Traffic disruption during construction 	<ul style="list-style-type: none"> Construction of temporary carriageways for use during construction of bridges carrying A617 and A6175 over HS2 alignment and temporary realignment of gyratory. 	Tier 2
<u>Impact on Transport Links – M1 Junction 30 / A6135 / A616</u>	<ul style="list-style-type: none"> Traffic disruption during construction 	<ul style="list-style-type: none"> Construction of temporary carriageways for use during construction of bridges carrying A6135 over HS2 alignment and temporary realignment of gyratory. 	Tier 2
<u>Impacts on Transport Links – Kirkby-in-Ashfield and Sutton-in-Ashfield</u>	<ul style="list-style-type: none"> Traffic disruption during construction 	<ul style="list-style-type: none"> Adoption of staged construction to ensure that not all routes to and from the west are affected simultaneously 	Tier 2

Location	Impact	Mitigation Options	Categorisation
<u>Rights of Way and Access Routes</u>	<ul style="list-style-type: none"> Severance of existing and proposed rights of way 	<ul style="list-style-type: none"> Minor amendments to infrastructure combined with deviations / realignments of the rights of way 	Tier 1 and Tier 2

- Appendix A Route Alignment Drawings**
- Appendix B Notes of Meeting with East Midlands Councils
16 March 2018**
- Appendix C Notes of Meeting with East Midlands Councils
23 May 2018**
- Appendix D Rights of Way and Access Routes Consultation
(Anna Chapman)**

Amendment Record

Issue	Description	Distribution	Date
1	First Issue	Derbyshire County Council	14/03/2018
2	Second Issue	Derbyshire County Council	02/05/2018
3	Third Issue	Derbyshire County Council	11/06/2018
4	Fourth Issue	Derbyshire County Council	19/07/2018
5	Fifth Issue	Derbyshire County Council	17/08/2018
6	Sixth Issue	Derbyshire County Council	09/11/2018

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