



Department
for Transport

HS2 Phase 2b Western Leg Crewe - Manchester

Supplement to the Update on the SOBC



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Department for Transport
Great Minster House
33 Horseferry Road
London SW1P 4DR



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1. Introduction

Purpose

- 1.1 In January 2022 the Phase 2b Western Leg Strategic Outline Business Case Update (hereafter referred to as the SOBC) was published. The document accompanied the deposit of the High-Speed Rail (Crewe-Manchester) Bill and provided the rationale for deposit and progressing with the scheme to its next stage of delivery.
- 1.2 The SOBC set out the importance of the proposed scheme in linking Manchester to the high-speed network, reducing journey times between the UK's biggest economic regions (the South East, Midlands, and North West) and generating much needed passenger and network capacity on the West Coast Mainline (WCML), the UK's busiest mixed rail use corridor. It also outlined the scheme's central role in rebalancing the UK economy by providing the platform for economic growth and regeneration in Manchester and the North West, and its importance as the strategic enabler for Northern Powerhouse Rail (NPR) and the wider [Integrated Rail Plan for the North and Midlands](#) (IRP) including high speed services to Scotland.
- 1.3 As well as linking Manchester to the HS2 network, the scheme included a high-speed link from Hoo Green junction to the West Coast Mainline at Bamfurlong near Golborne, referred to as the Golborne Link. The Link provided relief to network capacity constraints on the section of the WCML between Crewe and Wigan, supported by other network upgrades, and facilitated an increase in the number of HS2 train services between England and Scotland, as well as improving journey times.
- 1.4 The independent [Union Connectivity Review \(UCR\)](#), led by Sir Peter Hendy and published in November 2021 looked at how best to connect the four nations of the UK. An assessment of the Golborne Link was included within this report and whether it was the optimum way for HS2 to serve Scotland. The UCR advised that, while the Link did improve some journey times, it also presented challenges for future connectivity to Scotland by exacerbating existing network constraints on the West Coast Mainline. It therefore recommended that alternative options should be considered further.
- 1.5 The IRP, also published in November 2021, referenced this issue being considered by the UCR, noting that with respect to the Golborne Link *'the Government will be interested to understand affordable options that maintain, or improve, overall value for money'*

- 1.6 The government believes there continue to be opportunities to improve services between England and Scotland and that it must take the time required to consider the most effective way to find the right balance between delivering the benefits, improving journey times, controlling costs and understanding the deliverability of alternatives. To ensure that this does not constitute additional impacts to the passage of the Bill, which could delay the project, the government has taken the decision to remove the Link from the High Speed Rail (Crewe-Manchester) Bill (which provides the powers for the Phase 2b Western Leg Scheme), subject to the will of Parliament, so the benefits to Manchester and the North West can be brought forward as soon as possible while it explores alternatives to the Link that can deliver a similar range of benefits, so long as these deliver for the taxpayer within the £96bn envelope allocated for the Integrated Rail Plan.
- 1.7 This document serves to provide a corresponding supplement to the SOBC published at Bill deposit and reflects the impacts of this change on the analysis which underpinned the case. This Supplement should be considered in tandem with the SOBC, which provided at the time the most recent appraisal of the case for the Phase 2b Western Leg scheme. The Outline Business Case, which will mark the next formal approval stage, is expected to be completed in 2023 and will contain an updated appraisal of the scheme.

Summary of Decision

- 1.8 The Secretary of State confirms the following decisions relating to the Phase 2b Western Leg, following the findings of the [UCR](#) and the [IRP](#):
- Removal of the ‘Golborne Link’ from the High Speed Rail (Crewe-Manchester) Bill, subject to the will of Parliament, meaning that the Government will no longer be seeking to construct the Link as part of this Bill scheme, via an Additional Provision to be presented after Second Reading of the Bill
 - Inclusion of passive provision that would allow for a future HS2 connection to the West Coast Mainline to be constructed, should the Government decide to pursue a high speed link at a later date
 - Commitment to improving Union Connectivity and exploring alternatives within the £96bn envelope of the IRP. In exploring these, consideration of how they may avoid the drawbacks of the Golborne Link, such as capacity constraints on the WCML, is likely be a key factor.

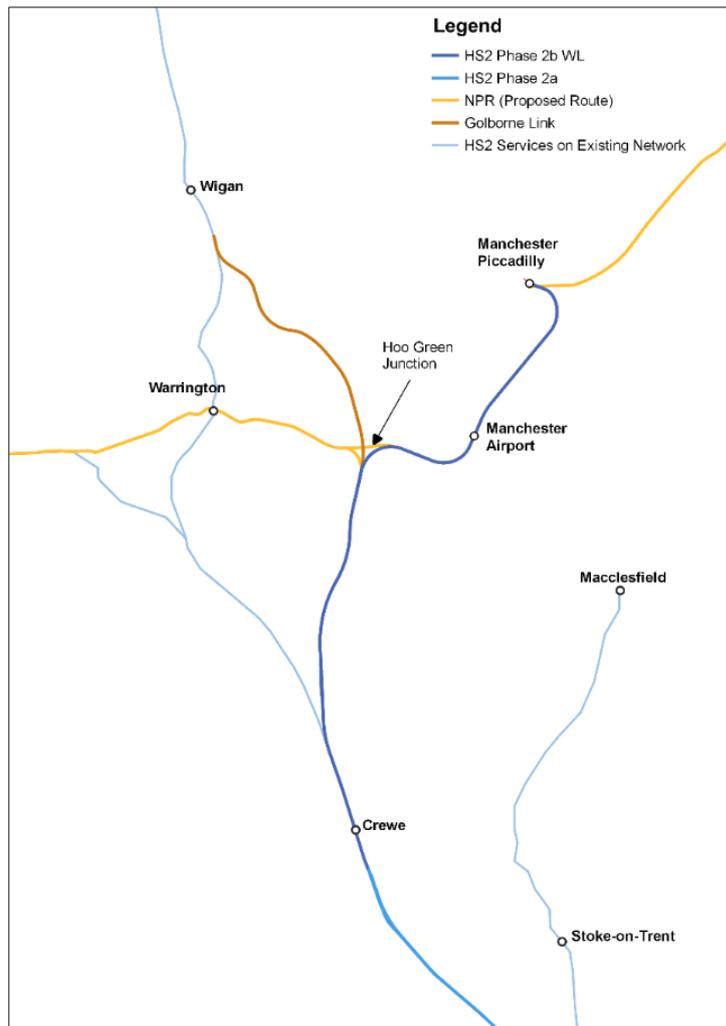
Context of the Decision

Removal of the Golborne Link from the High Speed Rail (Crewe-Manchester) Bill

- 1.9 On 24 January 2022, the High Speed Rail (Crewe-Manchester) Bill was deposited in Parliament. Subject to Royal Assent, the Bill will provide the necessary legislative powers for land acquisition and construction of the HS2 Phase 2b Western Leg, resulting in a new dedicated high-speed rail line that connects Phase 2a of HS2, south of Crewe, with new stations at Manchester Airport and Manchester Piccadilly. The deposited hybrid Bill also included an additional section of high-speed track, which looped back to the WCML, referred to as the ‘Golborne Link’.

1.10 The Golborne Link is a 22km (13.5 mile) stretch of the HS2 network, branching off from the core route at Hoo Green Junction, in an area of land bound by the A556, the A50 and the M56. It travels in a north-westerly direction passing along the western edge of Partington, and then through the areas of Glazebrook, Culcheth and Lowton Common before joining the WCML at Bamfurlong, just north of Golborne. It was selected for inclusion as part of the HS2 scheme in 2013 due to its potential to enable an increased frequency of high-speed services between London and Scotland, based on an indicative HS2 Trains Service Specification (iTSS) which had been developed for the Programme.

Figure 1: Maps of the Phase 2b Western Leg route showing the ‘Golborne Link’ which runs between Hoo Green Junction and Bamfurlong near Golborne



1.11 In October 2020, the Government commissioned Sir Peter Hendy to undertake the independent UCR, to assess transport connections and networks in, and between, England, Scotland, Wales, and Northern Ireland. The UCR considered how the quality and availability of transport can support economic growth, levelling up and an improvement in quality of life. It re-emphasised the need for such a link but questioned whether the link as currently designed offered the optimal solution.

1.12 The final UCR report was published in November 2021 and noted that the Golborne Link is expected to deliver quicker journey times and more capacity between England and Scotland, as well as resolving some of the constraints between Crewe and Preston, however it does not resolve all of the issues. The review therefore

recommended that the UK Government should *'reduce rail journey times and increase rail capacity between Scotland and London, the Midlands and North West England by upgrading the West Coast Main Line north of Crewe and reviewing options for connections between HS2 and the West Coast Main Line'*.

- 1.13 The IRP, also published in November 2021, referenced this issue being considered by the UCR, noting that with respect to the Golborne Link *'the Government will be interested to understand affordable options that maintain, or improve, overall value for money'*.
- 1.14 It is within this context that a decision has been made to propose removal of the Link from the Bill, and not seek to construct it as part of this scheme, so that the remaining core elements of the scheme can proceed without delay whilst wider opportunities for Union connectivity can be developed. Specifically, this decision allows further time to consider alternatives to the Golborne Link in greater detail. This will ensure the right infrastructure is provided for long term benefits to the rail network, to the North West and to Scotland, and the optimum solution for providing the capacity and connectivity objectives as set out in the UCR.

Opportunities for Anglo-Scottish connectivity and capacity

- 1.15 The Government believes there are potential opportunities other than the Golborne Link for improving high speed services between England and Scotland. We will look at the potential for these alternatives to bring similar benefits to passengers sooner, allowing improved Scotland services from Manchester and Manchester Airport, as well as from Birmingham and London. HS2 trains will continue to serve Wigan and Preston, as well as Lancaster, Cumbria and Scotland.
- 1.16 The revised Crewe-Manchester Bill scheme is a vital enabler to improved connectivity and capacity benefits for Anglo-Scottish services, while removing the Golborne Link from this Bill scheme gives government the time to explore these opportunities and ensure it delivers the most effective long term solution for Anglo-Scottish connectivity.
- 1.17 The Government will work with Network Rail and HS2 Ltd, and engage with the Scottish Government, to ensure the best evidence is gathered to investigate and consider appropriate options for future Union connectivity.
- 1.18 Exploring these opportunities, as noted previously, is key to the Government's commitment to explore alternatives that deliver similar benefits to the Golborne Link, within the £96bn envelope of the IRP.

Legislative powers to enable a future HS2 connection to the WCML

- 1.19 To enable government to capitalise on any of these opportunities in future and demonstrate the Government's commitment to Union connectivity, a number of works intended to support the Phase 2b train service with the Golborne Link are being retained in this Bill.
- 1.20 These include platform extensions at Carlisle and Preston stations; and works to construct Annandale depot for stabling and maintenance of HS2 trains running to Scotland. Given the Government's commitment to exploring alternatives that deliver similar benefits to the Golborne Link, the powers for these works would likely be

required for any alternative high-speed connection and are therefore retained in the Bill to act as potential enablers for future services.

- 1.21 The legislative powers to enable passive provision of a short stub of railway at Hoo Green Junction will also be provided within the Bill to allow a future connection to the WCML to be built with minimal disruption to the operations of the HS2 network, should the Government decide to pursue a high speed link after considering alternatives to the Golborne Link.
- 1.22 It should however be noted that these powers are permissive, and should Government pursue different options following consideration of alternatives these works may be reconsidered.

2. Update to the analysis supporting the Phase 2b Western Leg SOBC

Background to the SOBC

- 2.1 To support the passage of the Bill through Parliament, in January 2022 the Government published an update to the Strategic Outline Business Case (SOBC) for the Western Leg scheme, setting out the rationale for proceeding with its delivery. The case is predicated on five strategic objectives which reflect both current government priorities and the wider strategic goals of the HS2 project.
- 2.2 A refresh of the economic analysis was undertaken to provide a quantified view of the scheme's value for money. This was informed by the most recent cost and schedule estimates, and a thorough assessment of its potential monetised and non-monetised benefits. The economic modelling presented a BCR range of 0.5 to 1.7, with the value for money assessment placing the scheme in the 'low' value for money category, indicating that benefits will outweigh scheme costs, and that the scheme provides long-term economic value for the taxpayer.
- 2.3 The financial cost estimate for the Phase 2b Western Leg, used HS2 Ltd's most recent cost baseline (Baseline 2.1) and an estimated level of risk appropriate for that stage of the scheme's lifecycle. This estimated cost range was between £15bn and £22bn (Q3 2019 prices) based on the introduction of services between 2035 and 2041.
- 2.4 As the Government has decided to undertake a review to identify the optimal intervention to enhance Anglo-Scottish connectivity and capacity, it is appropriate to update the underlying analysis which informed the SOBC.

Strategic Considerations

- 2.5 HS2's western leg will be built in three phases. Phase 1, currently under construction, builds new high-speed track between London and the West Midlands, with a connection onto the WCML via Handsacre Junction in Staffordshire. Phase 2a, which has received Royal Assent, extends the high-speed track from the West Midlands to Crewe. Phase 2b Western Leg, for which the Bill has been deposited, further extends the high-speed track from Crewe to Manchester. The Government intends to remove the Golborne link part of Phase 2b, branching off the Crewe-Manchester line near Knutsford in Cheshire, from the Bill subject to a decision in Parliament.

- 2.6 HS2 services to Scotland were planned to operate and scale up in three phases. The first phase, beginning after the completion of Phase 1, would see one HS2 train per hour between London and Scotland. It would use the new high-speed line between London and the West Midlands, then the WCML. This phase will proceed as planned. The second phase, beginning after the opening of Phase 2a, would see that one HS2 train per hour from London to Scotland using the new high-speed line between London and Crewe and joining the WCML there, reducing the journey time still further. Again, this phase will proceed as planned. The indicative train service specifications for Phases 1 and 2a are outlined in the Phase One Full Business Case
- 2.7 As originally designed, the third phase, starting some time in the late 2030s or early 2040s after the opening of Phase 2b and the Golborne Link, would see two HS2 trains per hour between London and Scotland, and one further HS2 train per hour between Birmingham and Scotland, using the Link and joining the WCML at Golborne, south of Wigan.
- 2.8 As the Government has said, it is committed to looking again at alternative routes and schemes which deliver similar benefits to Scotland as if the Golborne Link had been built, so long as these can be done within the envelope of £96 billion announced in November 2021.
- 2.9 Given that no decision has yet been made on these alternatives, and that at this stage we cannot be confident of the exact costs or benefits of the alternatives, it is premature to present a full SOBC for HS2 services in their final end-state.
- 2.10 However, five strategic objectives of the scheme set out in the SOBC continue to hold in the absence of the Golborne Link. The scheme will continue to:
- Connect the largest economic regions and cities across the UK, through the provision of a step-change in connectivity and capacity
 - Enable significant enhancements to the conventional rail network across the North West and the North, freeing up much needed capacity on key bottlenecks as well as providing critical infrastructure to allow the delivery of NPR and new Metrolink routes.
 - Support development and regeneration across the North-West through the alignment to and support of local authority growth strategies, enabling the development and transformation of key sites at Manchester Piccadilly and Manchester Airport
 - Support government plans to build back better through the direct and indirect expansion of investment in the development of technical skills needed to bring the UK in line with other leading economies
 - Provide a sustainable long-term transport solution that supports the UK's Net Zero carbon target and aims to provide a net 10% gain in biodiversity, alongside economic prosperity'
- 2.11 The assessment carried out for the purpose of this report assumes a Train Service Specification to Scotland, Wigan, Preston, Lancaster and Carlisle that matches the service under Phase 2a, as set out in Annex A of the Update on the SOBC published in January 2022. This is used only for modelling purposes, and not as the end-state, given that the Government is considering alternatives to the Golborne Link.

Economic considerations

Impact of removing the link to the WCML

- 2.12 Following the decision to remove the Golborne Link from the Phase 2b Western Leg scheme, the economic appraisal has been updated to reflect the change in Bill scheme scope. The analysis is based on a purely modelled HS2 end-state which does not include either the Golborne Link or any of the alternatives to it being considered by the Government. We will not pre-empt what the end-state is, but presenting this analysis enables an alternative scheme to the Golborne Link to be assessed separately at a future point and decouples it from the High Speed Rail (Crewe-Manchester) Bill process, allowing the Bill to progress to current timescales.
- 2.13 Removing the Golborne Link from the Phase 2b Western Leg scheme, without replacing it with any alternative scheme, results in a reduction to the anticipated BCR range and reference case BCR for Phase 2b. The updated appraisal shows that the BCR range (taking into account Level 1 and Level 2¹ impacts only) for the scheme is now 0.5-1.2, with the reference case BCR sitting at 0.7. The values presented in the SOBC for the scheme, which included the Golborne Link, are 0.6-1.7 for the BCR range, and 0.9 for the reference case BCR. When the updated economic analysis for the Phase 2b Western Leg scheme without the Link is considered as part of the wider Value for Money (VfM) assessment, the VfM category is considered to be 'poor to low'. This compares with the previous 'low' categorisation for the Phase 2b Western Leg scheme including Golborne².
- 2.14 Whilst this VfM categorisation takes into account wider economic impacts as well as qualitative impacts, it does not value the importance of Phase 2b Western Leg both in terms of enabling NPR and a future link to Scotland, as the assessment is on the Phase 2b Western Leg in its own right.
- 2.15 Constructing a future link between HS2 and the WCML would be able to build on the existing infrastructure and benefit from it, enhancing its own BCR. For example, modelling indicates that if the Golborne Link as currently proposed were to be delivered incrementally to the Phase 2b Western Leg investment, the reference case BCR for the Link would be 1.4. However, this BCR is only realised because Phase 2b Western Leg provides the necessary connection into the high-speed network.
- 2.16 Furthermore, when the HS2 network is considered as a whole (Phases One, 2a and 2b Western Leg) the programme (excluding the Golborne Link) is expected to deliver positive value for money to the taxpayer with a BCR above 1, whilst also providing the infrastructure required to enable future rail schemes in the North and meet the objectives set out in the IRP.

Phase 2b Western Leg (Crewe to Manchester) as a catalyst for wider economic change

- 2.17 As evidenced in the [SOBC](#), the HS2 Phase 2b Western Leg scheme is expected to act as a catalyst for dynamic economic change, by altering the economic geography

¹ For the purposes of appraisal, economic impacts are considered at three levels. Levels 1 and 2 relate to static impacts. Level 3 impacts relate to dynamic impacts and are not considered within the reference case BCR or BCR range presented here. Further detail can be found in the [Phase 2b WL SOBC Update](#).

² See the [January 2022 Phase 2b \(Crewe – Manchester\) SOBC](#).

of the UK with benefits concentrated most strongly on Greater Manchester and the wider North West region. Direct impacts along with regeneration (including development of new businesses) are expected to induce further investment and encourage greater numbers of highly skilled workers to live and work in the North West due to increased job opportunities. This potentially leads to dynamic agglomeration impacts (i.e. further expansion of productive clusters of businesses consolidating in the area). The scheme is expected to enable this transformational change, which will be supported by a 'feedback loop': sustained productivity improvements will attract further private sector investment, generating further agglomeration and positive spill over effects.

- 2.18 The removal of the Golborne Link from the appraisal inevitably has an impact on the reach of these wider economic impacts. However, the potential of these impacts is still far reaching with the scheme estimated to generate £1.8bn-3.1bn of additional GDP benefits³. These impacts, also referred to as Level 3 dynamic impacts, are not included within the BCR range presented above as they are challenging to accurately quantify. Given this uncertainty, three methodologies have been used to validate the range stated above.
- 2.19 These methodologies draw on estimates of empirical analysis by Melo et. al (2013), regeneration land value uplift evidence from the Greater Manchester Growth Strategy and macroeconomic outputs from a Spatial-Computable General Equilibrium Model (S-CGE). Further information on how these estimates have been calculated, along with the estimates for each individual methodology is provided in the Technical Annex.

Sensitivity Analysis

- 2.20 It is standard practice in any transport appraisal to carry out a range of sensitivity tests to account for uncertainty around the future demand for travel and other assumptions that feed the appraisal. Demand for travel is largely determined by population and economic growth which are difficult to forecast a long way into the future. Demand for travel is also affected by travel behaviour, with the COVID-19 pandemic causing a short-term impact on some types of travel, elements of which could continue into the longer term, but with no certainty around this.
- 2.21 To this end, in the updated appraisal of the Phase 2b Western Leg scheme without the Golborne Link, a range of sensitivities has been undertaken. The sensitivities allow the impact of changing assumptions on the benefits of the scheme to be assessed, with the sensitivities informing the upper and lower bounds of the 0.5-1.2 BCR range. The bottom end of the range occurs in a scenario where demand is permanently reduced due to behavioural changes driven by the COVID-19 pandemic, and also in a sensitivity considering low economic growth, whilst the top end of the range is informed by a high economic growth scenario.
- 2.22 Whilst a high-growth scenario may be considered optimistic in the current economic climate, it should be remembered that HS2 will be delivered in a high growth corridor and focusses primarily on long distance business and leisure travel markets. The WCML has experienced relatively strong demand growth, averaging 4.3% per annum

³ The Level 3 benefits provided are estimates of GDP impacts. This contrasts with the Level 1 and Level 2 benefits, which provide estimates of welfare impacts on society.

between 2013/14- 2018/19, far above the network average growth and significantly higher than the reference case analysis which shows an implied growth of around 1.6% per annum. If the recent historic growth on the WCML as outlined above was sustained over a 10-year period following the introduction of HS2, this would bring demand growth in line with the high economic growth scenario.

2.23 The full range of sensitivities considered is set out in the Technical Annex.

Interdependencies with other planned rail schemes

2.24 Figure 3 assesses the impact of other planned rail schemes and their potential impact on the demand for Phase 2b Western Leg, be it complementary or substitutes. The results are not based on any new modelled outputs but provide a qualitative assessment on some planned schemes that could impact future demand for Phase 2b Western Leg.

2.25 The HS2 Phase 2b Western Leg scheme is fundamental to the development for NPR, and this does not change with the removal of the Golborne Link. Furthermore, it is anticipated that the complementary nature of the two schemes will generate a return on investment greater than the sums of the two schemes in isolation.

2.26 Beyond NPR, the HS2 Phase 2b Western Leg scheme additionally has the potential to interact with a number of other rail schemes currently under development. The demand impacts are considered further in the table below.

Figure 3: Interdependency table between HS2 Phase 2b Western Leg and other planned rail schemes

	HS2 East	Northern Powerhouse Rail	East Coast Mainline Upgrades	Transpennine Route Upgrade
Description of scheme	New rail line between West Midlands to East Midlands Parkway.	New rail line between Warrington, Manchester and Yorkshire. Upgraded lines between Liverpool and Warrington, and Standedge tunnels to Leeds.	Upgrades along route from London to Newcastle.	Faster connections between York and Manchester via Leeds.
Magnitude of impact on demand for HS2 Phase 2b Western Leg	Unlikely to significantly impact demand.	Likely to significantly increase demand.	Unlikely to significantly impact demand.	Likely to slightly increase demand.
Reasoning	HS2 East is to serve a different market: the East Midlands, where relatively few benefits are recorded for Phase 2b Western Leg.	The previous business case indicated that integration of the schemes could generate additional benefits which is unlikely to change by removing the Golborne Link.	Removing the Golborne Link results in an iTSS that does not serve Edinburgh, therefore faster journey times to Edinburgh along the ECML are unlikely to impact demand.	Passengers may change in Manchester for connections towards London on HS2.

- 2.27 Removing the Golborne Link from the Phase 2b Western Leg scheme results in a reduced interdependency between HS2 and the planned ECML upgrades. The ECML upgrades have the potential to reduce the journey time from London to Edinburgh and bring it into line with the journey time that could be delivered via HS2 (with the Golborne Link).
- 2.28 All other interdependencies are expected to result in either increased demand for the scheme or to have little to no impact.

Carbon Impacts

- 2.29 In line with the Government's aim to reach net-zero carbon emissions by 2050, the carbon impacts of all new transport schemes must be assessed.
- 2.30 In January 2022, HS2 Ltd published its [Net Zero Carbon Plan](#). In this plan, HS2 is expected to be run on zero carbon electric power from day one of operations which should result in net zero operational emissions. HS2 will be an environmentally sustainable form of transport, offering significantly lower carbon emissions per passenger kilometre than cars (including electric vehicles) and domestic air travel. Under this scenario, the Phase 2b Western Leg scheme is forecast to decrease operational and mode shift greenhouse gas (GHG) emissions by approximately 65,000 tCO₂e across the 60-year appraisal period (2038-2098)⁴.
- 2.31 When assessing the carbon impacts in line with Transport Analysis Guidance (TAG) carbon assumptions (as included in the reference case), there will be a negative impact on the combined level of operational and mode shift carbon emissions, thereby increasing greenhouse gas (GHG) emissions by approximately 330,000 tCO₂e. This is largely due to the increase in demand for HS2 services and the higher values of carbon placed on them.
- 2.32 This compares to the [SOBC](#) where the Phase 2b Western Leg increment (including Golborne) was forecast to decrease operational and mode shift GHG emissions by 750,000 tCO₂e. This increase occurs for several reasons: Conventional Rail emissions increase despite a net reduction in passenger trips, as the scheme enables a small number of additional conventional rail services to take advantage of released capacity as HS2 services are moved onto captive track. There is also a reduction in mode shift from rail and air as a result of fewer and slower services to Scotland.
- 2.33 Further detail on the impact on carbon emissions can be found in the Technical Annex.

Switching Values analysis

- 2.34 Switching Value analysis refers to the calculation of how much additional benefit a scheme would need to generate to move up to the next VfM categorisation and helps to frame the likelihood that a scheme will offer a positive return on investment.
- 2.35 Figure 4 sets out how much additional benefit the scheme would need to generate to sit in the 'low' and 'medium' VfM categories under different scenarios, that is, the point at which the scheme would offer a positive return on investment. This is based

⁴ Assumptions in this scenario are akin to the Department for Transport's [Transport Decarbonisation Plan](#)

on the Level 1 and Level 2 BCR, and does not include the Level 3 dynamic wider economic impacts.

- 2.36 The switching value analysis indicates that in our reference case scenario £3.2bn additional benefits (42% of total benefits) would be required to move into a “low” VfM category. In the medium COVID-19 demand sensitivity, £6.2bn additional benefits would be required to move the BCR into the “low” VfM category. In the 100-year appraisal period scenario just £700m, or 7% of total benefits, is needed to move to a ‘low’ VfM category. The High Economy Scenario sits firmly in the low VfM category, with an estimated BCR of 1.2.

Figure 4: Switching values table showing the level 2 BCR of the scheme under four different scenarios and the additional benefit required to move into the Low and Medium VfM category

	Scenarios			
	Phase 2b Western Leg (Excl Golborne Link) Reference case	Medium demand due to COVID behavioural change	100-year appraisal period	High Economy
BCR with Level 2 WEIs	0.7	0.5	0.9	1.2
Additional benefit required to achieve 'Low' VfM category (implied BCR between 1 and 1.5) (£m, 2015 prices, PV)	£3,200	£6,200	£700	N/A
Additional benefit required to achieve 'Medium' VfM category (implied BCR between 1.5 and 2) (£m, 2015 prices, PV)	£8,600	£11,800	£6,100	£2,900

Value for Money assessment

- 2.37 A Value for Money (VfM) assessment provides an overall assessment of whether the scheme is likely to bring an overall positive return on investment, taking into account a wider range of inputs beyond the BCR. The assessment uses modelling and appraisal consistent with the DfT's Transport Appraisal Guidance (TAG) and assesses a wide range of sensitivity tests resulting from the uncertainty of demand, based on the principles of the TAG Uncertainty Toolkit. In addition to transport user benefits and wider economic benefits, it also accounts for monetisable environmental benefits, including landscape impacts, and non-monetised benefits.
- 2.38 There are limits to the certainty of this assessment, not least because not all impacts currently monetised generate informative conclusions on the scheme's value for money, particularly if it is still in relatively early stages of design and development.
- 2.39 Sensitivities assessing wider modelling scenarios, including accounting for different economic and population growth projections, and COVID-19 impacts, indicates a BCR range between 0.5 to 1.2, with a central BCR of 0.7. The central BCR rises to 0.9 when assessed over a 100-year appraisal period, rises to 0.8 when using more recent economic and demand forecasts⁵, and rises to 0.8 when considering an alternative Train Service Specification. This should be balanced against a scenario

⁵ This sensitivity uses the November 2021 release of Demand Driver Generators (DDGs) compared to the November 2020 release used in the reference case. Note that this sensitivity has not undergone the same level of assurance as other sensitivities.

where the fall in demand due to behavioural changes brought on by COVID-19 may be sustained.

2.40 On the balance of probabilities, having regard to the uncertainty around future demand and wider level 3 economic impacts, it is concluded that the Phase 2b Western Leg increment without the Golborne Link is most likely to fall within the poor to low DfT VfM category⁶. Overall, the HS2 network (Phases One, 2a and 2b (Crewe to Manchester)) deliver positive value money to the taxpayer with a BCR above 1, whilst offering infrastructure that future rail schemes such as NPR and HS2 East can use to meet the objectives set out in the IRP.

Financial Considerations

2.41 The Financial Case of the SOBC published in January 2022 presented an estimated cost range of £15bn to £22bn (Q3 2019 prices) and a Delivery into Service (DIS) date range for the start of operation set at 2035-2041.

2.42 Revised financial analysis has been undertaken with considers the impact of deferring a decision on the Golborne Link and its removal from the hybrid Bill on the cost position of the scheme and its ongoing affordability. There is no impact to the DIS date range provided in the SOBC.

Cost range adjustment

2.43 Removal of the Golborne Link from the scope of the Phase 2b Western Leg Bill scheme reduces the overall cost range of the Phase 2b Western Leg to £13bn - £19bn. The adjustment provides a net position of the capital costs for delivering the remaining scope of the Phase 2b Western Leg and represents a cost reduction to the scheme of between £2bn and £3bn.

2.44 The cost and schedule estimates continue to be provided in ranges to allow for adequate provision for uncertainty and unforeseen risks inherent in the delivery a major infrastructure project over many years. As per the SOBC, the adjusted estimate continues to be informed by the most recent Phase 2b Western Leg Baseline 2.1 with Reference Class Forecasting 70 (RCF70) used to inform the upper end of the range, providing 70% likelihood of delivering the scheme within budget, when compared with the reference class.

2.45 Adjustments have been applied to the cost components set out below while core and 3rd party funding assumptions remain unchanged from those outlined in the SOBC.

- Construction Costs
- Land and Property Costs
- Indirect Costs
- Operating & Maintenance Costs up to DIS
- Rolling Stock Costs

⁶ The use of hybrid categories is justified in the [DfT Value for Money Framework](#).

2.46 As set out in the SOBC published in January, the funding options remain under consideration, including the identification of potential sources of income for the non-HS2 scope particularly the relocation of Metrolink and the construction of Manchester Airport Station, which are subject to a local funding commitment. In addition, consideration by the Department on the management of risks and opportunities continue to be assessed to support the efficient delivery of the scheme.

Current and ongoing expenditure on the Golborne Link

2.47 There has been some land and property expenditure on the line of route covered by the Golborne Link, of which an element may be recoverable through future sale.

2.48 Land and property Safeguarding will continue to remain in place along the line of the Golborne Link while alternative solutions are being assessed. There could therefore be ongoing land & property costs associated with the area of the Golborne Link as affected landowners can continue to be able to serve blight notices to DfT. The estimated annual cost of these Safeguarding arrangements is allowed for in the current Spending Review settlement to 2024-25. The allocated cost attributable to the Golborne Link will remain as part of the overall project estimate for the Phase 2b Western Leg scheme. An assessment will be made on reallocating related costs and assets to any revised project solution for the Golborne Link.

Efficiencies

2.49 HS2 Ltd will continue to drive out efficiencies in the delivery of the Phase 2b Western Leg scheme. The removal of the Golborne Link will result in increased costs in some areas, as plans to redistribute and dispose of materials will need to be reassessed. However, opportunities to defer other related works may materialise depending on any future decision on the alternative for the Golborne Link.

Schedule

2.50 The removal of the Golborne Link has no material impact on the Delivery into Service date for Phase 2b Western Leg Bill scheme, which remains between 2035 and 2041.

Impact to ongoing affordability

2.51 The SOBC published in January 2022 showed that, once the Phase 2b Western Leg (including the Golborne Link) is operational, the net impact on GB rail finances is close to neutral, generating a small average annual deficit. The 'no link to the WCML' sensitivity suggested a marginally improved financial position. This supplement calculates that removing the Golborne Link marginally deteriorates the net financial position for HS2 up to and including the Bill scheme, relative to that sensitivity, generating a small average annual deficit of approximately £40m (2015 prices).

2.52 The deviation from the January SOBC is a result of revised assumptions for trial operations, rolling stock fleet size, and renewal costs. It also includes the latest traincrew assumptions and updated Infrastructure Renewals for the Western Leg increment.

2.53 The impact on the net GB financial position is estimated to vary over the appraisal period. In steady state (pre-renewals) from 2041/42 to 2056/57), a small average annual surplus of £1m is forecast, with this deteriorating to an approximately £60m

deficit per annum from 2057/58 until 2098/99, due to the start of renewals (2015 prices).

- 2.54 As was the case in the January publication, HS2 services in isolation are expected to yield a significant financial surplus once operational. However, taking into account the abstracted conventional services and released capacity being taken up with new services, the surplus generated by HS2 is not significant enough to offset the deficit on the conventional services, resulting in a deterioration to GB rail finances.
- 2.55 As is the current case for the wider UK economy, the HS2 programme is experiencing high levels of inflation. DfT and HS2 Ltd remain focused on working to assess and mitigate the impact of inflationary pressures on the HS2 Western Leg scheme.

Technical Annex to the Economic considerations

A.1 This technical appendix contains further detail on the updated economic analysis. Information is provided under the following headings which follow the same structure as that provided in the main document

- Changes in methodology from the January 2022 SOBC
- Assessment of Level 1 and 2 Benefits and Costs
- Dynamic Wider Economic Impacts
- Sensitivity Analysis
- Environmental and non-monetised benefits
- Ongoing Affordability Analysis

Changes in methodology from the SOBC

A.2 A 'no link to the WCML sensitivity' in which the Golborne Link was not included in the scheme was published in the [SOBC](#). In the time since the original publication of this scenario a small number of methodological changes were introduced in order to capture the full removal of all the costs associated with the Link and to reflect the latest assumptions around appraisal years and sunk costs. These changes can be summarised as follows:

- Changes to capital cost assumptions, which includes:
 - The deletion of any passive provision for a future Golborne Link⁷.
 - The exclusion of Land and Property costs for continuing to hold Safeguarding between Hoo Green and Lilly Lane.
 - The adjustment of the Rolling Stock Fleet only for Phase 2a indicative Train Service Specification (iTSS) operating to Scotland.
 - The removal of the costs related to Off Route Works including Annandale, Preston, Carlisle, Craigentenny Provisional Sum (for Edinburgh turnback) and signal Headways near Mid Calder.
 - The reduction of the size of the Crewe North Rolling Stock Depot to reflect the downsized rolling stock fleet.
- The appraisal year and sunk costs assumptions were updated from 2021/22 to 2022/23. This change affects the discounting for both benefits and costs hence the results are marginally different when compared.

⁷ It should be noted that both passive provision remains in the Bill for a link to the WCML, as do the works at Annandale, Preston and Carlisle. They have only been removed from the economic analysis as costs would fall to any project which takes forward a future link to the WCML.

Assessment of Level 1 and 2 Benefits and Costs

A.3 In line with the approach undertaken in Section 2.9 of the [SOBC](#), the impacts of transport schemes are classified under three different levels of benefits. The reference case BCR is formed of Level 1 and 2 benefits but excludes the Level 3 dynamic impacts. The table below sets out these Level 1 and 2 costs and benefits for the Phase 2b Western Leg scheme without the Golborne Link (the new reference case, labelled Scenario (a)) and compares it with the three options described below:

- Scenario (b): A modelling sensitivity looking at a variation of the iTSS, including changes to both the HS2 and conventional rail network iTSS with the aim to improve the operational affordability of the scheme. This option uses the one free path into Manchester Piccadilly to extend the London-Macclesfield HS2 service to Manchester Piccadilly with a stop at Birmingham Interchange. The Cross Country Bournemouth-Manchester service is therefore curtailed at Birmingham New Street.⁸
- Scenario (c): The Golborne Link as an increment to Phase 2b Western Leg. In this scenario the Link is deferred and will open 5 years after Phase 2b (2043).
- Scenario (d): assuming a Phase 2b Western Leg with the Golborne Link. This option considers the impact of scenario (a) plus scenario (c)⁹.

⁸ It should be noted that this scenario is for purely illustrative purposes, the operational feasibility of this iTSS was not tested and no work has been carried out at present to understand the full impacts on the Conventional Rail Network (CRN). It should therefore only be considered in the context that the schemes value could be increase with a revised iTSS.

⁹ It should be noted that because of the changing assumptions around appraisal year, and the fact that the Golborne Link is assumed to be deferred for 5 years, these figures, are slightly different from the figures presented in the SOBC.

Figure A1: BCR Components for Phase 2b not including the Golborne Link, a iTSS option assessment, the Golborne Link increment, and Phase 2b including the Golborne Link

Present Value (£m, 2015 prices)	Phase 2b without the Golborne Link (a)	iTSS option (b)	The Golborne Link increment (c)	Phase 2b with the Golborne Link (d) = (a) + (c)
(1) Net Transport Benefits	5,200	5,800	4,700	9,900
(2) Net Transport Benefits (including WEIs) ¹⁰	7,500	8,300	6,500	14,000
(3) Capital Costs	10,400	10,400	4,000	14,300
(4) Operating Costs (including Non-Ticket Revenue)	1,900	1,800	3,700	6,000
(5) Rolling Stock & Infrastructure Renewal Costs	600	600	400	900
(6) Total Costs = (3) + (4) + (5)	12,900	12,800	8,000	20,800
(7) Revenues	2,100	2,300	3,400	5,500
(8) Net Costs to government = (6) – (7)	10,800	10,500	4,600	15,300
(6) BCR1 (excluding WEIs) = (1) / (8)	0.5	0.5	1.0	0.7
(7) BCR2 (including WEIs) = (2) / (8)	0.7	0.8	1.4	0.9

- A.4 The reference case BCR (a) as outlined in Figure A1, sits at 0.7, and a scheme in which the Golborne Link is considered incrementally to the Phase 2b Western Leg scheme (c) has a level 2 BCR of 1.4, making the case for a link. If the two schemes were to be combined, as assumed in the SOBC (d), there would be an overall level 2 BCR of 0.9. This remains unchanged from the figure reported in the SOBC.
- A.5 The fall in benefits and revenues when the Golborne Link is removed is attributed to the reduction in services to Scotland (from two to one from London, and none from Birmingham). This means there is less mode shift occurring along these routes from road, aviation and conventional rail, and there are fewer generated trips compared to the do-minimum assuming Phase 2a.
- A.6 This does therefore mean that the BCR for the Golborne Link as an increment on top of Phase 2b Western Leg (c) delivers a higher BCR at 1.4, as it increases capacity along these routes and increases demand for the extended HS2 service.
- A.7 The iTSS option (b) is likely to improve the No-Golborne Link reference case Level 2 BCR; this scenario is only one such design change which shows an improvement to the BCR to 0.8. It results in reduced waiting times from Macclesfield to Manchester and reduced crowding in the north-west. This results in a 10% and 8% increase in

¹⁰ The WEIs included only assume fixed land use (Level 2 impacts).

benefits and revenues respectively. Operating costs also decrease by 6% as the decrease in daily Cross Country train distance travelled is greater than the increase from the HS2 service extension. It must however be noted that this test is purely illustrative, the operational feasibility of this iTSS was not tested and no work has been carried out at present to understand the full impacts on the Conventional Rail Network (CRN). It should therefore only be considered in the context that the schemes value could be increase with a revised iTSS.

Analysis for the HS2 network

A.8 This section updates the economic analysis of the Full Network assessment which considers the impact of Phase One, 2a and 2b Western Leg together, excluding the Golborne Link. It should be noted that these tests have not been formally modelled since the [SOBC](#), but have been produced off-model to consider the impact of excluding the Golborne Link from the scope of the HS2 programme. Therefore, these results should be taken as indicative and not precise results and will be updated for the Outline Business Case. The assessments were performed against a “Do Minimum” option that assumes no HS2 services.

Figure A2: BCR Components for Phase One + 2a, Phase 2b Western Leg increment (excl Golborne Link) and Phase One + 2a + 2b Western Leg increment (excl Golborne Link)

Present Value (£m, 2015 prices)	Phase One + 2a (a) ¹¹	Phase 2b Western Leg increment (excl Golborne Link) (b)	Phase One + Phase 2a + Phase 2b Western Leg (excl Golborne Link) (c) = (a) + (b)
(1) Net Transport Benefits	30,300	5,200	35,500
(2) Net Transport Benefits (including WEIs) ¹²	39,700	7,500	47,200
(3) Capital Costs	35,400	10,400	45,700
(4) Operating Costs (including Non-Ticket Revenue)	8,300	1,900	10,200
(5) Rolling Stock & Infrastructure Renewal Costs	2,900	600	3,500
(6) Total Costs = (3) + (4) + (5)	46,600	12,900	59,400
(7) Revenues	16,200	2,100	18,300
(8) Net Costs to government = (6) – (7)	30,400	10,700	41,100
(6) BCR1 (excluding WEIs) = (1) / (8)	1.0	0.5	0.9
(7) BCR2 (including WEIs) = (2) / (8)	1.3	0.7	1.1

¹¹ These figures differ to the figures in the [SOBC](#) because of the updates in discounting assumptions from 2021/22 to 2022/23.

¹² The WEIs included only assume fixed land use (Level 2 impacts).

Dynamic Wider Economic Impacts

- A.9 It is unlikely that the removal of the Golborne Link will affect the calculations around the Gross Development Value (GDV) of new developments around Manchester Piccadilly and Manchester Airport given that services to both stations are unaffected by the Golborne Link. Moreover, the modelling outputs for the Phase 2b Western Leg increment with and without the Golborne Link suggest use of these stations is similar in both scenarios. The SOBC estimated GDV for Manchester Piccadilly and Airport of £3.3bn and £1.16bn respectively, demonstrating the value of the Phase 2b Western Leg Scheme to Manchester.
- A.10 The spatial Computable General Equilibrium (S-CGE) model has not been rerun for the new reference case, instead, model outputs have been scaled down in line with the fall in Level 2 business user benefits, which are 46% lower with the removal of the Golborne Link relative to the figure reported on in the January SOBC. This gives central Level 3 GDP impact of £1.8bn, with an upper end estimate of £3.1bn.
- A.11 Using the outputs from Melo et. al (2013) meta-analysis and applying them to the new reference case capital investment, results in an estimated range of additional Level 3 GDP impact of between £3bn-£9bn.¹³
- A.12 Bringing together these estimates, we approximate the likely range of additional GDP benefits for the reference case as between £1.8bn-3.1bn.¹⁴ Further work is needed to understand how these GDP impacts translate into welfare benefits.

Sensitivity Analysis

- A.13 The sensitivities set out below are explained in detail in the [SOBC](#). The impacts to the reference case follow similar patterns as with the previous analysis, with the impact on the BCRs presented below.
- A.14 The new sensitivities included here are:
- a 2-year delay to opening: this is based on RCF70 in HS2 Ltd's Baseline 2.1w as opposed to the 1-year delay which was based on RCF70 in HS2 Ltd's Baseline 2.
 - Updated economic forecasts: updating the Demand Driver Generators (DDGs) and Transport Analysis Guidance (TAG) Databook to November 2021 (from November 2020 and February 2021 respectively in the core assumptions) to see the impact of new GDP, employment and population forecast updates¹⁵. While the updated TAG databook forecasts do not have a material impact on demand, the adoption of November 2021 DDGs leads to a substantial uplift in rail demand and corresponding benefits.

- A.15 The following sensitivities that are set out in detail in the [SOBC](#) are briefly explained below:

¹³ The low-end additional GDP estimate is higher than in the SOBC, which uses the previous reference case as an input to the calculation. This is due to how the additional GDP benefits are calculated; whereby business user benefits and Level 2 GDP impacts are subtracted from the GDP impacts implied by the Melo et. al (2013) meta-analysis.

¹⁴ The low and high range are informed by the CGE estimates and include within their range the low estimate of the Melo et. al (2013) implied GDP benefits.

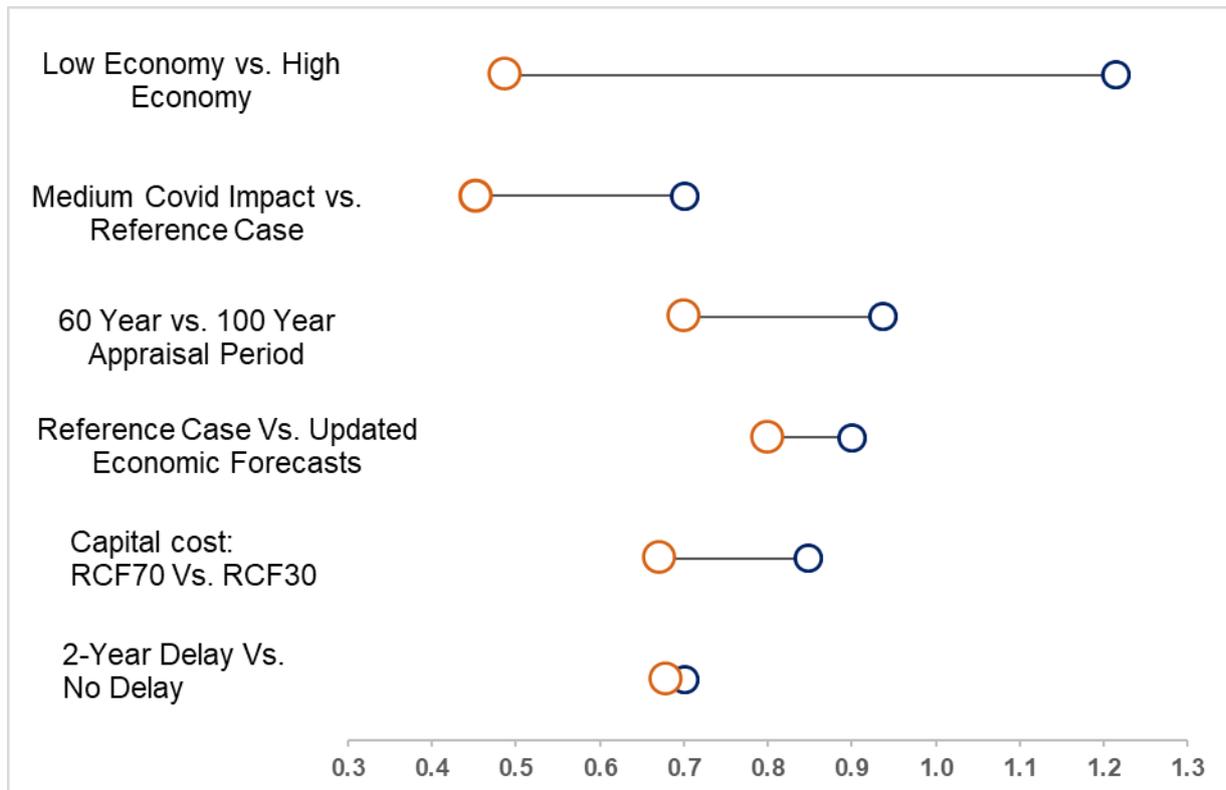
¹⁵ It should be noted that this sensitivity has not undergone the same level of assurance as other sensitivities.

- High and Low Economy scenarios: these assume alternative projections for population, GSP per capita and employment, the key drivers of rail demand. Population projections use the high and low population variant projections (ONS). The GDP per capita assumptions apply a +/- 0.5 percentage point year-on-year growth rate from the reference case assumptions. Employment assumptions increase at the same rate of central employment growth¹⁶ uplifted by the ratio of growth in the scenario's working age population compared with the core working age population in that year.
- Medium COVID-19 demand scenario: in this scenario demand for rail is permanently reduced due to changes brought on by COVID-19. The changes are split in commuting and business travel where a 26% reduction in demand is assumed, and some components of leisure travel¹⁷ where a 25% reduction is assumed. This scenario is not a prediction but explores a scenario on the impacts of the pandemic on rail demand.
- Extended appraisal period: In line with DfT TAG guidance, the reference case appraisal period for the impacts of the scheme is 60 years from scheme opening (assumed 2038). A sensitivity test using a 100-year appraisal period, which more accurately reflects the expected lifetime of the investment, provides an estimate of the long-term value of HS2.
- Capital cost: Cost sensitivities were undertaken using the TAG-consistent RCF approach in which the level of optimism bias is adjusted. Using a range of optimism bias from RCF30 to RCF70, reflects different levels of risk to the cost of the programme.

¹⁶ This rate is informed by [OBR's March 2020 Economic and Fiscal Outlook release](#), which forecasts core workforce growth of 0.05% year on-year.

¹⁷ This includes public events, eating out, day trips and cinema specifically. All other leisure trips are not affected. It results in a 3.25% and 6.5% reduction in leisure travel.

Figure A3: BCR with level 2 Wider Economic Impacts ranges for Phase 2b Western Leg (excluding the Golborne Link)



A.16 Figure A3 shows the range of the level 2 BCR for the different sensitivities falls between 0.5 and 1.2. The low end of the range occurs in both the medium COVID-19 behavioural impact and low economic growth sensitivities, whilst the upper end occurs in the high economic growth sensitivity.

Environmental and non-monetised benefits

Carbon Impacts

A.17 The Phase 2b Western Leg Increment (excl Golborne) is forecast to increase operational and mode shift greenhouse gas (GHG) emissions by approximately 330,000 tCO_{2e}. This differs to the [SOBC](#) where the Phase 2b Western Leg Increment (incl Golborne) was forecast to decrease operational and mode shift GHG emissions by 750,000 tCO_{2e}. Conventional Rail emissions increase despite a net reduction in passenger trips, as the scheme enables a small number of additional conventional rail services, to take advantage of released capacity as HS2 services are moved onto captive track. There is also a reduction in mode shift from road and air as a result of fewer and slower services to Scotland. This results in a combined increase in operational and mode shift emissions when the Golborne Link is removed from scope relative to its inclusion.

A.18 Figure A4 indicates the emissions generated through construction, operation, mode shift and sequestration:

- The construction impacts include: product manufacturing, material transportation and other construction and installation processes.

- The sequestration impacts include: the disbenefit from the removal of woodland in the construction phase and the benefits from tree planting and maintained grassland/wetland during the operational phase.
- Operation (other) includes: repair, maintenance and replacement of rolling stock and infrastructure, including operational energy usage relating to infrastructure.

A.19 Only non-traded operational carbon is included in the reference case BCR estimate, a benefit of £3m (2015 price, present value). This is in line with TAG where emissions that occur in the traded sector need not be monetised to avoid double counting as the Emissions Trading System (ETS) already reflects costs. The estimated benefit of £3m compares with an estimate of £20m in the [SOBC](#). The total traded and non-traded carbon emissions would result in a disbenefit of £358m. Including this monetised impact (that is, also including monetised traded emissions) has no impact on the BCR to one decimal place.

A.20 A sensitivity assessing faster decarbonisation of transport modes and national grid was undertaken¹⁸. This also assumes HS2 services run on zero carbon electricity, as set out in HS2 Ltd's [Net Zero Carbon Plan](#), helping to fulfil the fifth strategic objective of the scheme. This results in total emissions falling from 5,020,000 tCO_{2e} to 2,485,000 tCO_{2e} with the monetised impact falling from £358m to £239m (2015 prices).

Figure A4: Traded and non-traded carbon emissions for Phase 2b Western Leg (excluding the Golborne Link)

			Emissions (tCO _{2e})		Monetised Impact (2015 prices, £m, present value)	
			Central estimate	Sensitivity	Central estimate	Sensitivity
Non-traded transport	Non-traded	Road Petrol & Diesel, Conventional Rail Diesel	-20,000	15,000	3	-2
Traded emissions and sequestration	Traded	HS2, Electric Conventional Rail, Electric Road and Aviation	350,000	-80,000	-2	0
	Traded	Construction	3,790,000	2,490,000	-351	-231
	Traded	Operational (other)	890,000	50,000	-3	0
	Non-traded	Net Sequestration	5,000	5,000	-5	-5
Total (traded and non-traded emissions)			5,020,000	2,485,000	-358	-239

Landscape Impacts

A.21 The landscape model has been updated to account for the removal of the Golborne Link from the reference case and updates to the long-term GDP per capita growth assumptions. Overall, the central scenario indicates that there is a disbenefit to the associated landscape of £0.4bn (PV, 2015 prices). This is lower level of disbenefit than the previous reference case (£0.5bn) due to less land being used. The new high and low scenarios indicate a disbenefit of £0.3bn and £0.6bn respectively (PV, 2015

¹⁸ Details of which can be found in the [SOBC](#)

prices). Landscape impacts are not included in the core BCR but are used to inform the overall VfM assessment; inclusion of the monetised landscape impacts in the central case would reduce the reference case BCR by at most 0.1.

Non-monetised Impacts

A.22 The non-monetised impacts have been updated to reflect the removal of the Golborne Link. The table below shows were there has been updates to the Environmental Impact Assessment. The distributional impact assessment is found to remain unchanged with the new reference case. Although the modelling suggests that towns such as Preston and Wigan will not benefit to the same extent once the Golborne Link is removed, deprived areas in Greater Manchester are still expected to benefit from the user benefits enabled by the scheme.

Figure A5: Non-monetised impacts summary for Phase 2b Western Leg (excluding the Golborne Link)

Impact	Assessment	Comments
Landscape	Moderate Adverse	Eight sections of the route have been recognised as having major impacts on landscape character and qualities of the wider countryside.
Heritage	Slight adverse	One Grade II listed building will be demolished. Five Grade II listed buildings and one Grade II* listed building within the land required for construction will be affected but not demolished.
Biodiversity	Slight adverse ¹⁹	15 ancient woodlands have some impact, though no ancient trees will be lost. The land required for construction will include approximately 20.8ha of semi-natural broadleaved woodland; 24.5ha of grassland; 263 ponds; and 246km (153 miles) of hedgerow. Construction will lead to the permanent loss of approximately 5.1ha of ancient woodland. However, the scheme’s design includes habitat creation, including the creation of new hedgerows. A total of approximately 204ha of habitats will be created, mainly lowland mixed deciduous woodland and lowland meadow with some wetland habitats. In addition, there will be further areas of landscape planting of native broadleaved woodland, which will also contribute to habitat creation.
Water Environment	Large adverse	One major waterway diverted, flood risk and minor potential ground water impact. 1.3km (0.8 miles) of route through flood zone 3. 0.9km (0.5 miles) of station to be built within flood zone 3. Though no tunnelling will be through SPZ 1 or 2.

Ongoing Affordability Analysis

A.23 The Ongoing Affordability analysis is subject to considerable uncertainty, particularly with regard to passenger demand and the operation of conventional services. To

¹⁹ It should be noted that although the Proposed Scheme has committed to a net gain in biodiversity, the rating takes into account the loss of ancient woodland which cannot be directly replaced.

reflect this uncertainty, sensitivities have been undertaken to demonstrate the impact on GB rail industry finances once the Western Leg is operational.

- A.24 We estimate that from 2036/7 to 2098/9 the change in the net financial position of GB rail could range from a deficit of approximately £2m in a high rail demand scenario to £70m in a low rail demand scenario (2015 prices). To arrive at these scenarios, we assume a marginally higher/lower rate of population growth, GDP growth and employment level.
- A.25 As in the economic analysis, the alternative iTSS option was also considered with the aim of improving the ongoing affordability of the scheme. It resulted in an improvement to the GB rail finances, generating an average annual deficit of £28m from 2036/7 to 2098/9.²⁰

²⁰ It should be noted that this scenario is for purely illustrative purposes, the operational feasibility of this iTSS was not tested and no work has been carried out at present to understand the full impacts on the CRN. It should therefore only be considered in the context that the schemes value could be increase with a revised iTSS.