M42 Junction 6 Improvement
Scheme Number TR010027
Volume 6
6.1 Environmental Statement
Chapter 13 – Population and Health

Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

January 2019

Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

M42 Junction 6 Improvement Development Consent Order 202[ ]

6.1 Environmental Statement
Chapter 13 Population and Health

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Planning Inspectorate Scheme Reference	TR010027
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13 Population and health

13.1 Competent expert evidence

13.1.1 This chapter presents the results of an assessment of the likely significant effects of the Scheme on population and health, which comprises:

a. occupiers of agricultural, community and development land;

b. owners and users of private and commercial property;

c. users of community facilities;

d. people making journeys by vehicle on the strategic and local road networks;

e. non-motorised users (NMUs) travelling on the local road and public rights of way (PRoW) networks, including journeys made between communities and facilities; and

f. local residents health and wellbeing.

13.1.2 The competent expert responsible for the assessment is a Regional Director within AECOM who holds the qualification of Masters in Economics, and is a Member of the Institute of Economic Development.

13.1.3 They have over 18 years of experience in the co-ordination, management, delivery and review of environmental impact assessments (EIAs) for a wide variety of development projects. They have previously authored and technically reviewed assessments involving the prediction and mitigation of effects on NMUs, vehicle travellers, private assets, development land and agricultural land on strategic and local road-based projects throughout the UK.

13.2 Legislative and policy framework

13.2.1 The following legislation and planning policy is of direct relevance to the assessment of population and health.

13.2.2 Compliance with statute and policy relating to population and health is addressed within the Planning Statement [**TR010027/APP/7.1**].

Localism Act 2011

13.2.3 The Localism Act 2011 [REF 13-1] sets out a series of measures with the potential to achieve a substantial shift in power away from central government towards local communities.

13.2.4 Effects on local communities resulting from the Scheme have been identified and evaluated as part of this assessment.

Commons Registration Act 1965

13.2.5 The Commons Registration Act 1965 [REF 13-2] created a system for the registration and protection of Common Land and Town and Village Greens.

13.2.6 The assessment has considered the potential effects of the Scheme on such areas and their users.

Countryside and Rights of Way Act 2000

13.2.7 The Countryside and Rights of Way Act 2000 [REF 13-3] is the principal legislation governing the registration and protection of public footpaths, bridleways and byways, and provides measures to improve public access to the open countryside and Common Land.

13.2.8 The potential effects of the Scheme on NMUs travelling on these routes have been considered as part of the assessment.

Health and Social Care Act 2012

13.2.9 In terms of human health legislation, the Health and Social Care Act 2012 [REF 13-4] outlines the Secretary of State's duty to promote and improve the National Health Service (NHS), in pursuit of a number of key aims, which include:

a. an improvement in the quality of services;

b. a reduction in health inequalities;

c. the promotion of autonomy for general practitioners and health centres; and

d. improvements to the treatments and services offered to patients.

13.2.10 The document focuses on the regulation of the NHS at a national and local level, and also promotes changes such as the abolition of NHS Trusts, support for the production of Joint Strategic Needs Assessments (JSNA), and establishment of Health and Well-being boards at a local authority level. These boards will be established for the purpose of advancing the health and wellbeing of people within each local authority area and will aim to "*encourage persons who arrange for the provision of any health or social care services in that area to work in an integrated manner*".

13.2.11 Matters relating to human health and wellbeing have been considered as part of the assessment.

National Policy Statement for National Networks

13.2.12 The National Policy Statement for National Networks (NPSNN) [REF 13-5] does not provide specific guidance on the identification, assessment and mitigation of effects on population and health as a topic area, but does include statements relating to journeys made on the national road network, effects on communities and accessibility, and the need to consider land use impacts as part of development applications for nationally significant infrastructure projects.

13.2.13 Paragraphs 4.79 to 4.82 of the NPSNN [REF 13-5] acknowledges that traffic congestion can lead to a marked deterioration in the experience of road users, leading to frustration and stress when making journeys. It sets out a number of development-related expectations with regard to communities and accessibility, including:

a. the delivery of improvements that reduce community severance, particularly where the national road network acts as a barrier to the NMU movements;

b. addressing historic problems on the road network;

c. taking account of the accessibility needs of NMUs, including disabled users, as part of the design-development process; and

d. minimising, where possible, the impacts of developments on the amenity of local communities.

13.2.14 The document identifies that existing and proposed land uses should be identified as part of development applications, and includes statements concerning the development and/or loss of open space, sports, recreational land and buildings. The need to consider the economic benefits of higher grade agricultural land by directing development towards areas of lower grade land, wherever possible, is also emphasised.

13.2.15 These considerations have been taken account of in the assessment in order to identify the likely significant effects on people and communities that the Secretary of State needs to give due regard to in their decision-making.

National Planning Policy Framework

13.2.16 The National Planning Policy Framework (NPPF) [REF 13-6] promotes sustainable transport that takes account of the needs of residential and business communities, and encourages the use of public transport, cycling and walking.

13.2.17 The NPPF [REF 13-6] acknowledges the need to take account of the traffic and transport effects of development on population and health, and amplifies the objective of promoting safe and healthy communities by securing sustainable development opportunities that promote walking and cycling.

13.2.18 The NPPF [REF 13-6] acknowledges the need to consider the safety and welfare of NMUs and road users, and emphasises the need to protect and enhance PRoW facilities and accessibility.

13.2.19 The document provides similar direction to the NPSNN [REF 13-5] with regard to agricultural land, stating that local planning authorities should take into account the economic and other benefits of the "*best and most versatile*" (BMV) agricultural land as part of land use planning and decision-making, and emphasising a preference to develop poorer quality land wherever possible.

13.2.20 In promoting healthy communities, the NPPF [REF 13-6] requires planning decisions to deliver the social, recreational and cultural facilities and services that communities need. It states that existing open space, sports and recreational buildings and land (including playing fields) should not be built upon unless an assessment clearly demonstrates the need for development outweighs the loss, or that the loss would be replaced by better or equally advantageous provisions.

13.2.21 The requirements of the NPPF [REF 13-6] have been accounted for in the assessment, with particular regard given to establishing the effects of the Scheme on existing and future land uses, and identifying opportunities to improve NMU facilities and accessibility to community facilities through the design-development process, where practicable.

National Planning Practice Guidance

13.2.22 The following National Planning Practice Guidance (NPPG) adds further context to the NPPF [REF 13-6] in respect of land use, communities and accessibility:

a. health and wellbeing [REF 13-7]; and

b. open space, sports and recreation facilities, public rights of way and local green space [REF 13-8].

13.2.23 This guidance [REF 13-7]; [REF 13-8] has been considered in the assessment by establishing all areas of community land and facilities, and the movements made by NMUs on the PRoW and local road network (and any associated amenity value), that would be affected or enhanced through implementation of the Scheme.

Solihull Local Plan: Shaping a Sustainable Future

13.2.24 The adopted Solihull Local Plan: Shaping a Sustainable Future [REF 13-9] acknowledges the vital role that planning and good design has in creating and supporting vibrant and healthy communities, protecting areas and facilities used for recreation, and safeguarding the borough's BMV agricultural land.

13.2.25 Policy P7: Accessibility and Ease of Access sets out the importance of ensuring that "*people can access local services, key employment and retail centres and education locations on foot, by bicycle and public transport*".

13.2.26 Policy P8: Managing Demand for Travel and Reducing Congestion sets out that development proposals should have regard of transport efficiency and highway safety.

13.2.27 Policy P17: Countryside and Green Belt makes clear the intention to protect the most valuable and agriculturally viable land, unless there is an overriding need for development progression and insufficient alternative lower grade land is available.

13.2.28 Policy P18: Health and Well Being sets out the expectations of new development in respect of promoting, supporting and enhancing physical and mental health and wellbeing, stating that support will be given to proposals that: offer opportunities for recreation; encourage social interaction and facilitate NMU movements; contribute to the development of the walking and cycling network; and enhance PRoW access to open space.

13.2.29 Policy P20: Provision for Open Space, Children's Play, Sport, Recreation and Leisure sets out the benefits of public open space, sport and recreational facilities, noting that the loss of such provisions would only be acceptable under certain circumstances.

13.2.30 These local policy requirements have been addressed by undertaking an assessment of the effects of the Scheme on agricultural land, areas and users of open spaces and community land, and users of the PRoW network, taking into account any mitigation measures incorporated into its design.

Highways England Delivery Plan

13.2.31 The number of new and upgraded crossings is a Key Performance Indicator (KPI) in the Highways England Delivery Plan (2015-2020) [REF 13-10]. Success against these KPIs is a key requirement in the Delivery Plan.

13.2.32 The Delivery Plan also sets out Highways England's commitments for improving integration and accessibility through the network including a commitment to work with local communities, to listen to local people to identify how to improve the physical or environmental quality of a place, or the economic or social well-being of a community.

Solihull Joint Health and Well-being Strategy

13.2.33 The Solihull Joint Health and Well-being Strategy [REF 13-11] was published with the aim of improving the quality of health and wellbeing, and reducing health inequality by prioritising the needs of the local population in Solihull.

13.2.34 Key considerations within the Solihull area relating to health include: an ageing population; health inequalities across the borough between different people and places; enabling children to have the best start in life; and mental health issues. Prevention and early intervention are highlighted as a primary focus for addressing these considerations.

13.3 Assessment methodology

Scope of the assessment

13.3.1 A scoping exercise was undertaken in late 2017 to identify the matters to be covered by the population and health assessment and agree the approach with relevant statutory bodies.

13.3.2 The outcomes of the scoping exercise were recorded in a scoping report [REF 13-12], which was consulted upon as part of a formal request to the Inspectorate for a scoping opinion. The scoping report [REF 13-12] included a summary of all assessment work undertaken as part of the design-development of the Scheme up to the point of its publication.

13.3.3 The Inspectorate's scoping opinion [REF 13-13] identified a number of additional overarching EIA and topic-specific matters that were subsequently brought into the overall scope of the assessment. These further considerations are detailed in Appendix 5.3 [**TR010027/APP/6.3**] and include responses to the points raised, and identify where the relevant information is presented within this chapter and elsewhere in this Environmental Statement.

13.3.4 In addition to the matters raised in the scoping opinion [REF 13-13], the final assessment scope has also been shaped by the following:

a. design changes made to the Scheme in respect of its form and extent; and

b. the outcomes of further desk-based studies and landowner interviews undertaken to establish the baseline conditions associated with population and health, and to inform the identification of the likely significant effects of the Scheme.

13.3.5 Consideration was given to the activities associated with the future maintenance and management of the Scheme, and whether these have the potential to result in significant effects on population and health. Following a review of the maintenance activities presented in Chapter 3 The project, the process concluded that there would be limited potential of such effects to occur, and that these activities are comparable with standard maintenance operations already being undertaken elsewhere on the strategic and local road networks. Accordingly, the effects associated with this phase of the Scheme were scoped out of the assessment and not considered further.

Assessment guidance

13.3.6 The following guidance has been used to inform the scope and content of the assessment, and to assist the identification and mitigation of likely significant effects. This builds upon the overarching EIA methodology and guidance presented in Chapter 5 EIA methodology and consultation.

Design Manual for Roads and Bridges: Volume 11

13.3.7 Guidance contained within the following parts of Volume 11 of the Design Manual for Roads and Bridges (DMRB) has been used in the assessment of effects on PRoW users, communities and severance:

a. DMRB Volume 11: Section 3, Part 8 – Pedestrians, Cyclists, Equestrians and Community Effects [REF 13-14], in relation to effects on NMUs, communities and severance;

b. DMRB Volume 11: Section 3, Part 6 – Land Use [REF 13-15], in relation to effects on agricultural and other land uses; and

c. DMRB Volume 11: Section 3, Part 9 – Vehicle Travellers [REF 13-16], in relation to effects associated with changes in driver stress and views from the road.

Other guidance

13.3.8 For some aspects of the assessment (for example health) guidance on the scope of the assessment has been used, such as the London Healthy Urban Development Unit (HUDU) Rapid Health Impact Assessment Tool Third Edition 2017 [REF 13-17], however no specific guidance for the identification and determination of impacts and effects (or their significance)

13.3.9 In these cases, the likely significant effects of the Scheme have been assessed using professional judgement, giving regard to the sensitivity of people and community resources and receptors, and the magnitude of impacts that would likely arise as a result of construction and operation of the Scheme.

13.3.10 Reference is also made to related guidance and prevailing planning policy, where applicable, which is presented as part of the descriptions of assessment criteria in the following sections.

Establishment of the baseline conditions

13.3.11 Establishment of the baseline environment has involved reference to existing data sources, interviews with landowners affected by the Scheme, and field observations.

Desk studies

13.3.12 The following sources of data were obtained and reviewed as part of the assessment:

a. Google Streetview roadside photography [REF 13-18], to inform the assessment of views from the road;

b. traffic forecasts prepared as part of the Transport Assessment Report [**TR010027/APP/7.2**], to inform the assessment of traffic-related severance and changes in driver stress (see Appendix 13.1 [**TR010027/APP/6.3**]); and

c. environmental measures incorporated into the design of the Scheme, to inform the assessment of view from the road, as illustrated on the Environmental Masterplan (see **Figure 8.8** [**TR010027/APP/6.2**]).

13.3.13 Other information sources referenced as part of the baseline review included:

a. 1:25,000 and 1:10,000 scale Ordnance Survey mapping and aerial photography available in the public domain – used to identify land use relationships, community land and facilities; and

b. Solihull Metropolitan Borough Council's (SMBC) definitive map of rights of way – to identify the PRoW potentially affected by the Scheme.

Landowner interviews and soil surveys

13.3.14 Engagement with landowners affected by the Scheme was carried out during the design-development and assessment processes, the objectives being:

a. to establish information including current land ownership (tenure), access arrangements, drainage regimes, husbandry, field boundary types and sizes;

b. to identify the extent to which construction and operation of the Scheme would result in severance and/or the loss of land within affected land holdings (and thereby potentially affect existing operations); and

c. to inform the identification of mitigation measures and their incorporation into the design of the Scheme, for example the inclusion of accommodation bridges and farm access tracks.

13.3.15 Agricultural data sheets compiled using information gathered from interviews with agricultural landowners are presented within Appendix 13.2 [**TR010027/APP/6.3**].

13.3.16 Field surveys were undertaken to sample agricultural soils at representative locations within the Order Limits (where land access was obtained by prior negotiation), the purpose of which was to record the types and distribution of soils present and confirm their grade in accordance with the Agricultural Land Classification (ALC) grading system [REF 13-19]. The findings of this survey are presented within Appendix 10.2 [**TR010027/APP/6.3**] and were used to inform the assessment of impacts and effects on agricultural land holdings.

Non-motorised user surveys

13.3.17 To establish the number of NMUs travelling on roads and PRoWs within the Order Limits, a programme of surveys using cameras positioned at representative locations was planned to be undertaken from the 06 August to the 12 August 2018.

13.3.18 Following their installation and upon inspection on 06 August 2018, it was recorded that a number of the cameras installed along Catherine-de-Barnes Lane had been tampered with or stolen, which affected the validity of the survey.

13.3.19 In response, a second camera survey was undertaken on 27 August and 28 August 2018 to record movements typically associated with a normal weekday and Bank Holiday (where peak use of the network would be likely to occur).

13.3.20 In order to establish the origin and destination of NMUs, and the purpose and frequency of their journeys, a further questionnaire-based survey was undertaken at representative locations within the Order Limits from the 09 November to the 12 November 2018.

13.3.21 The information obtained from the untampered camera surveys was used to inform the development of NMU provisions (for example diversion routes) incorporated into the design of the Scheme.

13.3.22 Due to the problems encountered and the timing of the origin-destination surveys, this information has not been able to be included within the assessment of impacts and effects on NMUs; however, the findings of these surveys will be submitted to the Inspectorate as other environmental information prior to DCO examination.

13.3.23 Further information regarding the limitations that this has presented on the assessment, and the assumptions made in response, are presented in Section 13.4.

Sensitivity towards change

Agricultural land

13.3.24 As defined in Natural England's Technical Information Note TIN049 – Agricultural Land Classification: protecting the best and most versatile agricultural land [REF 13-20], and in the Agricultural Land Classification guidelines [REF 13-19], agricultural land in England and Wales is graded between 1 and 5, depending on the extent to which physical or chemical characteristics impose long-term limitations on agricultural use.

13.3.25 Grade 1 land is excellent quality agricultural land with very minor or no limitations to agricultural use, and Grade 5 is very poor quality land, with severe limitations due to adverse soil, relief, climate or a combination of these.

13.3.26 Grade 3 land is subdivided into Subgrade 3a (good quality land) and Subgrade 3b (moderate quality land). BMV agricultural land comprises Grades 1, 2 and Subgrade 3a (see NPSNN paragraph 5.168 [REF 13-5]).

13.3.27 The sensitivity of agricultural land has been assessed according to its ALC grade, as set out in **Table 13.1**. The criteria take into account guidance within the NPSNN [REF 13-5] in respect of the economic and other benefits of BMV land, and give limited weight to the loss of land in Grades 3b, 4 and 5.

Table 13.1: Sensitivity of agricultural land

Sensitivity	Agricultural Land
High	Irreversible loss of Grade 1 or 2 agricultural land
Medium	Irreversible loss of Grade 3a agricultural land
Low	Irreversible loss of Grade 3b agricultural land
Negligible	Irreversible loss of Grade 4 or 5 agricultural land

Agricultural holdings

13.3.28 Farm holding sensitivity reflects the size of an affected holding, with larger holdings generally more able to accommodate change than smaller ones, and the nature of the particular agricultural activity.

13.3.29 Complex activities, or ones dependent upon particular infrastructure or regular access to land, for example dairying, intensive livestock and horticulture, have a high degree of sensitivity to change. General arable and grazing enterprises normally have a degree of operational flexibility which can adapt to changing circumstances. Non-commercial activities are deemed to have a low sensitivity.

13.3.30 Given the complex nature of farm activities and operations, professional judgement has been applied when determining sensitivity to change.

Non-motorised user facilities

13.3.31 There is no specific guidance within DMRB guidance [REF 13-14] in terms of how to assess the sensitivity of NMU facilities to temporary disruption/closure or permanent modification. Accordingly, the criteria detailed in **Table 13.2** have been applied in the assessment, which have been developed based upon the professional judgement of suitably qualified and experienced specialists, and as applied in the assessments of other major road infrastructure developments.

Table 13.2: Sensitivity of NMU facilities

Sensitivity	Description
Very high	• Key routes used by pedestrians, cyclists and other NMUs. Routes record very high numbers of NMU journeys and/ or connect communities with employment land uses and other services with a direct and convenient NMU route. Routes are important since they offer opportunities to meet sustainable transport and public health objectives through active travel modes rather than private car use. Any interruption of these would inconvenience many people and could cause people to switch from active modes to private car use. • Routes regularly used by vulnerable travellers such as the elderly, school children and people with disabilities, who may be disproportionately affected by small changes in the baseline due to potentially different needs.

Sensitivity	Description
High	• National or regional trails and routes likely to be used for recreation that record high use. The sensitivity of these routes is judged to be high because of the number of people affected and effects upon regional leisure. • Crossing points on busy roads for NMU (roads with more than 8,000 vehicles per day) which may not currently record high use, but for which limited alternatives are available. These points are sensitive because disruption to these may affect the convenience or safety of journeys for NMU.
Medium	• Public rights of way and other routes close to communities which are used mainly for recreational purposes (for example dog walking), but for which alternative routes can be taken. These routes are likely to link to a wider network of routes to provide options for longer, recreational journeys. It is likely that direct and efficient journeys are not the priority for the majority of people using these routes so they would be more tolerant of disruptions and diversions. However, people are likely to be sensitive to changes to the amenity and character of the overall route.
Low	• Routes which have fallen into disuse such as through past severance or which are scarcely used because they do not currently offer a meaningful route for either utility or recreational purposes. Whilst these routes would not be sensitive in terms of disruption from development proposals, they may present opportunities for enhancement if existing barriers or poor amenity can be overcome through development proposals.

Sensitivity of community and private assets

13.3.32 For community and private assets, the value and typical descriptors which have been applied to determine sensitivity to the impacts as a result of the Scheme have been based on professional judgment in the absence of guidance within DMRB [REF 13-15], as presented within **Table 13.3**.

Table 13.3: Sensitivity of community and private assets

Sensitivity	Description
High	Residential, commercial or industrial buildings Buildings used by the community e.g. schools, community halls Community land that attracts users nationally e.g. national parks Designated public open space Religious sites and cemeteries
Medium	Residential, commercial or industrial land e.g. gardens Land used by the community on a regional scale, e.g. country parks, forests and other land managed in such a way as to attract visitors from a regional catchment
Low	Derelict or unoccupied buildings Locally used community land e.g. local parks and playing fields

Sensitivity of vehicle travellers

13.3.33 As DMRB guidance [REF 13-16] does not require sensitivity to be ascribed to the assessments of driver stress and views from the road when assessing impacts and effects, these have not been assigned.

Magnitude of impact and significance of effect criteria

Agricultural land and soils

13.3.34 There is no nationally agreed methodology for determining the effects of a development on the loss of agricultural land. The following approach has therefore been developed using best practice and a review of approaches applied in other EIAs for major highways developments.

13.3.35 The thresholds for the magnitude of impact adopted in the assessment for agricultural land and soils, as set out in **Table 13.4**, have regard to relevant guidance within the NPPF [REF 13-6] regarding BMV land.

13.3.36 As Natural England has the statutory right to be consulted where the threshold of 20ha or more of BMV land is exceeded, the 20ha threshold at and above which the impact of losses of agricultural land are assessed to be 'high', represents a measure of significance for the loss of such land which has been used in land use planning for two decades or more, and is therefore deemed a justifiable threshold.

13.3.37 Impacts of medium magnitude have been defined based on the approach set out in paragraph 6 of Department of the Environment Circular 71/71 Development of Agricultural Land [REF 13.21] whereby a threshold of use of 10 acres (equating to approximately 4ha) of BMV land is considered to represent a moderate loss.

Table 13.4: Impact magnitude criteria for agricultural land

Magnitude	Agricultural Land
High	20 ha or more of BMV land (i.e. agricultural land classified as Grades 1, 2 or 3a under ALC system) would be lost as a result of the Scheme.
Medium	4 – 19.9 ha or more of BMV land would be lost as a result of the Scheme.
Low	Between 1 and 3.9 ha of BMV land will be lost as a result of the Scheme.
Negligible	The Scheme does not include 1 ha or more of contiguous BMV versatile land.

13.3.38 The overall significance criteria of the loss of agricultural land is found through combining the magnitude of loss and the sensitivity of the receptor, as identified in **Table 13.5**.

Table 13.5: Significance criteria for agricultural land

Overall Significance Criteria				
Sensitivity				
Significance of Loss	**High**	**Medium**	**Low**	**Negligible**
High	Substantial	Moderate-substantial	Moderate	Negligible
Moderate	Moderate-substantial	Moderate	Minor	Negligible
Low	Moderate	Minor	Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

13.3.39 Where the matrix in **Table 13.5** identifies a potential range of effects, there is a requirement for professional judgement in determining the overall significance of the loss of agricultural land. This professional judgement takes into account the loss of the agricultural land in the context of BMV land in the surrounding region. It is considered that in areas where BMV land is not uncommon and there is a comparatively high proportion of Grade 1 and 2 land, the loss of grade 3a land is not considered to be as significant.

Agricultural holdings

13.3.40 The criteria applied to assess the magnitude of impacts on agricultural holdings are presented in **Table 13.6**.

13.3.41 Where a farm holding is predicted to experience different levels of impact for different types of impact, the higher level has been assigned. For example, a farm holding that would lose 15% of its land (medium impact) but would retain access to severed land via a private means of access (low impact) has been assessed as incurring a medium impact. The assessment considers the temporary effects first followed by the permanent effects.

Table 13.6: Impact magnitude criteria for agricultural holdings

Sensitivity	Land required	Severance	Infrastructure	Disruption
Major	>20% of all land farmed	No access available to severed land	Direct loss of farm dwelling, building or structure	Disruption discontinues land use or enterprise
Moderate	>10% - 20% of all land farmed	Access available to severed land via the public highway	Loss of or damage to infrastructure affecting land use	Disruption necessitates change to scale or nature of land use or enterprise
Minor	> 5% - 10% of all land farmed	Access available to severed land via private way	Infrastructure loss/damage does not affect land use	Disruption does not affect land use or enterprise

Sensitivity	Land required	Severance	Infrastructure	Disruption
Negligible	5% or less of all land farmed	No new severance	No impact on farm infrastructure	No disruption on land use or enterprise

13.3.42 The significance of effect on agricultural holdings is a product of the magnitude of the impact and the sensitivity of the receptor, as identified in **Table 13.7**. Where the significance criteria allows for two levels of significance, for example moderate/minor, professional judgement has been used on a case by case basis to determine the appropriate level of significance.

Table 13.7: Significance criteria for agricultural holdings

Magnitude Sensitivity	High	Medium	Low	Negligible
High	Major	Moderate	Moderate	Minor
Medium	Moderate	Moderate	Moderate/minor	Minor
Low	Moderate	Moderate/minor	Minor	Negligible
Negligible	Minor	Minor	Negligible	Negligible

Non-motorised users

13.3.43 The assessment of effects on NMUs has focused on the impact of severance of existing routes and the resulting changes in journey lengths and times and local travel patterns.

13.3.44 The assessment has considered users of existing routes likely to be affected by severance of routes, alterations in traffic distribution and flows, as well as potential users of NMU facilities during construction and operation of the Scheme.

13.3.45 Journey length in the assessment covers both the distance travelled and the time taken. The assessment of NMU effects has considered effects arising from the construction and operation of the Scheme. Changes in journey lengths and travel patterns are predicted using the methodology outlined in DMRB guidance [REF 13-14].

13.3.46 A qualitative assessment of impacts has been undertaken using a four point scale of magnitude of impact as follows, to assess the changes in journey length and local travel patterns arising from the Scheme experienced by pedestrians, cyclists and equestrians (with particular consideration of vulnerable groups such as children, the aged and disabled, where identified):

a. neutral – no increase or decrease in journey length and/or travel patterns and no increase or decrease in opportunities for NMUs to access the wider network and/or community infrastructure;

b. low – slight increase/decrease in journey length and/or travel patterns and increased/decreased opportunities for NMUs to access the wider network and/or community infrastructure;

c. medium – noticeable increase/decrease in journey length and/or travel patterns and increased/decreased opportunities for NMUs to access the wider network and/or community infrastructure; and

d. high – substantial increase/decrease in journey length and/or travel patterns and increased/decreased opportunities for NMUs to access the wider network and/or community infrastructure.

Motorised travellers (views from the road)

13.3.47 The assessment of effects on motorised travellers covers views from the road, driver stress and traffic-related severance.

13.3.48 Driver views are related to the quality of the landscape along a given route, the extent to which travellers are able to view the Scheme and whether there are any features of particular interest or prominence in the view. Professional judgement has been used to determine the significance of effects associated with views from the road, referencing where appropriate DMRB guidance [REF 13-16].

Motorised travellers (driver stress)

13.3.49 Driver stress is related to adverse mental and physiological effects experienced by drivers using the road network, including from frustration and fear of accidents.

13.3.50 For the operational assessment of the Scheme, an assessment of predicted changes in traffic flows has been undertaken. Congestion caused by high traffic flows can lead to frustration by creating a situation in which the driver does not feel in control due to an inability to determine the total duration of travel. The presence of other vehicles also causes fear of accidents. Reducing driver stress experienced in this respect has been a key factor in the design of the Scheme.

13.3.51 **Table 13.8** and **Table 13.9** set out DMRB recommendations [REF 13-16] for assessing driver stress on single and dual carriageway roads respectively, with a three point descriptive value for the level of driver stress (low, moderate or high) being ascribed based on the level of predicted traffic flows (average peak hourly flow per lane, in flow units per hour) and the average journey speed (km/hr).

Table 13.8: Assessment of driver stress on single carriageway roads

Average peak hourly flow per lane, in flow Units/1 hour	Average Journey Speed (km/hr)		
	Under 50	**50-70**	**Over 70**
Under 600	High	Moderate	Low
600-800	High	Moderate	Moderate
Over 800	High	High	High

Table 13.9: Assessment of driver stress on dual carriageway roads

Average peak hourly flow per lane, in flow Units/1 hour	Average Journey Speed (km/hr)		
	Under 50	**50-70**	**Over 70**
Under 1200	High	Moderate	Low
1200-1600	High	Moderate	Moderate
Over 1600	High	High	High

13.3.52 For new or improved routes designed in accordance with modern standards, driver stress is considered to be no worse than moderate.

13.3.53 In calculating existing and future levels of driver stress on the network, traffic flows have been compared between the do minimum (without scheme) and do something (with Scheme) scenarios. In accordance with DMRB guidance [REF 13-16] the worst year in the 15 years after the Scheme opens has been considered in the assessment, which is represented by year 2038, this having the highest forecast vehicle flows.

13.3.54 Significance of effect has been addressed using comparison of present and future conditions, using the beneficial, neutral and adverse definitions presented in **Table 13.10**.

Table 13.10: Drivers' stress significance of effect

Significance of effect	Description
Very large (beneficial or adverse)	Where there would be a very major increase/reduction in driver stress resulting from the Scheme compared to the Do Minimum.
Large (beneficial or adverse)	Where there is a major increase/reduction in driver stress resulting from the Scheme compared to the Do Minimum.
Moderate (beneficial or adverse)	Where there is a moderate increase/reduction in driver stress resulting from the Scheme compared to Do Minimum
Slight (beneficial or adverse)	Where there is a minor increase/reduction in driver stress resulting from the Scheme compared to the base year and Do Minimum.
Neutral	Where no effects on driver stress is anticipated from the Scheme, or where the beneficial and adverse effects are considered balanced.

Vehicular user severance

13.3.55 The assessment of severance has considered the extent to which people making journeys would be separated (severed) from community facilities they use and visit. This has taken account of the following factors:

a. the physical changes introduced by the Scheme;
b. the consequential changes in traffic levels on existing roads;
c. the number of people whose journey would be affected;
d. the type of road involved; and
e. the provision of mitigation measures.

13.3.56 The following criteria have been applied when assessing the magnitude of impact associated with changes relating to severance :

a. high**:** people are likely to be deterred from making trips to an extent sufficient to induce reorganisation of their habits. Considerable hindrance would be caused to people trying to make their existing journeys for a prolonged period of time;

b. medium: some people are likely to be dissuaded from making trips. Other trips would be made longer or less attractive; and

c. low: in general the current journey pattern is likely to be maintained, but there would probably be some hindrance to movement for limited amount of time.

13.3.57 The magnitude of impact relating to relief from existing severance has been also been assessed using a scale of high, medium and low.

13.3.58 The assessment has considered the reduction in traffic on existing roads in the worst year in the 15 years after opening of the Scheme (2038), and has given regard to the size of communities affected, the provision/availability of alternative routes and diversions, and existing road standards.

13.3.59 Taking into account the magnitude of impact, significance of effect criteria for vehicular user severance has been developed based upon guidance contained in the DMRB [REF 13-14], defined as follows:

a. slight effects: experienced where journey patterns are generally maintained, but there would be some hindrance to movement;

b. moderate effects: expected where some residents are likely to be dissuaded from making trips. Other trips will be made longer or less attractive; and

c. severe effects: occurring where people are likely to be deterred from making trips to an extent sufficient to induce a re-organisation of their habits. Alternatively, considerable hindrance would be caused to people trying to make their existing journeys.

Private assets

13.3.60 The assessment of impacts and effects on private assets has considered direct effects on properties, businesses and community facilities (for example public open space) arising from land take and demolition, and has followed DMRB guidance [REF 13-15].

13.3.61 The magnitude of impact has been assessed as the amount of land to be taken or properties to be demolished, using a five point scale of major, moderate minor, negligible and no change.

13.3.62 The significance of effects has been determined by considering the relationship between the sensitivity of the receptor and this magnitude of impact, using the significance criteria in **Table 13.11**.

Table 13.11: Significance of effects matrix

Value/Sensitivity of Receptor					
Magnitude of change	**Very High**	**High**	**Medium**	**Low**	**Negligible**
Major	Very large	Large/very large	Moderate/large	Moderate	Slight
Moderate	Large/very large	Moderate/large	Moderate	Slight	Neutral
Minor	Moderate/large	Moderate	Slight	Neutral	Neutral
Negligible	Slight	Slight	Neutral	Neutral	Neutral
No change	Neutral	Neutral	Neutral	Neutral	Neutral

Loss of designated and development land

13.3.63 In the absence of assessment criteria, a combination of professional judgement and DMRB guidance [REF 13-15] has been applied to qualitatively assess the likely impacts and effects of the Scheme on development land, which comprises unimplemented planning permissions and local authority development allocations.

Human health

13.3.64 The assessment of human health has not involved the completion of a Health Impact Assessment (HIA); however, it does provide consideration of population and health.

13.3.65 As no consolidated methodology or practice is available to guide the assessment of impacts and effects on human health, the approach was informed by the requirements of paragraphs 4.79 to 4.82 of the NPSNN [REF 13-5], and with reference to the following DMRB guidance documents that cover matters of relevance to human health (when applied to the assessment of highway developments):

a. Air quality: HA 207/07 [REF 13-22], IAN 185/15 [REF 13-23], IAN 175/13 [REF 13-24], IAN 174/13 [REF 13-25], and IAN 170/12 [REF 13-26];

b. Noise and vibration: HD 213/11 [REF 13-27] and IAN 185/15 [REF 13-23]; and

c. Road drainage and the water environment: HD 45/09 [REF 13-28].

13.3.66 The assessment of the potential impacts and effects of the Scheme on human health has considered the following health and well-being determinants of relevance as identified from those set out in the HUDU Rapid Health Impact Assessment Tool Third Edition 2017 [REF 13-17]:

a. access to healthcare services and other social infrastructure;

b. access to open space and nature;

c. air quality, noise and neighbourhood amenity;

d. accessibility and active travel;

e. access to work and training;

f. social cohesion and neighbourhoods; and

g. climate change.

13.3.67 The assessment has considered the potential consequences for health and wellbeing from the construction and operation of the Scheme, and draws upon the information and conclusions reported within Chapter 6 Air quality, Chapter 8 Landscape, Chapter 12 Noise and vibration, and Chapter 15 Climate. Reference has also been made to the content of the Transport Assessment Report [**TR010027/APP/7.2**].

13.3.68 The geographical extent of the impacts considered within the human health assessment is dependent upon the type of effects and receptors. A qualitative assessment of the impact of the Scheme on the surrounding statistical wards has been undertaken, in particular identifying where existing indicators of poor health have the potential to change as a result of the Scheme.

13.3.69 A qualitative approach has been adopted due to the diverse nature of health determinants and health outcomes which are assessed. Although the assessment of human health effects describes the likely qualitative health outcomes, it is not possible to quantify the severity or extent of the effects which derive from these impacts. Accordingly, the potential health impacts during the construction and operational phases of the Scheme have been presented using the categories defined in **Table 13.122**.

Table 13.12: Human health impact categories

Impact Category	Impact Symbol	Description
Positive	+	A beneficial impact is identified
Neutral	0	No discernible health impact is identified
Negative	-	An adverse impact is identified
Uncertain	?	Where uncertainty exists as to the overall impact

13.3.70 In many cases, mitigation measures to reduce the severity of negative (adverse) impacts (or measures to enhance certain health benefits) already form an integral part of the design of the Scheme, as described in Chapter 3 The project and set out in Section 13.8; however, where such impacts have been recorded through the assessment, appropriate mitigation measures have been identified as necessary.

13.4 Assessment assumptions and limitations

Scheme design and limits of deviation

13.4.1 The assessment has been based on the Scheme description detailed within Chapter 3 The project, and has taken into account the lateral and vertical limits of deviation defined on the Works Plans [**TR010027/APP/2.3**] in order to establish a realistic worst case assessment scenario.

13.4.2 This scenario has identified and reported the effect that any lateral and vertical deviation would realistically give rise to. For example, the calculation of permanent land take has assumed that all land within the lateral limits of deviation could be lost as a consequence of the Scheme.

13.4.3 Notwithstanding any potential deviation, all mitigation measures incorporated into the design of the Scheme, as described in Section 13.8, would still be deliverable within the limits of deviation and would still fulfil their intended function.

Warwickshire Gaelic Athletic Association (WGAA)

13.4.4 Using professional judgement, the illustrative reconfiguration design options for the WGAA presented in **Figure 3.5a** to **3.5e** [**TR010027/APP/6.2**] were appraised to take account of the variation in the physical extents, pitch layout, buildings, fencing and lighting provision across the options.

13.4.5 The objective of the appraisal was to identify whether one option would potentially give rise to different effects than another, in order to then identify the worst case for the purposes of the assessment presented within this chapter.

13.4.6 The appraisal concluded that the design variation between the options would not be of a level that would result in different types or significance of effect in relation to population and health.

Baseline data

13.4.7 The establishment of baseline conditions has referenced, where relevant, baseline information gathered as part of other assessments reported within the Environmental Statement. Accordingly, any limitations and assumptions applied in those assessments relating to the validity and accuracy of baseline data and information apply.

13.4.8 As noted in Section 13.3, limitations were encountered in relation to the timing and completeness of NMU surveys, and the availability of data obtained from them. Accordingly, assumptions have been made to identify the routes that NMUs are likely to take between villages and community facilities.

13.4.9 Community resources are referred to expressly in Section 13.6 only where they contribute to the local context, or where they are likely to be affected by the Scheme. Consequently, not all community resources within the adopted study area defined in Section 13.5 are mentioned in the assessment.

13.4.10 The ALC survey findings were undertaken on agricultural land within the Order Limits for which permission to access the land was negotiated with landowners.

Impact assessment and mitigation

13.4.11 The assessment of impacts and effects has referenced, where relevant, the findings of other assessments reported within the Environmental Statement. Accordingly, any limitations and assumptions applied in those assessments apply.

13.4.12 The following assumptions relating to the assessment of impacts and effects (and their mitigation) on land and land use interests have been applied:

a. land returned to agriculture following construction would be restored to its pre-construction condition;

b. the existing pattern of ownership and agricultural land use would remain unaltered until the start of construction, such that the proportion of land required from agriculture holdings would remain unaltered;

c. measures contained in the Outline Environmental Management Plan (OEMP) [**TR010027/APP/6.11**] regarding field water supplies, fencing, and liaison would be followed during construction;

d. the assessment addresses only the direct impacts and effects on commercial land in terms of land take; and

e. any impacts on individual properties do not constitute a significant community effect. There are a number of individual properties within the Order Limits where impacts may be experienced from other topics, for example noise and vibration. These impacts are reflected in other topic assessments, where relevant.

13.5 Study area

13.5.1 The study area varies depending on the effect or type of resource being assessed.

13.5.2 The Order Limits and effects on land bordering the Order Limits associated with severance of land has been used in the assessment of effects on agricultural land.

13.5.3 The study area adopted in the assessment of effects on farm holdings and private assets (including residential properties, businesses and community facilities) covers the order limits of the scheme and 250m outwards.

13.5.4 Effects on motorised users and NMUs consider those resources likely to be affected by alterations in traffic distribution and flows, as well as users of the Scheme. The types of resources considered include roads, PRoWs and footpaths located within 500m of the Order Limits of the Scheme.

13.5.5 The study area for human health comprises five wards (Bickenhill; Knowle; Chelmsley Wood; Coleshill South; and Fillongley). These have been profiled based on their proximity to the Scheme on the basis that they could experience effects arising from construction activities and traffic, and the Scheme itself once operational.

13.6 Baseline conditions

Overview

13.6.1 Land use is marked by a contrast of urban development immediately north-west of M42 Junction 6 set against the more open agricultural landscapes and settlements found to the south, east and north east of the junction.

13.6.2 Small settlements are scattered around the area, the main settlements being Bickenhill and Catherine-de-Barnes, located south-west of the Scheme, and Hampton in Arden located south east of the junction.

13.6.3 Local businesses and smaller commercial enterprises throughout the area include plant nurseries and garden centres, liveries, fitness clubs, fleet hire, taxi services, breweries and public houses. Bed and breakfast accommodation also forms part of the local trade within the settlements of Bickenhill and Hampton in Arden.

13.6.4 The agricultural landscapes south of M42 Junction 6 are interspersed by small blocks and pockets of mature woodland, with particularly prominent examples located around the western fringes of Hampton in Arden, at Barber's Coppice on the eastern fringes of Catherine-de-Barnes, and at Aspbury's Copse adjacent to the B4102 Solihull Road (Solihull road) overbridge over the M42 motorway.

13.6.5 A recreational sports facility (WGAA) is located opposite the junction of Shadowbrook Lane and Catherine-de-Barnes Lane. Equestrian activities also form a key part of the recreational offer of the local area, with opportunities for recreational walking and cycling also provided through the extensive network of roads and public rights of way.

13.6.6 Community facilities include small areas of public open space, village halls and churches within the settlements of Bickenhill, Hampton in Arden and Catherine-de-Barnes.

Agriculture

Agricultural land classification

13.6.7 ALC grades have been evaluated in accordance with the ALC guidelines [REF 13-19] from surveys undertaken on 9 and 10 of October 2018 on land within the Order Limits.

13.6.8 The extent and distribution of the different ALC grades and subgrades, including limitations on their use, is set out in **Table 13.13** and is mapped within Appendix 10.2 [**TR010027/APP/6.3**].

13.6.9 Of the 125.1ha of agricultural land identified within the Order Limits, a total of 103.4ha has been surveyed where access was granted through prior negotiation.

13.6.10 Of the surveyed area (**Table 13.13**), a total of 82ha is BMV land in Subgrade 3b. This comprises of 77.8ha in Type 1 soils and 4.2ha in areas with flood risk. The remainder of the surveyed area (21.4ha) are in Subgrade 3a (Type 2 soils), which are classified as BMV.

13.6.11 The classification of the remaining 21.7ha of agricultural land not surveyed is not known.

Table 13.13: Agricultural land classification and limitations

Grade	Area (ha)	Limitations	Classification details
1	-	-	-
2	-	-	-
3a	21.4	Type 2 soils - Wetness	The combination of the topsoil texture (disturbed medium clay loam), Wetness Class (IV) and the number of Field Capacity Days (165.0) results in ALC Grade 3b for Type 1 soils.
3b	77.8	Type 1 soils – Wetness	The combination of the topsoil texture (medium clay loam), Wetness Class (IV) and the number of Field Capacity Days (165.0) results in ALC Grade 3b for Type 2 soils.
	4.2	Site – Flood Risk	A Zone 3 High Probability of flooding is mapped on 4.2 ha of land resulting in ALC Grade 3b within the Flood Risk area.
4	-	-	-
5	-	-	-
Unsurveyed Land	21.7	-	-

Agricultural holdings

13.6.12 Agricultural land use within the study area is predominantly arable.

13.6.13 To the south of the study area, in-between Solihull Road and Shadowbrook Lane and to the west of Catherine-de-Barnes Lane, the field network comprises of large fields typical of arable farming.

13.6.14 Further north through the study area, the field boundaries become small and more compact, which is associated with the medieval origins of Bickenhill and become larger around the south of Clock Interchange.

13.6.15 On the survey dates the majority of the fields were in rough pasture, and fields to the south of the Order Limits were in an arable crop.

13.6.16 **Table 13.14** sets out the current understanding of main farm holdings affected and their sensitivity to change.

Table 13.14: Summary of characteristics of agricultural holdings

Holding name	Holding type	Size (ha)	Sensitivity to change
Hampton Estate	Arable (predominantly)	240ha	Medium
Woodhouse Farm	Grassland and arable	70ha	Medium

Holding name	Holding type	Size (ha)	Sensitivity to change
Land West of Catherine-de-Barnes Lane (A) and adjoining the Bickenhill Meadows NW SSSI unit	Grassland used for livestock grazing	7.22ha	Medium
Land West of Catherine-de-Barnes Lane (B) and immediately to the south of (A) above	Arable (currently fallow)	10.47ha	Medium

Non-motorised users

13.6.17 There are a number of NMU routes in the study area, including a comprehensive network of PRoWs, shared use footpath/cycleways and local roads recognised for use by walkers and cyclists.

Pedestrian facilities

13.6.18 Existing facilities for walkers are shown in **Figure 13.1** [**TR010027/APP/6.2**]. These routes serve a wide range of uses including for recreational enjoyment and for travelling between local communities. PRoWs within the study area include;

a. **PRoW M106**, a north-south route between the Catherine-de-Barnes Lane (near Clock Interchange)in the north and Church Street in Bickenhill in the south;

b. **PRoW M107**, an east-west route between Church Lane in Bickenhill in the west and the M42 junction 6 in the east;

c. **PRoW M109** and **PRoW M112**, two east-west routes between Bickenhill in the east and the Damson Parkway near Elmdon in the west;

d. **PRoW M122**, an east-west route between Catherine-de-Barnes Lane in the west the M42 in the east;

e. **PRoW M110**, a north-south route between Church Lane in Bickenhill in the north and the M42 in the south;

f. **PRoW M111**, a north-south route between the M42 in the north and Home Farm near Hampton in Arden in the south;

g. **PRoW M113**: an east-west route commencing at Catherine-de-Barnes Lane in the east and Castle Hills in the north-west;

h. **PRoW M113a**: a north-south route travelling parallel to Catherine-de-Barnes Lane between the M113 PRoW in the north and Four Winds in the south; and

i. **PRoW M123**, a south-north route between Hampton Lane Farm on Solihull Road and Heath Farm on Shadowbrook Lane.

13.6.19 Sections of the Green Man Trail are also located within the study area. This is a 34km undesignated walking trail promoted by SMBC for educational and travel purposes, primarily on routes within the PRoW network. In the study area, the Green Man Trail passes through Bickenhill and Hampton in Arden on PRoW routes M106, M110 and M111.

13.6.20 There are a number of advisory roads deemed suitable for use by pedestrians within the study area.

Shared use facilities between pedestrians and cyclists

13.6.21 Existing facilities shared by walkers and cyclists are shown in **Figure 13.1** and **13.2** [**TR010027/APP/6.2**]. The following shared use footway/cycleways are in the study area;

a. along the west side of Catherine-de-Barnes Lane from Bickenhill Lane, north of Catherine-de-Barnes to Clock Lane, just south of the A45. This footway/cycleway is approximately 2m wide with a verge separation from the carriageway;

b. on the outer side of Clock Interchange carriageway approximately 2m wide;

c. from Clock Interchange to the A45 eastbound and westbound carriageways;

d. along the north and south of the A45 between Clock Interchange and M42 Junction 6; and

e. along the free flow link between the A45 and Birmingham Airport.

13.6.22 The only crossing point for pedestrians and cyclists along the A45 between M42 Junction 6 and Clock Interchange is at Clock Interchange.

Cyclist facilities

13.6.23 There is a short length of cycle lane to the east of M42 Junction 6 to encourage cyclists off the A45 and onto East Way.

13.6.24 There are a number of advisory on road cycle routes in the study area.

Equestrian facilities

13.6.25 There are no bridleways within the study area.

13.6.26 There are three equestrian facilities within the study area within Bickenhill, a private equestrian paddock off St Peters Lane and off Church Lane, and a larger livery at Hazel Farm to the south of the village.

Motorised travellers

Routes within the study area

13.6.27 The M42 motorway and the A45 are two major roads travelling within the study area. The M42 is a three lane dual carriageway (operating with dynamic hardshoulder) running in a north-easterly direction from Worcestershire to Leicestershire, with a speed limit of 70mph. The A45 is a two-lane dual carriageway road which runs in an east/west direction connecting Coventry to Birmingham, with a speed limit of 50mph.

13.6.28 Important local road network routes within the study area include Catherine-de-Barnes Lane, which connects to the A45 at Clock Interchange and runs past Bickenhill, and Solihull Road which connects Catherine-de-Barnes and Hampton in Arden, as well as Middle Bickenhill Lane which connects the A45 and the A452. These routes are used more by local traffic travelling between communities.

Driver stress

13.6.29 Within the study area, drivers are frequently exposed to frustration and fear of accidents on congested roads.

13.6.30 The M42 motorway experiences long delays and frequent congestion which causes slow moving traffic and frequent stop-start conditions, particularly on junction approaches. This results in driver impatience and/or hesitancy which contribute to high driver stress. These conditions are exacerbated by the large number of heavy goods vehicles (HGVs) and vulnerable or inexperienced road users making journeys on the network.

13.6.31 Drivers on the A45 and Catherine-de-Barnes Lane can also experience high driver stress during peak periods.

13.6.32 **Table 13.15** shows driver stress in the study area in the do minimum (without Scheme) scenario.

Table 13.15: Driver stress levels in the do minimum scenario (without Scheme)

Road Link	Direction	Driver stress	
		AM peak	PM peak
M42 motorway			
South of M42 Junction 5A	Southbound	High	High
	Northbound	High	High
North of M42 Junction 5A	Southbound	High	High
	Northbound	High	High
North of M42 Junction 6	Southbound	High	High
	Northbound	High	High
A45 Coventry Road			
East of M42 Junction 6	Eastbound	Low	High
	Westbound	Low	Low
West of M42 Junction 6	Eastbound	High	High
	Westbound	Moderate	Low
B4438 Catherine-de-Barnes Lane			
North of Bickenhill Roundabout	Southbound	Low	High
	Northbound	High	High
Approaching Clock Interchange	Southbound	Moderate	High
	Northbound	High	High

Driver views

13.6.33 For vehicles travelling on the M42, A452 and A45, driver views are generally concealed by a combination of established tree and shrub planting. This roadside vegetation creates a sense of separation and offers very few opportunities for drivers to experience more far reaching views beyond the roads.

13.6.34 A similar composition of view is experienced at Clock Interchange, where established lines of trees contain the junction and slip roads. To the immediate south, the elevated Catherine-de-Barnes Lane slip road to Airport Way screens and filters longer distance views towards the rural landscapes surrounding Bickenhill.

13.6.35 Views from Catherine-de-Barnes Lane are contained in the majority of places by dense lines of trees along both sides of the road. As the lane passes north of Bickenhill, the planting reduces and the outlook from the road opens up to offer vehicle travellers a view of the surrounding agricultural landscape.

13.6.36 Views for drivers on the stretch of Solihull Road near to Hampton in Arden are concealed either by shrub planting or established lines of trees. As the road passes by Shadow Brook, the view to the north opens up to reveal the surrounding green fields, but established lines of trees prevent viewing to the south. Views to the south and north are then concealed again by shrub planting as drivers continue west towards the junction of Solihull Road and Catherine-de-Barnes Lane.

13.6.37 Shrub planting, established lines of trees and residential properties conceal views along the full stretch of St Peter's Lane.

Vehicular user severance

13.6.38 The existing Catherine-de-Barnes Lane is the primary route between residents in Bickenhill and community resources in Solihull, Catherine-de-Barnes and Hampton in Arden. Within Bickenhill, the only community facility likely to be used by local residents is the Church of St Peter. All other community resources used by residents are located away from the village.

13.6.39 Within Catherine-de-Barnes, there is a public house and restaurants as well as a cricket and canoe club. Solihull is a large town and contains a wide range of community resources, including a number of educational and healthcare facilities.

13.6.40 The village of Hampton in Arden includes a doctor's surgery, a number of public houses, a post office and two schools. Vehicular users travel via Catherine-de-Barnes Lane and Shadowbrook Lane to access Hampton in Arden.

13.6.41 Catherine-de-Barnes Lane does experience congestion at peak times, particularly in the northbound direction in the AM and the southbound direction in the PM.

13.6.42 T**able 13.16** presents the Annual Average Daily Traffic (AADT) on Catherine-de-Barnes Lane in the do minimum scenario in 2038.

Table 13.16: AADTs in the do minimum (without Scheme) scenario on Catherine-de-Barnes Lane in 2038

Location	Direction	Traffic Count
North of Shadowbrook Lane	Southbound	11687
	Northbound	13747
South of Shadowbrook Lane	Southbound	9077
	Northbound	11846

Private assets

Residential properties

13.6.43 The study area is mostly rural but marked by urban development immediately north-west of M42 Junction 6.

13.6.44 Residential properties within the study area are primarily located in Catherine-de-Barnes and Bickenhill. Catherine-de-Barnes is a village east of the M42 crossed by Hampton Lane. Bickenhill is located approximately 300m to the south of Clock Interchange and currently served by Catherine-de-Barnes Lane. Isolated dwellings on Solihull Road and Shadowbrook Lane are also within the study area.

13.6.45 There are also sparse isolated properties in the settlement of Middle Bickenhill on Middle Bickenhill Lane.

Business premises

13.6.46 In addition to the agricultural holdings, there are several commercial businesses identified within the study area focused primarily around Clock Interchange and M42 Junction 6. These comprise, the National Exhibition Centre (NEC) to the north of Junction 6, National Motorcycle Museum to the south east of Junction 6 and a range of offices, retail, hotels, a petrol station, a casino, and a cinema.

13.6.47 Other business premises within the study area include the following:

a. Sovereign Cars: located on Clock Lane in the village of Bickenhill;

b. Church Farm Bed and Breakfast: located on Church Lane in Bickenhill;

c. Birmingham Dogs Home: located off Catherine-de-Barnes Lane immediately south of Bickenhill Lane;

d. Bracey's Nursery and Garden Centre: Located immediately east of the existing Catherine-de-Barnes Lane, to the north of Shadowbrook Lane;

e. The Haven Caravan Park: located to the immediate north west of Bickenhill off Catherine-de-Barnes Lane; and

f. Hazel Farm riding school: located off St Peter’s Lane in Bickenhill.

Community facilities

13.6.48 No parks, public spaces, allotments, town or village greens or common land are located within the study area.

13.6.49 The WGAA has a facility located in Bickenhill. The facility comprises three playing fields and associated sports facilities including a clubhouse, pavilion and parking. It is considered the principal Gaelic games sports facility in the West Midlands.

13.6.50 In addition, the Church of St Peter is located within the centre of Bickenhill Village (see Chapter 7 Cultural heritage).

Designated and development land

13.6.51 The study area is contained within the Meriden Gap, an area of land protected by SMBC green belt designation. Whilst holding no formal designation for community purposes, the greenbelt is valued by the local community as a means of preventing urban growth south of the A45.

13.6.52 There are two sites allocated for employment in the Solihull Local Plan [REF 13-9] within the Order Limits of the Scheme:

a. land allocated for employment provision located to the north of Clock Interchange on A45 ; and

b. land allocated for the High Speed 2 (HS2) interchange, located to the north east of M42 Junction 6.

13.6.53 There are no other sites allocated for future development within the study area.

13.6.54 There is a safeguarded site for gypsies and travellers located on Catherine-de-Barnes Lane to the north of the Bickenhill, which is within the Order Limits of the Scheme.

Human health

13.6.55 This section provides a human health profile of the study area surrounding the Scheme, focusing on key indicators identified by Public Health England at ward level including a comparison of these to national averages.

13.6.56 Indicators deemed relevant to likely health impacts of the Scheme for each area have been identified, with data relating to these and the national (England) average figure set out in detail in **Table 13.17**.

13.6.57 The proportion of the population in Bickenhill with a general health classification of ‘bad or very bad’ is in broadly similar with the average for England. Bickenhill records rates of long-term illness or disability and obesity among adults above the national average, and the proportion of the population aged over 65 is notably higher than the national average.

13.6.58 The proportion of the population in Knowle with a general health classification of 'bad or very bad' is lower than the wards in the study area and the average for England. Rates of obesity among adults and children in reception in Knowle are also below the national average. The proportion of the population with long-term illnesses or disabilities is also considerably lower than the national average and the incidence of income deprivation is also the lowest of the wards in the study area and the national average. Though the proportion of people aged 65 and over is higher in Knowle in comparison to the study area wards and the national average.

13.6.59 Residents of the ward of Chelmsley Wood are considered to experience existing poor levels of health as identified by indicators, most notably that the proportion of the population with a general health classification of 'bad or very bad' is greater than the average for England and the proportion of population with a long term illness or disability is higher in comparison to the wards in the study area and higher than recorded nationally. Rates of obesity in children and adults, emergency hospital admissions for Chronic Obstructive Pulmonary Disease (COPD) and deaths from respiratory diseases are higher for Chelmsley Wood than national averages. Compared to the wards in the study area and national averages, Chelmsley Wood has the highest proportion of the population considered income deprived and unemployed. Residents in Chelmsley Wood ward are therefore considered most susceptible from the perspective of human health effects of the wards within the study area.

13.6.60 The ward of Coleshill South records a higher proportion of the population with long term illness or disability than the national average. The proportion of the population with a general health classification of 'bad or very bad' and the proportion of the population aged over 65 in Coleshill are also higher than the averages for England. Additionally, rates of obesity in children in reception and adults are also higher in Coleshill South than rates recorded for England as a whole. However, levels of income deprivation and the proportion of the population unemployed in Coleshill are lower than recorded for England.

13.6.61 The proportion of the population in Fillongley with a general health classification of 'bad or very bad' is above the average for England. Fillongley also records a rate of long-term illness above those recorded nationally, though emergency hospital admissions for COPD and deaths from respiratory disease are lower than recorded for England.

13.6.62 The Metropolitan Borough of Solihull records a higher proportion of residents aged 65 and over than nationally. The proportions of the population in Solihull categorised as with bad or very bad health and with a long term illness or disability are marginally in line with national averages. The rates of both adult and child obesity in Solihull are also broadly similar to national averages. Emergency hospital admissions for COPD and deaths from respiratory disease in Solihull are lower than recorded for England.

Table 13.17: Human health profile in study area

Ward	Bickenhill	Knowle	Chelmsley Wood	Coleshill South	Fillongley	Solihull	North Warwickshire	England
Population	12,534	10,970	12,540	3,378	3,320	210,445	62,787	54,786.327
Population aged under 16 (%)	18.7	17.6	24.1	13.1	15.2	19.1	17.2	19.0
Population aged over 65 (%)	20.1	27.7	16.3	27.1	25.0	20.9	21.0	17.8
Income Deprivation (people living in income-deprived households as a % of population)	14.0	4.4	31.8	10.9	8.9	12.2	11.1	14.6
Unemployed Population (%)	7.9	3.2	16.1	6.2	4.2	7	5.9	7.6
General Health – bad or very bad (%)	5.5	3.8	8.8	6.1	6.5	5.2	6.0	5.5
Long term illness or disability (%)	18.8	16.2	22.7	22.1	19.7	17.9	19.2	17.6
Obese adults (%)	28.0	19.7	31.5	29.3	26.7	24.9	29.6	24.1
Obese children (reception year) (%)	7.8	3.3	11.3	9.4	10.1	8.1	9.8	9.3
Emergency hospital admissions for COPD (SAR)	78.9	33.6	180	69.9	74.1	81.2	86.3	100
Deaths from respiratory diseases (all ages) (SMR)	92.4	70.7	147.9	91.3	75.8	81.9	98.5	100

(SIR – Standardised Incidence Ratio, SAR – Standardised Admission Ratio, SMR – Standardised Mortality Ratio) SIR is the ratio of the observed number of Incidences in a ward to the number expected if the ward had the same age-specific rates as England. SAR is the ratio of the observed number of Admissions in a ward to the number expected if the ward had the same age-specific rates as England. A SMR is the ratio of the observed number of deaths in a ward to the number expected if the ward had the same age-specific rates as England.

Sources: Public Health England, Local Health (2016); ONS (2017), Ward Level Mid-Year Population Estimates (Experimental Statistics); ONS (2011), 2011 Census.

13.7 Potential impacts

Construction

Agricultural land and holdings

13.7.1 The principal potential impacts on agricultural land, and on farm and farm-based enterprises, are likely to occur during the construction of the Scheme.

13.7.2 Construction impacts on agricultural land and farm-based enterprises would include land requirements; severance; and the loss of, or disruption to, buildings and operational infrastructure. Other potential construction impacts would include the deposition of dust on sensitive crops, land uses or buildings; disruption to drainage, irrigation and water supply systems; unintentional pollution of soil and water courses; spread of injurious weeds to adjacent agricultural land from soil and material stockpiles; and construction noise.

13.7.3 Permanent construction impacts would comprise the net area of agricultural land required to operate the Scheme following the construction period and the restoration of land required temporarily to unrestricted agriculture; permanent severance; and the permanent loss of or effect on farm infrastructure such as property, buildings and structures, and the consequential effects on land uses and enterprises.

Non-motorised users

13.7.4 Potential impacts during construction include:

a. permanent land take associated with the footprint of the Scheme;

b. temporary land take, closure or diversion of routes during construction; and

c. temporary disruption to PRoWs during construction and resulting severance of access to community facilities.

Motorised travellers

13.7.5 Potential impacts during construction include:

a. temporary increase in driver stress across the Local Road Network (LNR) and Strategic Road Network (SRN) during the construction period;

b. temporary changes in driver views experienced arising from the presence of construction activities or from diversions; and

c. temporary changes including severance to vehicular user journeys for residents accessing community resources on local roads resulting from the redistribution of traffic on the wider network.

Private assets

13.7.6 Potential impacts include land required temporarily and/or permanently for construction and operation of the Scheme.

Human health

13.7.7 Potential impacts on human health determinants during construction include changes in noise and air pollution, severance, water quality and climate change as a result of construction activities and traffic.

Operation

Agricultural land and holdings

13.7.8 Other than potentially reducing severance and improving inter and intra-farm connectivity, no potentially new or additional impacts on agricultural land and holdings are likely during operation.

Non-motorised users

13.7.9 Potential impacts during operation of the Scheme include:

a. reducing severance and improving connectivity and local travel patterns through provision of new NMU routes; and

b. changes to journey times for NMUs accessing community resources, through the provision of new NMU routes, connections and crossing provisions.

Motorised travellers

13.7.10 Potential impacts during operation of the Scheme include:

a. permanent decrease in driver stress related to improvements in journey time reliability and a reduction in congestion;

b. possible changes in levels of driver stress across the wider road network from the redistribution of traffic; and

c. changes in severance for residents of villages accessing community facilities and social infrastructure as a result of reduced traffic flows on surrounding roads.

Private assets

13.7.11 Potential impacts include land required temporarily and/or permanently for construction and operation of the Scheme.

Human health

13.7.12 Potential impacts on human health determinants during operation of the Scheme include:

a. lifestyle changes such as encouraging travel by means other than private car, for example encouraging walking and cycling behaviours through provision of new NMU routes and potentially increased or reduced severance;

b. impacts on local employment opportunities and activity through changes in access to employment resulting from reduced delays, congestion and potential reductions in severance;

c. impacts on residents through changes in air quality, noise and neighbourhood amenity;

d. impacts on access to key services and social infrastructure such as health facilities and education facilities arising from reduced delays, congestion and potential reductions in severance; and

e. impacts on access to open space and recreation space through provision of new NMU routes.

13.8 Design, mitigation and enhancement measures

13.8.1 The Scheme has been designed, as far as possible, to avoid and minimise impacts and effects relating to population and health through the process of design-development (see Chapter 4 Scheme history and alternatives), and by embedding measures into the design of the Scheme.

13.8.2 A number of standard measures have been identified, which would be implemented by the contractor to reduce the impacts and effects that construction of the Scheme would have in relation to population and health.

13.8.3 No compensation or enhancement measures have been identified as being required.

Embedded mitigation measures

Agricultural land and holdings

13.8.4 Measures incorporated into the design of the Scheme to avoid or mitigate impacts and effects on agricultural land interests include:

a. designing earthworks along the new mainline link road and its junctions from to 1 in 3 with local steepening to1 in 2.5 gradients, to reduce the extent of permanent land take within agricultural holdings and the loss of BMV land;

b. the incorporation of severed and/or inaccessible land parcels into the design of the Scheme, where appropriate and reasonably practicable, as part of environmental mitigation works;

c. reinstating boundaries with fencing and hedgerows where components of the Scheme, for example the new mainline link road, would sever established field boundaries;

d. the use of underground storage tanks as part of the treatment train for road runoff, which avoid permanent land take within agricultural fields;

e. providing a combined NMU and farm access accommodation bridge over the new mainline link road, north west of M42 Junction 5A, to maintain access between fields on both sides of the road; and

f. provision of a new private means of access (PMA) running parallel to the western edge of the northbound carriageway of the new mainline link road, commencing from just south of Shadowbrook Lane and continuing north to The Haven Caravan Park, which would be used by landowners to gain access to fields to the west of the new mainline link road.

Non-motorised users

13.8.5 Measures incorporated into the design of the Scheme to avoid or mitigate adverse impacts associated with the severance or loss of routes used by NMUs include:

a. a combined NMU and farm access accommodation bridge over the new mainline link road, north west of M42 Junction 5A, to enable safe crossing over the road;

b. a grade separated pedestrian footway/cycle path (overbridge) over the A45 to replace the existing footway/cycle path at Clock Interchange and to ensure safe crossing over the A45;

c. upgrades to the combined footway/cycleway on the southern edge of the A45 to accommodate NMUs redirected from the footpath/cycleway at M42 Junction 6;

d. construction of a pedestrian underpass beneath the free flow link between the new mainline link road and Airport Way to allow continued movement of NMUs between the footbridge on A45 and footpaths to the west of the study area;

e. repurposing of redundant sections of the Catherine-de-Barnes Lane to footways and cycleways;

f. two new overbridges along the realigned Catherine-de-Barnes Lane with pedestrian and cycle facilities (Catherine-de-Barnes Lane south overbridge) and pedestrian facilities (Catherine-de-Barnes Lane north overbridge) connecting M42 Junction 5A and Clock Interchange, to enable users of the PRoW network to cross the new mainline link road, and

g. a new pedestrian cycleway/footway constructed adjacent to the northbound carriageway between Bickenhill Roundabout and Catherine-de-Barnes Lane.

13.8.6 The Scheme provides the opportunity to improve the amenity and enjoyment of NMU routes in the study area through the provision of these measures, which total 504m in net additional footway/cycleway length.

Motorised travellers

13.8.7 For motorised travellers, safety measures included in the design relate to the provision of signage and signalling, increased verge width to accommodate highway features such as signs, vehicle restraint systems, communication equipment and laybys, and central reserves providing appropriate visibility.

Private assets

13.8.8 The Scheme includes land within the Order Limits to reconfigure the WGAA sports facility adjacent to the existing WGAA sports facility (see Chapter 3 The project). In order to ensure its continued operation.

Standard mitigation measures

Agricultural land and holdings

13.8.9 Compliance with best practice measures set out within the OEMP [**TR010027/APP/6.11**] would avoid or reduce environmental impacts during construction.

13.8.10 Standard measures that are relevant to agricultural interests include:

a. arrangements for the maintenance of farm and field accesses affected by construction;

b. the protection and maintenance of livestock water supply systems, where reasonably practicable;

c. the protection of agricultural land adjacent to the construction site, including the provision and maintenance of appropriate stock-proof fencing;

d. the adoption of measures to control the deposition of dust on adjacent agricultural crops;

e. the control of invasive and non-native species and the prevention of the spread of weeds generally from the construction site to adjacent agricultural land. The adoption of measures to prevent, insofar as reasonably practicable, the spread of soil-borne, tree, crop and animal diseases from the construction area; and

f. liaison and advisory arrangements with affected landowners, occupiers and agents, as appropriate.

Motorised travellers

13.8.11 During construction of the Scheme, appropriate mechanisms to communicate with local residents would be set up to highlight potential periods of disruption (for example, web-based, newsletters, newspapers, radio announcements etc.) and an appropriate communication strategy will be developed.

13.8.12 An information web-page would be provided and kept up-to-date on the Highways England website

13.8.13 These communication measures will help drivers plan their journeys during the construction phase of the Scheme.

13.9 Assessment of likely significant effects

13.9.1 Effects have been identified following consideration of the potential impacts outlined in Section 13.7 and the mitigation measures detailed in Section 13.8.

Agricultural land and holdings

Agricultural land

Construction

13.9.2 A general maximum area of 21.4ha of Grade 3a agricultural land would be lost as a result of the construction of the Scheme. Topsoil and subsoil would be affected (e.g. excavated, driven over or used for storing materials) during the construction phase of the Scheme.

13.9.3 Although approximately 21.4ha of BMV land would be lost due to the Scheme, the surrounding area has a high proportion of good quality (Grade 3) agricultural land. Impacts arising from this are assessed to be high owing to greater than 20ha of BMV land being lost and the effect on the provision of agricultural land would be moderate-substantial adverse (significant) with regards to the loss of BMV agricultural land due to the Scheme.

Operation

13.9.4 Agricultural land would be lost during the construction phase of the Scheme.

13.9.5 There would be no further effects on agricultural land during operation of the Scheme.

Agricultural holdings

Construction (temporary effects)

13.9.6 The acquisition and use of land for the Scheme would interfere with existing uses of that land and, in some locations, preclude existing land use practices. This could result in effects associated with the ability of affected agricultural interests to access and use residual parcels of land.

13.9.7 Land used to construct the Scheme would fall into the following main categories when work is complete:

a. part of the operational road and kept under the control of the operator;

b. returned to unrestricted agricultural use (with aftercare management to ensure stabilisation of the soil structure); and

c. used for ecological and/or landscape mitigation.

13.9.8 Land would be required for the Scheme from holdings temporarily, during the construction period, or permanently. In most cases, the temporary and permanent land requirement would occur simultaneously at the start of the construction period and it is the combined effect of both that would have the most impact on the holding. During the construction period, some agricultural land would be restored to unrestricted agricultural use and the same agricultural condition, and the impact on individual holdings would reduce.

13.9.9 The effects of the Scheme on individual agricultural and related interests during the construction period are summarised in **Table 13.18**, which shows the total area of land required from a particular holding in absolute terms and as a percentage of the total area farmed. The area of agricultural land that could be returned to the holding following the construction period is also indicated. The degree of impact is based on the proportion of the holding required rather than the absolute area of land.

13.9.10 The effect of severance during construction as set out in **Table 13.18** is judged on the ease and availability of access to severed land, but excludes land already severed from the main holding or accessed from the public highway. The disruptive effects, principally of construction noise and dust, are assessed according to their effects on land uses and enterprises.

Table 13.18: Assessment of temporary effects on agricultural holdings

Holding Name	Sensitivity to change	Total area required from holding (and % of total size) / Scale [1]	Construction severance	Disruptive effects	Scale of construction effect	Area to be restored to agriculture
Hampton Estate	Medium	65.2 ha (27.2%)	Minor to Moderate	Minor	Minor adverse	36.8 ha
Woodhouse Farm	Medium	29.4 ha (42%)	Negligible	Moderate	Moderate adverse	11.7 ha

13.9.11 Overall, two holdings would be affected temporarily during construction: Hampton Estate and Woodhouse Farm. Hampton Estate would experience a minor adverse effect which is not significant. Woodhouse Farm would experience a moderate adverse effect which is significant.

Construction (permanent effects)

13.9.12 The permanent effects from the construction of the Scheme on individual agricultural and related interests are summarised in **Table 13.19**. The 'land required from holding' column refers to the area of land required to operate the Scheme in absolute terms and as a percentage of the overall area farmed. The scale of effect is based on the proportion of land required from the holding. The effects of severance are judged on the ease and availability of access to severed land once construction is completed. The impact on farm infrastructure refers to the loss of or damage to farm capital, such as property, buildings and structures, and the consequential effects on land uses and enterprises.

[1] Includes all land, not limited to productive agricultural land

Table 13.19: Summary of permanent effects on agricultural holdings

Holding name	Sensitivity to change	Land required from holding	Severance	Infrastructure	Scale of effect
[redacted]	Medium	28.4 ha (11.8%)	Minor	Negligible[1]	Minor adverse
Woodhouse Farm	Medium	17.75 ha (34.1%)	Negligible	Negligible[1]	Moderate adverse
West of Catherine-de-Barnes Lane and adjoining the Bickenhill Meadows NW SSSI unit	Medium	7.22 ha (100%)	N/A	N/A	Moderate adverse
West of Catherine-de-Barnes Lane and immediately to the south of above	Medium	10.47 ha (100%)	N/A	N/A	Moderate adverse

13.9.13 Overall, construction of the Scheme would affect four holdings permanently with three holdings experiencing moderate adverse permanent effects which are significant for each holding (see **Table 13.19**).

13.9.14 Although financial compensation would be available, there can be no certainty that this would be used to reduce these adverse effects. Therefore, this assessment represents the worst case, which could be reduced if the owner and/or occupier is able, and chooses, to use compensation payments to replace assets.

Non-motorised users

Journey length and local travel patterns

Construction

13.9.15 Changes to journey times, local travel patterns, and certainty of route for NMUs would arise from the temporary closures and diversions of PRoWs through direct land take, severance, and provision of access routes required for the construction of the Scheme. The provision of new and realigned NMU routes by the Scheme would also have an effect on journey times and local travel patterns.

13.9.16 Highway capacity improvements to Clock Interchange include widening the two bridge sections of the roundabout across the A45 from two to three lanes. To accommodate the widening, the existing footpath/cycle path on the eastern side of the roundabout will need to be removed. The footpath would be redirected east along A45 towards a new pedestrian footway/cycle path to be built over the A45. The introduction of a grade separated NMU bridge increases safety perception for users crossing the A45; however, the diversion increases the journey length required to cross the A45 by 300m to 700m. Impacts arising from this on journey

lengths and local travel patterns are assessed to be low, effects arising from this for NMUs are therefore assessed to be minor adverse and not significant.

13.9.17 The long distance Green Man Trail, which currently runs alongside Catherine-de-Barnes Lane through the existing bridge under the Airport Way link road to cross the A45, would be severed by construction of the new mainline link road and improvement works at Clock Interchange. The route would be redirected between Church Lane in the south and Airport Way in the north. The diversion travels west on Church Lane up to St Peters Lane, and then Catherine-de-Barnes Lane, before connecting with a new cycleway/footway on Clock Interchange and tying into the existing cycleway/footway on Airport Way. The route would reconnect with the Green Man Trail at the roundabout between Airport Way and Bickenhill Lane. This route offers a slight reduction in the overall journey distance (under 50m) of the Green Man Trail through the busy urban area around Clock Interchange. Impacts arising from this on journey lengths and local travel patterns are assessed to be negligible; the effect arising from this is therefore assessed to be negligible and not significant.

13.9.18 Construction of the free flow link between M42 Junction 6 southbound to A45 eastbound would require the closure of the footpath at this location. NMUs crossing the A45 at this location would be diverted west along the upgraded combined footway and cycleway (Section 13.9) on the southern edge of the A45 and under the A45 on the East Way underpass. Impacts arising from this on journey lengths and local travel patterns are assessed to be low, and the effect on NMUs is assessed to be minor adverse and not significant.

13.9.19 PRoW M109, a footpath between Dunstan Farm in the west and Bickenhill in the east, would be severed by construction of the new mainline link road connecting M42 Junction 5A and Clock Interchange. The PRoW would be redirected over the new mainline link road by a new overbridge near to St Peters Lane. The increase in journey length is estimated to be 150m, equivalent to 7.5% of the total length of the PRoW. This is assessed to result in minimal disruption for users of the PRoW, impacts arising from this on journey lengths and local travel patterns are assessed to be low, and the effect on NMUs is assessed to be minor adverse and not significant.

13.9.20 PRoW M112, a footpath between Damson Parkway in the west and Bickenhill in the east, would be severed by construction of the new mainline link road connecting M42 Junction 5A and Clock Interchange. The PRoW would be redirected over the new mainline link road by a new overbridge near to St Peters Lane. There is estimated to be a 50m reduction in journey length, equivalent to 2% of the total length of the PRoW. Impacts arising from this on journey lengths and local travel patterns are assessed to be negligible; the effect on NMUs is assessed to be negligible and not significant.

13.9.21 PRoW M113, a footpath between Damson Parkway in the west and Hampton in Arden in the east, would be severed by construction of the new mainline link road connecting M42 Junction 5A and Clock Interchange. The PRoW would be redirected north over the new mainline road by a new accommodation works bridge near to Shadowbrook Lane. The increase in journey length is estimated to be 180m, equivalent to 4% of the total length of the PRoW. Using this new bridge would result in minimal disruption for users of the PRoW, impacts arising from this on journey lengths and local travel patterns are assessed to be low, and thus the effect on NMUs is assessed to be minor adverse and not significant.

13.9.22 PRoW M122, a footpath between Catherine-de-Barnes and Hampton in Arden, would be severed by construction of the new mainline link road connecting M42 Junction 5A and Clock Interchange. The PRoW would be redirected north over the new mainline link road by a new accommodation works bridge near to Shadowbrook Lane. The increase in journey length is estimated to be 170m, equivalent to 5% of the total length of the PRoW. Using this new bridge would therefore result in minimal disruption for users of the PRoW, impacts arising from this on journey lengths and local travel patterns are assessed to be low, and the effect on NMUs is assessed to be minor adverse and not significant.

13.9.23 PRoW M123, a footpath between Catherine-de-Barnes and Hampton in Arden, would be severed by construction of the new mainline link road connecting M42 Junction 5A and Clock Interchange. The PRoW would be redirected north on a new footpath next to the new Barber's Coppice Roundabout and over the new mainline link road via a new accommodation bridge. The increase in journey length is estimated to be 400m, equivalent to 1% of the total length of the PRoW. The presence of this diversion would result in some disruption for users of the PRoW, impacts arising from this on journey lengths and local travel patterns are assessed to be low, and the effect on NMUs is assessed to be minor adverse and not significant.

13.9.24 A section of footpath running along the southern edge of the A45 between East Way, through M42 Junction 6 to the Wyckhams Close locality, would be upgraded to form a 2m wide combined footway and cycleway. A short section of footway adjacent to the existing M42 northbound free flow link would be upgraded to form a 3m wide combined cycleway and footway.

13.9.25 The realigned Catherine-de-Barnes Lane would incorporate a 2m wide footway adjacent to the road, between the intersection with St Peters Lane and Bickenhill roundabout. A new cycleway/footway would also be constructed adjacent to the northbound carriageway between Bickenhill Roundabout and the Barber's Coppice Roundabout to south of the Catherine-de-Barnes Lane, where the cycleway/footway ties into the existing Catherine-de-Barnes Lane.

Operation

13.9.26 A pedestrian underpass would be constructed beneath the new free flow link to Airport Way to segregate NMUs and traffic, and allow the continued movement of users from the new footbridge on the A45 towards Bickenhill and footpaths to the west of the study area including PRoWs M109 and M112.

13.9.27 As several sections of Catherine-de-Barnes Lane would be made redundant through the implementation of new local road improvements, these would be repurposed as footways and cycleways to segregate traffic and NMUs.

Motorised travellers

Driver stress

Construction

13.9.28 There would be an increase in driver stress in the study area due principally to the presence of construction traffic, as well as construction activities taking place along the route and nearby. Vehicle users on sections of Catherine-de-Barnes Lane would be required to travel on temporary roads due to construction of the new mainline link road. These construction activities would likely lead to some frustration amongst motorised travellers, though no expected change in fear of accidents due to the change in traffic levels being low. The assessment takes account of road management measures associated with the construction traffic and activities as well as diversions which could potentially create route uncertainty.

13.9.29 Changes and resulting impacts would be monitored through implementing traffic management requirements set out in the OEMP [**TR010027/APP/6.11**] which would make drivers aware of disruptions ahead of time to help them plan their routes and journeys accordingly with signage mitigating any impact. It is therefore assessed that effects on driver stress levels during construction would likely be minor adverse and therefore not significant.

Operation

13.9.30 The Scheme would help reduce congestion and improve connectivity between local roads and should contribute to a reduction in driver fear. Signage would be provided throughout the Scheme which would also help inform drivers about route changes and restrictions.

13.9.31 To assess the level of change in driver stress levels (frustration and fear of potential accidents) arising from the improvements, Appendix 13.3 [**TR010027/APP/6.3**] sets out the predicted driver stress level for each of the five road links for do minimum and do something scenarios.

13.9.32 A summary of the driver stress levels is provided below in **Table 13.20**.

Table 13.20: Summary of driver stress

Road Link	Direction	AM Peak		PM Peak		Change in Driver Stress Level
		Do Minimum Scenario Driver Stress	Do Something Scenario Driver Stress	Do Minimum Scenario Driver Stress	Do Something Scenario Driver Stress	
M42 Motorway						
South of M42 Junction 5A	Southbound	High	High	High	High	No change
	Northbound	High	High	High	High	No change
North of M42 Junction 5A	Southbound	High	High	High	High	No change
	Northbound	High	High	High	High	No change
North of M42 Junction 6	Southbound	High	High	High	High	No change
	Northbound	High	High	High	High	No change
A45 Coventry Road						
East of M42 Junction 6	Eastbound	Low	Low	High	Low	Reduction (PM only)
	Westbound	Low	Low	Low	Low	
West of M42 Junction 6	Eastbound	High	High	High	High	No change
	Westbound	Moderate	Moderate	Low	Low	No change
B4438 Catherine-de-Barnes Lane						
North of Bickenhill Roundabout	Southbound	Low	Low	High	High	No change
	Northbound	High	Low	High	Low	Reduction
New mainline link road						
Between M42 Junction 5A and the on-slip from Barber's Coppice Roundabout	Northbound	NA	Low	NA	Low	NA
Between the on-slip from Barber's Coppice Roundabout to the Airport Way diverge	Northbound	NA	High	NA	Low	NA
From Clock Interchange diverge to Bickenhill Roundabout	Southbound	NA	Low	NA	Low	NA

Road Link	Direction	AM Peak		PM Peak		Change in Driver Stress Level
		Do Minimum Scenario Driver Stress	Do Something Scenario Driver Stress	Do Minimum Scenario Driver Stress	Do Something Scenario Driver Stress	
From diverge into Bickenhill Roundabout to M42 Junction 5A	Southbound	NA	Low	NA	Low	NA
Proposed new free-flow link at M42 Junction 6						
Proposed free-flow link from A45 eastbound to M42 northbound	Northbound	NA	High	NA	High	NA

13.9.33 As shown in **Table 13.20**, the Scheme is likely to result in a reduction in driver stress from 'High' to 'Low' on Catherine-de-Barnes Lane (North of Bickenhill Roundabout) in both peak periods. It is also likely to result in a reduction in driver stress from 'High' to 'Low' in the AM peak period.

13.9.34 On the remaining road links, driver stress levels in both peak periods are not expected to change from the levels experience in the do minimum scenario. The new mainline link road is generally expected to experience 'Low' driver stress levels, the exception being the on-slip from Barber's Coppice Roundabout to the Airport Way diverge, which is expected to have high driver stress in the PM peak period. The proposed new northbound free-flow link at M42 Junction 6 is expected to have high driver stress in the AM and PM peak periods.

13.9.35 Though drivers are likely to experience high stress in certain sections of the Scheme during peak periods, the Scheme is expected to cause reductions in traffic on the M42, A45 and Catherine-de-Barnes Lane and the overall effect on driver stress is assessed to be slightly beneficial and therefore not significant.

Driver views

Construction

13.9.36 Views for vehicular users on the M42 and the A45 are currently restricted due to shrub planting. Construction is therefore not likely to alter views though there may be removal of some vegetation in the far distance. The effect on views is therefore assessed to be negligible and not significant.

13.9.37 During construction, users of Catherine-de-Barnes Lane would travel on temporary roads to enable construction of the M42 Junction 5A to Birmingham Airport link road. Construction activity would dominate the view for vehicular users on these temporary roads. However, views for travellers on the existing road are currently contained in the majority of places by dense lines of trees. Therefore, the effect on views from Catherine-de-Barnes Lane is likely to be negligible and not significant.

13.9.38 For vehicle users on Solihull Lane and St Peters Road, views would be altered due to removal of vegetation and dominated by construction activity. However, both roads currently have concealed views to the nearby landscape due to roadside vegetation. Therefore, the effect on views on these roads is likely to be negligible and not significant.

Operation

13.9.39 The effect on driver views in the operational phase is likely to be limited due to the majority of routes in the area maintaining their existing alignment. Vehicular users continuing to travel on the A452, the M42 and the A45 in the study area as well as local roads such as Solihull Road, Shadowbrook Lane and St Peters Lane would experience no change in driver views. There is therefore expected to be no effect on vehicular users for these roads in the operation period.

13.9.40 The new mainline link road between Birmingham Airport and the M42 Junction 5A will be constructed in a cutting. Driver views are from this road are therefore expected to be limited. However, both the A45 and the M42, roads which would be otherwise used by users of the new mainline link road, both have limited visibility due to presence of roadside planting. The effect on view during operation is therefore assessed to be negligible and not significant.

13.9.41 The realigned Catherine-de-Barnes Lane would travel over the new mainline link road between the M42 Junction 5A and Birmingham Airport. Construction of the new mainline link road would result in clearance of mature trees along Catherine-de-Barnes Lane, opening up views towards the wider area. The effect on view in operation for these users is therefore assessed to be slightly beneficial and not significant.

Vehicular user severance

Construction

13.9.42 The construction of the Scheme would require users of Catherine-de-Barnes Lane to travel on temporary roads whilst the lane is being realigned. Whilst construction activities may result in an increase in journey times, journeys would not be deterred or vehicle users prevented from making journeys. Impacts are assessed to be slight and the effect on the vehicular user is assessed to be negligible and not significant.

Operation

13.9.43 The operation of the Scheme would result in changes to traffic flows on the route and surrounding roads such that it would have a potential impact on severance in relation to users accessing community resources in the study area.

13.9.44 Since there are limited community facilities in Bickenhill, its residents are likely to travel on Catherine-de-Barnes Lane to access community facilities in Solihull and the nearby villages of Hampton in Arden and Catherine-de-Barnes. Catherine-de-Barnes Lane is being realigned to accommodate the new mainline link road between M42 Junction 5A and Clock Interchange. The new mainline link road would be linked to Catherine-de-Barnes Lane via the southbound carriageway at Bickenhill Roundabout and the northbound carriageway at Barber's Coppice roundabout. **Table 13.21** and **Table 13.22** present a comparison of the traffic counts in AADT on Catherine-de-Barnes Lane in the do something and do minimum scenarios in 2038 to assess for a potential change in severance.

13.9.45 The tables indicate that the southbound carriageway on Catherine-de-Barnes Lane, used by Bickenhill residents to access Solihull and Hampton in Arden, is likely to be slightly higher in the realigned road in the do something scenario than in the unchanged road in the do minimum scenario. However, the northbound carriageway used by Bickenhill residents travelling back from Solihull and Hampton in Arden would encounter less traffic in the do something scenario due to vehicles travelling between the M42 Junction 5A and Clock Interchange being redirected to the new mainline link road. The potential effect on vehicular users accessing resources is therefore assessed to be minor beneficial and not significant.

Table 13.21: AADTs on Catherine-de-Barnes Lane in the do minimum scenario

Location	Direction	Traffic Count
North of Shadowbrook Lane	Southbound	11,687
	Northbound	13,747
South of Shadowbrook Lane	Southbound	9,077
	Northbound	11,846

Table 13.22: AADTs on Catherine-de-Barnes Lane in the do something scenario

Location	Direction	Traffic Count
North of Bickenhill Roundabout	Southbound	13,362
Between Bickenhill Roundabout and Catherine-de-Barnes Roundabout	Southbound	12,156
	Northbound	793
South of Catherine-de-Barnes Roundabout	Southbound	8,348
	Northbound	11,829

13.9.46 It has been assessed that there are no other potential severance effects within the study area.

Private assets

Construction

13.9.47 Construction of the new mainline link road between the M42 Junction 5A and Clock Interchange would result in the demolition of a property east of the existing Catherine-de-Barnes Lane (Heath End House) and the potential for the temporary loss of boundary fencing at Cedar Cottage on Clock Lane. As less than five residential properties would be impacted by the Scheme, the impact on residential properties has not been assessed.

Operation

13.9.48 The operation of the Scheme would require small parcels of permanent landtake from a single residential property, commercial properties located within the study area. Based on professional judgement the potential impacts on private assets during operation are not considered significant.

Community facilities

13.9.49 Highways England have committed (as a minimum), for the like-for-like reconfiguration of the affected WGGA playing fields through the powers afforded within the Development Consent Order for the Scheme.

13.9.50 Highways England will continue to engage with the WGAA to minimise disruption as far as practicable to allow for the continued use of the facility during the construction phase. As such, it is considered that the sports facility would not be subject to significant adverse effects.

13.9.51 Potential impacts and subsequent effects for both construction and operation phases relating to changes to air quality emissions, visual amenity and noise levels have been assessed in Chapters 6, 8 and 12 respectively.

Development land

Construction

13.9.52 Construction of the Scheme would require partial permanent loss of a land parcel designated as a proposed employment site in the Solihull Local Plan [REF 13-9]. The land is north of Clock Interchange in Bickenhill. It is defined as a ‘General Business Site’ in the Local Plan with a preferred use class of B1. Approximately 1.2ha of the approximate 9.4ha site (equivalent to 13%) would be required to enable construction of the proposed pedestrian footbridge. It is unlikely that the location of the pedestrian footbridge would restrict development of employment land in the site, and therefore the potential effect has been assessed to be slight adverse and not significant.

13.9.53 Construction of the free flow link connecting the M42 southbound and the A45 westbound carriageways would permanently impact a land parcel allocated for development of the HS2 interchange station in the Solihull Local Plan [REF 13-9]. Approximately 15ha of the approximate 150ha land parcel (equivalent to 10%) would be required to construct the Scheme. The existing East Way and Middle Bickenhill Lane are within the land allocated for development of the station, and it is not yet confirmed as to the extent of development required within the land parcel. The HS2 Birmingham Interchange is set to open in 2026 and the Scheme is expected to have no impact on the construction or operation of the station.

Operation

13.9.54 There are no planning applications / permissions affected by land required for operation of the Scheme and thus no effects have been assessed.

Human health

Construction

Access to healthcare services and other social infrastructure

13.9.55 During periods of the construction phase, traffic would be restricted at Clock interchange, A45 and Catherine-de-Barnes Lane. However, the provision of mitigation measures, such as diversions and relevant access points, would ensure accessing facilities remains possible. The effect on local community assets as a determinant of human health during construction is assessed to be neutral.

Access to open space and nature

13.9.56 During construction, traffic management areas, temporary working and storage areas, material stockpiles, haul roads and provision for site compounds are expected. Existing open and natural spaces would be retained and remain usable during construction, with any changes to access or potential impact on the amenity of users being mitigated.

13.9.57 Changes to journey times, local travel patterns, and certainty of route for NMUs would arise from the temporary closures and diversions of PRoWs through direct land take and provision of access routes required for the construction of the Scheme.

13.9.58 Through mitigation measures, such as temporary diversions to access routes and PRoWs and replacement provision of open space, access to open and natural space during the Scheme construction would be maintained and so the effect on human health is assessed to be neutral.

Air quality, noise and neighbourhood amenity

13.9.59 During construction, the Scheme would result in some temporary noise and vibration impacts from construction works and there is potential for changes in air quality due to dust emissions from construction activity, emissions from site plant equipment and HGVs.

13.9.60 There is potential for residents to be affected by noise exceedances or worsening in air quality due to construction activities and construction traffic where present. Construction works and increased traffic noise from additional vehicle movements including HGVs would increase noise and vibration impacts at nearby Noise Sensitive Receptors (NSRs), although they would be temporary in nature.

13.9.61 The assessment in respect of construction noise and vibration concludes that the majority of effects on NSRs would not be significant, however significant adverse effects are predicted for receptors in close proximity to Solihull Road, Catherine-de-Barnes Lane, St Peter's Lane, Clock Lane, Church Lane and Wyckhams Close as a result of construction activities and the duration of the works. Mitigation measures detailed in Chapter 12 Noise and vibration and the OEMP [**TR010027/APP/6.11**] would be implemented accordingly, and the contractor will investigate options for further mitigation of these impacts and demonstrate that Best Practicable Measures would be implemented.

13.9.62 During construction, emissions from construction dust, HGVs and traffic effects would occur, although they would be temporary in nature. Additional vehicle movements have the potential to increase concentrations of pollutants including nitrogen dioxide and PM_{10} at receptors near the Scheme. A number of works such as those on the M42, A45, Junction 6 and Catherine-de-Barnes Lane will likely result in changes in traffic flows. Sensitive receptors along St Peters Lane and Catherine-de-Barnes Lane will be protected by the implementation of specific mitigation measures as presented in Chapter 6 Air quality and in the OEMP [**TR010027/APP/6.11**]. Therefore, in respect of the air quality assessment conclusion, there would be no significant effects during the construction phase.

13.9.63 Potential impacts on air quality, noise and neighbourhood amenity would be managed through the use of best practicable means included in the OEMP [**TR010027/APP/6.11**] and the use of temporary noise barriers where possible as outlined in the noise and vibration assessment. As a result, the effect of the Scheme on air quality, noise and neighbourhood amenity as a determinant of human health during construction is assessed to be neutral.

Accessibility and active travel

13.9.64 The construction phase would require a number of closures and diversions to the existing PRoW network at locations directly affected by the Scheme. However diversions/other relevant access points would mitigate any potential impact on NMU routes.

13.9.65 Construction traffic may impact on journeys made by pedestrians and cyclists in the local area. However, the effects would be minimised through measures set out within the OEMP [**TR010027/APP/6.11**] and the required traffic management plans.

13.9.66 In respect of mitigation, diversions and alternative access routes, disruption resulting from the Scheme would be minimised and therefore the effect of the Scheme on accessibility and active travel as a determinant of human health during construction is assessed to be neutral.

Access to work and training

13.9.67 The construction phase of the Scheme would provide net additional employment opportunities in the local area. Therefore, the effect of the Scheme on access to work and training as a determinant of human health during construction is assessed to be positive (+).

Social cohesion and lifetime neighbourhoods[2]

13.9.68 During the construction phase, temporary severance issues may occur due to disruption to existing road usage. Through mitigation measures, such as the provision of diversions during construction, the effect of the Scheme on social cohesion and lifetime neighbourhoods as a determinant of human health is assessed to be neutral.

Climate change

13.9.69 During construction, the Scheme would be designed to improve its resilience to climate change and in accordance with current planning, design and engineering practice and codes. Road design standards will be incorporated to take into consideration future climate allowances and construction materials which have high tolerance to fluctuating temperatures will be used.

13.9.70 Chapter 15 Climate identifies and takes into account the existing resilience measures for each climate variable and associated risks either already in place or in development. Innovation and investments in environmentally sound infrastructure and technologies can both reduce GHG emissions and enhance resilience to climate change. Sustainable drainage techniques will be incorporated (where practicable) in the design of the Scheme to ensure that flooding is not exacerbated. All drainage has been designed in accordance with current drainage guidelines such as Construction Industry Research and Information Association (CIRIA) which are included in the OEMP [**TR010027/APP/6.11**] where applicable.

13.9.71 As stated in Chapter 15 Climate, climate resilience impacts and effects of the Scheme during the construction phase are not expected to be significant. The effect of effect of the Scheme on climate change as a determinant of human health during construction is therefore assessed to be neutral.

Operation

Access to healthcare services and other social infrastructure

13.9.72 During the operational phase, the new mainline link road and the provision of the new M42 Junction 5A would provide additional capacity and improve accessibility for residents of Bickenhill when accessing healthcare facilities in surrounding settlements. Improved access to healthcare is an essential component of creating sustainable, healthy communities.

[2] Lifetime neighbourhoods are places designed to be inclusive regardless of age or disability as set out by the UK Government.

13.9.73 The Scheme would improve connectivity to community facilities located in Catherine-de-Barnes, Hampton in Arden and those located to the north of Clock Interchange and M42 Junction 6. Therefore, the improved access to healthcare services and social infrastructure facilitated by the Scheme is assessed to positively impact human health (+) of residents in the study area**.**

Access to open space and nature

13.9.74 During operation, the Green Man Trail located south of Clock Interchange would be severed and closed by the new mainline link road. Route connectivity will however be maintained as the footpath would be redirected west on Church Lane up to St Peters Lane, and then Catherine-de-Barnes Lane to tie into the existing cycleway/footpath on Airport Way. The redirected route would reconnect with the Green Man Trail at the roundabout between Airport Way and Bickenhill Lane and maintain access to natural space.

13.9.75 The Scheme would incorporate improvements to existing footways and cycleways which would enable NMUs to access the PRoW network in the area and improve access to natural space. Therefore, with the provision of improved NMU routes, the effect of the Scheme on access to open and natural space as a determinant of human health during operation is assessed to be positive (+) for residents in the study area.

Air quality, noise and neighbourhood amenity

13.9.76 During operation, the Scheme would move the road closer to some receptors, and further away from others. The receptors identified along St Peters Lane in Bickenhill and the Catherine-de-Barnes Lane would experience the greatest change in pollutant concentration during the operational phase of the Scheme, due to the introduction of new traffic along the route. However, as air quality is considered to be of a good quality in the vicinity of the Scheme, the introduction of new traffic along the route is not predicted to give rise to any changes considered significant in pollutant concentrations at these receptors.

13.9.77 The Scheme would cause a redistribution of traffic on the local highway network, resulting in a decrease in traffic flows at some junctions and an increase at other junctions. Changes to the M42 Junction 6 arising from the Scheme would result in reduced journey times and congestion, and likely reductions to levels of air pollution. The Scheme would improve traffic conditions on the M42 by creating a new junction (Junction 5A) and a new mainline link road connecting Junction 5A and A45 Clock Interchange. The new mainline link road is positioned in cutting and diverts traffic off the existing Catherine-de-Barnes Lane resulting in decreased traffic noise for a number of residential properties in Bickenhill and contributing to improvements to health and quality of life for local residents.

13.9.78 In summary, considering the redistribution of traffic resulting from the Scheme, the influence of the Scheme on air quality, noise and neighbourhood amenity as a determinant of human health during operation is assessed to be positive (+) for residents in the study area.

Accessibility and active travel

13.9.79 During the operational phase, provisions have been included in the design to replace and enhance existing routes used by NMUs. The Scheme will improve NMU routes in the area, providing improved access across the A45 to link with other NMU provisions in the area.

13.9.80 The existing footpath/cycle path on the east side of Clock Interchange will need to be removed to accommodate the widening of the two bridge sections of the gyratory across the A45. However, this path will be re-provided via the new proposed footway/cycleway overbridge across the A45 between Clock Interchange and the M42 Junction 6. This new footpath will allow NMUs to safely cross and improve connectivity between Bickenhill village and facilities to the north.

13.9.81 Construction of the free flow link between M42 Junction 6 southbound to A45 eastbound would require the closure of a footpath. However, NMUs would be diverted west on the southern edge of the A45 and up to the East Way underpass, and beneath the M42 motorway to maintain access to Middle Bickenhill Lane.

13.9.82 The provision of the new accommodation bridge across the new mainline link road, west of Shadowbrook Lane and east of Catherine-de-Barnes Lane, would enable NMUs to cross the road as part of journeys made on the PRoW network in the area.

13.9.83 The Scheme requires the closure of the Green Man Trail to the south of Clock interchange resulting in severance. However, the Scheme maintains the route connectivity as the recreational footpath would be redirected west on Church Lane up to St Peters Lane and Catherine-de-Barnes Lane to the north of the Scheme.

13.9.84 Where feasible, existing footpaths will be upgraded and improved to encourage walking, therefore the influence of the Scheme on accessibility and active travel as a determinant of human health during operation is assessed to be positive (+) for residents in the study area.

Access to work and training

13.9.85 No direct impacts on employment are expected as a result of the operation of the Scheme. However, the operation of the Scheme may improve accessibility to local employment and training opportunities with indirect benefits on mental health and well-being. This could particularly be of benefit for residents of some areas (e.g. Chelmsley Wood) which record higher income deprivation scores than others in the study area.

13.9.86 The Scheme would provide direct access to employment areas as well as improve connectivity between Knowle, Catherine-de-Barnes and Birmingham. Key employment locations such as Birmingham International Park, Birmingham Business Park, Eagle Court Business Park, The Gateway Estate and the National Exhibition Centre are expected to benefit from the Scheme. The Scheme also supports the wider economy and makes Birmingham a more attractive place for businesses to invest in and enables the delivery of development sites.

13.9.87 Therefore, the influence of the Scheme on access to work and training as a determinant of health during operation is assessed to be positive (+) for residents in the study area.

Social cohesion and lifetime neighbourhoods

13.9.88 During the operational phase, the Scheme would reduce community severance through improved links between villages in Catherine-de-Barnes and Bickenhill and facilities to the north. The two bridges on the new mainline link road would retain connectivity between the villages of Catherine-de-Barnes and Bickenhill, and Clock Lane.

13.9.89 Traffic congestion along the M42 and around Junction 6 would be reduced, allowing residents of surrounding villages to have improved access to neighbouring settlements and community resources. This would represent a substantial benefit in relation to encouraging social cohesion.

13.9.90 Whilst levels of social interaction can be influenced by a number of other factors, such as the availability and quality of community facilities, open and play space, the influence of the Scheme on social cohesion and lifetime neighbourhoods as a determinant of human health during operation is assessed to be positive (+) for residents in the study area.

Climate change

13.9.91 During the operational phase in respect of climate change resilience the Scheme may be vulnerable to a range of potentially significant impacts. During operation, the resilience of the Scheme to climate change will be improved through effective and maintained drainage systems and lighting systems which are designed with 25% spare capacity to reduce the risk of overheating. As identified in Chapter 15 Climate, based on the mitigation built into the design and assumed management practices, United Kingdom Climate Change Projections 09 (UKCP09) [REF 13-29] climate change projections, information from other environmental disciplines, and details on scheme design, none of the potential impacts identified would be significant (and are therefore classed as non-significant).

13.9.92 In respect of pollution incidents, the mitigation embedded into the drainage design of the Scheme would prevent or mitigate for any incidents and any effects are assessed to be not significant.

13.9.93 The measures incorporated are presented in: Chapter 14 Road drainage and the water environment; in Appendix 14.5 [**TR010027/APP/6.3**]; and in the OEMP [**TR010027/APP/6.11**]. These measures include the provision of a number of attenuation areas which would provide storage to excess storm water and reduce the potential impacts of flooding.

13.9.94 Given these conclusions would ensure that effects on human health would be minimised, the effect of the Scheme on climate change as a determinant of human health are assessed to be neutral.

13.10 Monitoring

13.10.1 The significant adverse effect during construction on BMV agricultural land would remain permanently with no mitigation possible.

13.10.2 The significantly affected farm holdings would be entitled to financial compensation (as with all affected farm holdings). It would not be necessary to undertake any monitoring associated with these effects.

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