M54 to M6 Link Road

TR010054

Volume 6

6.1 Environmental Statement

Chapter 9 – Geology and Soils

Regulation 5(2)(a)

Planning Act 2008

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

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Infrastructure Planning

Planning Act 2008

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

M54 to M6 Link Road

Development Consent Order 202[ ]

6.1 Environmental Statement

Chapter 9 Geology and Soils

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9 Geology and Soils

9.1 Introduction

9.1.1 This chapter assesses the potential geology and soils impacts associated with the construction and operation of the Scheme, including contaminated land, and follows the methodology set out in Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 11, LA 109 Geology and Soils (Ref 9.1) and LA 104 Environmental Assessment and Monitoring (Ref 9.2).

9.1.2 This chapter summarises the regulatory and policy framework related to geology and soils, details the methodology followed for the assessment and describes the existing environment in the area surrounding the Scheme. Following this, the design and mitigation measures and residual effects of the Scheme are presented.

9.1.3 This chapter of the Environmental Statement (ES) has been prepared by competent experts with relevant and appropriate experience. The technical lead for the geology and soils assessment has 23 years of relevant experience and has professional qualifications as summarised in Appendix 1.1 [TR010054/APP/6.3].

9.2 Legislative and policy framework

Legislation

9.2.1 There are a number of pieces of legislation that are of relevance to the geology and soils assessment, these include:

- The Environmental Protection Act 1990 and Part 2A (the Contaminated Land Regime) (Ref 9.3).
- The Water Act 2003 (Ref 9.4).
- The Water Resources Act 1991 (Ref 9.5).

Planning policy

9.2.2 The primary basis for deciding whether or not to grant a Development Consent Order (DCO) is the National Policy Statement for National Networks (NPSNN) [1](Ref 9.6) which sets out policies to guide how DCO applications would be decided and how the impacts of national networks infrastructure should be considered. Table 9.1 identifies the NPSNN policies relevant to the geology and soils assessment and where in this ES chapter information is provided to address these policy requirements.

Table 9.1: NPSNN policies relevant for the geology and soils assessment

NPSNN para.	Requirement of the NPSNN	Location where information addresses policy requirements
5.117	This paragraph requires the applicants to consider land stability in respect of new development. It states that 'Specifically, proposals should be appropriate for the	Refer to Appendix 9.1 Ground Investigation Report [TR010054/APP/6.3]

[1] Although other policies can have weight as relevant and important matters in decision making. See Case for the Scheme for more information [TR010054/APP/7.2].

NPSNN para.	Requirement of the NPSNN	Location where information addresses policy requirements
	location, including preventing unacceptable risks from land instability. If land stability could be an issue, applicants should seek appropriate technical and environmental expert advice to assess the likely consequences of proposed developments on sites where subsidence, landslides and ground compression is known or suspected.'	
5.118	This paragraph requires the applicants to carry out preliminary assessment of ground instability at the earliest possible stage before a detailed application for development consent is prepared and undertake any necessary investigations to ascertain that the site will remain stable or can be made so as part of the development. It also requires the applicants to complete a land stability or slope stability risk assessment report, taking into account the surrounding areas where subsidence, landslides and land compression could threaten the development / neighbouring land or property.	Refer to Appendix 9.1 Ground Investigation Report [TR010054/APP/6.3]
5.168	This paragraph requires applicants to take into account the economic and other benefits of the best and most versatile agricultural land and, where significant development of agricultural land is demonstrated to be necessary, to seek to use areas of poorer quality land in preference to that of a higher quality. Additionally, this paragraph requires the applicants to identify any effects, and seek to minimise impacts, on soil quality and, for developments on previously developed (brownfield) sites, ensure that they have considered the risk posed by land contamination and how it is proposed to address this.	Section 9.6 'Baseline conditions' paragraphs 9.6.16 to 9.6.24 considers agricultural land quality. Section 9.8 'Design mitigation and enhancement measures' presents measures to minimise impacts on soil quality.

9.2.3 An assessment of the Schemes conformity with the relevant paragraphs and provisions for cultural heritage in the NPSNN is presented in the NPSNN Accordance Table, Annex A of the Case for the Scheme [TR010054/APP/7.2].

9.2.4 Other relevant policies have been considered as part of the geology and soils assessment where these have informed the identification of receptors and resources and their sensitivity; the assessment methodology; the potential for significant environmental effects; and required mitigation. These policies include:

- National Planning Policy Framework (NPPF) (Ref 9.7) e.g. paragraphs 170 in relation to contributing to and enhancing the local environment (including economic and other benefits of the best and most versatile agricultural land), paragraphs 178 - 179 in relation to ground conditions and pollution and supporting Planning Practice Guidance (PPG) for Land Affected by Contamination and for Land Stability (Ref 9.8);
- 25 Year Environment Plan, A Green Future: Our 25 Year Plan to Improve the Environment (Ref 9)

- South Staffordshire Council Local Plan – Core Strategy (Local Plan) Development Plan Document (Ref 9.10).
- Staffordshire County Council Local Transport Plan 2011 (Ref 9.11).

9.2.5 National objectives for the sustainable management of soil are set out by the Department for Environment, Food and Rural Affairs (Defra) in the guidance paper, entitled 'Safeguarding our Soils, A Strategy for England' (Ref 9.12). The four key objectives detailed in the strategy, which have been taken into account in this assessment are as follows:

- Agricultural soils will be better managed and threats to them will be addressed.
- Soils will play a greater role in the fight against climate change and in helping us manage our impacts.
- Soils in urban areas will be valued during development and construction practices will ensure vital soil functions can be maintained.
- Pollution of our soils is prevented, and our historic legacy of contaminated land is being dealt with.

9.3 Assessment methodology

General approach

9.3.1 The geology and soils assessment includes the assessment of impacts on the following elements during construction and operation of the Scheme:

- effects from contamination on human health and controlled waters (surface water and groundwater);
- effects on bedrock geology and superficial deposits, including geological designations and sensitive / valuable non-designated features; and
- effects on soil resources.

9.3.2 The geology and soils assessment has been undertaken in accordance with the following standards and guidance documents:

- DMRB LA 109 Geology Soils (Ref 9.1).
- DMRB LA 104 Environmental Assessment and Monitoring (Ref 9.2).
- Impacts associated with land contamination and ground hazards:
  - Contaminated Land Report 11: Model Procedures for the Management of Land Contamination (Ref 9.13).
  - Land Contamination: Risk Management (Ref 9.14).
  - British Standards (BS) 10175+A2:2017: Investigation of Potentially Contaminated Sites – Code of Practice (Ref 9.15).
  - Environment Agency: Soil Screening Values for Assessing Ecological Risks (Ref 9.16).
  - BS3882: Specification for Topsoil and Requirements for Use (Ref 9.17).

- CIRIA C552 'Contaminated Land Risk Assessment. A Guide to Good Practice', (Ref 9.18).
- CIRIA C665 'Assessing Risks Posed by Hazardous Ground Gases to Buildings' (Ref 9.19).
- Contaminated Land: Applications in Real Environments (CL:AIRE) 'The Definition of Waste: Development Industry Code of Practice', V2, 2011 (Ref 9.20).

- Agricultural land:
  - Natural England's Guide to assessing development proposals on agricultural land (Ref 9.21).

Conceptual site model

9.3.3 Contaminated Land, as defined in Part IIA of Environmental Protection Act 1990 (Ref 9.3), is assessed through the identification and assessment of pollutant linkages (contaminant-pathway-receptor relationships). Implicit in the guidance is the application of risk assessment to assess whether potential pollutant linkages may be significant. The risk-based methodology adopted in this chapter is based upon the Environment Agency's Model Procedures for the Management of Land Contamination (CLR11) (Ref 9.13) together with the supporting guidance referenced within this document. The methodology adopted relies on the development of a site-specific Conceptual Site Model (CSM) consisting of three components:

- A source of contamination, for example due to historical site operations.
- A pathway: a route by which receptors can become exposed to contaminants. Examples include vapour inhalation, soil ingestion and groundwater migration.
- A receptor: a target that may be exposed to contaminants via the identified pathways. Examples include human occupiers/users of the site, surface water, groundwater, property or ecosystems.

9.3.4 For a potential risk to either environmental or human receptors to exist, a plausible pollutant linkage involving each of these components must exist. If one of the components is absent then a pollutant linkage, and thereby potentially unacceptable risk, is also unlikely to exist. Where all three components are or may be present, a potentially complete pollutant linkage can be considered to exist. This does not automatically imply the presence of unacceptable risk, but further investigation of the potential pollutant linkages is required.

9.3.5 Human health and controlled waters risk assessments have been undertaken based on findings of the ground investigation works and laboratory testing recorded in the Ground Investigation Report (Appendix 9.1 [TR010054/APP/6.3]). The risk assessments are discussed in Section 9.6.

9.3.6 A CSM has been prepared following the results of the 2019 ground investigation and is presented in Section 9.6.

Establishing baseline conditions

9.3.7 Establishment of the baseline environment has involved reference to existing data sources, consultation with appropriate statutory bodies and organisations, and fieldwork surveys. Further details are presented in the following sections.

Desk study

9.3.8 Historical factual and interpretive geotechnical and geo-environmental reports relating to site investigation, soil surveys and agricultural land classification surveys have been reviewed and reported as applicable in the assessment. The following reports prepared for the scheme have been reviewed and used in establishing the baseline conditions:

- The Geotechnical Preliminary Sources Study Report (PSSR), revisions 1 and 2 for the Scheme (Ref 9.22, 9.23 and 9.24);
- M54 – M6/M6 Toll Link Road Scheme. PCF Stage 2 Environmental Assessment Report (Ref 9.25); and
- M54 to M6 Link Road Scheme, Ground Investigation Report, Appendix 9.1 [TR010054/APP/6.3].

9.3.9 In addition, information and views concerning the Scheme were obtained from the following organisations:

- British Geological Survey (BGS) (Ref 9.26);
- Defra Multi-Agency Geographic Information for the Countryside (MAGIC) website (Ref 9.27);
- Ordnance survey mapping (Ref 28 and Ref 29);
- Cranfield Soil and Agrifood Institute 'Soilscapes' database (Ref 9.30);
- The Coal Authority online interactive maps (Ref 9.31);
- Landmark Envirocheck Report (Ref 9.32);
- Natural England;
- Environment Agency; and
- Information on controlled waters as detailed in Chapter 13: Road Drainage and the Water Environment.

9.3.10 Information on potential contaminated sites was requested from the Environment Agency and Staffordshire County Council. Details of designated geological sites were requested from Natural England and Staffordshire Wildlife Trust.

Fieldwork

9.3.11 An intrusive ground investigation along the alignment of the Scheme commenced on 17 June 2019. The ground investigation has been undertaken to understand the prevailing ground conditions and to assess the potential constraints associated with geology and soils. A summary of the findings of this investigation is included in Section 9.6 'Baseline conditions'.

9.3.12 Agricultural Land Classification (ALC) surveys were undertaken in November and December 2019 to determine the ALC of soil resources within the Scheme boundary, where access was available.

Value of receptor

9.3.13 The criteria outlined in Table 9.2 has been used to define the value/ sensitivity of receptors potentially affected by the Scheme. Defining the value of a receptor takes into consideration the surrounding land uses, based on mapping and site visits and existing planning designations.

Table 9.2: Defining the value (sensitivity) of geology and soil receptors

Value of receptor	Contamination	Geology	Soils
Very High	**Human health**: very high sensitivity land use such as residential or allotments. **Surface water**: Watercourse having Water Framework Directive (WFD) classification shown in River Basin Management Plan (RBMP) and Q_{95} ≥1.0 m^3/s. Site protected/designated under EC or UK legislation (Special Area of Conservation (SAC), Special Protection Area (SPA), Site of Special Scientific Interest (SSSI), Ramsar site, salmniod water) /Species protected be EC legislation Ecology and Nature Conservation. **Groundwater**: Principal aquifer providing a regionally important resource and/or supporting a site protected under EC and UK legislation Ecology and Nature Conservation. Groundwater locally supports Groundwater Dependent Terrestrial Ecosystems (GWDTE) Source Protection Zone (SPZ) 1.	Very rare and of international importance with no potential for replacement (e.g. UNESCO World Heritage Sites, UNESCO Global Geoparks, SSSI's and GCR where citations indicate features of international importance). Geology meeting international designation citation criteria which is not designated as such.	• Soils directly supporting an EU designated site (e.g. SAC, SPA, Ramsar). • ALC grades 1 and 2.
High	**Human health**: high sensitivity land use such as public open space. **Surface water**: Watercourse having WFD classification shown in RBMP and Q95 <1.0 m^3/s. Species protected under EC or UK legislation Ecology and Nature Conservation.	Rare and of national importance with little potential for replacement (e.g. geological SSSI's, ASSI, National Nature Reserves (NNR)). Geology meeting national designation citation	• Soils directly supporting a UK designated site (e.g. SSSI). • ALC grade 3a.

Value of receptor	Contamination	Geology	Soils
	Groundwater: Principal aquifer providing locally important resource or supporting a river ecosystem. Groundwater locally supports GWDTE SPZ2.	criteria which is not designated as such.	
Medium	**Human health**: medium sensitivity land use such as commercial or industrial. **Surface water**: Watercourse not having a WFD classification shown in RBMP and Q95 >0.001 m^3/s. **Groundwater:** aquifer providing water for agricultural or industrial use with limited connection to surface water. SPZ3.	Geology of regional importance with little potential for replacement (e.g. Regionally Important Geological Site (RIGS)). Geology meeting regional designation citation criteria which is not designated as such.	• Soils supporting non statutory designated sites (e.g. Local Nature Reserves (LNR), Local Geological Site's Sites of Nature Conservation Importance (SNCIs)). • ALC grade 3b.
Low	**Human health**: low sensitivity land use such as highways and rail. **Surface water**: Watercourses not having WFD classification shown in RBMP and Q95 ≤0.001 m^3/s. **Groundwater:** Unproductive strata.	Geology of local importance / interest with potential for replacement (e.g. non designated geological exposures, former quarries / mining sites).	• Soils supporting non designated notable or priority habitats. • ALC grade 4 & 5.
Very Low	**Human health**: undeveloped surplus land / no sensitive land use proposed. Surface water: N/A Groundwater: N/A	No geological exposures, little / no local interest.	• Soils previously developed land formerly in 'hard uses' with little potential to return to agriculture

Magnitude of impact

9.3.14 The magnitude of potential impacts on identified receptors, as associated with the Scheme, have been determined using the 4-point scale as detailed in Table 9.3, considering the potential pathways through which an impact source/ hazard may affect identified receptors.

Table 9.3: Criteria for assessing the magnitude of impact upon geology and soils features/attributes

Impact magnitude	Receptors susceptible to contamination impacts	Geology	Soil
Major	**Human health:** Significant contamination identified. Contamination levels significantly exceed	Loss of geological feature / designation and/or quality and integrity, severe	Physical removal or permanent sealing of >20 ha of agricultural

Impact magnitude	Receptors susceptible to contamination impacts	Geology	Soil
	background levels and relevant screening criteria (e.g. category 4 screening levels) SP1010 (Ref 9.2) with potential for significant harm to human health. Contamination heavily restricts future use of land. **Surface water:** Compliance failure with EQS values. **Groundwater:** Loss of, or extensive change to an aquifer. Loss of regionally important water supply. Potential high risk of pollution to groundwater from routine run-off.). Reduction in water body WFD classification. Loss or significant damage to major structures through subsidence or similar effects	damage to key characteristics, features or elements.	land.
Moderate	**Human Health:** Contaminant concentrations exceed background levels and are in line with limits of relevant screening criteria (e.g. category 4 screening levels) SP1010 (Ref 9.2). Significant contamination can be present. Control/remediation measures are required to reduce risks to human health / make land suitable for intended use. **Surface water:** Compliance with EQS values. Degradation of regionally important public water supply or loss of major	Partial loss of geological feature / designation, potentially adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.	Physical removal or permanent sealing of 1 ha to 20 ha of agricultural land. Permanent loss / reduction of one or more soil function(s) and restriction to current or approved future use (e.g. through degradation, compaction, erosion of soil resource).

Impact magnitude	Receptors susceptible to contamination impacts	Geology	Soil
	commercial/industrial/agricultural supplies. Contribution to reduction in water body WFD classification. **Groundwater:** Partial loss or change to an aquifer. Degradation of regionally important public water supply or loss of significant commercial/ industrial/ agricultural supplies. Potential medium risk of pollution to groundwater from routine runoff.		
Minor	**Human Health:** Contaminant concentrations are below relevant screening criteria (e.g. category 4 screening levels) SP1010 (Ref 9.2). Significant contamination is unlikely with a low risk to minimise risks to human health. Surface water: Minor effects on water supplies. **Groundwater**: Potential low risk of pollution to groundwater	Minor measurable change in geological features / designation attributes, quality or vulnerability, minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.	Temporary loss / reduction of one or more soil function (s) and restriction to current or approved future use (e.g. through degradation, compaction, erosion of soil resource.)
Negligible	**Human health:** Contaminant concentrations substantially below levels outlined in relevant screening criteria (e.g. category 4 screening levels) SP1010 (Ref 9.2). No requirement for control measures to reduce risk to human health / make land suitable for intended use.	Very minor loss or detrimental alteration to one or more characteristics, features or elements of geological feature / designation. Overall integrity or resource not affected.	No discernible loss / reduction of soil function(s) that restrict current or approved future use.

Impact magnitude	Receptors susceptible to contamination impacts	Geology	Soil
	Surface water and groundwater: The proposed project is unlikely to affect the integrity of the water environment.		
No change	**Human health:** Reported contaminant concentrations below background levels. **Surface water and groundwater:** No loss or alteration of characteristics, features, or elements; no observable impact in either direction	No temporary or permanent loss / disturbance of characteristics features or elements.	No loss / reduction of soil function (s) that restrict current or approved future use.

Significance of effect

9.3.15 When assessing the potential significance of effects, impact avoidance measures included in the Scheme as well as standard management activities have been taken into account (see Section 9.8). The overall significance of effect has been derived using the significance matrix shown in Table 4.3, Chapter 4: Environmental Assessment Methodology. Residual effects predicted to be minor or negligible are not considered to be significant, whereas effects assessed as moderate or major are considered significant.

Scoping response

9.3.16 The proposed scope of the geology and soils assessment was detailed in the Environmental Impact Assessment (EIA) Scoping Report (Ref 9.33) submitted to the Inspectorate on 11 January 2019. An overview of the Inspectorate's Scoping Opinion (Appendix 4.1 [TR010054/APP/6.3]) in relation to geology and soils is presented in Table 9.4. Where the assessment has been undertaken in accordance with the scoping opinion point, a response and the relevant ES section is provided; where an alternative approach has been agreed with the relevant stakeholders, an explanation is provided.

Table 9.4: Scoping opinion and response

Scoping opinion	Where addressed in the ES
The Planning Inspectorate	
The ES should explain and justify the chosen study areas.	Refer to Section 9.5 'Study area' which explains and justifies the chosen study area.

Scoping opinion	Where addressed in the ES
The Applicant should ensure that the assessment of effects is consistent with any assessment of significance based on hydrogeology and hydrology criteria adopted for the Road Drainage and the Water Environment assessment. This includes consistency within the assessment of impacts to controlled waters. The Applicant should refer to the Environment Agency Guiding principles for land contamination for information regarding how best to assess risks to controlled waters from the Proposed Development.	Refer to Section 9.9 'Assessment of likely significant effects'. Cross references to Chapter 13: Road Drainage and the Water Environment have been provided as appropriate. Refer to Section 9.3 'Assessment Methodology.'
The ES should describe the SuDs [Sustainable Drainage System] that will be used and include detail of any associated construction works. The ES should identify the requirement for any environmental permits for discharges to surface water and/or groundwater and provide evidence of the effort made to consult/ agree the approach with the relevant consultation bodies.	Refer to Section 9.8 controlled waters – cross referenced with Chapter 13: Road Drainage and the Water Environment
The ES should address the potential for subsurface archaeological remains to be present within the study area during ground investigation works.	The ground investigation specification included the requirement for an archaeological watching brief and reporting. Refer to Appendix 6.2 Archaeological Monitoring and Recording Report [TR010054/APP/6.3].

Consultation

9.3.17 The Preliminary Environmental Information (PEI) Report for this Scheme (Ref 9.34) was published in May 2019 as part of the statutory consultation. The PEI Report presented the environmental information collected, together with the preliminary findings of the assessment of likely significant environmental effects of the Scheme at the time. Comments received during public consultation and the associated responses, are detailed within the Consultation Report [TR010054/APP/5.1].

9.4 Assessment assumptions and limitations

Scheme design and limits of deviation

9.4.1 The assessment has been based on the Scheme description detailed within Chapter 2: The Scheme, and has taken into account the lateral and vertical limits of deviation (defined on the Works Plans [TR010054/APP/2.4] and detailed in Article 6 of the draft DCO [TR010054/APP/3.1]) in order to establish a realistic worst-case assessment scenario. This scenario has identified and reported the effect that any lateral and vertical deviation would realistically give rise to. Taking into account the potential for the Scheme to impact existing geological and soil resources and agricultural land, and impact potential contaminative land uses through the development of the Scheme, which may potentially result in a different effect.

9.4.2 Notwithstanding any potential deviation, all geology and soils mitigation measures embedded in the design of the Scheme and described in Section 9.8 would still be deliverable within the limits of deviation and would still fulfil their intended function.

Baseline data

9.4.3 The assessment has been based on, and is limited to, the baseline conditions recorded at the time of undertaking the desk study using the sources outlined in Section 9.3. The use of third-party data within this assessment has been supported by a ground investigation. The Ground Investigation Report is provided in Appendix 9.1 [TR010054/APP/6.3].

9.5 Study area

9.5.1 The study area for human health contamination includes the Scheme boundary and an additional buffer of 250 m. This area is considered appropriate for the consideration of historical and current potentially contaminative land uses and it aligns with established industry practice and professional judgement for defining land contamination study areas for EIA.

9.5.2 An extended study area of 1 km from the Scheme boundary has been considered appropriate for assessing potential contamination of groundwater, surface water and potable water abstractions in line with Chapter 13: Road Drainage and the Water Environment. This is considered to include potential receptors to any land contamination.

9.5.3 The study area for geology and geological designated sites is within and up to 250 m of the Scheme boundary. This area is considered appropriate as intrusive works may impact upon designated geological sites during the design and construction phase of the Scheme.

9.5.4 For the impacts on soil assessed within this chapter, including the description of agricultural land classification the study area is limited to the Scheme boundary. These aspects are only likely to be impacted where the Scheme directly crosses or interfaces with them.

9.5.5 The study areas for the geology and soils assessment, as detailed above, are illustrated on Figure 9.1 [TR010054/APP/6.2].

9.6 Baseline conditions

Geology

Topography and land use

9.6.1 The current land use and topography along the alignment of the Scheme is primarily fields and farm land with some small wooded areas (Ref 9.28 and 9.29). As the route heads north-east from the M54 Junction 1 (135 m above ordnance datum (AOD)), through farm land and fields it by-passes the residential areas of Featherstone (430 m west of Scheme boundary), Hilton (200 m west of the Scheme boundary) and Shareshill (650 m west of the Scheme boundary) to the west passing through Lower Pool Site of Biological Importance (SBI) 130 m to

140 m AOD an area of ponds and woodland west of Hilton Hall. The Scheme would continue through existing fields and farm land passing to the east of Brookfield Farm, to Junction 11 of the M6 (125 m AOD).

Published geology

9.6.2 The 1:50,000 scale Solid and Drift geological map for Wolverhampton and the BGS GeoIndex (Ref 9.26) mapping, provide information on the published geology in the area of the Scheme. The geology along the Scheme is shown in Figure 9.2 [TR010054/APP/6.2]. Descriptions of the encountered ground conditions during the 2019 ground investigation are summarised in the following sections, full details of which are available in Appendix 9.1 [TR010054/APP/6.3].

Made ground

9.6.3 Made Ground is present around Junction 1 of the M54 as noted on the BGS Geoindex mapping. The Made Ground is described as 'artificial ground'. Made Ground described as 'infilled ground' is also shown in the area immediately south of the M54 Junction 1. This is likely to be colliery spoil associated with the former Hilton Colliery. Made Ground described as 'worked ground' is also present at Junction 11 of the M6. Although, not shown on the BGS mappings, other Made Ground deposits associated with infilled ponds in the area are likely to be present within the Scheme boundary.

9.6.4 During the 2019 ground investigation topsoil was encountered across the Scheme, predominantly in the agricultural fields. The maximum thickness recorded for the topsoil was 0.6 m.

9.6.5 Made ground was confirmed at various locations across the Scheme during the ground investigation. In the locations around the M54 Junction 1 made ground consisted of engineered fill from the construction of the M54 during the 1970s.

9.6.6 The exploratory locations undertaken during the ground investigation between the M54 Junction 1 and Featherstone overbridge encountered made ground described as clay and sand with glass fragments, burnt wood fragments, red brick, tiles, concrete, charcoal, rubber, metal, old railway sleepers and tyres. An aroma of tar/oil was also encountered in locations which had remnants of railways sleepers and tyres.

9.6.7 Ground investigation locations around the M6 Junction 11 encountered made ground consisting of firm to stiff gravels of sandstone, siltstone and quartz, slag, clinker, coal, concrete and brick. In addition a hydrocarbon odour was noted in the made ground at BH29 (M6 Junction 11).

Superficial Deposits

9.6.8 The BGS mapping indicates that the superficial deposits underlying the majority of the Scheme boundary are Devensian Till – Diamicton described by the BGS as "variable lithology, usually sand, silty clay with pebbles, but can contain gravel rich, or laminated sand layers; varied colour and consistency". Variations to this include a strip of alluvium associated with an unnamed watercourse (Watercourse 2) which runs north-east to south-west across the A460 and M6. The alluvium is described

as “normally soft to firm consolidated, compressible silty clay, but can contain layers of silt, sand, peat and basal gravel. A stronger, desiccated surface zone may be present”. No superficial deposits are present in areas around the Tower House Farm (North of M54), Rosemary House (on Hilton Lane) and the immediate area south of the alluvium strip. From Junction 2 of the M54 travelling eastwards for approx. 1.5km to Cat and Kittens Lane, the superficial deposits underlying the Scheme are Glacial Fluvial Deposits of Devensian sands and gravels.

9.6.9 Glacial till was encountered throughout the Scheme boundary, with the exception of the area near the River Penk Tributary where it was absent. Glacial till typically comprised firm to stiff reddish brown, slightly gravelly, slightly silty, slightly sandy clay. The gravel is subangular to rounded fine to coarse.

9.6.10 The glacial till predominantly overlies the glacial sands and gravels, which were encountered across the Scheme.

Bedrock geology

9.6.11 The BGS mapping indicates that the Chester Formation (Sandstone and Conglomerate Interbedded) of the Sherwood Sandstone Group bedrock geology underlies the majority of the Scheme boundary. Along the eastern edge of the Scheme boundary there are areas of the Clent Formation and Enville Formation, described by the BGS as undifferentiated mudstone and sandstone. To the east of the M54 Junction 1 a relatively thin strip of the Chester Formation (mudstone) crosses the M54 in a north-south orientation, overlying the interbedded sandstone and conglomerate. The Chester Formation in the West Midlands area generally comprises conglomerates and reddish brown, cross-bedded, pebbly sandstones with subordinate beds of red-brown mudstone. The BGS website describes this formation as “pebble conglomerates and reddish-brown sandstones. The sandstones are cross-bedded and pebbly. The conglomerates have a reddish brown sandy matrix and consist mainly of pebbles of brown or purple quartzite, with quartz conglomerate and vein quartz”.

9.6.12 The bedrock geology of the section from Junction 2 of the M54 towards Junction 1 of the M54 (from the junction to the former railway line) is Helsby Sandstone Formation, which is described by the BGS as “fine to medium grained locally micaceous, cross bedded and flat bedded sandstones, with weathering to sand near the surfaces. The sandstones are fluvial (sub-angular to sub rounded grains) and Aeolian (well-rounded grains) facies. Pebbles may be common near the base of the formation with thin units of hard intraformational conglomerate occurring. Thin lenticular beds of reddish brown siltstone and mudstone occur and may be common in fining upward sequences. Calcretes and rhizocretions occur at some horizons”.

9.6.13 There is a short section from the railway east of Junction 2 of the M54 for approx. 280 m from Cat and Kittens Lane where the bedrock geology is Wildmoor Sandstone Member consisting of generally “silty or argillaceous sandstones, fine to medium grained, bright orange red to dark brick red, with subordinate siltstone and mudstone and rare pebbles”.

9.6.14 The 2019 ground investigation confirmed the presence of sandstones from the Chester Sandstone Formation and mudstones and siltstones within the Clent Formation and Enville Member.

Geological sensitive sites

9.6.15 There are no designated or non designated geological sites within the study area. The Scheme is located within a Nitrate Vulnerable Zone.

Soil resources

9.6.16 The Soilscapes database describes the majority of the soils underlying the Scheme as 'loamy and clayey soil', slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils with impeded drainage, moderate to high fertility'. To the north-west and east of Shareshill are 'freely draining slightly acid loamy soils, freely draining and low fertility'. To the east of the M54 Junction 1 are 'sandy, some loamy, freely draining very acidic sandy and loamy soils, very low fertility.

9.6.17 The Soil Survey of England and Wales soil association mapping (Ref 9.35) (1:250,000 scale) shows the Clifton association to be present across the site. Clifton association soils are characterised by clay loam or sandy clay loam throughout, which is consistent with the soilscapes database.

9.6.18 Publicly available mapping sources, the Natural England Provisional ALC 1:250,000 map for the West Midlands Region (Ref 9.36), the Natural England ALC Grades - Post 1988 survey maps (Ref 9.37) were reviewed to identify the agricultural land classification along the Scheme alignment and within the Scheme boundary.

9.6.19 The Natural England guidance (Ref 9.21) defines best and most versatile (BMV) land as Grades 1 (excellent quality), 2 (very good quality), and 3a (good quality). The Natural England ALC Grades - Post 1988 Survey map (Ref 9.37) is only available for the area of the Scheme boundary north of Hilton Lane. The map indicates that the majority of this area, to the north of Hilton Lane (approximately 21 ha), is classified as Grade 2 (very good) agricultural land. There are small areas north of Hilton Lane classified as Grade 3a (good) and 3b (moderate) agricultural land, approximately 6 ha and 21 ha, respectively. However, the area located to the north-east of the A462 is classified as Grade 3a (good) agricultural land.

9.6.20 Agricultural land to the south of Hilton Lane, and from Junction 1 to Junction 2 of the M54, has been classified by the Natural England Provisional ALC 1:250,000 map (Ref 9.36) as Grade 3, approximately 91 ha, (good to moderate) but has not been subdivided into Grades 3a and 3b. An ALC survey was required to determine the division of the land identified as Grade 3 into areas of Grade 3a and Grade 3b.

9.6.21 ALC surveys were undertaken between 11 November 2019 and 05 December 2019. The result of the ALC surveys are presented in Appendix 9.2 [TR010054/APP/6.3]. The results report that Grade 2 land is found throughout the central portion of the Scheme. Subgrade 3a land is found in small areas across the south, centre and north of the Scheme. Land in the centre of the Site is limited by gradient to Subgrade 3b where slopes are between 8 to 9°. Gradient is a limiting

factor to agricultural land quality in the ALC guidelines because of both ease of working with machinery and risk of erosion. Any land steeper than 7 degrees cannot be classified as best and most versatile). West of Junction 11 of the M6, a restricted area of land is classified as Subgrade 3b due to the ground being impenetrable from depths of between 20 cm and 30 cm.

9.6.22 The areas of each ALC grade are given in Table 9.5 and the distribution is shown in Figure 9.4 [TR010054/APP/6.2]. Refer to Appendix 9.2 [TR010054/APP/6.3] for the results of the soils survey and further details of the agricultural land quality within the Scheme boundary.

Table 9.5: Agricultural land classification

Grade	Description	Area (ha) within the Scheme boundary	% of agricultural land within the Scheme boundary
1	Excellent quality	-	-
2	Very good quality	52.8	66
3a	Good quality	19.3	24
3b	Moderate quality	8.4	10
4	Poor quality	-	-
5	Very poor quality	-	-
	Total Agricultural	80.5	100
	Non-agricultural	118.8	-

9.6.23 The Staffordshire Agri-food Economy Review (Ref 9.38), states that Staffordshire contains a significant area of Grade 2 in the south of the county with Grade 3 found across much of the centre of the county and the majority of Grade 4 and 5 land being in the north of the county.

9.6.24 The Scheme boundary is located on the western edge of the National Character Area (NCA) for Cannock Chase and Cank Wood. The quality of agricultural land in the NCA is set out in Table 9.6. This shows the area of each grade, derived from the Provisional ALC map, and the proportion of each grade within the total agricultural land within the NCA. The assumption is made that Grade 3 is divided equally between Subgrades 3a and 3b.

Table 9.6: ALC within the Cannock Chase and Cank Wood NCA

Agricultural Land Classification	Area (ha)	Percentage of NCA (%)
Grade 1	0	0
Grade 2	6,695	19
Grade 3a	12,138	35
BMV	18,833	54
Grade 3b	12,138	35
Grade 4	4,186	11

Agricultural Land Classification	Area (ha)	Percentage of NCA (%)
Grade 5	0	0

9.6.25 Although the proportion of BMV land required for the Scheme is proportionally higher than is typical for the NCA, the area surrounding the Scheme (between the M6, M54 and A460) is predominantly BMV, with detailed ALC surveys showing that over 90% of the land is BMV land in Grades 2 and 3a.

9.6.26 The following locally designated sites of ecological importance were identified within the Scheme study area (refer to Chapter 8: Biodiversity for further details):

- Lower Pool SBI, Lower Pool pond and woodland (6.3 ha within the Scheme boundary).
- Brookfield Farm SBI, wet woodland (3.1 ha within the Scheme boundary).

Contamination

Conceptual Site Model

9.6.27 The following sections detail the CSM for the Scheme, defining the plausible contaminant source, pathway and receptor linkages, which are integral to defining baseline conditions. Figure 9.3 [TR010054/APP/6.2] illustrates a schematic drawing of the CSM for the Scheme.

Potential Sources of Contamination

9.6.28 Data obtained from the available sources and the 2019 ground investigation have been reviewed to identify current and historical potential contaminative land uses. A summary of the key areas of potentially contaminated land within the geology study area are summarised in Table 9.7. These key areas are split into those within the Scheme boundary, and those within 250 m of the Scheme boundary.

Table 9.7: Summary of potential sources of contamination within the study area.

Source location	Potential source	Description
Within the Scheme boundary and extending offsite.	Made Ground	Made ground associated with the former Hilton Colliery at Junction 1 of the M54 extends directly south for approximately 1.1 km and north for approximately 200 m. Made ground across the Scheme was recorded to a maximum depth of 6 m below ground level (bgl). Historical rail sidings, storage yards and conveyors and storage tanks (potentially fuel) associated with former Hilton Colliery, south of the M54 Junction 1. Made Ground associated with the construction of the M54 and M6. Historic 'Landfill Site Adjacent to A460' to the west of Junction 11.

Source location	Potential source	Description
		Landfill material recovered in trial pits during the ground investigation, which included off cuts of used railway sleepers, tyres, bricks, and concrete. Chrysotile containing Asbestos was identified as loose fibres in trial pit TP04.
	Historical mining of coal seams	The Scheme alignment north of Hilton Lane would pass to the west of historic underground mining from Hilton Main Colliery (south of the M54 junction 1, extending north towards the Hilton Hall Pools and mined between 1928 and 1938), although around Hilton Lane and south of Hilton Lane the route of the Scheme is directly above the historically mined area. The Scheme would be within very close proximity to the western boundary of the underground workings from Hilton Main Colliery, north of Hilton Lane until just south of Brookfield Farm, and is likely to encroach slightly within them.
	Agricultural use	Agricultural land used for both arable/livestock farming. Fertilisers, pesticides and herbicides may have been applied to the ground. Chemicals, e.g. if there are livestock there is the potential for a sheep dip, and fuels may have been stored on farmland. Also burial pits may be present where infectious carcasses or waste materials may have been disposed of.
	Soil leachate	Leachates associated with potential contaminants in made ground. Tier 2 screening indicate exceedances of Total Petroleum Hydrocarbons, Volatile Organic Compounds, Polycyclic Aromatic Hydrocarbons. Users of open ground with a low-level of activity (e.g. dog walking) e.g. Public Right of Way (PRoW) within 250 m of the Scheme boundary.

Table 9.8: Description of potential receptors

Potential Receptors	Description
Human health receptors	Includes users of the newly developed road. Residents who live within 500 m, employees and customers at facilities located within 500 m of the Scheme boundary.
Surface water and groundwater	The surface waters and hydrological features as identified in paragraph 9.6.36. The underlying Principal, Secondary 'A' and Undifferentiated aquifers as identified in paragraphs 9.6.32 to 9.6.35.
Development Infrastructure	Includes the newly developed road and any infrastructure built as part of the Scheme.
Construction Workers	Exposures experienced by construction workers are of shorter duration than for future site users due to the limited period of exposure. However, the nature of the exposure may be more

Potential Receptors	Description
	severe than for future site users as construction workers may be required to expose, treat, excavate and transport or otherwise engage in close contact with the exposed materials as a necessity. Construction workers and Maintenance workers involved in below ground works could be affected by the ground gases present within the Scheme boundary.
Flora and fauna	The Scheme would pass through areas designated 'Priority Habitat: Deciduous Woodland' and a priority area for Countryside Stewardship measures addressing Lapwing habitat issues.
Agricultural soils	Grade 2, Grades 3a and 3b agricultural land is present within the alignment of the Scheme.
Off-site Receptors	Includes people, surface waters (ponds etc) and groundwater, flora and fauna and agricultural soils situated outside the scheme extents.

Pathways

9.6.29 Table 9.9 provides a summary of the potential pathways by which contamination sources may come into contact with receptors considered most appropriate for the Scheme.

Table 9.9: Description of potential pathways

Potential pathways		Description
Soil pathways for the following sources: Made Ground. Soil leachate.	Dermal contact	Direct contact with contaminated ground soils, soil derived dust, soil leachate and perched water in the made ground.
	Ingestion	Direct or indirect ingestion of made ground soil and soil derived dust.
	Inhalation	Inhalation of made ground soil derived dust, organic vapours or ground generated gas.
Groundwater pathways for the following sources: Soil leachate. Groundwater	Infiltration and vertical migration via permeable strata	Rainfall infiltration can generate and mobilise made ground soil-derived leachate impacting on surface waters and groundwater. Majority of the Scheme would include areas of hard standing which would limit the amount of infiltration at the site.
	Lateral migration through aquifers	Aquifers allow transportation of contaminants through the permeable strata.
Gas Pathway including the following sources: Ground Gas	Vertical / Lateral Migration via permeable strata	Permeable strata may allow migration of ground gases and build up within confined spaces. Possible explosion risk.

Potential contaminant linkages

9.6.30 The potential contaminant linkages and associated risks identified for the Scheme are summarised in Table 9.10.

Table 9.10: Potential Contaminant Linkages

Source	Potential pathways	Receptors
Made ground and soil leachate	Inhalation/ingestion of soil derived dust. Inhalation of organic vapours Direct contact with soils/dusts Leaching into groundwater and migration to surface watercourses	Human health (future site users) Groundwater Surface water Agricultural soils
Groundwater	Infiltration and vertical migration via permeable strata. Lateral migration of contaminants through aquifers. Plant uptake of leached substances.	Surface watercourses Shallow and deep groundwater Human health (future site users)
Agricultural use	Inhalation/ingestion/dermal contact. Leaching of contaminants to groundwater in underlying aquifers.	Human health (future site users) Surface water Groundwater
Ground gases	Migration and diffusion via permeable strata	Human health (future site users) Receptors outside the Scheme boundary

Human Health Risk Assessment

9.6.31 A human health risk assessment has been undertaken and is reported in Appendix 9.1 [TR010054/APP/6.3]. Key findings of the risk assessment are summarised herein.

9.6.32 The results of the Generic Quantitive Risk Assessment (Tier 2 Screening assessment) of soil samples did not identify any exceedances of metal, or inorganic determinands when compared against the corresponding generic assessment criteria (GAC) for human health value for a commercial and industrial end use. However, single marginal exceedances of the GAC were recorded for Benzo(a)pyrene, Dibenz(a,h)anthracene and Benzo(b)fluoranthene in a sample of made ground obtained at a depth of 3 m bgl in BH29 situated on the M6 Junction 11 roundabout. Due to the marginal nature of these exceedances the soil results indicate that the various strata exhibit a negligible risk to human health.

Groundwater

9.6.33 The Devensian Till superficial deposits are designated as Secondary (Undifferentiated) aquifers, while the Alluvium deposits are designated as secondary ‘A’ aquifer. The Chester Formation is designated a ‘Principal’ aquifer by the Environment Agency. The Clent and Enville Formation, are designated as ‘Secondary A’ aquifers.

9.6.34 The majority of the Scheme is not within a SPZ. However, an SPZ3 (Total Catchment Area) crosses the Scheme boundary north to south at M54 Junction 2, which lies approximately 1 km west of the town of Featherstone. The SPZ 1 (Inner Protection Zone) is approximately 2.8 km west of the Scheme boundary. There are three recorded groundwater abstractions within 500 m of the Scheme. One lies approximately 400 m south-east of Junction 11, M6, water abstracted by Hollybush Nurseries for spray irrigation. One is approximately 240 m south of Junction 1, M54, abstracted by Tarmac Building Products for process water. The third is approximately 425 m south of the M54 east of Junction 1 abstracted by Essington Fruit Farm for spray irrigation. An unlicensed potable water supply abstraction (Latherford Farm) lies approximately 300 m north of the Scheme boundary. Reference to groundwater abstractions and private water supplies extending beyond the study area for Geology and Soils is recorded within the Chapter 13: Road Drainage and Water Environment along with a detailed understanding of the groundwater conditions.

9.6.35 Groundwater strike data was obtained from the historical borehole logs. The historic borehole logs record groundwater strikes at shallow depths within the superficial Devensian Till. In areas of thin superficial deposits where the solid geology of the Clent and Enville Beds are below thin topsoil covering the water strikes are at shallow depths. The Alveley Member and Chester Formation were often dry. Table 9.11 summarises the range and average depth of groundwater strikes within the strata and in the Scheme boundary.

Table 9.11: Summary of groundwater strikes from historical borehole logs

Strata	Groundwater strike depth range (Average depth) m/bgl.	Remarks
Alluvium	N/A	Described as damp throughout
Devensian Till	1.2 – 20.0 (5.5)	Described as a strong seepage
Clent and Enville Formation	2.3 – 7.2 (4.6)	Strikes within gravel
Alveley Member	4.0 – 7.0 (5.2)	N/A
Chester Formation	0.7 – 11.5 (5.7)	N/A

9.6.36 During the 2019 ground investigation and on six further occasions following the end of the ground investigation (29th August, 6th September, 5th, 12th, 18th and 25th November 2019), water levels within the borehole installations have been monitored. Results of this monitoring are shown in Table 9.12 and locations of the monitored boreholes can be found on drawing HE514465-ACM-EGT-M54_ZZ_ZZ_Z-DR-GS-0002 in Appendix 9.1 [TR010054/APP/6.3].

Table 9.12: Summary of groundwater levels across the Scheme

Borehole location	Borehole depth to base (m/bgl)	Min. depth to groundwater (m/bgl)	Max. depth to groundwater(m/bgl)
BH03	8.00	0.62	4.48
BH04	12.50	5.04	6.3
BH05	12.00	3.27	3.48
BH06	21.00	3.06	8.4
BH07	15.50	5.03	6.7
BH08a	28.20	2.06	3.79
BH09	27.00	8.21	9.28
BH10	13.50	4.89	8.69
BH11	14.00	4.13	4.92
BH12	5.00	0.27	1.40
BH16	12.00	6.77	8.68
BH18	12.00	1.55	3.55
BH20	15.00	10.74	12.96
BH21	5.00	1.03	1.99
BH22a	29.00	N/A	N/A
BH24	8.00	3.01	4.13
BH25	27.00	7.02	7.18
BH26	5.00	4.76	5.01
BH27	18.00	12.41	12.53
* During the ground investigation BH22a was found to have artesian properties.			

Surface Water

9.6.37 There are multiple small ponds throughout the agricultural land and wooded areas. The key surface water features within the study area are as follows (refer to Chapter 13: Road Drainage and the Water Environment, Section 13.6 and Figure 13.1 [TR010054/APP/6.2] for further details):

- several fisheries lakes operated by Millride Country Sports near Hill Farm, approximately 130 m south-east of M54 Junction 1;a pond at Tower House Farm, approximately 90 m north-east of M54 Junction 1;
- four large ponds to the west of Hilton Hall; Lower Pool associated with Lower Pool SBI and three fishing ponds (Red Feather Fisheries);
- several lakes and large ponds at Kings Pools Fishery west of the A460 Cannock Road;
- three ponds south-east of Brookfield Farm, the closest approximately 50 m away and online with Watercourse 4;

- four ponds associated with Brookfield Fishery 55 m north-west and 280 m north-east of the farm buildings at Brookfield Farm. The ponds lie alongside Latherford Brook and Watercourse 4;
- Latherford Brook (also referred to as Watercourse 5), a tributary of Saredon Brook, running south-east to north-west between the M6 and A460;
- six un-named watercourses cross the Scheme boundary (Watercourse 1, 2, 3, 4, 6 and 7);
- Staffordshire and Worcestershire Canal lies 440 m west of Junction 2, M54; and
- a drain lies along the eastern edge of the railway line east of Junction 2, M54.

Controlled Waters Risk assessment

9.6.38 A controlled waters risk assessment has been undertaken and is reported in Appendix 9.1 [TR010054/APP/6.3]. The Tier 2 (screening) controlled waters risk assessment identified potential risk to surface water and groundwater from potential contaminant concentrations in groundwater within the Scheme boundary. The determinands which failed at the Tier 2 screening stage were then taken on to the next stage of risk assessment which is Detailed Quantitative Risk Assessment.

9.6.39 The detailed quantitive risk assessment was carried out using the Environment Agency Remedial Targets Worksheet for the contaminants identified in groundwater within the made ground and natural ground across the Scheme. The results indicated that there was negligible risk to identified receptors from organic contaminants. The assessment concluded that there was a very low risk to receptors from metals including cadmium, chromium (hexavalent), copper, nickel and zinc.

Ground gas risk assessment

9.6.40 A ground gas risk assessment was undertaken and included in the Ground Investigation Report (Appendix 9.1 [TR010054/APP/6.3]), the findings of which are summarised as follows.

9.6.41 The assessment of the gas risk indicates that nine of the eighteen locations monitored are classed as Characteristic Situation (CS) 1(very low risk). Five locations (two in the superficial deposit strata, two in the weathered bedrock and one in the bedrock) are classed as CS2 (low risk), three readings (one in the superficial deposits and two in the weathered bedrock) are classed as CS3 (moderate risk) and one reading taken in the Made Ground is classed as CS4 (moderate to high risk).

Future baseline

9.6.42 As detailed in Chapter 4: Environmental Impact Assessment Methodology, in order to identify the effects of the Scheme on environmental features, it is important to understand the baseline at the year of construction commencement and at the year the Scheme becomes operational. The baseline conditions for these years may be

different to the current conditions and such changes could alter the sensitivity of existing environmental receptors, as well as introduce new sensitive receptors.

Construction year baseline (2021)

9.6.43 The potential for the baseline ground conditions to change in the lead up to the construction of the Scheme is limited to the extent to which any new development necessitates remediation or mitigation measures to control potential contamination releases. Any new development along the Scheme on potentially contaminated land would need to be suitable for its intended use as set out in the NPPF (Ref 9.7). To meet this requirement new development sites may require remediation to be undertaken. This would mean that some areas described as having potentially contaminative current or historical land use, may no longer be of significance at the time of construction of the Scheme. There are no known application sites within the Scheme boundary where this may apply.

9.6.44 The potential for the baseline conditions to change would also depend on whether any land has been classified as contaminated land, none has been classified currently, by the Local Authority under Part 2A of the Environmental Protection Act 1990. A number of mechanisms drive these determinations. Therefore, they are difficult to predict. Where Part 2A determinations are made, the potential baseline change would occur where remediation works are subsequently undertaken. Based on the above, the land quality assessment does not consider any significant future changes to the baseline ground conditions by 2021.

9.6.45 No developments anticipated to be operational by 2021 have been identified within the geology and soils study areas.

Opening year baseline (2024)

9.6.46 The potential for the baseline to have changed by the time the Scheme is operational is limited to the extent to which any new development, between 2021 and 2024, necessitates remediation or mitigation measures to control potential contamination. There are four proposed new developments within 500 m of the Scheme boundary which are due to be built by 2024. However, it is not envisaged that these developments would materially alter the baseline conditions in 2024 for land quality.

9.6.47 The proposed developments are:

- Land at Brinsford Lodge, Featherstone (Development ID 23), 60 houses on 2.5 ha of land.
- Hilton Cross Business Park, Featherstone (Development ID 30) is a Regional Investment Site for B1, B2 and B8 use.
- Regeneration Corridor 1, Pendedeford, Fordhouses (Development ID 43). A premier high quality employment location in the Black Country and a focus for leading edge, high technology industry in the Wolverhampton to Telford High Technology Corridor. I54 access improvements including M54 J2 and Vine Island/Wobaston Road. Rapid transit on Stafford Road. Enhancement of existing open space and canal network, maintaining drainage functions to

minimise flood risk. High quality design to attract high value occupiers. Additional 10ha of additions to employment land between 2009 - 2026. New park and ride site located at Brinsford.

- Outline application to demolish an existing house (Development ID 45) and erect one house and two bungalows.

9.7 Potential impacts

9.7.1 Mitigation measures are being incorporated in the design and construction of the proposed Scheme which are set out in Section 9.8. Before the implementation of mitigation measures, a summary of the potential impacts on geology and soils, both beneficial and adverse, associated with the construction and operation of the Scheme is outlined as follows.

Construction

9.7.2 In relation to potentially contaminative land uses, the following adverse impacts could potentially arise as a result of construction of the Scheme:

- mobilising existing contamination in soil and groundwater as a result of ground disturbance and de-watering during construction;
- increasing the potential for contaminants in unsaturated soils to leach to groundwater in open excavations during construction;
- increasing the potential for contaminated surface run-off to migrate to surface water and groundwater receptors as a result of leaching from uncovered stockpiles;
- introducing new sources of contamination, such as fuels, chemicals and oils used during construction activities;
- increasing the potential of construction workforces (from handling, storage and exposure) to possibly unknown contaminants/ waste as a result of working through known historical landfills; and
- creating preferential pathways for the migration of soil contamination and gases, for example along new below ground service routes, service ducts and as a result of dewatering.

9.7.3 With regard to existing geological and soils resources, construction has the potential to result in the following adverse impacts:

- Degradation of soil resources (including damage to soil structure, reduced biological function, mixing of soil types) resulting from the compaction of soil due to heavy construction vehicle movement, changes in topography, handling and storage of soils, or ground stability impacts.
- The temporary and permanent loss of best and most versatile agricultural soils through land-take.
- Impacts to farm based enterprises due to loss of or disruption to buildings and operational infrastructure, including impact to sensitive crops due to dust

deposition during construction. Disruption to drainage, irrigation and water supply systems and construction noise on farm and farm-based enterprises.

- The generation of waste soils that cannot be reused elsewhere on the proposed Scheme, requiring off-site disposal as waste.

9.7.4 Construction has the potential to result in beneficial impacts through the following:

- Creation of a new geological features or attributes, for example through fresh exposure of a geological sequence in a road cutting.
- Removal or treatment of contaminated soil, with the effect that existing adverse effects on receptors are removed.
- A reduction in soil erosion through improved drainage.

Operation

9.7.5 During operation of the Scheme, road users, and the road infrastructure would be introduced as new receptors. Any contamination deemed by risk assessment to have posed a significant risk to the Scheme, would have been removed or remediated during the construction phase. Previous risk assessment and any subsequent mitigation measures would have already been undertaken to satisfactorily close out any residual risks identified as part of the construction phase.

9.7.6 Following the opening of the Scheme, soils adjacent to the road may be affected by spray or airborne contaminants generated during routine maintenance and operation of the road or released during road accidents/emergency situations.

9.8 Design, mitigation and enhancement measures

Embedded mitigation

9.8.1 The Scheme has been designed, as far as possible, to avoid and minimise impacts and effects on the geology and soils environment through the process of design-development (refer to Chapter 3: Assessment of Alternatives) considering good design principles. Embedded mitigation defined within the DMRB as 'Design measures which are integrated into a project for the purpose of minimising environmental effects.' is reported as part of the scheme description in Chapter 2: The Scheme. The following section reports the essential mitigation required in addition to embedded mitigation to reduce and offset likely significant adverse environmental effects.

Essential mitigation

9.8.2 A number of essential mitigation measures have been identified to reduce, remediate or compensate likely significant adverse environmental effects.

Construction

9.8.3 Construction of the Scheme would be subject to measures and procedures as defined within the Outline Environmental Management Plan (OEMP) for the Scheme [TR010054/APP/6.11]. The OEMP includes a range of measures to enable compliance with relevant standards and legislation as associated with

geology and soils. The measures detailed within the OEMP would be developed into a Construction Environmental Management Plan (CEMP) and implemented by the selected construction contractor. Such measures accord with legal compliance and best practice guidance when working with or around contaminated materials.

9.8.4 Before construction, an earthworks strategy, which may include a remediation strategy for isolated areas of the Scheme, will be required. The strategy will set out how the earthworks/ excavation stage of the Scheme will be undertaken. Where necessary, the strategy will consider what materials, if any, can be reused and what materials are surplus and require either disposal or onward management to ensure appropriate re-use. The strategy will also define whether any treatment may be required, prior to reuse or disposal as well as establishing risk-based compliance criteria for soils to be screened against. The strategy will cover site clearance and the works required to prepare it for development. A remediation strategy will be prepared where significant contamination is encountered during any future ground investigation.

9.8.5 A Materials Management Plan (MMP) will be prepared alongside the earthworks strategy. The MMP will detail the procedures and measures that will be taken to classify, track, store, dispose of and possibly re-use all excavated materials that are expected to be encountered during the development works.

9.8.6 The disposal of soil waste, contaminated or otherwise to landfill sites will be best mitigated by minimisation of the overall quantities of waste generated during construction and by ensuring that excavated material consigned to landfill cannot, as an alternative, be put to use either on site or on other sites (see Chapter 10: Materials Assets and Waste).

Human health receptors

9.8.7 The potential impacts on human health receptors including off-site receptors would be addressed through the adoption of the following measures, which would be included in the CEMP:

- damping of ground with water to minimise dust;
- sheeting of lorries transporting spoil off site and the use of dust suppression equipment on plant;
- groundwater level controls (as required);
- adequate fuel/chemical storage facilities e.g. bunded tanks, hard standing and associated emergency response spillage control procedures;
- well maintained plant and associated emergency response/spillage control procedures; and
- any temporary onsite storage of contaminated material would be stored on sheeting and covered to minimise the potential for leachate and run off from the stockpile being generated.

9.8.8 The historical land use of the study area does not include activities that would result in asbestos contamination. The materials and reclamation strategy and safe work plan would include provisions for asbestos containing material should it be

encountered during the earthworks. The reclamation strategy and/or earthworks specification will detail works to reduce the gassing potential of made ground within the area of BH03 in the vicinity of M54 Junction 1.

Controlled waters

9.8.9 The mitigation measures detailed in Chapter 13: Road Drainage and the Water Environment would ensure that the surface water run-off from the construction site (site preparation, earthworks and construction activities) do not have a detrimental effect on any receiving waterbodies. or underlying Principal and Secondary A Aquifers. Surface water run-off would be controlled using appropriate drainage measures to minimise infiltration of the surface waters into the ground. This would minimise the potential for contaminants to migrate into controlled waters during construction.

9.8.10 If piled foundation solutions are required for the Scheme, then piling risk assessments would need to be undertaken in accordance with Environment Agency guidance. Construction involving piling or penetrative ground improvement would require a location-specific risk assessment to establish the means of mitigating the risks of causing new pollutant linkages or worsening existing ones with respect to risks to controlled waters at the construction stage. This would be undertaken during the detailed design of the Scheme.

Soil resources

9.8.11 Potential impacts specific to contamination impacting on soil resources would be mitigated through the following measures:

- Works would be in compliance with BS 3882:2015 'British Standard Specification for Topsoil and Requirements for Use' (2015) and the Defra Construction Code of Practice for the sustainable use of soils on construction sites (Ref 9.16).
- The source of topsoil and subsoil would be investigated carefully with respect to its suitability for the intended use.
- A Soil Resource Plan would need to be prepared by the contractor prior to the start of construction. The Soil Resource Plan would detail the areas and type of topsoil/subsoil to be stripped, stripping method, haul routes and the management of the soil stockpiles.
- Topsoil would be handled only in the appropriate conditions of weather and soil moisture, and with suitable machinery in line with the Defra Construction Code of Practice (Ref 9.16).
- The stockpiling of soils would be avoided whenever possible. Where stockpiling is unavoidable, heaps would be tipped loosely and the surface firmed and shaped to shed water. Where soils are to be stockpiled for more than six months the surface would be seeded with a grass/ clover seed mix.
- Where possible, topsoil would be re-used on site as applicable.
- The movement of traffic would be confined to designated haul routes to reduce the amount of heavy machinery going over soil materials which could

cause compaction of soil materials. Such routes would exclude areas of proposed landscaping.

- Following the completion of construction activities, agricultural land taken on a temporary basis would be restored and returned to the landowner for unrestricted agricultural use in the same agricultural condition that currently exists (refer to Section 9.6).

Agricultural Soils

9.8.12 The footprint of the scheme has been designed through optioneering to reduce the loss of BMV agricultural land where possible, see Chapter 3: Assessment of Alternatives, Table 3.2, Table 3.4 and paragraph 3.3.56.

9.8.13 There are no universally applicable measures available to mitigate the direct loss of agricultural land.

9.8.14 The primary measures to mitigate the impacts on soil resources would be set out in a Soil Management Strategy, to be prepared at the detailed design stage. The Soil Management Strategy would include a Soil Resource Plan and Soil Handling Strategy which would confirm the different soil types (based on the soil surveys already undertaken); the most appropriate re-use for the different types of soils; and the proposed methods for handling, storing and replacing soils on-site.

9.8.15 The aim of a Soil Resource Plan will be to re-use as much of the surplus soil resources on-site in the detailed design of the Scheme. Any surplus soils will be used in a sustainable manner (i.e. as close to the Scheme as possible and to an after-use appropriate to the soils quality) in accordance with Defra's Construction Code of Practice for the Sustainable Use of Soils on Construction Sites.

9.8.16 The quality of soils retained on-site or exported off-site (if required) will be maintained by following good practice guidance on soil handling and storage, particularly to avoid compaction and biodegradation of soils that are to be retained on site in storage. In this respect, topsoil must be stockpiled separately to subsoil.

9.8.17 With the adoption of appropriate mitigation for the handling and restoration of soils, as part of a CEMP, most soils will be able to continue their various ecosystem functions on or off site, principally as a medium for producing food and biomass; for storing and cycling water and carbon; and for supporting habitats, biodiversity and landscape planting.

<u>Operation</u>

9.8.18 The mitigation measures detailed in Chapter 13: Road Drainage and the Water Environment (refer to Section 13.8) and Chapter 2: The Scheme would prevent the pollution of controlled waters during the Scheme operational phase.

9.8.19 Potential risks posed to maintenance workers would be mitigated through adherence to appropriate site and task specific health and safety documentation, required for legal compliance.

9.8.20 Any spillages on the Scheme following road accidents would be routinely managed by Highways England who is responsible for the maintenance of trunk road assets

with the Area 9 West Midlands Region (refer to Chapter 13: Road Drainage and the Water Environment, Section 13.8).

Enhancement measures

9.8.21 No enhancement measures have been identified in relation to geology and soils.

9.9 Assessment of likely significant effects

Construction

Contamination - human health receptors

9.9.1 Human health receptors potentially affected by the Scheme during the construction phase include; construction workers, people living close to the Scheme in residential areas and those using commercial/industrial properties in the vicinity of the Scheme. Exposure to contaminants could occur through various pathways including; dermal contact, ingestion, inhalation and migration through groundwater. The sensitivity of these receptors ranges from medium to very high, the highest rating concerns residents living in close proximity of the Scheme who would experience prolonged exposure. However, the magnitude of impact is considered negligible due to there being no significant contaminant concentration exceedances that would warrant additional control measures to reduce the risk as the overall risk to human health is low. With standard mitigation measures in place as outlined in the OEMP [TR010054/APP/6.11] the impact on construction workers is considered to be minor adverse due the close contact with soils. The significance of these effects on human health receptors is considered to be no worse than slight adverse which is not significant.

9.9.2 The risks from accumulation of ground gases are considered to be during the construction and maintenance phases. During the construction phase, access to confined spaces and excavations should be restricted. Where work in confined spaces in unavoidable, a site specific and task specific risk assessments should be undertaken prior to the commencement of the works. Monitoring of confined spaces for potential ground gas accumulation should be carried out and the works should be undertaken by suitably trained personnel with the use of specialist personal protective equipment where necessary. Maintenance workers that are required to undertake excavations during the operational life of the Scheme would be provided with sufficient information on the nature of each sub area at the site, upon which to base site and task specific risk assessments. Such work would also include measures as detailed in the OEMP to minimise the effects of the work on human health.

Contamination - surface water and groundwater

9.9.3 No remedial works are considered necessary regarding the potential risks to surface waters and groundwater from the concentrations of potential contaminants in groundwater recorded within the Scheme boundary. The sensitive water receptors include; groundwater abstractions which can be polluted or rendered inactive during dewatering activities, groundwater aquifers which can be polluted and then act as a pathway to laterally migrate contamination through the aquifer to

underlying aquifers, and surface water features which can be polluted and migrate contaminants to other water courses. The sensitivity of these receptors range from low to high. Construction works would be carried out in accordance with the CEMP, and Water Management Plan resulting in a minor adverse impact. Mitigation measures are detailed in Chapter 13: Road Drainage and the Water Environment, Section 13.8. The significance of these effects on surface water and groundwater receptors is considered to be no worse than slight adverse which is not significant.

Soil Resources

9.9.4 The construction of the Scheme would necessitate a loss of soil resources. The footprint of the Scheme has been designed through optioneering to reduce the loss of BMV agricultural land, minimising the footprint of the Scheme where possible, see Chapter 3: Assessment of Alternatives, Table 3.2, Table 3.4 and paragraph 3.3.56. However the area surrounding the Scheme contains a high percentage of BMV agricultural land and therefore loss of BMV land could not be avoided.

9.9.5 The Scheme would result in 41.8 ha permanent loss and 11 ha temporary loss of Grade 2 (very high value); 15.5 ha permanent loss and 4.7 ha temporary loss of Grade 3a (high value); and 7.3 ha permanent loss and 1.2 ha temporary loss of Grade 3b (medium value) agricultural land to facilitate the Scheme. As shown in Table 9.13 this would result in the loss of 56.3 ha of BMV soils from agricultural use, 0.7% of the BMV soils within the NCA.

Table 9.13: Impact on agricultural soils in the NCA.

ALC	Total area of ALC in the NCA (ha)	Total area permanently impacted by the Scheme (ha)	Percentage of ALC in the NCA permanently impacted (%)
Grade 2	6,695	41.8	0.6
Grade 3a	12,138	14.5	0.1
Grade 3b	18,833	7.3	0.03

9.9.6 Table 9.14 sets out the total permanent loss of ALC land (by grade) and the proposed change in land use with the Scheme. This demonstrates that less than 8 ha of BMV would be sealed permanently by the Scheme, with the remaining area required to deliver environmental mitigation which would therefore no longer be available for agricultural use.

Table 9.14: Area of ALC permanently impacted by the Scheme

Aspect of the Scheme	Area of ALC permanently impacted (ha)			
	Grade 2	Grade 3a	Total BMV (Grade 2 and 3a)	Grade 3b
Amenity grassland	1.4	0.2	1.6	0.22
Drainage ponds	0.6	0.5	1.1	-
Ecology ponds	1.1		1.1	-
Marsh and wetlands	0.7	0.3	1	-

Species rich grassland	15.5	7.3	22.8	4.6
Ancient woodland compensation planting		1.4	1.4	0.55
Woodland planting	15.3	1.1	16.4	0.087
Hardstanding (permanently sealed)	5.8	1.9	7.7	0.8
Returned to current state (permanently acquired)	1.4	1.8	3.2	1
Total area of agricultural land permanently acquired	41.8	14.5	56.3	7.3

9.9.7 There would be a permanent loss of 0.01 ha and temporary loss of 0.05 ha of soil which support local wildlife sites, Lower Pool SBI and Brookfield Farm SBI during construction. Using professional judgement, the magnitude of impact on soils which support local wildlife sites is considered to be minor adverse due to the small area of soils that would be permanently lost as a result of the Scheme.

9.9.8 The significance of these effect resulting from the permanent loss of soils is very large adverse for Grade 2 soils; moderate adverse for Grade 3a soils and moderate adverse for Grade 3b soils. The loss of soils which support sites of nature conservation importance (Lower Pool SBI and Brookfield Farm SBI) would result in a slight adverse effect.

Geology

9.9.9 No designated important geological exposures have been identified within 250 m of the Scheme boundary. The sensitivity of geology across the Scheme is very low and is not of local interest. The magnitude of impact would be negligible as the overall integrity of the resource would not be affected. The Scheme would have a neutral effect on geology during Scheme construction, which is not significant.

Operation

Contamination - human health receptors

9.9.10 The main human receptors affected by the Scheme during the operation phase include; maintenance workers, future users of the road, people living close to the Scheme in residential areas and those using PRoW, commercial/industrial properties in close proximity to the Scheme. Exposure to contaminants could occur through various pathways including; through dermal contact, ingestion, inhalation and migration through groundwater. The sensitivity of these receptors ranges from medium to very high, the highest rating concerning residents living in the vicinity who would experience prolonged exposure. However, the magnitude of impact is considered negligible due to there being no significant contaminant concentration exceedances that would warrant additional control measures to reduce the risk. Maintenance workers would be required to adopt safe working practices under relevant health and safety legislation, no additional mitigation measures are required as operation of the Scheme is unlikely to result in significant effects on offsite receptors. With regards to geology and soils, and the potential exposures to

future users of the Scheme the impact would be negligible and transient in nature and therefore unlikely to interact with the underlying ground conditions and hydrogeology. The significance of these effects on human health receptors is considered to be neutral which is not significant.

9.9.11 There is considered not to be a significant risk from ground gas during the operation phase as ground gas accumulation is only considered a risk in confined/enclosed spaces.

Contamination - surface water and groundwater

9.9.12 The sensitive water receptors include; groundwater abstractions which can be polluted, groundwater aquifers and surface water features which could experience a reduction in groundwater quality due to an uncontrolled release of pollutants, and surface water features which can be polluted and migrate contaminants to other water courses. The sensitivity of these receptors is considered to be medium and from the results of the ground investigation and the low risk of contamination to groundwater the magnitude of the impact is minor adverse. Mitigation measures are detailed in Chapter 13: Road Drainage and the Water Environment, Section 13.8. The significance of these effects on human health receptors is considered to be slight adverse which is not significant.

Soil resources

9.9.13 No further impacts are anticipated beyond those occurring during the construction phase. No additional mitigation measures are required.

Geology

9.9.14 The operation of the Scheme would result in no change to geology resources (very low value) resulting in a neutral effect which is not significant.

9.9.15 A summary of the residual effects on geology, soils and receptors for contaminated land during construction and operation of the Scheme is presented in Table 9.15 and Table 9.16.

Table 9.15: Summary of residual effects on geology, soils and contaminated land during construction

Description of resource/ receptor and impact	Sensitivity of receptor	Magnitude of impact	Significance of residual effects
Contaminated land - human health receptors			
Off-site receptors of residential area, - exposure to contaminants, vapour, dust and vapours, migration through groundwater.	Very high	Negligible	Slight adverse (not significant)
Off-site receptors of PRoW users (public open spaces) - exposure to contaminants, vapour, dust and vapours, migration through groundwater.	High	Negligible	Slight adverse (not significant)
Off-site receptors to commercial and industrial areas- exposure to contaminants, vapour, dust and vapours, migration through groundwater.	Medium	Negligible	Neutral (not significant)
Construction workers – exposure to contaminated soils, groundwater, and ground gas	Medium	Minor adverse	Slight adverse (not significant)
Contaminated land – groundwater and surface water			
Groundwater aquifers – reduction in groundwater/quality due to uncontrolled release of pollutants. Lateral migration of contamination through aquifer. Leaching of contaminants to underlying aquifers. Migration of contaminated water through preferential pathways (such as piling) to groundwater in underlying aquifers.	High	Minor adverse	Slight adverse (not significant)
Watercourses 1 and 4 - Reduction in surface water quality due to uncontrolled release of pollutants. Migration of contaminants to surface watercourses. Discharge of contaminants entrained in surface water run off followed by overland flow and discharge.	Low	Minor adverse	Neutral (not significant)
Watercourses 2, 3, 6 and 7 - Reduction in surface water quality due to uncontrolled release of pollutants. Migration of contaminants to surface watercourses. Discharge of contaminants entrained in surface water run off followed by overland flow and discharge.	Medium	Minor adverse	Slight adverse (not significant)
Watercourse 5 (Latherford Brook) - Reduction in surface water quality due to uncontrolled release of pollutants. Migration of contaminants to surface watercourses. Discharge of contaminants entrained in surface water run off followed by overland flow and discharge.	High	Minor adverse	Slight adverse (not significant)

Description of resource/ receptor and impact	Sensitivity of receptor	Magnitude of impact	Significance of residual effects
Ponds at Brookfield Farm - Reduction in surface water quality due to uncontrolled release of pollutants. Migration of contaminants to surface watercourses. Discharge of contaminants entrained in surface water run off followed by overland flow and discharge.	High	Minor adverse	Slight adverse (not significant)
Ponds at Kings Pool, Lower Pool and west of Hilton Hall - Reduction in surface water quality due to uncontrolled release of pollutants. Migration of contaminants to surface watercourses. Discharge of contaminants entrained in surface water run off followed by overland flow and discharge.	Medium	Minor adverse	Slight adverse (not significant)
Soil resources			
Permanent loss of 41.8 ha of soil resources BMV agricultural land Grade 2 (5.8 ha of which would be permanently sealed under hardstanding)	Very high	Major adverse	Very large adverse (Significant)
Temporary loss of 11 ha of soil resources BMV agricultural land Grade 2	Very high	Minor adverse	Moderate adverse (Significant).
Permanent loss of 14.5 ha of soil resources BMV agricultural land Grade 3a (1.9 ha of which would be permanently sealed under hardstanding)	High	Moderate adverse	Moderate adverse (significant)
Temporary loss of 4.7 ha soil resources BMV agricultural land Grade 3a	High	Minor adverse	Slight adverse (not significant)
Permanent loss of 7.3 ha of soil resources agricultural land Grade 3b (0.8 ha of which would be permanently sealed under hardstanding.	Medium	Moderate adverse	Moderate adverse (significant)
Temporary loss of 1.2 ha of soil resources agricultural land Grade 3b.	Medium	Minor adverse	Slight adverse (not significant)
Permanent loss of 0.01 ha of soils supporting sites of nature conservation importance, e.g. local wildlife sites	Medium	Minor adverse	Slight adverse (not significant)
Temporary loss of 0.05 ha of soils supporting sites of nature conservation importance, e.g. local wildlife sites	Medium	Minor adverse	Slight adverse (not significant)

Description of resource/ receptor and impact	Sensitivity of receptor	Magnitude of impact	Significance of residual effects
Impact on geology	Very low	Negligible	Neutral (not significant)

Table 9.16: Summary of geology and soils effects during operation

Description of resource/ receptor and impact	Sensitivity of receptor	Magnitude of impact	Significance of residual effects
Off-site receptors of residential area (human health), - exposure to contaminants, vapour, dust and vapours, migration through groundwater.	Very high	Negligible	Slight adverse (not significant)
Off-site receptors of PRoW (human health) – exposure to contaminants, vapour, dust and vapours, migration through groundwater.	High	Negligible	Slight adverse (not significant)
Off-site receptors to commercial and industrial areas (human health) - exposure to contaminants, vapour, dust and vapours, migration through groundwater.–	Medium	Negligible	Neutral (not significant)
Future site users (human health) – exposure to contaminants dust and vapour	Medium	Negligible	Neutral (not significant)
Maintenance workers (human health) – exposure to contaminated soils groundwater, ground gas.	Medium	Negligible	Neutral (not significant)
Groundwater (abstraction) – pollution of resource	Medium	Minor adverse	Slight adverse (not significant)
Groundwater aquifers – reduction in groundwater quality due to uncontrolled release of pollutants.	Medium	Minor adverse	Slight adverse (not significant)
Surface waters – reduction in surface water quality due to uncontrolled release of pollutants.	Low to high	Minor adverse	Slight adverse (not significant)
Effect on agricultural soils. No further loss of agricultural land anticipated during the operational phase.	Very low	No change	Neutral (not significant)

Description of resource/ receptor and impact	Sensitivity of receptor	Magnitude of impact	Significance of residual effects
Loss of topsoil and subsoil – no further loss of topsoil and subsoil anticipated during the operational phase.	Very low	No change	Neutral (not significant)
Impact of local geological sites – no further impact on local geological sites anticipated during the operational phase.	Very low	No change	Neutral (not significant)

9.10 Monitoring

9.10.1 The Scheme would have significant adverse residual effects upon agricultural land within the Scheme boundary, primarily due to the proportion of temporary and permanent land take required to construct the Scheme. Where agricultural land taken on a temporary basis is restored and returned to the landowner for continued agricultural use, post-construction monitoring would be required to determine whether pre-existing agricultural soil capability had been reinstated. Soil conditions would also be monitored in the proposed areas of species rich grassland and woodland creation to ensure the soil is of an appropriate condition to support the establishment of proposed habitats. Monitoring will be undertaken in Year 1 and Year 5. Such monitoring requirements would be detailed in a Soil Management Strategy, the requirement for which is detailed in the OEMP [TR010054/APP/6.11].

9.10.2 No other significant residual effects have been identified, therefore no further monitoring is required.

9.11 References

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Ref 9.2 Highways England (2019) Design Manual for Roads and Bridges, Volume 11, Section 3, Part 11, LA 104 Environmental Assessment and Monitoring

Ref 9.3 Environmental Protection Act 1990

Ref 9.4 The Water Act 2003

Ref 9.5 The Water Resources Act 1991

Ref 9.6 Department for Transport (2014) National Policy Statement for National Networks (NPSNN)

Ref 9.7 Ministry of Housing, Communities and Local Government (2019) National Planning Policy Framework (NPPF)

Ref 9.8 Ministry of Housing, Communities and Local Government (2014) Land affected by contamination. Available online at: https://www.gov.uk/guidance/land-affected-by-contamination

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Ref 9.12 Department for Environment, Food and Rural Affairs (Defra) (2009) Safeguarding our Soils, A Strategy for England.

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Ref 9.14 Environment Agency (2019) Land Contamination : Risk Management. Available online at https://www.gov.uk/guidance/land-contamination-how-to-manage-the-risks

Ref 9.15 British Standards BS10175+A2:2017 'Investigation of Potentially Contaminated Sites – Code of Practice' 2017

Ref 9.16 Environment Agency (2017) Soil Screening Values for Assessing Ecological Risks.

Ref 9.17 British Standards BS3882:2015 'Specification for Topsoil and Requirements for Use', 2015

Ref 9.18 CIRIA C552 'Contaminated Land Risk Assessment. A Guide to Good Practice', 2001

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Ref 9.20 Contaminated Land: Applications in Real Environments (CL:AIRE) 'The Definition of Waste: Development Industry Code of Practice', V2, 2011

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Ref 9.22 Highways Agency (2002) HA069/001/006822 2 M54 to M6 Toll Link Road – Geotechnical Preliminary Sources Study Report (PSSR) Volume 1 and 2 of 2, Issue 1.

Ref 9.23 Highways Agency (2008) 5049906/GT/PSSR/001 M54 to M6/M6 (Toll) Link Road – Geotechnical PSSR Rev2.

Ref 9.24 Highways England (2015) M54 – M6/M6 Toll Link Road Scheme. Preliminary Sources Study Report Addendum.

Ref 9.25 Highways England (2015) M54M6-ATK-0000-ZZ00-RP-C-001M54 – M6/M6 Toll Link Road Scheme. PCF Stage 2 Environmental Assessment Report.

Ref 9.26 British Geological Survey (BGS) 'Geoindex Onshore' Available online at: https://www.bgs.ac.uk/GeoIndex/

Ref 9.27 Department for Environment, Food and Rural Affairs (Defra) 'MAGIC' website (last accessed 14/06/19).

Ref 9.28 Ordnance Survey Explorer Map 244 Cannock Chase and Chasewater

Ref 9.29 Ordnance Survey Explorer Map 127 South Molton and Chulmleigh

Ref 9.30 Cranfield Soil and Agrifood Institute 'Soilscapes' database (last accessed 24/06/19).

Ref 9.31 Coal Authority online interactive maps (last accessed 24/04/2019).

Ref 9.32 Landmark Envirocheck Report 120340012_1_1 (05-Apr-2017).

Ref 9.33 Highways England (2018) M54-M6/M6 Toll Link Road: PCF Stage 3 EIA Scoping Report. Available online at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010054/TR010054-000025-54M6-Scoping%20Report.pdf

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