East Midlands Gateway
Phase 2 (EMG2)

Document DCO 6.13/MCO 6.13

ENVIRONMENTAL STATEMENT

Volume 1 Main Statement

Chapter 13

Flood Risk and Drainage

July 2025

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The East Midlands Gateway Phase 2 and Highway Order 202X and The East Midlands Gateway Rail Freight and Highway (Amendment) Order 202X

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13. Flood Risk and Drainage

13.1. Introduction

13.1.1. This chapter of the ES evaluates any potential significant effects of the **EMG2 Project** as described in full in **Chapter 3: Project Description (Document DCO 6.3/MCO 6.3)** on the environment in respect of Flood Risk and Drainage.

13.1.2. In brief, the **EMG2 Project** comprises three main components as follows:

Main Component	Details	Works Nos.
DCO Application		
EMG2 Works	Logistics and advanced manufacturing development located on the EMG2 Main Site south of East Midlands Airport and the A453, and west of the M1 motorway. Together with an upgrade to the EMG1 substation and provision of a community park.	DCO Works Nos. 1 to 5 as described in the draft DCO. DCO Works Nos. 20 and 21 as described in the draft DCO.
Highway Works	Works to the highway network: the A453 EMG2 access junction works; significant improvements at Junction 24 of the M1 (referred to as the J24 Improvements) and works to the wider highway network including active travel works.	DCO Works Nos. 6 to 19 as described in the draft DCO.
MCO Application		
EMG1 Works	Additional warehousing development on Plot 16 together with works to increase the permitted height of the cranes at the EMG1 rail-freight terminal, improvements to the public transport interchange, site management building and the EMG1 access works.	MCO Works Nos. 3A, 3B, 5A, 5B, 5C, 6A and 8A in the draft MCO.

13.1.3. The following information accompanies this chapter as technical appendices

- **Appendix 13A: Flood Risk and Drainage Study Area Figure** (**Document DCO 6.13A/MCO 6.13A**)
- **Appendix 13B: Surface Water Bodies Figure (Document DCO 6.13B/MCO 6.13B)**
- **Appendix 13C: Environment Agency (EA) Flood Zones Figure (Document DCO 6.13C/MCO 6.13C)**
- **Appendix 13D: EA Risk of Flooding from Surface Water Mapping Figure (Document DCO 6.13D/MCO 6.13D)**

- **Appendix 13E: Lockington Brook Flood Assets (Document DCO 6.13E/MCO 6.13E)**
- **Appendix 13F: Water Framework Directive (WFD) Screening for the EMG2 Project (Document DCO 6.13F/MCO 6.13F)**
- **Appendix 13G: Flood Risk Assessment – EMG2 Works (Document DCO 6.13G/MCO 6.13G)**
- **Appendix 13H: Flood Risk Screening – Highway Works (Document DCO 6.13H/MCO 6.13H)**
- **Appendix 13I: Flood Risk Assessment – EMG1 Works (Document DCO 6.13I/MCO 6.13I)**
- **Appendix 13J: Sustainable Drainage Statement – EMG2 Works (Document DCO 6.13J/MCO 6.13J)**
- **Appendix 13K: Sustainable Drainage Statement – Highways Works (Document DCO 6.13K/MCO 6.13K)**
- **Appendix 13L: Sustainable Drainage Statement – EMG1 Works (Document DCO 6.13L/MCO 6.13L)**

13.1.4. This chapter will describe the sources of flood risk that could affect the **EMG2 Project**. It will identify the flood risk and drainage receptors that could potentially be affected by the **EMG2 Project**, including surface water quality. It will identify the significance of any potential impacts, and identity any mitigation measures that may be required to help address significant impacts.

13.2. Scope and Methodology of the Assessment

13.2.1. This section of the chapter is common to both the DCO Application and the MCO Application and is applicable to the **EMG2 Project** as a whole.

Scoping Opinion

13.2.2. An EIA Scoping Report for the EMG2 Project was submitted to the Planning Inspectorate (PINS) in August 2024. A Scoping Opinion was adopted by PINS on the 24th of September 2024 (**Document DCO 6.1D/MCO 6.1D**). **Table 13.1** summarises the relevant comments from the Scoping Opinion and provides commentary as required.

Table 13.1: Summary of Scoping Opinion Comments

Originator	Summary of Scoping Opinion Comment	Commentary
PINS ID 3.6.2	The Inspectorate requested details and appropriate figures that illustrate the main watercourses and waterbodies.	The plan included as **Appendix 13B** identities the main watercourses and surface water bodies in the study area. These are described, where relevant, within this chapter.

Originator	Summary of Scoping Opinion Comment	Commentary
PINS ID 3.6.3	The Inspectorate requested a figure that illustrate extent of the study area.	The plan included as **Appendix 13A** identities the flood risk and drainage study area.
PINS ID 3.6.4	The ES should consider the potential direct and indirect effects on water quality, water resources and the physical characteristics of the water environment.	This chapter considers the potential effects on surface water quality and the physical characteristics of the water environment, which is supported by a WFD Screening report included as **Appendix 13F**. Potable water resources are considered in **Chapter 16: Utilities**.
PINS ID 3.6.5	The ES should include a Water Framework Directive (WFD) assessment to inform the ES assessment.	The ES is supported by a WFD Screening report included as **Appendix 13F**.
PINS ID 3.6.6	The ES should include consideration of flood risk from the Hall Brook and confirm the catchment sizes of watercourses to ensure all sources that could pose a risk of flooding have been captured by the assessment.	Leicestershire LLFA's integrated catchment model of the Diseworth and Long Whatton Brooks includes the Hall Brook and the contributing flows from the upstream catchment (the EMIA). This data has been used in the assessment of flood risk, which is discussed within this chapter, and in the supporting Flood Risk Assessment **Appendix 13G**.
PINS ID 3.6.7	The Inspectorate notes that the northern section of the Proposed Development intersects with flood assets for a main river. These assets should be considered within the flood risk assessment presented in the ES	Information on these mapped assets has been provided within **Appendix 13E**. They are associated with a historical digitising error/ misunderstanding on the route of the Lockington Brook. The assets are not associated with the Lockington Brook. Therefore, this has been scoped out of the ES in agreement with the EA.
PINS ID 3.6.8	The ES should include an assessment of the water demand required for each phase of the Proposed Development and identify the sources of supply that would be used.	Potable water resources are considered in **Chapter 16: Utilities**.

Originator	Summary of Scoping Opinion Comment	Commentary
Leicestershire County Council Lead Local Flood Authority (LLFA)	The LLFA welcomed the proposal to discharge surface water at greenfield conditions, mimicking runoff from the undeveloped site. The proposal to discharge surface water from the **EMG2 Works** downstream of the village of Diseworth was also welcomed.	The preliminary proposed surface water management parameters have been improved upon since scoping was submitted. Details of the drainage strategy are provided within **Appendix 13G**, and the drainage principles are discussed within this chapter.
	Robust surface water management measures should be implemented during the construction phase to ensure that surface water flood risk (and pollution risk) is not increased during construction.	Construction phase surface water management measures are outlined within this chapter, as well as within the submitted Construction Environmental Management Plan (CEMP) – **Appendix 3A.**
	Any flood modelling should be reviewed and approved by the EA or an appropriately qualified independent third-party consultant	The hydraulic modelling has been submitted to an independent consultant for peer review. This is discussed as part of **Appendix 13G**.
	With reference to the ordinary watercourses within the EMG2 Main Site, it was noted that extents of watercourse disruption should be kept to an absolute minimum. Where watercourse diversion is required, appropriate justification should be supplied.	This chapter and the accompanying WFD Screening (**Appendix 13F**) include a description of the drainage ditch present in the **EMG2 Works** and justify its removal/ replacement with a network of SuDS.
Environment Agency (EA)	More information on the proposals within Flood Zone 3 and 2 in the vicinity of the A50 eastern and western slip roads was requested by the EA.	More information of the proposals on the A50 eastern and western slip roads is provided within this chapter and within **Appendix 13H**.
	It was requested that the Main River (Lockington Brook) flood assets beneath the A50 eastern and western slip roads were scoped into the assessment.	Information on these mapped assets have been provided within **Appendix 13E**. The assets are associated with a historical digitising error/ misunderstanding on the route of the Lockington Brook. The assets are not associated with a Lockington Brook. Therefore, they have been scoped out of this assessment in agreement with the EA.

Originator	Summary of Scoping Opinion Comment	Commentary
	The EA asked that design life of the development should be defined to inform appropriate climate change projections.	A design life of >75years has been identified and appropriate climate change allowances are identified within this chapter, and within the accompanying appendices.
	A decrease in flood risk is shown downstream of the **EMG2 Works**, due to the increase in surface water storage within the development. Therefore, the EA asked that the proposed storage basins and swales should be illustrated within the output from the hydraulic modelling.	The floodplain mapping included as part of **Appendix 13G**, includes the basins and swales as requested.
	The EA asked that the potential for the proposals to alter the risk category of the existing reservoirs to be considered.	A review of the flood risk from reservoirs are included within the accompanying Flood Risk Assessments (**Appendix 13G, 13H and 13I**).
	The EA asked if the integrated catchment model of the Diseworth Brook from the LLFA uses the latest design rainfall data (e.g.: FEH22 rainfall).	The hydraulic modelling technical note included as part of **Appendix 13G** includes a comparison of the latest rainfall data (FEH22) and that adopted within the LLFA model (FEH99). This identifies that the FEH99 dataset is more precautionary, and therefore appropriate for use in the hydraulic flood model.
	The EA asked for information to demonstrate that the diversion/ removal of the field drain in the **EMG2 Works** can be scoped out.	This chapter and the accompanying WFD Screening (**Appendix 13F**) include a description of the drainage ditch present in the **EMG2 Works** and justify its removal/ replacement with a network of SuDS.
	The EA identified that the impact of the **Highways Works** on the existing highway drainage system and the potential to increase the flow rate into the downstream watercourses needed to be considered.	The impact on the existing highway drainage network is assessed within this chapter and is considered within **Appendix 13K**.

Originator	Summary of Scoping Opinion Comment	Commentary
	The EA asked that the capacity within the piped connection alongside the A42 should be considered along with how the risk of blockage could be managed.	The capacity of the A42 culvert is reviewed as part **Appendix 13J**, which also includes information on the maintenance strategy that encompasses the inlet to the A42 culvert.
	The EA recommended that the EIA covers compliance with the Water Framework Directive, with a particular focus on ensuring that the development does not contribute to phosphate issues within the Long Whatton catchment.	The impacts on the Water Framework Directive are considered within this chapter, and a WFD Screening is provided as **Appendix 13F**.
	The EA identify that water treatment activities requiring flocculant treatment may constitute a water discharge activity and therefore require an environmental permit. They would expect to see the requirement for an environmental permit secured within the environmental assessment.	The potential requirement for an environmental permit is included within this chapter, and also with the accompanying CEMP – **Appendix 3A.**
	The EA requested consideration of water resources within the ES.	The potable water supply to the proposed EMG2 Project is considered within **Chapter 16: Utilities**.

Statutory Consultation

13.2.3. A six-week period of statutory consultation was undertaken between Monday 3rd February 2025 and Monday 17th March 2025. This included the presentation of draft application material for the **EMG2 Project**, including draft ES Chapters which were as advanced as they could be at that stage. Following this consultation phase, responses to the draft information were provided by the statutory bodies. Key issues raised by the statutory Flood Risk and Drainage bodies are listed in **Table 13.2** together with details of how these issues have been addressed within this chapter of the ES.

Table 13.2: Summary of Statutory Consultation Responses (Flood Risk & Drainage)

Originator	Summary of Statutory Consultation Comment	Commentary
Leicestershire County Council Lead Local Flood Authority (LLFA)	The LLFA raised no issues, but requested that agreement of following with the LLFA are secured as a requirement in the DCO: • the construction phase drainage strategy • the operational phase drainage strategy • the long-term maintenance strategy for the drainage	The requested items have been added as Requirements within the draft DCO (see Requirements 16, 17 and 18).
Environment Agency (EA)	The EA requested that more information on the ground conditions, the underlying aquifers/ groundwater bodies, the potential impact of the EMG2 Project, and any protective measures that may be required, are included within WFD Screening and the ground conditions and flood risk and drainage chapters.	Assessment of the ground conditions is provided within **Chapter 14: Ground Conditions**. Assessment of the potential impact on the status of the groundwater bodies is provided within this chapter, and the accompanying WFD screening (**Appendix 13F**)
	The EA requested hydraulic assessments of the minor watercourses associated with the L57 footpath and the Active Travel Route next to the A453 and completed to fill in any potential data gaps.	Hydraulic assessments have been completed and are discussed within this chapter and are available within **Appendix 13H**. These have been confirmed as acceptable with the EA.
	The EA requested further information on the Lockington Brook flood assets beneath the A50 eastern and western slip roads.	More information on these mapped assets have been provided within **Appendix 13E**. The assets are associated with a historical digitising error/ misunderstanding on the route of the Lockington Brook. The assets are not associated with Lockington Brook. Therefore, they have been scoped out in agreement with the EA.
	The EA requested that the Sequential Test to be considered in the submission for the Secretary of State's consideration.	The Sequential test is considered as part of the Planning Statement and has been agreed with NWLDC.

Originator	Summary of Statutory Consultation Comment	Commentary
	The EA requested that the integrated catchment model of the Diseworth and Long Whatton Brook is independently reviewed.	The hydraulic modelling has been submitted to an independent consultant for peer review. This is discussed as part of **Appendix 13G**.
	More information on the proposals within River Trent and River Soar floodplain in the vicinity of the A50 eastern and western slip roads was requested.	More information of the proposals on the A50 eastern and western slip roads is provided within this chapter, and also within **Appendix 13H**.
	Assessment of the construction phase within the WFD Screening was requested.	The construction stage has been included within the latest revision of the WFD screening which is included as **Appendix 13F**. This is also discussed within this chapter.
	The EA requested confirmation of any works that were proposed to the watercourse culvert beneath the **Highways Works** No. 16 at the A453/The Green junction.	These works no longer form part of the **EMG2 Project.**

Other Consultations

Severn Trent Water

13.2.4. A developer enquiry was submitted to Severn Trent Water (STW) on 19th November 2024, in relation to the **EMG2 Works** and the **EMG1 Works** (specifically the undeveloped land at Plot 16). Responses to the enquiries were received on 25th and 26th November, in which the limited capacity in the local network was confirmed**.** STW identified that hydraulic sewer modelling will be required to identify what reinforcement works are required on the network to accommodate the **EMG2 Works** and **EMG1 Works**, and that this would be undertaken once the **EMG2 Project** had received approval.

National Highways

13.2.5. An email was submitted to National Highways 4th June 2024 enquiring about the A42 drainage culvert and its proposed continued use by the **EMG2 Works**. A meeting with a representative was held on the 24th of July 2024, in which the following points were discussed. These were also sent to National Highways in an email on the same date:

- As set out in the DfT circular 01/2022 and written into the DMRB (CG 501 paragraph 6.3.1) “Where there is already an existing informal or formal connection into the highway drainage system from a proposed development site, the right for a connection may be allowed to continue provided that the flow, rate and quality of the

discharge into the highway drainage system remains unaltered or results in a betterment".

- The topographical and CCTV survey sent National Highways identify that there is an existing outfall from the **EMG2 Works** site to a pipe system that runs at the toe of the A42 and outfalls to the Diseworth Brook within the A42 culvert. Therefore, it is understood that subject to controlling the flow rate and quality of water leaving the future development site it would be acceptable to National Highways for this connection to be maintained.
- The **EMG2 Works** is bisected by Hyam's Lane. Land to the south currently drains to the A42 culvert. Land to the north of Hyam's generally drains to the west, through the village of Diseworth before eventually making its way towards the A42. Diseworth has a historical flooding problem, and to try and offer some relief, all surface water runoff from the development is proposed to be diverted to the culvert (thereby bypassing the village entirely). This would represent an increase to the catchment draining into the culvert; however, the flow rate would be restricted at the greenfield flow rate that currently enters the A42 culvert.

13.2.6. In an email dated 23rd December 2024 National Highways confirmed that the approach described above was generally acceptable.

Assessment Methodology

13.2.7. This assessment outlines the potential direct and indirect effects of the development on Flood Risk and Drainage during the construction and operational phase, including surface water quality.

13.2.8. This assessment follows the methodology set out in **Chapter 1: Introduction (Document DCO 6.1/MCO 6.1)** of this ES, the criteria that has been used to establish the sensitivity of receptors, magnitude of impact and significance of effect in specific regard to flood risk and drainage, and as outlined below in **Table 13.3 – 13.6**.

Table 13.3: Environmental Sensitivity

Sensitivity	Example of Receptor
High	The receptor/resource has little ability to absorb change without fundamentally altering its present character or is of international or national importance.
Moderate	The receptor/resource has moderate capacity to absorb change without significantly altering its present character or is of high importance.
Low	The receptor/resource is tolerant of change without detriment to its character or is of low or local importance

13.2.9. The descriptions for magnitude of impact as outlined in **Table 13.4** shall be applied in this assessment. An impact has the potential to either be beneficial or adverse.

Table 13.4: Magnitude of Impact

Magnitude of Impact	Criteria for Assessing Impact
High	Total loss of or major/substantial alteration to key elements of the baseline (pre-development) conditions such that the post development character/composition/attributes will be fundamentally changed.
Moderate	Loss or alteration to one or more key elements/features of the baseline condition such that post development character/composition/attributes of the baseline will be materially changed.
Low	A minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible/detectable but not material. The underlying character/composition/attributes of the baseline condition will be similar to the pre-development circumstance/situation.
Negligible	Very little change from baseline conditions. Change barely distinguishable, approximating to a 'no change' situation.

13.2.10. The approach to deriving an effect's significance from receptor value and magnitude of impacts shall be based on **Table 13.5**.

Table 13.5: Effect Significance Matrix

Magnitude	Sensitivity		
	High	**Moderate**	**Low**
High	Major Adverse/Beneficial*	Major-Moderate Adverse/Beneficial*	Moderate-Minor Adverse/Beneficial
Moderate	Moderate Adverse/Beneficial*	Moderate-Minor Adverse/Beneficial	Minor Adverse/Beneficial
Low	Moderate-Minor Adverse/Beneficial	Minor Adverse/Beneficial	Minor-Negligible
Negligible	Negligible	Negligible	Negligible

* These effects are considered significant for the purposes of the EIA Regulations

13.2.11. Effects can be of different duration. The general approach is as defined in **Table 13.6** below:

Table 13.6: Duration of Impacts

Duration	Definition
Short term	The effect(s) would be of short duration and would not last more than 2-5 years
Medium Term	The effects would take 5-15 years to be mitigated
Long Term	The effects would be reasonably mitigated over a long period of time (15 years or more)

Study Area

13.2.12. A 250m buffer has been applied to the order limits to identify the potential flood risk and drainage receptors, this is illustrated within **Appendix 13A** (**Document DCO 6.13A/MCO 6.13A**)**.**

13.2.13. An initial screening of the **EMG2 Project** has been undertaken to identify the components which are removed from potential sources of flood risk and/or which would not significantly affect the floodplain, overland flow routes, existing drainage arrangements, EA flood risk assets, or surface water quality. This approach allows the assessment in the chapter to focus on the components of the **EMG2 Project** that could have a potential effect on flood risk and drainage receptors. Components screened out of the flood risk and drainage chapter are summarised below in **Table 13.6**:

Table 13.6: Screened Out Development Component

Component of the Proposed Development	Reason for Screening Out
DCO Application	
Sub-station upgrade (DCO Works No. 20)	Proposed works are limited to upgrading an existing sub-station within EMG1. No alterations that could significantly affect flood risk or drainage receptors are proposed. Therefore, for the purpose of this chapter when discussing the **EMG2 Works**, this excludes the DCO Works No. 20.
M1 J24 minor works (DCO Works No. 12)	Proposed works limited to amendments to signage and line markings on the existing highway. No alterations that could significantly affect flood risk or drainage receptors are proposed.
M1 NB alterations (DCO Works No. 8)	Proposed works comprises providing the new M1 northbound exit and associated gantry/signage improvements on the M1. No alterations that could significantly affect flood risk or drainage receptors are proposed.
EMG1 access improvements (DCO Works No. 13)	Proposed works limited to capacity improvement to the EMG1 access junction. At this stage works are expected to be limited to a new lane added to the junction requiring amendments to line markings and a minor and localised increase in impermeable area estimated at less than $100m^2$. Additional runoff generated is to be accommodated within existing highway drainage, with capacity improvements added where there is a shortfall.
A453 EMA junction uncontrolled crossing (DCO Works No. 15)	The proposed works are limited to the formation of a short length of footpath, estimated at 60m, between the **EMG2 Works** and the A453 and a pedestrian crossing of the A453. No alterations that could significantly affect flood risk or drainage receptors are proposed.

Component of the Proposed Development	Reason for Screening Out
Long Holden works (DCO Works No.17)	The proposed works are limited to the formation of a footpath connections between the Long Holden (track/footpath) and the Community Park. No alterations that could significantly affect flood risk or drainage receptors are proposed.
Grimes Gate Signage (DCO Works No 7)	Proposed works limited to amendments to signage. No alterations that could significantly affect flood risk or drainage receptors are proposed. The remainder of Works 7 (alterations to Hyam's Lane) will be considered as part of the **EMG2 Works** for the purpose of this chapter.
Finger Farm Roundabout (DCO Works No. 18)	Proposed works limited to amendments to signage and line markings on the existing highway. No alterations that could significantly affect flood risk or drainage receptors are proposed.
M1 northbound signage alterations (DCO Works No. 16)	Proposed works limited to amendments to signage on the existing highway. No alterations that could significantly affect flood risk or drainage receptors are proposed.
MCO Application	
Signalised crossing over the EMG1 exit road (MCO Works No. 8a)	Proposed works limited to a new signalised crossing of the existing EMG1 exit road. No alterations that could significantly affect flood risk or drainage receptors are proposed.
Alterations to the existing rail-freight terminal to improve its operation and efficiency	Proposed works are limited to changes in the maximum height of the gantry cranes. No alterations that could significantly affect flood risk or drainage receptors are proposed.

13.2.14. The components of the **EMG2 Project** assessed within this chapter are listed in below. These represent either a substantial piece of development that will significantly increase impermeable surfaces, and/or include works within or next to the floodplain, a surface water overland flow route, or an EA flood asset, and that has the potential to alter the topography and drainage pathways. When using the '**EMG2 Works'**, '**EMG1 Works'** and '**Highway Works'** terms within this chapter it only refers to the components listed below.

- **EMG2 Works**
    - Construction of logistics and advanced manufacturing development and ancillary buildings (DCO, Works No. 1);
    - Construction of road infrastructure (DCO, Works No. 2);
    - Construction of bus interchange (DCO, Works No. 3);
    - Construction of HGV parking (DCO Works No. 4);
    - Provision of hard and soft landscaping (DCO Works No. 5); and
    - Creation of a Community Park (DCO, Work No. 21).

- **Highway Works**
    - M1 southbound & A50 eastbound link to J24 widening (DCO Works No. 11) – referred to as the 'M1 SB & A50 EB link' within this chapter;
    - A50 westbound merge (DCO Works No. 10) - referred to as the 'A50 WB merge' within this chapter
    - M1 northbound to A50 westbound link (DCO Works No. 9) - referred to as the 'M1 NB to A50 WB link' within this chapter
    - Active Travel Link (DCO Works No. 14) – referred to as the 'Active Travel Link' within this chapter.
    - L57 Footpath upgrade (DCO Works No. 19).
- **EMG1 Works**
    - Construction of a new rail-served warehouse building on land adjacent to the rail-freight terminal referred to as Plot 16 (MCO, Works No. 3A) together with associated access (MCO Works No. 5A) and landscaping (MCO Works No. 6A).
    - An expansion of the EMG1 Management Suite by the EMG1 site entrance to cater for the additional demand on management facilities resulting from EMG1 (MCO Works No. 3B);
    - Enhancements to the Public Transport Interchange by way of the installation of EV charging infrastructure for buses and provision of a drop-off layby adjacent to the transport hub (MCO Works No. 5B and 5C).

13.2.15. The components of the **EMG2 Project** considered within this chapter are located within **Appendix 13A** (**Document DCO 6.13A/MCO 6.13A**)**.**

Receptors

13.2.16. The flood risk and drainage receptors for each of the identified components are identified within **Table 13.7** along with their sensitivity. The sensitivity of each is discussed further in the Baseline Conditions section of this Chapter.

Table 13.7: Flood Risk & Drainage Receptors

Development Component	Receptor	Sensitivity
DCO Application		
EMG2 Works	Hall Brook, Diseworth Brook, and Long Whatton Brook floodplain – including the flood risk to the historically flooded villages of Diseworth and Long Whatton	High
	Surface water body: Long Whatton Brook Catchment (trib of Soar), including its Water Framework Directive (WFD) status	Low

Development Component		Receptor	Sensitivity
		Surface water body: Soar from Long Whatton Brook to Trent, including its Water Framework Directive (WFD) status	Moderate
		Foul Drainage Infrastructure	Moderate
		Groundwater Body: Soar - Secondary Combined Water Body	Low
Highway Works	M1 SB & A50 EB link (DCO Works No. 11)	Lockington Brook Floodplain, and the flood risk it poses to third parties.	Moderate
		River Trent and River Soar floodplain, and the flood risk it poses to third parties.	High
		Surface water body: Hemington Brook Catchment (trib of the Soar), including its Water Framework Directive (WFD) status	Low
		Strategic Road Network Drainage Infrastructure	Moderate
		Groundwater Body: Soar - Secondary Combined Water Body	Low
	A50 WB merge (DCO Works No. 10)	Lockington Brook Floodplain, and the flood risk it poses to third parties.	Moderate
		River Trent and River Soar Floodplain, and the flood risk it poses to third parties.	High
		Surface water body: Hemington Brook Catchment (trib of the Soar), including its Water Framework Directive (WFD) status	Low
		Strategic Road Network Drainage Infrastructure	Moderate
		Groundwater Body: Soar - Secondary Combined Water Body	Low
	M1 NB to A50 WB link (DCO Works No. 9)	Lockington Brook Floodplain	Moderate
		Surface water body: Hemington Brook Catchment (trib of the Soar), including its Water Framework Directive (WFD) status	Low
		Strategic Road Network Drainage Infrastructure	Moderate
		Groundwater Body: Soar - Secondary Combined Water Body	Low
		Groundwater Body: Soar - PT Sandstone Water Body	Moderate

Development Component		Receptor	Sensitivity
	Active Travel Link (DCO Works No. 14)	Minor tributary of the River Soar Floodplain, and the flood risk it poses to third parties.	Moderate
		Surface water body: Soar from Long Whatton Brook to Trent, including its Water Framework Directive (WFD) status	Moderate
		Groundwater Body: Soar - Secondary Combined Water Body	Low
	L57 Footpath Upgrade (DCO Works No. 19)	Hemington Brook Floodplain, and the flood risk it poses to third parties.	High
		Surface water body: Hemington Brook Catchment (trib of the Soar), including its Water Framework Directive (WFD) status	Low
MCO Application			
EMG1 Works		Lockington Brook Floodplain	Moderate
		EMG1 Surface Water Drainage Infrastructure	Moderate
		Foul Drainage Infrastructure	Moderate
		Surface water body: Hemington Brook Catchment (trib of the Soar), including its Water Framework Directive (WFD) status	Low
		Groundwater Body: Soar - Secondary Combined Water Body	Low
		Groundwater Body: Soar - PT Sandstone Water Body	Moderate

Maximum design envelope parameters for assessment

13.2.17. The maximum design envelope parameters identified below will be so that the maximum extent of development is considered:

- Flood risk and drainage assessments are based upon the Parameter Plans (**Documents DCO 2.5** and **MCO 2.5)** and the Highways Plans (**Document DCO 2.8A-D**) which identify the maximum potential extent of development.

Uncertainties and/or data limitations

13.2.18. The chapter has made a number of assumptions; these include:

- The ES chapter, FRA and SDS are based on the available data from the EA, STW and British Geological Survey (BGS). The accuracy of this information has not been verified unless it has shown to pose a flood risk to the EMG2 Project.

- The EA Flood Map for Planning does not include all the watercourses in the vicinity of the EMG2 Project. However, hydraulic assessments or modelling has been undertaken to fill this data gap and understand the flood risk.
- The supporting hydraulic flood modelling is a theoretical simulation of potential flood events, albeit the results have been verified against historical observations.
- There is accuracy limitations associated with the use of Light Detection and Ranging (LiDAR) data. Relative height error is typically accurate to within ±5cm, and horizontal spatial error is typically ±40cm.
- The data used to inform this chapter plus the accompanying Flood Risk Assessment and Sustainable Drainage Statement was correct and up to date as of June 2025.

13.3. Policy, Guidance and Legislative Context

13.3.1. This section of the chapter is common to both the DCO Application and the MCO Application and is applicable to **EMG2 Project** as a whole.

13.3.2. The following summarises planning and environmental legislation, policies and guidance which are considered relevant to flood risk and drainage in relation to the **EMG2 Project**, and accordingly, have been referenced and consulted in the preparation of this chapter.

Legislative Context

Water Resources Act (1991)

13.3.3. The Water Resources Act[1] relates to the control of the water environment. The main aspects of the Act which are relevant include provisions concerning land drainage, flood mitigation and controlling discharges to watercourses to prevent water pollution. It also outlines the functions and responsibility of the EA in regulating the water environment.

Flood and Water Management Act (2010)

13.3.4. The Flood and Water Management Act[2] takes forward some proposals from the UK government's report *Future Water, Making Space for Water* and the government's Response to Sir Michael Pitt's Review of the summer 2007 floods.

13.3.5. The Act gives the EA the strategic overview of management of flood risk in England. It gives upper tier local authorities in England responsibility for preparing and putting in place strategies for managing flood risk from groundwater, surface water and ordinary watercourses in their areas.

13.3.6. Local flood authorities, district councils, internal drainage boards and highways authorities have a duty to aim to contribute towards sustainable development.

1 The Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009
2 Flood and Water Management Act (2010)

Water Framework Directive

13.3.7. The Water Environment (Water Framework Directive) (England and Wales) Regulations (2017) transposed the requirements of the Water Framework Directive (WFD)[3] into UK law and has been retained post-Brexit. The Regulations aim to ensure the protection of waterbodies from further deterioration, and that improvements in water quality are made. The assessment and protection of waterbodies is undertaken by implementing River Basin Management Plans (RBMP). Eleven River Basin Districts have been identified in England and Wales, of which the Study Area falls within the Humber River Basin District. The Regulations include a requirement for surface water bodies to achieve 'good' status with respect to ecology and water chemistry by 2021. Progress is monitored by the EA in its role as the 'competent authority'. The current plan relevant to the EMG2 Project is the Humber River Basin District River Basin Management Plan 2022 - 2027.

National Planning Policy Context

National Policy Statement for National Networks (2024)

13.3.8. The Department of Transport National Policy Statement for National Networks[4] (NPSNN) sets out the need for, and Government policies for, nationally significant infrastructure rail and road projects for England, and makes specific reference to assessing and mitigating flood risk to nationally significant infrastructure projects.

13.3.9. Much of the guidance relates to paragraphs contained within the NPPF and associated Planning Practice Guidance. It outlines that consultation should be carried out with the relevant parties where a site is located within designated Flood Zones, with appropriate mitigation provided, including treating surface water runoff and ensuring no detrimental impact elsewhere within the catchment.

National Planning Policy Framework (2024)

13.3.10. The National Planning Policy Framework (NPPF)[5] sets out the national policies on different aspects of land use planning, including flood risk. The NPPF sets out a sequential, risk-based approach to the location of development, taking into account all sources of flood risk and the current and future impacts of climate change, so as to avoid, where possible, flood risk to people and property. The NPPF states that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.

13.3.11. The accompanying Planning Practice Guidance (PPG)[6] sets out the vulnerability and suitability of different land uses to flood risk. It encourages development to be located in areas of lower flood risk where possible and stresses the importance of preventing increases in flood risk to the wider catchment.

3 Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy
4 National Policy Statement for National Networks, Department for Transport (March 2024)
5 National Planning Policy Framework (2024)
6 Planning Practice Guidance (2024)

Regional and Local Planning Policy Context

North West Leicestershire Local Plan (2021)

13.3.12. The North West Leicestershire Local Plan 2011 – 2031 was originally adopted in November 2017 and provides the current planning policies for the District. A partial review of the Local Plan was undertaken in February 2018 and was then adopted in March 2021. The relevant policies in the adopted plan are:

Policy Cc2 – Flood Risk

- The risk and impact of flooding will the minimised through:
    - Directing new development to areas with the lowest probability of flooding; and
    - Ensuring that all new development addresses the effective management of all sources of flood risk; and
    - Ensuring that development does not increase the risk of flooding elsewhere; and
    - Ensuring wider environmental benefits of development in relation to flood risk.

Policy Cc3 – Sustainable Drainage Systems

- When assessing development proposals where it is necessary to manage surface water drainage, Sustainable Drainage Systems (SuDS) should be incorporated into developments in accordance with national and local standards unless it can be clearly demonstrated;
    - That SuDS are not technically, operationally or financially deliverable or viable and that surface water drainage issues from the development can be alternatively mitigated; or
    - That the SuDS scheme will itself adversely affect the environment or safety.
- Where appropriate, every effort should be made to link SuDS into wider initiatives to enhance green infrastructure, improve water quality and benefit wildlife or contribute to the provision of the ecosystem service.
- Arrangements in accordance with national policy will need to be put in place for the management and maintenance of the SuDS over the whole period during which they are needed.

North West Leicestershire District Council – Water Cycle Study (2012)

13.3.13. The Detailed Stage Water Cycle Study was prepared to identify long term solutions that will help facilitate development whilst preventing further deterioration of water quality and water resources.

13.3.14. However, it is largely focussed upon the housing growth in the region and focusses upon the problem of phosphates within the River Mease.

13.3.15. It does recommend that all developments provide for separate surface water runoff drainage and use SuDS where possible on site. SuDS should be designed and located to promote biodiversity, an enhanced landscape and good quality amenity spaces. Potential climate change impacts should be accounted for when sizing SuDS and Leicestershire County Council should be contacted to ensure SuDS are suitable.

North West Leicestershire Strategic Flood Risk Assessment (2024 update)

13.3.16. A SFRA is a study carried out by one or more local planning authorities to assess the risk to an area from flooding from all sources, now and in the future.

13.3.17. The North West Leicestershire SFRA[7] aims to provide an overview of the planning context in relation to flood risk and development within North West Leicestershire as well as providing guidance on surface water management for new developments.

Humber River Basin District Management Plan (2022)

13.3.18. The Environment Agency Humber River Basin Management Plan (RBMP) describes the River Basin District, and the pressures that the water environment faces. It shows what this means for the current state of the water environment, and what actions will be taken to address the pressures under the requirements of the WFD. It sets out what improvements are possible and how the actions will make a difference to the local environment – the catchments, the estuaries and coasts, and the groundwater. The latest version of the Humber RBMP[8], undertaken by Defra and the EA, includes an assessment of river basin characteristics, a review of the impact of human activities, statuses of water bodies and an economic analysis of water use and progress since the first plan was published in 2009.

Other Relevant Guidance

Flood risk assessments: climate change allowances

13.3.19. Predicted future changes in peak river flows and rainfall intensity caused by climate change are provided by the EA in online guidance[9]. A range of projections are applied to regionalised River Basin Districts which are further subdivided into Management Catchments. When determining the appropriate allowance to consider in the design of a development, the Flood Zone classification, flood risk vulnerability and the anticipated lifespan of the **EMG2 Project** should be considered.

13.3.20. The **EMG2 Project** will have a life span of >75-years. Therefore, climate change at the 2080s epoch (2070 – 2125) will be considered in the assessment for peak river flows, and at the 2070s epoch (2061-2125) for rainfall intensity.

13.3.21. The **EMG2 Project** is considered representative of a less vulnerable development; therefore, the central climate change allowance will be used to inform the design flood and storm events. Additionally, in accordance with EA climate change guidelines and the National Networks National Policy Statement, the upper end allowance will also be assessed

[7] North West Leicestershire SFRA: SFRA Report (2024 Update) (March 2024)
[8] Humber River Basin District River Basin Management Plan, Defra and Environment Agency (2022)
[9] Environment Agency, Flood risk assessments: climate change allowances: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances. Last Accessed November 2024

as a credible maximum flood/storm event. The applicable climate change allowances assessed within this chapter are summarised below in **Table 13.8**.

Table 13.8: Applicable Climate Change Allowances

Source	Design Event climate change	Credible maximum climate change scenario / resilience check
Peak River Flows		
River Trent	+29%	+62%
Lockington Brook	+28%	+60%
Rainfall Intensity		
Integrated Catchment Flood Modelling (Hall Brook, Diseworth Brook, Long Whatton Brook)	+25%	+40%
Surface Water Drainage Design	+25%	+40%

Flood Risk to People and New Developments

13.3.22. The Flood Risk to People (FD2321/TR1)[10] document was prepared as a research project considering flood hazard and factors that affect it. Flood Risk Assessment Guidance for New Development (FD2320/TR2)[11] provides a framework and guidance for assessing and managing flood risks for new developments and sets flood hazard thresholds.

13.3.23. Hazard ratings are derived using the following equation in line with the above:

$$\text{Hazard Rating} = D * (V+0.5) + DF$$

Where:
D = depth
V = velocity
DF = debris factor

13.3.24. A supplementary note[12] provides clarification of the hazard rating thresholds which should be used for development planning and control use. **Table 13.9** identifies the thresholds of the flood hazard categories.

10 Flood Risk to People Methodology (FD2321/TR1), Defra/Environment Agency, 2006
11 Flood Risk Assessment Guidance for New Development (FD2320/TR2), Defra/Environment Agency, 2005
12 Supplementary Note on Flood Hazard Ratings and Thresholds for Development Planning and Control Purpose – Clarification of the Table 13.1 of FD2320/TR2 and Figure 3.2 of FD2321/TR1. (http://randd.defra.gov.uk/Document.aspx?Document=FD2321_7400_PR.pdf)

Table 13.9: Hazard to People[13]

Threshold for Flood Hazard Rating	Degree of Flood Hazard	Description
< 0.75	Very Low	Caution
0.75 - 1.25	Moderate	Danger for some - includes children, the elderly and the infirm
1.25 - 2.0	Significant	Danger for most - includes the general public
2.0 >	Extreme	Danger for all - includes the emergency services

Construction Industry Research and Information Association (CIRIA) Guidance

13.3.25. The CIRIA SuDS Manual (C753)[14] provides guidance regarding planning, design, construction and maintenance of Sustainable Drainage Systems (SuDS) to assist with the effective implementation within both new and existing developments.

13.3.26. Using SuDS to reduce phosphorus in surface water runoff (C808F)[15] provides good practice guidance on the use of SuDS for the reduction of phosphorus in runoff from new developments. It sets out the necessary SuDS, deployed in 'treatment trains' to achieve phosphorus reduction.

13.3.27. The Control of Water Pollution from Construction Sites guidance (C532)[16] provides practical guidance regarding the management of construction sites and projects to control water pollution with reference to site management advice and water treatment advice.

13.3.28. The Development and Flood Risk guidance (C624)[17] provides guidance on the assessment and management of flood risk with the intention to promote development that is considered to be sustainable in terms of flood risk. The aim of this guidance is to achieve a consistent approach to the implementation of planning guidance when considering flood risk to a new development.

Sustainable Drainage Systems: Non-Statutory Technical Standards

13.3.29. The Non-Statutory Technical Standards for Sustainable Drainage Systems was published in March 2015 and is the current guidance for the design, maintenance and operation of SuDS.

13 2008, DEFRA. Supplementary Note on Flood Hazard Ratings and Thresholds for Development Planning and Control Purposes.
[14] CIRIA C753 The SuDS Manual, B. Woods Ballard, S. Wilson, H. Udale-Clarke, S. Illman, T. Scott, R. Ashley. R. Kellagher (2015)
[15] CIRIA C808F Using SuDS to reduce phosphorus in surface water runoff. Bradley, J, Haygarth, P, Stachyra, K and Williams, P (2024)
[16] CIRIA C532 Control of water pollution from construction sites. Masters-Williams, H. Heap, A. Kitts, H. Greenshaw, L. Savis, S. Fisher, P. Mendrie, M. Owens, D. (2001)
[17] CIRIA C624 Development and flood risk, Lancaster, J.W, Preene, M., Marshall C.T. (2015)

13.3.30. The standards set out that the peak runoff rate should be as close as is reasonably practicable to the greenfield rate but should never exceed the pre-development runoff rate.

13.3.31. The standards also set out that the drainage system should be designed so that flooding does not occur on any part of a development for a 1 in 30-year rainfall event, and that no flooding of a building (including basement) would occur during a 1 in 100-year rainfall event.

13.3.32. It is also noted within the standards that pumping should only be used when it is not reasonably practicable to discharge by gravity.

13.4. Baseline Conditions

DCO Application

Hall Brook, Diseworth Brook, and Long Whatton Brook Floodplain

13.4.1. The Hall Brook, an ordinary watercourse, outfalls from the East Midlands Airport (EMA) and flows alongside the western boundary of the **EMG2 Works** for approximately 450m, before diverting to the west and then south to enter the village of Diseworth. The route of the watercourse is illustrated within the **Appendix 13B** (**Document DCO 6.13B**). The potential contributing flows from the EMA to the Hall Brook are restricted and controlled by the airport's drainage systems. The remainder of the watercourse's catchment is predominately rural, and this includes a proportion of the **EMG2 Works** which roughly comprises land located to the north of Hyam's Lane.

13.4.2. The Diseworth Brook, an ordinary watercourse, drains a largely rural catchment to the west of the **EMG2 Works** and Diseworth. The Brook flows from west to east through Diseworth, where it is joined by the Hall Brook. Downstream of Diseworth, the Brook passes beneath the A42 and M1 road embankments where it is joined by the Westmeadows Brook and is renamed as the Long Whatton Brook (both are also ordinary watercourses). The Long Whatton Brook continues to flow towards the east where it joins the River Soar. The route of the watercourse is illustrated within **Appendix 13B** (**Document DCO 6.13B**).

13.4.3. The Flood Zones of the Diseworth Brook are located approximately 240m south of the **EMG2 Works**; this is illustrated within **Appendix 13C** (**Document DCO 6.13C**). The **EMG2 Works** at its lowest point is elevated approximately 3m above the Diseworth Brook. The Hall Brook is too small to be identified in the Flood Maps for Planning.

13.4.4. A number of recent historical flooding incidents have been recorded in Diseworth in 2000, 2012, 2017, 2018, 2019 and 2020. A number of studies into the flood risk incidents have been commissioned by the LLFA, one of which included the production of an integrated hydraulic model of the catchment. This identified that the flooding to the village is primarily generated by high water levels on the Diseworth Brook, but that the situation is exacerbated by limited capacity in the channel and functional floodplain due to historical culverting and development encroachment. While the Hall Brook contributes a proportion of the flood flows to the Diseworth Brook, the flood studies identified that it is not the primary source of flood risk to the village.

13.4.5. There is also a documented history of flooding in Long Whatton; however, the flooding is understood to generally be from minor tributaries flowing though the village on their way to meet the Long Whatton Brook which is located to the north of the village.

13.4.6. Due to the historical flooding, and the proximity of existing development to the floodplain, the Hall Brook, Diseworth Brook, and Long Whatton Brook Floodplain is considered to be a receptor of high sensitivity.

13.4.7. The LLFA provided a copy of their integrated Diseworth and Long Whatton catchment hydraulic model to inform the assessment of flood risk at for the DCO Application. The model includes fluvial, surface water, and sewer interactions, and it includes the drainage network of the EMA and the Hall Brook. The model identifies that within the vicinity of the **EMG2 Works**, the Hall Brook floodplain is essentially contained to the channel – confirming that the **EMG2 Works** are at a low fluvial flood risk.

13.4.8. The model identifies that rainwater falling on the **EMG2 Works** can gather within topographical depressions and valley lines and propagate to form overland flow pathways. Generally, land to the north of Hyam's Lane is predicted to shed water to the Hall Brook, while the proportion of the **EMG2 Works** to the south of Hyam's Lane is predicted to direct runoff to the minor watercourse in the south-western corner where it is culverted into the Diseworth Brook, although some of the land in the very south sheds surface water to fields located off the southern boundary. The combined fluvial, surface water, and sewer flooding at the **EMG2 Works** from the integrated Diseworth and Long Whatton catchment hydraulic model is presented as part of **Appendix 13G** (**Document DCO 6.13G**)**.**

13.4.9. At the design flood event (the 1 in 100-year storm with a +25% uplift to account for future climate change) the overland flow pathways in the **EMG2 Works** are generally between 0.05 to 0.15m deep and of a low flood hazard. Greater depths and hazards only occur within low-lying areas such as the drainage channels and minor watercourse. Importantly, the overland flow pathways are shown to be predominately generated by surface water runoff from within the **EMG2 Works**. There are no significant overland flow pathways entering or passing through the site from upstream third-party land. Therefore, this source of flooding poses a low risk to a development on the **EMG2 Works**.

Lockington Brook Floodplain

13.4.10. The Lockington Brook issues from the land located to the north of the EMA and EMG1, where it is classified as an ordinary watercourse. It flows in a northerly direction through the village of Lockington where it is reclassified as a Main River. Downstream of Lockington it flows towards the east where it is culverted beneath the railway line constructed to serve the EMG1 rail freight interchange, the west bound A50 slip road, the M1, and the A50 east bound link to the M1, all within a stretch of approximately 600m. Downstream of this linear infrastructure, the watercourse flows in a north-easterly direction to meet the Hemington Brook, and the River Soar and Trent beyond. The Brook flows within 45m of the **Highway Works** at its most northerly point (the A50 WB merge). The route of the watercourse is illustrated within the **Appendix 13B** (**Document DCO 6.13B**).

13.4.11. A hydraulic model of the Lockington Brook was provided by the EA for use in the assessment of flood risk for the **EMG2 Project**. The data identifies that the watercourse poses a flood risk to the village of Lockington, Lockington Park and the open fields upstream of the **EMG2**

Project. Downstream of the **EMG2 Project**, the floodplain is predominately confined to its channel and agricultural fields and gravel extraction quarries located to the north-east of the **EMG2 Project**. The brook poses no flood risk to the railway line, the A50, or the M1. The modelled Lockington Brook floodplain is presented as part of **Appendix 13H** (**Document DCO 6.13H**).

13.4.12. Due to the flood risk to Lockington, the sensitivity of the village as receptor upstream of the **EMG2 Project** is High. However, the **EMG2 Project** only has the potential to interact with the lower reach of the watercourse, downstream of Lockington, where the floodplain is confined to open fields and gravel workings. Therefore, this receptor is of Moderate sensitivity in this location.

River Trent & River Soar Floodplain

13.4.13. The River Trent, a Main River, flows approximately 800m to the north of the **Highway Works** (A50 WB merge and the M1 SB & A50 EB link), from west to east. The River Soar, a Main River, flows approximately 650m to the east of these, from south to north. The confluence of the two rivers is located approximately 2.8km to the north-east. The route of the watercourses is illustrated within the **Appendix 13B** (**Document DCO 6.13B**).

13.4.14. The joint Trent and Soar floodplain in the local area is predominately rural, comprising pasture, arable land, and lakes on the site of former gravel extraction quarries. The local floodplain is crossed by linear infrastructure in the form of the M1, A50, A453, and railway lines which are located upon elevated embankments set above the floodplain. There are more minor communication routes that are at ground level and consequently at flood risk. The local villages (Hemington, Lockington, Castle Donington, and Kegworth) are generally located on the edge of, but near, the floodplain. The lower lying areas of the villages as well as isolated rural farmsteads and homes located in the local area are potentially at flood risk from the Trent and Soar. Therefore, this receptor is considered to be of a High sensitivity.

13.4.15. The EA provided the 2021 River Trent flood model for use in the assessment of flood risk of the **EMG2 Project**. This model includes the lower reach of the River Soar and its confluence with the River Trent. The peak flood levels from the model have been mapped against the latest EA LiDAR Digital Terrian Model (DTM) (as flown in 2022) to illustrate the current floodplain outlines next to the **Highway Works**, this is illustrated as part of **Appendix 13H** (**Document DCO 6.13H**).

13.4.16. The flood data identifies that the **Highway Works** are generally removed from the design event floodplain of these large rivers with two exceptions. **Appendix 13H** (**Document DCO 6.13H**) identities that the order limits at the M1 SB & A50 EB link fall in close proximity to the 1 in 100-year and the design event (1 in 100-year+30% climate change) floodplains. However, the area actually proposed for widening is located outside and above the floodplain (including any alterations to the highway embankment). The widened highway will also be located outside of the 1 in 1000-year and the credible maximum climate change floodplain. The toe of the highway embankment widening could encroach nominally in the 1 in 1000-year and the credible maximum climate change floodplain, but these extreme flood events are above the design standard and do not require floodplain compensation.

13.4.17. The A50 WB merge is located outside of the 1 in 100-year and the design event floodplains, but it falls marginally within the 1 in 1000-year and the credible maximum climate change

floodplain. However, these extreme flood events are above the design standard required for new development.

Hemington Brook Floodplain

13.4.18. The Hemington Brook issues from the land located to the north of the EMA, to the west of EMG1, and to the east of Castle Donnington, where it is classified as an ordinary watercourse. It flows in a northerly direction through the village of Hemington, where it is reclassified as a Main River. Downstream of Hemington, it continues to flow north and is culverted beneath the Castle Donnington railway line. Downstream of the railway line the watercourse flows towards the east, passing beneath the A50 and the M1 highway embankments, and back under the railway line, before being joined by the Lockington Brook and then continuing east to meet the River Soar and Trent beyond. The route of the watercourse is illustrated within the **Appendix 13B (Document DCO 6.13B)**.

13.4.19. A hydraulic model of the Hemington Brook was provided by the EA for use in the assessment of flood risk at the **EMG2 Project**; however, the **EMG2 Project** is removed from the modelled Hemington Brook floodplain. The data identifies that the floodplain is predominantly located in the open fields surrounding Hemington, but that it does pose a risk to properties in certain locations. Downstream of Hemington the floodplain is predominately confined to its channel and the surrounding agricultural fields and gravel extraction quarries. The Brook poses no flood risk to the railway line, the A50 or the M1. Due to the flood risk to the village of Hemington, downstream of the **EMG2 Project**, the sensitivity of this receptor is considered to be High.

13.4.20. A proportion of the **Highway Works** spans the upper reach of the Hemington Brook where an existing footpath (L57) crosses the channel. The reach in this location is too small to have been included in the Flood Maps for Planning, and it is located outside of the coverage of the hydraulic model provided by the EA. EA Risk of Flooding from Surface Water (RoFSW) mapping can be used as a high-level proxy for a floodplain in the absence of Flood Zones and hydraulic modelling. In this location the RoFSW data identifies that the floodplain is likely to be contained within the watercourse corridor. EA RoFSW mapping is included as **Appendix 13D (Document DCO 6.13D)**.

13.4.21. Footpath L57 crosses over a 0.5m diameter pipe culvert. A hydraulic assessment has identified that the culvert has limited capacity and that flood flows can readily spill over the footpath, which is only 0.40m above the soffit level of the pipe, with little attenuation of flow. The culvert capacity assessment is included as part of **Appendix 13H (Document DCO 6.13H)**.

Minor Tributary of the River Soar Floodplain

13.4.22. A small ordinary watercourse issues from the eastern side of the EMA. This is culverted beneath the A453 and the M1, outfalling to open fields on the eastern side of the M1. The watercourse continues to flow towards the east, eventually outfalling to the River Soar 2.1km downstream of the **EMG2 Project**. The route of the watercourse is illustrated within the **Appendix 13B (Document DCO 6.13B)**.

13.4.23. The watercourse is too small to have been included in the Flood Map for Planning, or to be hydraulically modelled by the EA. EA RoFSW mapping can be used as a high-level proxy

for a floodplain in the absence of Flood Zones and hydraulic modelling. However, in this instance the RoFSW mapping does not include for the culverted connections beneath the A453 and M1, and as a result flood water is incorrectly shown to pool on the upstream side of highway embankments. EA RoFSW mapping is included as **Appendix 13D** (**Document DCO 6.13D**).

13.4.24. A large proportion of the EMA forms part of the Hall Brook/Diseworth Brook catchment; the catchment to the minor tributary watercourse is limited to the south-eastern corner of the airport associated with airport long term parking and a proportion of the Pegasus Business Park. These developments are understood to include attenuated surface water storage, so the anticipated flows to the minor watercourse are expected to be equivalent to greenfield conditions.

13.4.25. A hydraulic assessment of the capacity of the A453 and M1 culverts next to the **Highway Works** (Active Travel Link) has identified that these have sufficient capacity to convey the potential flood flows generated from the upstream catchment, even when ignoring upstream attenuated storage. Therefore, the flooding from the minor watercourse within the vicinity of the **Highway Works** is expected to be largely contained within channel and culvert. The culvert capacity assessment is included as part of **Appendix 13H** (**Document DCO 6.13H**).

13.4.26. Downstream of the A453 and the M1, the EA RoFSW mapping suggests that the floodplain associated with the Minor Tributary of the River Soar is contained within the immediate watercourse corridor, posing little flood risk to the agricultural land located on either bank. At its downstream extent, just before out falling to the River Soar, the RoFSW data suggest that the watercourse could pose a flood risk to the A6. Therefore, the Minor Tributary of the River Soar Floodplain is considered to be of Moderate sensitivity.

Operational Surface Water Body: Long Whatton Brook Catchment (trib of Soar)

13.4.27. As shown in **Appendix 13B (Document DCO 6.13B)**, the Hall Brook and the Diseworth Brook fall within the "Long Whatton Brook Catchment (trib of the Soar)" operational surface water body. This is classified by the EA on the online 'Catchment Data Explorer'[18] as having a poor ecological status. The reasons for not achieving good status and reasons for deterioration are identified as:

- Diffuse pollution from riparian and in-river activities associated with agriculture and rural land management
- Diffuse pollution from livestock management associated with agriculture and rural land management (phosphate pollution)
- Physical barriers creating ecological discontinuity
- Point source pollution associated with an abandoned mine
- Diffuse pollution from urban and transport drainage (phosphate pollution)
- Point source pollution from sewage discharge (phosphate pollution)

[18] Environment Agency, Catchment Data Explorer: https://environment.data.gov.uk/catchment-planning. Last Accessed November 2024.

- Other pollutants, including Polybrominated diphenyl ethers (PBDE) and Mercury and Its Compounds.

13.4.28. The EA identify that there is a low confidence in achieving the objective of a good ecological status by 2027. Given the poor status of the waterbody and the low confidence in reaching a good status the sensitivity of this receptor is considered to be low.

13.4.29. Phosphate pollution has been identified by the EA as the most common cause of water quality failures in England, and in their scoping response phosphate pollution was raised as a particular point of failure on this surface water body. In an EA report[19] agriculture and rural land management is identified as the largest phosphate source and the most common cause of water bodies not achieving good status for phosphate status. Sewage effluent (from sewage treatment works) is the second largest source, and untreated urban and road runoff is the third most common source.

13.4.30. The **EMG2 Works** are largely located within the "Long Whatton Brook Catchment (trib of the Soar)" operational surface water body. A number of ditches are present in the south of the **EMG2 Works**, to the south of Hyam's Lane; these have been observed to be seasonally dry, canalised (artificial channel form/heavily modified) and to not contain any aquatic or riparian ecology of importance. Therefore, they are thought to only act as land drainage features, collecting surface water runoff from the agricultural fields and directing it to the outfall. The ditches direct surface water runoff into a National Highways culvert which runs between the south-eastern corner of the **EMG2 Works** and the Diseworth Brook. The Brook enters the culvert via a 1.6m almost vertical drop into a manhole chamber, before flowing within 380m of culvert due south. This significant length of culverting acts as a barrier to aquatic fauna, isolating the ditches from the downstream Diseworth Brook. Therefore, the ditches on are not considered to be an ecological asset of the surface water body.

13.4.31. The **EMG2 Works** area is currently largely used for arable agriculture. It is subject to seasonal ploughing, cultivation, and treatment with agrichemicals. In a rainfall event, and especially in storm events, sediments and the chemicals (including phosphates) have the potential to be mobilised and washed into the downstream watercourse system.

Operational Surface Water Body: Hemington Brook Catchment (trib of the Soar)

13.4.32. As shown in **Appendix 13B (Document DCO 6.13B)**, the Lockington Brook and Hemington Brook fall within the "Hemington Brook Catchment (trib of the Soar)" operational surface water body. The **Highway Works** (M1 SB & A50 EB link, A50 WB link, M1 NB to A50 WB link, and the L57 footpath) fall within this surface water body catchment.

13.4.33. This is classified by the EA on the online 'Catchment Data Explorer' as having a bad ecological status. The reasons for not achieving good status and reasons for deterioration are identified as:

- Diffuse pollution from riparian and in-river activities associated with agriculture and rural land management (dissolved oxygen)
- Natural drought

[19] Environment Agency, Phosphorus and Freshwater Eutrophication Pressure Narrative. October 2019

- Other pollutants, including Polybrominated diphenyl ethers (PBDE), Perfluorooctane sulphonate (PFOS), and Mercury and Its Compounds.

13.4.34. The biological quality of invertebrates, Macrophytes and Phytobenthos are identified as the main reasons for not achieving a good ecological status on this water body.

13.4.35. The EA identify that there is a low confidence in achieving the objective of good ecological status by 2027. Given the bad status of the waterbody and the low confidence in reaching a good status, the sensitivity of this receptor is considered to be Low.

Operational Surface Water Body: Soar from Long Whatton Brook to Trent

13.4.36. **Appendix 13B (Document DCO 6.13B)**, a proportion of the **EMG2 Works** and the proposed **Highway Works** (Active Travel Link) fall within the "Soar from Long Whatton Brook to Trent" operational surface water body. This is classified by the EA on the online 'Catchment Data Explorer' as having a moderate ecological status. The reasons for not achieving good status and reasons for deterioration are identified as:

- Diffuse pollution from livestock management associated with agriculture and rural land management (phosphate pollution)
- Point source pollution from sewage discharge (phosphate pollution)
- Physical modifications affecting fish navigation
- Other pollutants, including Polybrominated diphenyl ethers (PBDE) and Mercury and Its Compounds.

13.4.37. Phosphate pollution is identified as one of the main reasons for not achieving a good ecological status on this water body.

13.4.38. The EA identify that there is a low confidence in achieving the objective of good ecological status by 2027. Given the moderate status of the waterbody and the low confidence in reaching a good status the sensitivity of this receptor is considered to be Moderate.

Strategic Road Network Drainage Infrastructure

13.4.39. The **Highway Works** at A50 WB merge, the M1 SB & A50 EB Link, and the M1 north bound carriageway at M1 junction 24 are served by existing highway drainage that is understood to be directed to a series of drainage basins and swales. These provide treatment, conveyance, and a degree of attenuated storage before the surface water runoff is discharged towards the Lockington Brook.

13.4.40. The highway drainage is understood to also drain the adjacent highway embankments and landscaped areas, in which the J24 Improvements are proposed, including the proposed M1 NB to A50 WB Link.

13.4.41. The highway drainage infrastructure will have been designed to manage a specific drainage catchment to a specific design standard. Therefore, this may be sensitive to change. Additional inflows from new impermeable areas could increase the risk of exceedance. Therefore, this receptor is considered to be of a Moderate sensitivity.

Foul Drainage Infrastructure

13.4.42. STW sewer records shows there to be public foul sewer assets within the boundary of the **EMG2 Works**. A foul water rising main bisects the centre of the **EMG2 Works** along Hyam's Lane. The main originates from a pumping station to the west off Grimes Gate and enters a foul water gravity sewer to the north off the A453. The public sewer continues in a northerly direction alongside the A453 within a series of gravity and pumped sewer runs.

13.4.43. STW have confirmed that there is limited capacity in the existing foul sewer infrastructure and that they will need to undertake a capacity assessment to identify what reinforcement works will need to be undertaken to accommodate the **EMG2 Works**. Given there is limited capacity, this is considered to be a receptor of Moderate sensitivity.

Groundwater Body: Soar - Secondary Combined Water Body

13.4.44. As shown in **Appendix 13F (Document DCO 6.13F)**, the majority of the **EMG2 Works** and **Highway Works** are located on the Soar - Secondary Combined Water Body. This is classified by the EA as having a good overall status. It has a surface area of 1359km^2.

13.4.45. British Geological Survey (BGS) mapping identities that the water body is comprised of a mix of Triassic (undifferentiated) mudstones, siltstones with small area of sandstone within the vicinity of the **EMG2 Project**. The BGS identify that the aquifer is of low productivity and that flow is limited to through fractures and other discontinuities.

13.4.46. The water body includes a source protection zone at Melton Mowbray, approximately 30km to the east of the **EMG2 Project**, and at Coalville 7.5km to the south.

13.4.47. The water body includes drinking water protected areas 1.3km to the west and 13km to the south-east.

13.4.48. The waterbody includes multiple Nitrate Vulnerable Zones which are associated with designated areas at risk from agricultural nitrate pollution.

13.4.49. Soakaway tests at the **EMG2 Works** have identified a low permeability of the soils within these areas which is typical in areas underlain by mudstone and siltstone areas. More information of the observed ground conditions is provided within **Chapter 14: Ground Conditions (Document DCO 6.14).**

13.4.50. Given the size of the waterbody, its limited productivity and flow, and because the Source Protection Zones and Drinking Water protected areas significantly removed from the **EMG2 Project**, this is considered to have a low sensitivity.

Groundwater Body: Soar - PT Sandstone Water Body

13.4.51. As shown in **Appendix 13F (Document DCO 6.13F)**, a proportion of the **Highway Works** fall within the Soar - PT Sandstone Water Body. This is classified by the EA Catchment Data Explorer' as having a poor overall status. It has a surface area of 45km^2.

13.4.52. The reasons for not achieving good status and reasons for deterioration are identified as:

- Poor livestock management, and

- Poor nutrient management from rural areas.

13.4.53. The EA identify that there is a low confidence in achieving the objective of a good status by 2027 as it would be disproportionately expensive.

13.4.54. BGS mapping identities that the water body is comprised of a mix of Triassic sandstones within the vicinity of the **EMG2 Project**. The BGS identify that the aquifer is highly productive and that significant intergranular flow occurs. However, this is understood to be overlain by low permeability soils. More information of the observed ground conditions is provided within **Chapter 14: Ground Conditions (Document DCO 6.14)**.

13.4.55. The water body includes a source protection zone at Coalville 7.5km to the south in disparate region to the **EMG2 Project**.

13.4.56. The water body includes drinking water protected areas 1.3km to the west and 6.6km to the south, again in disparate regions to the **EMG2 Project**.

13.4.57. The waterbody includes multiple Nitrate Vulnerable Zones which are associated with designated areas at risk from agricultural nitrate pollution.

13.4.58. Given the productive nature of the aquifer and the significant intergranular flow that is expected, this is considered to have a moderate sensitivity.

MCO Application

Flood Risk

13.4.59. As shown in **Appendix 13C (Document MCO 6.13C)**, the **EMG1 Works** are located entirely within Flood Zone 1, and it is significantly removed from the local watercourse networks. While the EA RoFSW mapping, **Appendix 13D (Document MCO 6.13D)**, identities a potential surface water flood risk within EMG1, this data does not reflect the drainage infrastructure that is already in place to manage surface water flood risk to the site. The **EMG1 Works** will have no impact on the local watercourses or their respective floodplains, and this will not be considered further in the ES. The flood risk to the **EMG1 Works** is discussed in more detail within EMG1 Works Flood Risk Assessment included as **Appendix 13I (Document MCO 6.13I)**.

EMG1 Surface Water Drainage Infrastructure

13.4.60. EMG1 is located in the upper catchment of the Hemington Brook and Lockington Brook, and surface water from the development is discharged to both watercourses. The EMG1 development included drainage infrastructure designed to manage surface water runoff, mimicking the pre-development conditions. Surface water runoff is directed within pipe to a series of basins which provide storage and treatment prior to surface water being discharged from the development. The discharge rate from the development is restricted to the equivalent greenfield annual average runoff rate (QBAR) to mimic the pre-development conditions.

13.4.61. The drainage infrastructure was designed to manage the 1 in 100-year critical duration storm with a 20% allowance for climate change. Larger events will utilise any additional storage

volume available within the basin's freeboard allowance, before overflowing into the downstream watercourses.

13.4.62. The EMG1 surface water drainage infrastructure was designed to manage a specific drainage catchment to a specific design standard. Therefore, this could be sensitive to change. Additional inflows from new impermeable areas will increase the risk of exceedance. Therefore, the sensitivity will reflect the sensitivity of the downstream watercourses – high sensitivity if discharging to the Hemington Brook or the upper reach of the Lockington Brook, and a Moderate sensitivity if discharging to the lower reach of the Lockington Brook (i.e.: downstream of Lockington).

13.4.63. The proposed **EMG1 Works** are located in the existing EMG1 drainage catchment outfalling to the lower reach of the Lockington Brook, downstream of Lockington. Therefore, a Moderate receptor sensitivity has been adopted for this assessment.

Operational Surface Water Body: Hemington Brook Catchment (trib of the Soar)

13.4.64. The **EMG1 Works** also fall within this surface water body catchment. As previously described under the DCO Application, the sensitivity of this receptor is considered to be low.

Foul Drainage Infrastructure

13.4.65. The existing development at EMG1 includes infrastructure to manage foul water. This uses a series of pumping stations to discharge to the public foul water sewer next to the A453.

13.4.66. After receiving the connection from EMG1, the public foul sewer is routed eastwards to the Kegworth wastewater treatment works.

13.4.67. STW have confirmed that there is limited capacity in the existing foul sewer infrastructure and that they will need to undertake a capacity assessment to identify what reinforcement works will need to be undertaken to accommodate the **EMG1 Works**. Given there is limited capacity, this is considered to be a receptor of Moderate sensitivity.

Groundwater Body: Soar - Secondary Combined Water Body

13.4.68. The majority of the **EMG1 Works** are located in the Soar - Secondary Combined Water Body. As previously described under the DCO Application, the sensitivity of this receptor is considered to be low.

13.4.69. Soakaway tests at EMG1 have identified a low permeability of the soils within these areas which is typical in areas underlain by mudstone and siltstone areas. More information of the observed ground conditions is provided within **Chapter 14: Ground Conditions (Document MCO 6.14)**.

Groundwater Body: Soar - PT Sandstone Water Body

13.4.70. A proportion of the **EMG1 Works** also fall within the Soar - PT Sandstone Water Body. while the BGS identify that the aquifer is highly productive and that significant intergranular flow occurs. It is understood to be overlain by low permeability soils. More information of the observed ground conditions is provided within **Chapter 14: Ground Conditions (Document MCO 6.14).**

13.4.71. As previously described under the DCO Application, the sensitivity of this receptor is considered to be moderate.

13.5. Potential Impacts

13.5.1. This section considers the potential construction and operational impacts arising from the DCO Application and the MCO Application respectively, and in combination by reference to the components of the **EMG2 Project**.

DCO Application

Alteration or Loss of Floodplain

13.5.2. Building on or altering ground levels in the floodplain as part of the construction or operational stages has the potential to adversely displace flood storage and redirect flow pathways, potential increasing the flood risk elsewhere in the floodplain.

Embedded Mitigation

13.5.3. The design of the DCO Application has included embedded mitigation in the form of flood risk avoidance so that the built development is located outside of the floodplain and away from watercourses, wherever possible. Where crossing a watercourse cannot be avoided, the structures will be designed appropriately to convey flood flows, without adversely affecting downstream flood risk.

Hall Brook, Diseworth Brook, and Long Whatton Brook Floodplain

13.5.4. The **EMG2 Works** are located in proximity to the Hall Brook and Diseworth Brook. However, the location of the built development is offset significantly from these watercourses and their respective floodplains. Therefore, the floodplain will not be impacted – there will be no loss of floodplain storage or adverse interruption of flow pathways.

13.5.5. Therefore, the magnitude of the potential impact at the construction and operational phases will be Negligible. The significance of this effect is Negligible. The duration of the effect at the will be long term. No additional mitigation is required.

13.5.6. Further information on the flood risk at the **EMG2 Works** is provided is **Appendix 13G (Document DCO 6.13G)**.

Lockington Brook Floodplain

13.5.7. The EA modelled data of the Lockington Brook, included as part of **Appendix 13H (Document DCO 6.13H)**, identifies that the DCO Application is located almost entirely outside of outside of the modelled floodplain. The exception to this is the order limits associated with the north-eastern most area of the **Highway Works** which encroach slightly upon the 1 in 1000-year and the 1 in 100-year+60% climate change floodplain. However, the **Highway Works** in this area (M1 SB & A50 EB link) are located outside of the floodplain. Moreover, these proposed works are to occur upon an existing highway embankment which is 2.4m above the most precautionary modelled peak flood levels in this location. Therefore,

the floodplain will not be impacted – there will be no loss of floodplain storage or adverse interruption of flow pathways.

13.5.8. Therefore, the magnitude of the potential impact at the construction and operational phases will be Negligible. The significance of this effect is Negligible. The duration of the effect at the will be long term. No additional mitigation is required.

River Trent & River Soar Floodplain

13.5.9. The northern extent of the J24 Improvements extends into the River Trent and River Soar Flood Zones, as identified in **Appendix 13C (Document DCO 6.13C)**. However, the highway widening works in this location are located upon the existing highway embankments which are generally located above the floodplain, as identified as part of **Appendix 13H (Document DCO 6.13H)**.

13.5.10. At the M1 SB & A50 EB link, the existing carriageway is generally at an elevation 2m above the design flood level (the 1 in 100-year+30% return period event), 1.75m above the 1 in 1000-year flood level, and 1.70m above the maximum credible climate change scenario (1 in 100-year+62% return period event). Additionally, the associated works to the highway embankment are all to occur above the design flood level. Therefore, this will not result in any loss of floodplain storage or interruption of overland flow pathways in either the construction or operational phases.

13.5.11. On the A50 WB merge, the J24 Improvements are also located outside of the design event floodplain and the 1 in 1000-year floodplain. Therefore, this will also not result in any loss of floodplain storage or interruption of overland flow pathways in either the construction or operational phases.

13.5.12. At the maximum credible climate change scenario (1 in 100-year+62% return period event) flood levels are predicted to reach a level that could overtop and flow onto the A50 WB merge, leading to approximately 0.42m depth of flooding. However, the proposed highway widening at this location is not likely to displace a significant volume of flood water or disrupt the overland flow route. Also, this interaction with the floodplain would only occur at this extreme scenario, which is well above the accepted design standard.

13.5.13. Therefore, the magnitude of the potential impact at the construction and operational phases will be Negligible. The significance of this effect is Negligible. The duration of the effect at the will be long term. No additional mitigation is required.

Minor Tributary of the River Soar

13.5.14. The **Highway Works** within the vicinity of this watercourse include the improvement of an existing informal footpath, to create an Active Travel Link suitable for pedestrians and cyclists.

13.5.15. As reported in the Baseline Conditions section of this Chapter, a hydraulic capacity assessment was undertaken which identified that the existing A453 and M1 culverts have sufficient capacity to convey the potential flood flows from the upstream catchment. Therefore, any potential flooding within the vicinity of the **Highway Works** is expected to be largely contained within the channel and culvert.

13.5.16. At this stage the Active Travel Link is expected to be undertaken at grade, and any required crossing of the channel will be made with an appropriate culvert to convey design flows. Therefore, the footpath improvements are not expected to result in a significant loss of floodplain or interruption of flow routes.

13.5.17. Therefore, the magnitude of the potential impact at the construction and operational phases will be Negligible. The significance of this effect is Negligible. The duration of the effect will be long term. No additional mitigation is required.

13.5.18. Further information on the flood risk related to the Minor Tributary of the River Soar is provided as part of **Appendix 13H (Document DCO 6.13H**)**.**

Hemington Brook Floodplain

13.5.19. Footpath L57 crosses the upper reaches of the Hemington Brook. To improve the footpath to make it suitable for cycle use it is necessary to raise the footpath level as it crosses the watercourse channel.

13.5.20. At its current elevation, flood flows in excess of the capacity of the 0.5m diameter culvert can readily overtop the footpath into the downstream channel, with little attenuation. Raising the footpath level will alter the ability for the overtopping to occur. However, the **Highway Works** includes replacing the existing 0.5m diameter culvert with a larger diameter culvert that will increase capacity. The hydraulic analysis included as part of **Appendix 13H (Document DCO 6.13H)**, demonstrates that flood levels immediately upstream of the footpath are expected to increase because of the alterations, but that these impacts are contained entirely within the applicant's wider land ownership. The hydraulic analysis has confirmed that pass on flows into the downstream watercourse are unaffected. Therefore, the L57 Footpath upgrade will not result in any significant impacts in either the construction or operational phases.

13.5.21. Therefore, the magnitude of the potential impact at the construction and operational phases will be Negligible. The duration of the effect will be long term. No additional mitigation is required.

Surface Water Quantity

Construction Phase

13.5.22. At the construction phase, the clearance of vegetation can increase runoff, and operation of construction plant and vehicles can result in the compaction of soils subsequently reducing the rate of infiltration. A reduction in the infiltration rates of the soils can consequently result in an increase in surface water runoff rates and volumes. Also, the alteration of the catchments through reprofiling of topography can change the distribution of surface water runoff from the baseline conditions.

Hall Brook, Diseworth Brook, and Long Whatton Brook Floodplain

13.5.23. An increase in the rate and volume of surface water runoff from within the **EMG2 Works** has the potential to increase flood risk to this receptor. However, the **EMG2 Works** only represents a very small proportion of the catchment draining to the Hall Brook and Diseworth

Brook. Therefore, without additional mitigation, the magnitude of any potential impact at the construction phase would be Moderate Adverse.

Strategic Road Network Drainage Infrastructure

13.5.24. The J24 Improvements at the M1 SB & A50 EB link and the A50 WB merge represent widening works to the existing carriageway. Surface water runoff from the existing carriageway is dealt with by highway drainage infrastructure. At this stage it is expected that the runoff from the additional width of carriageway will connect into the existing drainage infrastructure, at both the construction and operational phases.

13.5.25. At this stage it is also expected that surface water runoff from the proposed new M1 NB to A50 WB link will also be directed to the local highway drainage infrastructure, at both the construction and operational phases.

13.5.26. The location of the proposed J24 Improvements is understood to already be drained into the highway drainage, albeit at greenfield rates. However, without mitigation, the additional runoff generated at the construction phase has the potential to overwhelm the current surface water drainage conveyance and storage provision, increasing the risk of surface water flooding in the downstream drainage network, and potentially increasing exceedance flows entering the Lockington Brook, bypassing the attenuated surface water storage currently offered by the highway drainage basins. However, this impact would likely only be observed in larger storm events.

13.5.27. Therefore, without additional mitigation, the magnitude of this potential impact at the construction and operational phases is considered to be Moderate Adverse.

Lockington Brook Floodplain

13.5.28. As discussed above, at this stage it is expected that the J24 Improvements at the A50 WB merge, the M1 SB & A50 EB link, and the M1 NB to A50 WB link, will connect into the existing drainage infrastructure, directing surface water from the construction and operational phases to the Lockington Brook via the existing highway drainage infrastructure.

13.5.29. Without additional mitigation, the alterations to the Lockington Brook catchment have the potential to alter the surface water runoff regime, potentially increasing the rate and volume of surface water runoff generated and transmitted to the watercourse through the highway drainage infrastructure. Without mitigation this has the potential to adversely affect flood risk to the receptor.

13.5.30. The DCO Application only represents a relatively small proportion of the catchment draining to the Lockington Brook. Therefore, without mitigation, the magnitude of any potential impact at the construction phase would be Moderate Adverse.

Operational Phase

13.5.31. At the operational phase, new development can introduce large areas of impermeable surfaces that can alter the surface water runoff regime, increasing the rate and volume of surface water runoff generated and transmitted to the receiving drainage systems, sewers, and watercourses, potentially adversely affecting flood risk to downstream receptors.

Embedded Mitigation

13.5.32. The DCO Application includes surface water drainage infrastructure as embedded mitigation that will manage the quantity of runoff from the built development of the **EMG2 Works** and the **Highway Works**. This will mimic, preserve, or improve upon, the baseline conditions in terms of the equivalent discharge rate.

13.5.33. In accordance with best practice and local and national requirements, the drainage infrastructure will be designed with respect to the design storm (the 1 in 100-year+25% storm) as well as the resilience check storm (the 1 in 100-year+40% event).

13.5.34. Regular inspection and maintenance of the drainage systems will take place throughout the life span of the DCO Application to ensure that they remain in good operational condition and work efficiently. This will include inspection and clearance of the outfall structures to remove any potential blockages.

Hall Brook, Diseworth Brook, and Long Whatton Brook Floodplain

13.5.35. At the **EMG2 Works** a series of cascading drainage basins and swales along the western and southern boundaries are proposed, which will help attenuate and treat surface water runoff from the **EMG2 Works**. This strategy will direct all surface water runoff from the built development to the minor watercourse/A42 culvert in the southern-eastern corner of the **EMG2 Works**, thus reducing the volume and rate of surface water runoff directed towards Diseworth below that in the baseline conditions. This will have a beneficial effect on the existing flood risk in Diseworth.

13.5.36. To comply with National Highway guidance, the outfall from the **EMG2 Works** will be restricted to current greenfield 1 in 1 year runoff rate from just the southern half of the site (the area that currently drains to the A42 culvert). As a result, the total peak discharge rate from the **EMG2 Works** will be reduced below the baseline conditions – a reduction of approximately 39% at the 1 in 1-year storm, and 86% at the 1 in 100-year+40% storm event. This will result in a beneficial effect to the Diseworth Brook floodplain.

13.5.37. The excess surface water runoff above the discharge rate will be stored within the basins and swales and supplemented with below ground storage within the **EMG2 Works**, where necessary. Sufficient storage for the 1 in 100-year storm event with a 25% allowance for climate change applied will be provided, and the drainage design will also be made resilient to the 1 in 100-year storm event with a 40% allowance for climate change applied. Potential exceedance flows generated in storm events above this, will be directed towards the south-eastern outfall and away from the village of Diseworth.

13.5.38. Further information on the drainage strategy is provided within **Appendix 13J (Document DCO 6.13J).**

13.5.39. With the embedded mitigation measures considered, the magnitude of the potential impact to the High sensitivity receptor would be Low Beneficial. The significance of this effect is Moderate-Minor beneficial. The duration of the effect at the will be long term. No additional mitigation is required.

Strategic Road Network Drainage Infrastructure

13.5.40. The additional surface water runoff generated by the J24 Improvements at the A50 WB merge and the M1 SB & A50 EB link (widening of existing carriageway) is expected to be directed into the existing highway drainage which ultimately outfalls to the Lockington Brook. This will be accommodated within the existing drainage infrastructure through addition of new surface water storage infrastructure constructed in the location of the works. This will allow the additional runoff to be stored at the location it is generated and drain into the downstream drainage network when capacity is available. This approach will allow the downstream drainage network to be retained and will ensure that pass on flows are retained at the existing rate (i.e.: preserving the existing conditions). There is also the option of enhancing the available storage within the existing downstream highway basins, to accommodate the additional runoff.

13.5.41. The proposed M1 NB to A50 WB link represents a new stretch of carriageway that will require a new drainage strategy. It is expected that the discharge rate will be restricted to the equivalent greenfield QBAR or 2l/s/ha, whichever is greatest, thus mimicking the baseline conditions as far as practicable. The excess surface water runoff above the discharge rate will be stored, until such time that it can drain into the downstream system. Sufficient storage for the 1 in 100-year storm event with an allowance for climate change applied will be provided.

13.5.42. Further information on the drainage strategy is provided within **Appendix 13K (Document DCO 6.13K**)**.**

13.5.43. With the mitigation measures considered, the magnitude of the potential impact to the Moderate sensitivity receptor would be Negligible. The significance of this effect is Negligible. The duration of the effect would be long term. No additional mitigation is required.

Lockington Brook Floodplain

13.5.44. The surface water drainage strategies previously described will manage the additional runoff generated within the Lockington Brook catchment by the **Highway Works**. With the embedded mitigation measures considered, the magnitude of the potential impact to the Moderate sensitivity receptor would be Negligible. The significance of this effect is Negligible. The duration of the effect would be long term. No additional mitigation is required.

Surface Water Quality, Including WFD Status

Construction Phase

13.5.45. The construction phase of the DCO Application has the potential to create excavations, expose bare ground, soil stockpiles, and generate dust and mud. In the event of heavy rainfall sediments may be mobilised and transported into the downstream water body. This could lead to the disruption of habitats, blockage of restrictive structures and alteration to flow regimes in addition to a decline in water quality.

13.5.46. This risk is exacerbated by the presence of very fine particles within the composition of the soils which are particularly susceptible to entrainment and transportation, and which can take a long time settle out of the water.

13.5.47. Also, the soils of the current agricultural land with the **EMG2 Works** may contain a reserve of agrichemicals, that could lead to increased concentration of phosphates and other pollutants if they were to be washed into the downstream water body.

13.5.48. Additionally, the operation of construction plant and vehicles poses the risk of hazardous substances (such as fuels and oils) leaching into receiving watercourses as a result of spillages or leakages. If concrete production is undertaken on the site during the construction phase, there is also the potential for particulate pollution of the watercourses. The construction phase could also introduce hazardous substances to the site such as solvents, cleaning agents, paints and other chemical substances. Improper storage or use of such materials may lead to pollution of the local waterbodies and damage to existing ecological habitats.

Operational Surface Water Body: Long Whatton Brook Catchment (trib of Soar)

13.5.49. At the construction phase, the **EMG2 Works** will discharge surface water to the "Operational Surface Water Body: Long Whatton Brook Catchment (trib of Soar)".

13.5.50. While the construction site has the potential to introduce new sources of pollution to the catchment, these will replace the current agricultural land use, which can also leave large areas of soils exposed and potentially release suspended solids into the downstream watercourses through the ploughing and cultivation of fields.

13.5.51. Also, the **EMG2 Works** will represent a reduction in agricultural land uses which will result in a net reduction in diffuse pollution sources from agrichemicals in the catchment – a significant source of phosphate and nitrate pollution.

13.5.52. Therefore, without additional mitigation, and when compared to the baseline conditions, the magnitude of this potential impact is considered to be Moderate Adverse at the construction phase.

13.5.53. Furthermore, continued or increased pollutant transfer into the surface water body from the **EMG2 Works** at the construction phase would potentially hinder the ability for it to reach a good status in the future. Therefore, without additional mitigation the construction phase would not comply with objectives of the WFD.

Operational Surface Water Body: Hemington Brook Catchment (trib of the Soar)

13.5.54. At the construction and operational phases, the runoff from the L57 Footpath will discharge to the "Operational Surface Water Body: Hemington Brook Catchment (trib of the Soar)", and there is the potential for pollutant transfer from the construction site into the surface water body.

13.5.55. Without additional mitigation, the magnitude of this potential impact at the construction and phase is considered to be Moderate Adverse.

13.5.56. Furthermore, increased pollutant transfer into the surface water body will potentially hinder the ability for it to reach a good status in the future. Therefore, without additional mitigation, the construction phase would not comply with objectives of the Water Framework Directive.

Operational Surface Water Body: Soar from Long Whatton Brook to Trent

13.5.57. At the construction and operational phases, a proportion of the runoff from the Active Travel Link will discharge to the Minor Tributary of the River Soar and the "Operational Surface Water Body: Soar from Long Whatton Brook to Trent".

13.5.58. Due to its proximity to the watercourse there is a risk that pollutants could be released at the construction phase. Without additional mitigation, the magnitude of this potential impact at the construction phase is considered to be Moderate Adverse.

13.5.59. Furthermore, increased pollutant transfer into the surface water body would potentially hinder the ability for it to reach a good status in the future. Therefore, without additional mitigation, the construction phase would not comply with objectives of the Water Framework Directive.

Operational Phase

13.5.60. At the operational phase, the DCO Application will introduce additional trafficked areas that will be drained to the downstream water body. Without mitigation, these could lead to an increase in suspended solids and metals, and dissolved pollutants and hydrocarbons being transmitted downstream, adversely affecting the water quality and health of a water body. Additionally, spillages and accidents can cause temporary unexpected releases of high pollutant concentrations. The level of contamination tends to rise with traffic intensity (particularly with lorry movements) and a higher risk of spillages and process contaminates can be expected from commercial and industrial activities.

Embedded Mitigation

13.5.61. The DCO Application includes surface water drainage infrastructure as embedded mitigation that will manage the quality of runoff from operational phase of the **EMG2 Works** and **Highway Works**.

13.5.62. The individual drainage strategies will be tailored to provided appropriate stages of treatment based upon the pollution hazard indices set out in the SuDS manual (C753), or, in the case of the **Highway Works**, a Highways Agency Water Risk Assessment Tool (HAWRAT) analysis.

13.5.63. In the case of the **EMG2 Works,** SuDS will primarily be used to provide treatment to runoff from the EMG2 Main Site in the form of basins and swales. Additional treatment will be provided within plots in the form permeable paving in car parking areas, and full retention oil separators in service yards that can be isolated from the downstream drainage system should a spillage occur.

13.5.64. Further information on the drainage strategy is provided within **Appendix 13J (Document DCO 6.13J**) and **Appendix 13K (Document DCO 6.13K**)**.**

13.5.65. Regular inspection and maintenance of the drainage systems will take place throughout the life span of the DCO to ensure that they remain in good operational condition and work efficiently.

Operational Surface Water Body: Long Whatton Brook Catchment (trib of Soar)

13.5.66. The development of the **EMG2 Works** will represent a reduction in the agriculture land use in the catchment, and therefore a reduction in the use of agrichemicals. It will also stop the seasonal ploughing and cultivation of the **EMG2 Works**, which can currently release sediments and entrained chemicals into the downstream water body.

13.5.67. When this is considered alongside the identified embedded mitigation measures, the magnitude of the potential impact to the Moderate sensitivity receptor is Low Beneficial. The significance of this effect is Moderate-Minor Beneficial. The duration of the effect is long term. No additional mitigation is required.

13.5.68. Furthermore, considering the reduction in agricultural land use and the improved management of surface water runoff quality, especially the sediment and pollutant content, the operational phase of the DCO Application would comply with objectives of the Water Framework Directive.

13.5.69. The **EMG2 Works** include the removal of a number of minor ditches. As previously reported, these only act as land drainage, collecting surface water runoff from the agricultural fields and directing it to the A42 culvert. The A42 culvert acts as a barrier to aquatic fauna, isolating the ditches from the downstream Diseworth Brook. Therefore, the ditches are not considered to be an ecological asset of the surface water body, and their removal will not affect its ecological WFD status.

Operational Surface Water Body: Hemington Brook Catchment (trib of the Soar)

13.5.70. The L57 footpath will be trafficked by pedestrians and cyclists and so does not represent a significant source of pollution to the Hemington Brook at the operational phase. The magnitude of the potential impact to the Low sensitivity receptor would be Negligible. The significance of this effect is Negligible. The duration of the effect would be long term. No additional mitigation is required.

13.5.71. Furthermore, it would comply with objectives of the Water Framework Directive.

Operational Surface Water Body: Soar from Long Whatton Brook to Trent

13.5.72. The Active Travel Link will be trafficked by pedestrians and cyclists and so does not represent a significant source of pollution to the watercourse at the operational phase. The magnitude of the potential impact to the Low sensitivity receptor would be Negligible. The significance of this effect is Negligible. The duration of the effect would be long term. No additional mitigation is required.

13.5.73. Furthermore, it would comply with objectives of the Water Framework Directive.

Additional Foul Water Flows

Foul Drainage Infrastructure

13.5.74. Protective Provisions for STW assets are included in Schedule 13 of the dDCO.

13.5.75. At the construction phase, welfare facilities will be required for the construction workers. If these are self-contained with built-in drainage tanks, then there will be no interaction with the local foul sewer network and therefore no change to the baseline conditions which will result in a Negligible impact.

13.5.76. If a connection is made to the local foul sewer network from the welfare facilities, then there will be a temporary but minor increase in pressure on the local foul network. Without additional mitigation, the potential magnitude of this impact would be Moderate Adverse.

13.5.77. At the operational phase, there will be increased flows to the local foul water network because of the **EMG2 Works**. STW has confirmed network upgrades are likely to be required because of insufficient capacity in the network. Without additional mitigation, the potential magnitude of this impact would be Moderate Adverse.

Groundwater Quality, Including WFD Status

Construction Phase

13.5.78. At the construction phase, the clearance of vegetation can increase runoff, and operation of construction plant and vehicles can result in the compaction of soils subsequently reducing the rate of infiltration.

13.5.79. Conversely, through excavations and reprofiling of the ground, the upper layers of clayey soils could be removed, exposing a more permeable geology, potentially creating new pollution pathways into the groundwater.

13.5.80. The operation of construction plant and vehicles poses the risk of hazardous substances (such as fuels and oils) leaching into the ground as a result of spillages or leakages. The construction phase could also introduce hazardous substances to the site such as solvents, cleaning agents, paints and other chemical substances. Improper storage or use of such materials may lead to pollution leaching into the ground.

Groundwater Body: Soar - Secondary Combined Water Body

13.5.81. While the construction site could lead to localised compaction of soils and a reduction in the infiltration rate, the soils already have low permeability in a similar manner to the underlying aquifer. Therefore, any change to the already limited infiltration/ groundwater recharge rate brought about by the construction phase would have a negligible impact at the scale of the groundwater body.

13.5.82. While the construction phase has the potential to introduce new sources of pollution to the catchment, the DCO Application will represent a reduction in agricultural land uses which will result in a net reduction in diffuse pollution sources from agrichemicals in the catchment – a significant source of phosphate and nitrate pollution.

13.5.83. Therefore, without additional mitigation, and when compared to the baseline conditions, the magnitude of this potential impact on groundwater quality is considered to be Minor Adverse at the construction phase.

13.5.84. Furthermore, continued or increased pollutant transfer into the groundwater body at the construction phase could potentially contribute to a deterioration of the waterbody status in the future. Therefore, without additional mitigation the construction phase would not comply with objectives of the WFD.

Groundwater Body: Soar - PT Sandstone Water Body

13.5.85. The permeability of the aquifer associated with this groundwater body is greater, but based on the local infiltration testing, the local soils have low permeability. Additionally, the DCO Application's interaction with this waterbody is limited to enhancements to existing impermeable infrastructure and development at J24 of the M1 and at Footpath L57. Therefore, while the construction phase could lead to localised compaction of soils, any change to the already limited infiltration/ groundwater recharge rate brought about by the construction phase would be negligible at the scale of the groundwater body.

13.5.86. However, should pollutants enter the aquifer then they could be expected to migrate due to its significant intergranular flow. Therefore, without additional mitigation, the magnitude of this potential impact on groundwater quality is considered to be Moderate Adverse at the construction phase.

13.5.87. Furthermore, continued or increased pollutant transfer into the groundwater body at the construction phase could help prevent the waterbody from achieving a good status in the future. Therefore, without additional mitigation the construction phase would not comply with objectives of the WFD.

Operational Phase

13.5.88. At the operational phase, new development can introduce large areas of impermeable surfaces that can alter the surface water runoff regime, increasing the rate of surface water runoff generated and transmitted to the receiving drainage systems, sewers, and watercourses, potentially adversely affecting groundwater recharge.

13.5.89. Additionally, the DCO Application will introduce additional trafficked areas that will be drained to the downstream surface water body. Without mitigation, these could lead to an increase in metals, dissolved pollutants, and hydrocarbons being transmitted downstream, adversely affecting the water quality and health of the underlying groundwater body. Additionally, spillages and accidents can cause temporary unexpected releases of high pollutant concentrations. The level of contamination tends to rise with traffic intensity (particularly with lorry movements) and a higher risk of spillages and process contaminates can be expected from commercial and industrial activities.

Embedded Mitigation

13.5.90. The DCO Application includes surface water drainage infrastructure as embedded mitigation that will manage the quality of runoff from operational phase of the **EMG2 Works** and **Highway Works**. The individual drainage strategies will be tailored to provided appropriate

stages of treatment based upon the pollution hazard indices set out in the SuDS manual (C753), or, in the case of the **Highway Works**, a Highways Agency Water Risk Assessment Tool (HAWRAT) analysis.

13.5.91. In the case of the **EMG2 Works,** SuDS will primarily be used to provide treatment in the form of basins and swales. Additional treatment will be provided within plots in the form permeable paving in car parking areas, and full retention oil separators in service yards that can be isolated from the downstream drainage system should a spillage occur.

13.5.92. The underlying soils have poor permeability that will limit the transmission of pollutants into the underlying ground waterbody. However, in the event that permeable soils or geology are exposed following the proposed reprofiling of the topography, then the SuDS will be lined to prevent the potential formation of pollution pathways into the ground waterbody.

13.5.93. Regular inspection and maintenance of the drainage systems will take place throughout the life span of the DCO to ensure that they remain in good operational condition and work efficiently.

13.5.94. Foundation design has not been undertaken at this stage of project. Shallow foundations are unlikely to have any significant impact on the groundwater body(s), but if deeper piled foundations are required then a Foundation Works Risk Assessment (FWRA) will be completed to identify any necessary measures required to mitigate any potential contaminative risks to the groundwater body, in accordance with relevant EA guidance.

Groundwater Body: Soar - Secondary Combined Water Body

13.5.95. While the additional impermeable area introduced by the DCO Application will generate a greater volume of surface water runoff, the impact of this on the underlying groundwater body will be negligible as the infiltration rate is already low and the DCO Application only represents a very small proportion of the groundwater body area. Additionally, the surface water runoff will be discharged to the downstream surface water body, which has hydraulic connectivity with the groundwater body.

13.5.96. The development of the **EMG2 Works** will represent a reduction in the agriculture land use in the groundwater body, and therefore a reduction in the use of agrichemicals. When this is considered alongside the identified embedded water quality mitigation measures, the magnitude of the potential impact to the Low sensitivity receptor is Low Beneficial. The significance of this effect is Minor-Negligible Beneficial. The duration of the effect is long term. No additional mitigation is required.

13.5.97. Furthermore, with the appropriate management of surface water runoff, especially the pollutant content, the DCO Application would comply with objectives of the Water Framework Directive.

Groundwater Body: Soar - PT Sandstone Water Body

13.5.98. The DCO Application's interaction with this groundwater body is limited to enhancements to existing impermeable infrastructure and development at J24 of the M1 and at Footpath L57. Therefore, while the operation phase will lead to a minor increase in impermeable areas,

any change to the groundwater recharge rate would be negligible at the scale of the groundwater body.

13.5.99. With the embedded water quality mitigation measures considered, the magnitude of the potential impact to the Moderate sensitivity receptor would be Negligible. The significance of this effect is Negligible. The duration of the effect would be long term. No additional mitigation is required.

13.5.100. Furthermore, with the appropriate management of surface water runoff, especially the sediment and pollutant content of the runoff, the DCO Application would comply with objectives of the Water Framework Directive.

MCO Application

Alteration or Loss of Floodplain

13.5.101. Building on or altering ground levels in the floodplain as part of the construction or operational stages has the potential to adversely displace flood storage and redirect flow pathways, potential increasing the flood risk elsewhere in the floodplain. However, the **EMG1 Works** are well removed from watercourses and the floodplain so there will be no impact as a result of the MCO Application.

Surface Water Quantity

Construction Phase

13.5.102. At the construction phase, the clearance of vegetation can increase runoff, and operation of construction plant and vehicles can result in the compaction of soils subsequently reducing the rate of infiltration. A reduction in the infiltration rates of the soils can consequently result in an increase in surface water runoff rates and volumes. Also, the alteration of the catchments through reprofiling of topography can change the distribution of surface water runoff from the baseline conditions.

EMG1 Surface Water Drainage Infrastructure

13.5.103. The **EMG1 Works** are located within the EMG1 surface water drainage catchment. Without mitigation, the additional runoff generated during the construction phase has the potential to overwhelm the attenuated storage currently offered in the downstream surface water drainage network, increasing the risk of surface water flooding, and potentially increasing the risk of exceedance flows entering the Lockington Brook. However, this impact would likely only be observed in larger storm events. Therefore, without additional mitigation, the magnitude of any potential impact at the construction phases would be Moderate Adverse.

Lockington Brook Floodplain

13.5.104. As discussed above, the **EMG1 Works** will direct construction and operational phase surface water runoff to the Lockington Brook, via the EMG1 surface water drainage infrastructure.

13.5.105. Without additional mitigation, the alterations to the Lockington Brook catchment have the potential to alter the surface water runoff regime, potentially increasing the rate and volume

of surface water runoff generated and transmitted to the watercourse through the EMG1 drainage infrastructure. Without mitigation this has the potential to adversely affect flood risk to the receptor.

13.5.106. The **EMG1 Works** only represents a relatively small proportion of the catchment draining to the Lockington Brook. Therefore, without mitigation, the magnitude of any potential impact at the construction phase would be Moderate Adverse.

Operational Phase

13.5.107. At the operational phase, new development can introduce large areas of impermeable surfaces that can alter the surface water runoff regime, increasing the rate and volume of surface water runoff generated and transmitted to the receiving drainage systems, sewers, and watercourses, potentially adversely affecting flood risk to downstream receptors.

Embedded Mitigation

13.5.108. The MCO Application includes surface water drainage infrastructure as embedded mitigation that will manage the quantity of runoff from the operational phase of the **EMG1 Works**. This will mimic, preserve, or improve upon, the baseline conditions in terms of the equivalent discharge rate.

13.5.109. In accordance with best practise and local and national requirements, the drainage infrastructure will be designed with respect to the design storm (the 1 in 100-year+25% storm) as well as the resilience check storm (the 1 in 100-year+40% event).

13.5.110. Regular inspection and maintenance of the drainage systems will take place throughout the life span of the development to ensure that they remain in good operational condition and work efficiently.

EMG1 Works Surface Water Drainage Infrastructure

13.5.111. The relatively minor alterations in impermeable area introduced to the EMG1 drainage catchment as a result of the **EMG1 Works**, such as at minor road realignments, layby creation, etc., will be accommodated within the existing drainage infrastructure through addition of new surface water storage infrastructure constructed in the location of the works. This will allow the additional runoff to be stored at the location it is generated and drain into the downstream drainage network when capacity is available. This approach will allow the downstream surface water drainage network to be retained and will ensure that pass on flows are retained at the existing rate (i.e. preserving the existing conditions).

13.5.112. Where a more substantial component is proposed, such as at Plot 16, then new surface water drainage infrastructure will accompany it. The discharge rate into the downstream EMG1 Surface Water Drainage Infrastructure will be restricted at the equivalent greenfield QBAR, thus mimicking the baseline conditions. The excess surface water runoff above the discharge rate will be stored within attenuation basins, supplemented within on plot storage as necessary, until such time that it can drain into the downstream system.

13.5.113. Further information on the drainage strategy is provided within **Appendix 13L (Document MCO 6.13L).**

13.5.114. With the embedded mitigation measures considered, the magnitude of the potential impact to the Moderate sensitivity receptor would be Negligible. The significance of this effect is Negligible. The duration of the effect would be long term. No additional mitigation is required.

Lockington Brook Floodplain

13.5.115. The surface water drainage strategies previously described will manage the additional runoff generated within the Lockington Brook catchment by the **EMG1 Works**. With the embedded mitigation measures considered, the magnitude of the potential impact to the Moderate sensitivity receptor would be Negligible. The significance of this effect is Negligible. The duration of the effect would be long term. No additional mitigation is required.

Surface Water Quality, Including WFD Status

Construction Phase

13.5.116. The construction phase of the MCO Application has the potential to create excavations, expose bare ground, soil stockpiles, and generate dust and mud. In the event of heavy rainfall sediments may be mobilised and transported into the downstream water body. This could lead to the disruption of habitats, blockage of restrictive structures and alteration to flow regimes in addition to a decline in water quality.

13.5.117. This risk is exacerbated by the presence of very fine particles within the composition of the soils which are particularly susceptible to entrainment and transportation, and which can take a long time settle out of the water.

13.5.118. Additionally, the operation of construction plant and vehicles poses the risk of hazardous substances (such as fuels and oils) leaching into receiving watercourses as a result of spillages or leakages. If concrete production is undertaken on the site during the construction phase, there is also the potential for particulate pollution of the watercourses. The construction phase could also introduce hazardous substances to the site such as solvents, cleaning agents, paints and other chemical substances. Improper storage or use of such materials may lead to pollution of the local waterbodies and damage to existing ecological habitats.

Operational Surface Water Body: Hemington Brook Catchment (trib of the Soar)

13.5.119. The surface water runoff from the **EMG1 Works** will pass through the existing EMG1 drainage infrastructure before outfalling to the surface water body. This existing drainage networks have the potential to remove pollutants before runoff is discharged to the surface water body. However, as already discussed, the drainage networks were not designed with the additional development in mind, and they could be overwhelmed by the additional flows generated, thereby bypassing the treatment facilities. There is also a risk at the construction phase that they become chocked with sediments, leading to the treatment potential of the drainage networks being nullified.

13.5.120. Therefore, without additional mitigation, the magnitude of this potential impact at the construction and phase is considered to be Moderate Adverse.

13.5.121. Furthermore, increased pollutant transfer into the surface water body will potentially hinder the ability for it to reach a good status in the future. Therefore, without additional mitigation, the construction phase would not comply with objectives of the Water Framework Directive.

Operational Phase

13.5.122. At the operational phase, the MCO Application will introduce additional trafficked areas that will be drained to the downstream water body. Without mitigation, these could lead to an increase in suspended solids and metals, and dissolved pollutants and hydrocarbons being transmitted downstream, adversely affecting the water quality and health of a water body. Additionally, spillages and accidents can cause temporary unexpected releases of high pollutant concentrations. The level of contamination tends to rise with traffic intensity (particularly with lorry movements) and a higher risk of spillages and process contaminates can be expected from commercial and industrial activities.

Embedded Mitigation

13.5.123. The MCO Application includes surface water drainage infrastructure as embedded mitigation that will manage the quality of runoff from operational phase of the **EMG1 Works**.

13.5.124. The individual drainage strategies will be tailored to provided appropriate stages of treatment based upon the pollution hazard indices set out in the SuDS manual (C753).

13.5.125. In the case of the **EMG1 Works,** SuDS will primarily be used to provide treatment in the form of basins and swales. Additional treatment will be provided within Plot 16 in the form permeable paving in car parking areas, and full retention oil separators in service yards that can be isolated from the downstream drainage system should a spillage occur.

13.5.126. Regular inspection and maintenance of the drainage systems will take place throughout the life span of the development to ensure that they remain in good operational condition and work efficiently.

13.5.127. Further information on the drainage strategy is provided within **Appendix 13L (Document MCO 6.13L).**

Operational Surface Water Body: Hemington Brook Catchment (trib of the Soar)

13.5.128. **The EMG1 Works** will be trafficked, but with the embedded mitigation measures considered, the magnitude of the potential impact to the Low sensitivity receptor would be Negligible. The significance of this effect is Negligible. The duration of the effect would be long term. No additional mitigation is required.

13.5.129. Furthermore, with the appropriate management of surface water runoff, especially the sediment and pollutant content of the runoff, the MCO Application would comply with objectives of the Water Framework Directive.

Additional Foul Water Flows

Foul Drainage Infrastructure

13.5.130. At the construction phase, welfare facilities may be required for the construction workers. If these are self-contained with built-in drainage tanks, then there will be no interaction with the local foul sewer network and therefore no change to the baseline conditions which will result in a Negligible impact.

13.5.131. If a connection is made to the local foul sewer network from the welfare facilities, then there will be a temporary but minor increase in pressure on the local foul network. Without additional mitigation, the potential magnitude of this impact would be Moderate Adverse.

13.5.132. At the operational phase, there will be increased flows to the local foul water network because of the **EMG1 Works**. STW has confirmed network upgrades are likely to be required because of insufficient capacity in the network. Without additional mitigation, the potential magnitude of this impact would be Moderate Adverse.

Groundwater Quality, Including WFD Status

Construction Phase

13.5.133. At the construction phase, the clearance of vegetation can increase runoff, and operation of construction plant and vehicles can result in the compaction of soils subsequently reducing the rate of infiltration.

13.5.134. Conversely, through excavations and reprofiling of the sites, the upper layers of clayey soils could be removed, exposing a more permeable geology, potentially creating new pollution pathways into the groundwater.

13.5.135. The operation of construction plant and vehicles poses the risk of hazardous substances (such as fuels and oils) leaching into the ground as a result of spillages or leakages. The construction phase could also introduce hazardous substances to the site such as solvents, cleaning agents, paints and other chemical substances. Improper storage or use of such materials may lead to pollution leaching into the ground.

Groundwater Body: Soar - Secondary Combined Water Body

13.5.136. While the construction phase could lead to localised compaction of soils and a reduction in the infiltration rate, the soils already have low permeability in a similar manner to the underlying aquifer. Therefore, any change to the already limited infiltration/ groundwater recharge rate brought about by the construction phase would have a negligible impact at the scale of the groundwater body.

13.5.137. Therefore, without additional mitigation, and when compared to the baseline conditions, the magnitude of this potential impact on groundwater quality is considered to be Minor Adverse at the construction phase.

13.5.138. Furthermore, continued or increased pollutant transfer into the groundwater body at the construction phase could potentially contribute to a deterioration of the waterbody status in

the future. Therefore, without additional mitigation the construction phase would not comply with objectives of the WFD.

Groundwater Body: Soar - PT Sandstone Water Body

13.5.139. The MCO Application's interaction with this groundwater body is limited to changes in the maximum height of the existing rail interchange gantry cranes. Therefore, the magnitude of the potential impact to the Moderate sensitivity receptor would be Negligible. The significance of this effect is Negligible. The duration of the effect would be long term. No additional mitigation is required.

13.5.140. Furthermore, there would be no impact on the Water Framework Directive status on the water body.

Operational Phase

13.5.141. At the operational phase, new development can introduce large areas of impermeable surfaces that can alter the surface water runoff regime, increasing the rate of surface water runoff generated and transmitted to the receiving drainage systems, sewers, and watercourses, potentially adversely affecting groundwater recharge.

13.5.142. Additionally, the MCO Application will introduce additional trafficked areas that will be drained to the downstream surface water body. Without mitigation, these could lead to an increase in metals, dissolved pollutants, and hydrocarbons being transmitted downstream, adversely affecting the water quality and health of the underlying groundwater body. Additionally, spillages and accidents can cause temporary unexpected releases of high pollutant concentrations. The level of contamination tends to rise with traffic intensity (particularly with lorry movements) and a higher risk of spillages and process contaminates can be expected from commercial and industrial activities.

Embedded Mitigation

13.5.143. The MCO Application includes surface water drainage infrastructure as embedded mitigation that will manage the quality of runoff from operational phase of the **EMG1 Works**. The individual drainage strategies will be tailored to provided appropriate stages of treatment based upon the pollution hazard indices set out in the SuDS manual (C753).

13.5.144. In the case of the **EMG1 Works,** SuDS will primarily be used to provide treatment in the form of basins and swales. Additional treatment will be provided within Plot 16 in the form permeable paving in car parking areas, and full retention oil separators in service yards that can be isolated from the downstream drainage system should a spillage occur.

13.5.145. The underlying soils have poor permeability that will limit the transmission of pollutants into the underlying ground waterbody. However, in the event that permeable soils or geology are exposed following the proposed reprofiling of the topography, then the SuDS will be lined to prevent the potential formation of pollution pathways into the ground waterbody.

13.5.146. Regular inspection and maintenance of the drainage systems will take place throughout the life span of the development to ensure that they remain in good operational condition and work efficiently.

13.5.147. Foundation design has not been undertaken at this stage of project. Shallow foundations are unlikely to have any significant impact on the groundwater body(s), but if deeper piled foundations are required then a Foundation Works Risk Assessment (FWRA) will be completed to identify any necessary measures required to mitigate any potential contaminative risks to the groundwater body, in accordance with relevant EA guidance.

Groundwater Body: Soar - Secondary Combined Water Body

13.5.148. While the additional impermeable area introduced by the **EMG1 Works** will generate a greater volume of surface water runoff, the impact of this on the underlying groundwater body will be negligible as the infiltration rate is already low and the **EMG1 Works** only represents a very small proportion of the groundwater body area. Additionally, the surface water from the **EMG1 Works** will be discharged to the downstream surface water body, which has hydraulic connectivity with the groundwater body.

13.5.149. Furthermore, with the appropriate management of surface water runoff, especially the pollutant content, the MCO Application would comply with objectives of the Water Framework Directive.

Groundwater Body: Soar - PT Sandstone Water Body

13.5.150. The MCO Application's interaction with this groundwater body is limited to changes in the maximum height of the existing rail interchange gantry cranes. Therefore, the magnitude of the potential impact to the Moderate sensitivity receptor would be Negligible. The significance of this effect is Negligible. The duration of the effect would be long term. No additional mitigation is required.

13.5.151. Furthermore, there would be no impact on the Water Framework Directive status on the water body.

EMG2 Project

13.5.152. There are no additional impacts at the construction or operation phase, or changes to the significance of the impacts already discussed, when the DCO Application and MCO Application are considered jointly.

13.6. Additional Mitigation Measures

DCO Application

Alteration or Loss of Floodplain

13.6.1. As discussed previously, the DCO Application has generally been located outside of the floodplain. Therefore, any potential impact on the flood risk receptors has been mitigated by avoidance. The magnitude of the potential impact at the construction and operational phases will be Negligible. The significance of this effect is Negligible. The duration of the effect at the will be long term. No additional mitigation is required.

Surface Water Quantity

Construction Phase

13.6.2. All construction activities will be undertaken by a competent contractor in accordance with the Construction Environmental Management Plan (CEMP) included as **Appendix 3A (Document DCO 6.3A)**.

13.6.3. The CEMP includes surface water management measures to prevent an increase in runoff and subsequently increased flood risk to downstream receptors. This includes provision of designated pathways for large vehicles to limit the areas of sediment compaction, and the implementation of a construction stage surface water drainage strategy, which will ensure surface water runoff is intercepted, safely stored, and discharged from the construction sites at a rate no greater than existing. Phase specific construction environmental management plan (P-CEMP) will be drafted in accordance with the principles set out in the construction environmental management plan and submitted as per draft DCO Requirement 11.

Hall Brook, Diseworth Brook, and Long Whatton Brook Floodplain

13.6.4. As previously set out, at the **EMG2 Works**, embedded mitigation will be provided in the form of a series of cascading drainage basins and swales along the western and southern boundaries, which will help attenuate and treat surface water runoff from the finished development. It is proposed to deliver these at the start of the construction phase to also help treat and attenuate runoff from the construction site.

13.6.5. This embedded strategy also includes directing all surface water runoff to the minor watercourse/A42 culvert in the southern-eastern corner of the **EMG2 Works**, thus reducing the volume and rate of surface water runoff directed towards Diseworth below that in the baseline conditions. This will have a beneficial effect on the existing flood risk in Diseworth.

13.6.6. Additionally, as described previously, the outfall from the **EMG2 Works** will need to be restricted to the 1 in 1-year greenfield runoff rate from just the southern half of the site (the area that currently drains to the A42 culvert). As a result, the total peak discharge rate from the **EMG2 Works** will be reduced below the baseline conditions. This will result in a beneficial effect to the Diseworth Brook floodplain.

13.6.7. Surface water runoff above the discharge rate will be stored on the construction site, within the basins and swales, or within treatment facilities within the individual plots, until such time that it can drain into the culvert. Sufficient storage for the 1 in 100-year storm event with a 25% allowance for climate change applied will be provided, and a resilience check will be made against the 1 in 100-year storm event with a 40% allowance for climate change applied. Potential exceedance flows generated in storm events above this, will be directed to south-eastern outfall and away from the village of Diseworth.

13.6.8. Additionally, temporary bunds around each development plot will be provided to act as a safeguard against exceedance overland flows generated during extreme storm events from and leaving the **EMG2 Works** prematurely.

13.6.9. With the additional mitigation measures implemented, the magnitude of the potential impact to the High sensitivity receptor would be Low Beneficial. The significance of this effect is

Moderate-Minor Beneficial. The duration of the effect at the construction phase would be short term.

Strategic Road Network Drainage Infrastructure

13.6.10. In accordance with the CEMP a temporary surface water drainage strategy to manage surface water runoff from the construction phase of the **Highway Works** and will be implemented until such time that the new drainage infrastructure has been completed.

13.6.11. The discharge rate from the construction sites in will be restricted at the equivalent greenfield QBAR or 2l/s whichever is greatest, thus mimicking the baseline conditions as far as practicable. The excess surface water runoff above the discharge rate will be stored on the construction site until such time that it can drain into the downstream system.

13.6.12. With the additional mitigation measures implemented, the magnitude of the potential impact to the Moderate sensitivity receptor would be Negligible. The significance of this effect is Negligible. The duration of the effect at the construction phase would be short term.

Lockington Brook Floodplain

13.6.13. At this stage it is expected that the J24 Improvements at the A50 WB merge, the M1 SB & A50 EB link, and the M1 NB to A50 WB link, will direct surface water from the construction sites to the Lockington Brook via the existing highway drainage infrastructure.

13.6.14. The construction phase surface water drainage strategies previously described will manage the additional runoff generated within the Lockington Brook catchment through provision of attenuated storage and minimising potential runoff. With the additional mitigation measures implemented, the magnitude of the potential impact to the Moderate sensitivity receptor would be Negligible. The significance of this effect is Negligible. The duration of the effect at the construction phase would be short term.

Operational Phase

13.6.15. As discussed previously, the embedded mitigation addresses any potential significant impacts on water quantity. No additional mitigation is required.

Surface Water Quality, Including WFD Status

Construction Phase

13.6.16. During the construction phase, all site works will be undertaken in accordance with CIRIA 532 (2001) Control of Water Pollution from Construction sites which promotes environmental good practice for control of water pollution arising from construction activities.

13.6.17. All construction activities will be undertaken by a competent contractor in accordance with an appropriate detailed Construction Environmental Management Plan (CEMP) included as **Appendix 3A (Document DCO 6.3A)**.

13.6.18. The CEMP includes surface water management plan to provide treatment to surface water runoff from the sites prior to it being discharged to the downstream watercourses and drainage systems at the construction phase as part of the additional mitigation strategy.

13.6.19. A Silt Management Plan, included as part of the CEMP **Appendix 3A (Document DCO 6.3A)**, will ensure top soils and subsoils are stripped, moved, stockpiled, monitored, and respread in a manner that minimises erosion and entrainment.

13.6.20. The surface of stockpiles of soil and large areas of bare ground will be appropriately covered or treated through the use of methods such as hydroseeding or similar, to help secure sediments and reduce the risk of them being mobilised during a storm event. Steep slopes and bare earth will include appropriate drainage to intercept runoff and limit the propagation of overland flows routes which could otherwise cause erosion and mobilise sediments.

13.6.21. Treatment facilities such basins, swales, and storm fencing, will be used capture and remove pollutants and suspended sediments prior to runoff leaving the construction sites. In preliminary consultations, the EA identified that the typical suspended solid limit of 40 mg/l would likely apply when discharging surface water. The minimum standard will be confirmed at the permitting stage and factored into the detailed design of the construction phase surface water treatment facilities.

13.6.22. The underlying soils have poor permeability that limit the transmission of pollutants into the underlying ground waterbody. However, in the event that permeable soils or geology are encountered during reprofiling, then the basins and swales will be lined to prevent the formation of pollution pathways into the ground.

13.6.23. Temporary ponds or above ground containment will be provided on each plot to remove the bulk of the sediment and pollution load. Surface water runoff will then pass through secondary or tertiary treatment, as necessary to achieve the require quality, before being discharged.

13.6.24. Where the suspended solids are particularly fine, flocculants may be used to help maximise removal. This may constitute a water discharge activity and therefore an environmental permit may be required. The permit requirements will be discussed and confirmed with the EA at the appropriate time.

13.6.25. At the **EMG2 Works,** the cascading drainage basins and swales along the western and southern boundaries that will help attenuate and treat surface water runoff from the operational development, will be delivered at the start of the construction phase to also provide a final polish to runoff from the construction site prior to it being discharged. These SuDS may need to be rehabilitated after the construction phase, to remove any significant sediment depositions and pollutant concentrations.

13.6.26. Additionally, where necessary, temporary bunds around each development plot, will be provided to act as a safeguard against exceedance overland flows generated during extreme storm events from bypassing the treatment facilities and leaving the **EMG2 Works** prematurely.

13.6.27. Temporary surface water conveyance routes, ditches, swales, and basins will be lined as necessary to minimise erosion and the mobilisation of sediments.

13.6.28. Existing outfalls from the construction sites, including land drainage, that do not form part of the drainage strategy will be stopped up to prevent treatment measures from being bypassed.

13.6.29. A penstock will be provided on the outfalls so that the discharge into the receiving watercourse or drainage system can be stopped in the event of a pollution incident.

13.6.30. Wheel washing facilities and regular sweeping will be undertaken to prevent the build-up of dust and silt on roads. Wheel washing facilities will be located in a designated bunded impermeable area a minimum of 10m from any surface water bodies. Any surplus water from these facilities will be disposed of via the foul water system or treated adequately prior to discharge.

13.6.31. Concrete will be mixed off site where possible. Where this is not possible, waste water from concrete production and lorry washing will be limited to a designated bunded impermeable area to prevent runoff or infiltration. Wastewater will be directed to the foul water network or adequately treated prior to disposal.

13.6.32. To avoid the pollution of watercourses from vehicles or accidental spillage, vehicles used on the site will undergo regular inspection and maintained to reduce the risk of leakages. Vehicle washing areas will be located at least 10m from any surface water bodies in designated bunded impermeable areas. Any runoff from this area will be treated prior to discharge.

13.6.33. On-site refuelling will be undertaken in a designated bunded impermeable area to prevent runoff/infiltration. The EA Pollution Prevention Guidance, while revoked, provides useful information regarding best practices for refuelling, including frequent testing and maintenance of storage tanks.

13.6.34. Oil and fuel storage facilities will be located in appropriate above ground storage tanks. Drip trays are to be used under vehicles, where appropriate to ensure that oil is collected to prevent contaminated runoff.

13.6.35. The appropriate management of surface water quality is a standard requirement, but it considered to be additional mitigation within this ES.

13.6.36. Regular monitoring of the downstream water quality will be undertaken during the construction phase to ensure that the sediment and pollution control measures are working effectively.

Operational Surface Water Body: Long Whatton Brook Catchment (trib of Soar)

13.6.37. With the additional mitigation measures implemented, the magnitude of the potential impact to the Moderate sensitivity receptor would be Negligible. The significance of this effect is Negligible. The duration of the effect at the construction phase would be short term.

13.6.38. Furthermore, with the appropriate management of surface water runoff, especially the sediment and pollutant content, the construction phase would comply with objectives of the Water Framework Directive.

Operational Surface Water Body: Hemington Brook Catchment (trib of the Soar)

13.6.39. With the additional mitigation measures implemented, the magnitude of the potential impact to the Low sensitivity receptor would be Negligible. The significance of this effect is Negligible. The duration of the effect at the construction phase would be short term.

13.6.40. Furthermore, with the appropriate management of surface water runoff, especially the sediment and pollutant content, the construction phase would comply with objectives of the Water Framework Directive.

Operational Surface Water Body: Soar from Long Whatton Brook to Trent

13.6.41. With the additional mitigation measures implemented, the magnitude of the potential impact to the Moderate sensitivity receptor would be Negligible. The significance of this effect is Negligible. The duration of the effect at the construction phase would be short term.

13.6.42. Furthermore, with the appropriate management of surface water runoff, especially the sediment and pollutant content, the construction phase would comply with objectives of the Water Framework Directive.

Operational Phase

13.6.43. As discussed previously, the embedded mitigation addresses any potential significant impacts on surface water quality. No additional mitigation is required.

Additional Foul Water Flows

Construction Phase

13.6.44. The CEMP includes a management plan to dispose of foul water from welfare facilities in an appropriate manner. The management of foul water on a construction site is a standard requirement, but it is considered to be additional mitigation within this ES.

Foul Drainage Infrastructure

13.6.45. Consultation with STW will continue so that they are aware of the development programme and can make any network upgrades that they consider to be necessary.

13.6.46. At the construction phase, the welfare facilities will either be self-contained with built-in drainage tanks, or an outfall to the public sewer will be made, but only after STW has implemented any necessary reinforcement works and confirmed that there is sufficient capacity.

13.6.47. With the additional mitigation measures in place the magnitude of the potential impact of the Moderate sensitivity receptor would Negligible. The significance of this effect is Negligible. The duration of the effect at the construction phase would be short term.

Operational Phase

Foul Drainage Infrastructure

13.6.48. Consultation with STW will continue so that they are aware of the development programme and can make any network upgrades that they consider to be necessary, prior to occupation.

13.6.49. Following any necessary upgrades to the STW network, the impact of the DCO Application upon the existing sewerage network will be Negligible due to a Negligible impact on a Moderate sensitivity receptor.

Groundwater Quality, Including WFD Status

Construction Phase

13.6.50. The surface water quality additional mitigation measures previously discussed are also applicable to managing the quality of any water transmitted into the ground. This includes lining the surface water treatment components (basins, swales, etc.) used at the construction phase, where necessary, to prevent pollutants from forming pathways into the groundwater body.

Groundwater Body: Soar - Secondary Combined Water Body

13.6.51. With the additional mitigation measures implemented, the magnitude of the potential impact to the Low sensitivity receptor would be Negligible. The significance of this effect is Negligible. The duration of the effect at the construction phase would be short term.

13.6.52. Furthermore, with the appropriate management of surface water runoff, especially the pollutant content, the construction phase would comply with objectives of the Water Framework Directive.

Groundwater Body: Soar - PT Sandstone Water Body

13.6.53. With the additional mitigation measures implemented, the magnitude of the potential impact to the Moderate sensitivity receptor would be Negligible. The significance of this effect is Negligible. The duration of the effect at the construction phase would be short term.

13.6.54. Furthermore, with the appropriate management of surface water runoff, especially the pollutant content, the construction phase would comply with objectives of the Water Framework Directive.

Operational Phase

13.6.55. As discussed previously, the embedded mitigation addresses any potential significant impacts on groundwater quality. No additional mitigation is required.

MCO Application

Alteration or Loss of Floodplain

13.6.56. As discussed previously, the **EMG1 Works** are well removed from watercourses and the floodplain. Therefore, any potential impact has been mitigated by avoidance. No additional mitigation is required.

Surface Water Quantity

Construction Phase

13.6.57. All construction activities will be undertaken by a competent contractor in accordance with the construction management framework plan approved pursuant to the original EMG1 DCO, and a phase specific CEMP.

13.6.58. The phase specific CEMP will include surface water management measures to prevent an increase in runoff and subsequently increased flood risk to downstream receptors. This includes provision of designated pathways for large vehicles to limit the areas of sediment compaction, and the implementation of a construction stage surface water drainage strategy, which will ensure surface water runoff is intercepted, safely stored to design storm standards, and discharged from the construction sites at a rate no greater than existing.

EMG1 Surface Water Drainage Infrastructure

13.6.59. A temporary surface water drainage strategy to manage surface water runoff from the construction phase of the **EMG1 Works** and will be implemented until such time that the new drainage infrastructure has been completed.

13.6.60. The discharge rate from the construction sites in will be restricted at the equivalent greenfield QBAR or 2l/s whichever is greatest, thus mimicking the baseline conditions as far as practicable. The excess surface water runoff above the discharge rate will be stored on the construction site, up to the appropriate design event, until such time that it can drain into the downstream system.

13.6.61. With the additional mitigation measures implemented, the magnitude of the potential impact to the Moderate sensitivity receptor would be Negligible. The significance of this effect is Negligible. The duration of the effect at the construction phase would be short term.

Lockington Brook Floodplain

13.6.62. The construction phase surface water drainage strategies previously described will manage the additional runoff generated within the Lockington Brook catchment through provision of attenuated storage and minimising potential runoff. With the additional mitigation measures implemented, the magnitude of the potential impact to the Moderate sensitivity receptor would be Negligible. The significance of this effect is Negligible. The duration of the effect at the construction phase would be short term.

Operational Phase

13.6.63. As discussed previously, the embedded mitigation addresses any potential significant impacts on water quantity. No additional mitigation is required.

Surface Water Quality, Including WFD Status

Construction Phase

13.6.64. During the construction phase, all site works will be undertaken in accordance with CIRIA 532 (2001) Control of Water Pollution from Construction sites which promotes environmental good practice for control of water pollution arising from construction activities.

13.6.65. All construction activities will be undertaken by a competent contractor in accordance with the construction management framework plan approved pursuant to the original EMG1 DCO, and a phase specific CEMP.

13.6.66. The phase specific CEMP will include surface water and silt management plan to provide treatment to surface water runoff from the construction site prior to it being discharged to the downstream watercourses and drainage systems.

13.6.67. The surface of stockpiles of soil and large areas of bare ground will be appropriately covered or treated through the use of methods such as hydroseeding or similar, to help secure sediments and reduce the risk of them being mobilised during a storm event. Steep slopes and bare earth will include appropriate drainage to intercept runoff and limit the propagation of overland flows routes which could otherwise cause erosion and mobilise sediments.

13.6.68. Treatment facilities such basins, swales, and storm fencing, will be used capture and remove pollutants and suspended sediments prior to runoff leaving the construction sites.

13.6.69. The underlying soils have poor permeability that limit the transmission of pollutants into the underlying ground waterbody. However, in the event that permeable soils or geology are encountered during reprofiling, then the basins and swales will be lined to prevent the formation of pollution pathways into the ground.

13.6.70. Temporary ponds or above ground containment will be provided to remove the bulk of the sediment and pollution load. Surface water runoff will then pass through secondary or tertiary treatment, as necessary to achieve the require quality, before being discharged.

13.6.71. Where the suspended solids are particularly fine, flocculants may be used to help maximise removal. This may constitute a water discharge activity and therefore an environmental permit may be required. The permit requirements will be discussed and confirmed with the EA at the appropriate time.

13.6.72. Temporary surface water conveyance routes, ditches, swales, and basins will be lined as necessary to minimise erosion and the mobilisation of sediments.

13.6.73. A penstock will be provided on the outfalls so that the discharge into the receiving watercourse or drainage system can be stopped in the event of a pollution incident.

13.6.74. Wheel washing facilities and regular sweeping will be undertaken to prevent the build-up of dust and silt on roads. Wheel washing facilities will be located in a designated bunded impermeable area a minimum of 10m from any surface water bodies. Any surplus water from these facilities will be disposed of via the foul water system or treated adequately prior to discharge.

13.6.75. Concrete will be mixed off site where possible. Where this is not possible, waste water from concrete production and lorry washing will be limited to a designated bunded impermeable area to prevent runoff or infiltration. Wastewater will be directed to the foul water network or adequately treated prior to disposal.

13.6.76. To avoid the pollution of watercourses from vehicles or accidental spillage, vehicles used on the site will undergo regular inspection and maintained to reduce the risk of leakages. Vehicle washing areas will be located at least 10m from any surface water bodies in designated bunded impermeable areas. Any runoff from this area will be treated prior to discharge.

13.6.77. On-site refuelling will be undertaken in a designated bunded impermeable area to prevent runoff/infiltration. The EA Pollution Prevention Guidance, while revoked, provides useful information regarding best practices for refuelling, including frequent testing and maintenance of storage tanks.

13.6.78. Oil and fuel storage facilities will be located in appropriate above ground storage tanks. Drip trays are to be used under vehicles, where appropriate to ensure that oil is collected to prevent contaminated runoff.

13.6.79. The appropriate management of surface water quality is a standard requirement, but it considered to be additional mitigation within this ES.

13.6.80. Regular monitoring of the downstream water quality will be undertaken during the construction phase to ensure that the sediment and pollution control measures are working effectively.

Operational Surface Water Body: Hemington Brook Catchment (trib of the Soar)

13.6.81. With the additional mitigation measures implemented, the magnitude of the potential impact to the Low sensitivity receptor would be Negligible. The significance of this effect is Negligible. The duration of the effect at the construction phase would be short term.

13.6.82. Furthermore, with the appropriate management of surface water runoff, especially the sediment and pollutant content, the construction phase of would comply with objectives of the Water Framework Directive.

Operational Phase

13.6.83. As discussed previously, the embedded mitigation addresses any potential significant impacts on surface water quality. No additional mitigation is required.

Additional Foul Water Flows

Construction Phase

13.6.84. The phase specific CEMP will include a management plan to dispose of foul water from any welfare facilities in an appropriate manner. The management of foul water on a construction site is a standard requirement, but it is considered to be additional mitigation within this ES.

Foul Drainage Infrastructure

13.6.85. Consultation with STW will continue so that they are aware of the development programme and can make any network upgrades that they consider to be necessary.

13.6.86. At the construction phase, the welfare facilities will either be self-contained with built-in drainage tanks, or an outfall to the public sewer will be made, but only after STW has implemented any necessary reinforcement works and confirmed that there is sufficient capacity.

13.6.87. With the additional mitigation measures in place the magnitude of the potential impact of the Moderate sensitivity receptor would Negligible. The significance of this effect is Negligible. The duration of the effect at the construction phase would be short term.

Operational Phase

Foul Drainage Infrastructure

13.6.88. Consultation with STW will continue so that they are aware of the development programme and can make any network upgrades that they consider to be necessary, prior to occupation.

13.6.89. Following any necessary upgrades to the STW network, the impact of the MCO Application upon the existing sewerage network will be Negligible due to a Negligible impact on a Moderate sensitivity receptor.

Groundwater Quality, Including WFD Status

Construction Phase

13.6.90. The surface water quality additional mitigation measures previously discussed are also applicable to managing the quality of any water transmitted into the ground. This includes lining the surface water treatment components (basins, swales, etc.) used at the construction phase, where necessary, to prevent pollutants from forming pathways into the groundwater body.

Groundwater Body: Soar - Secondary Combined Water Body

13.6.91. With the additional mitigation measures implemented, the magnitude of the potential impact to the Low sensitivity receptor would be Negligible. The significance of this effect is Negligible. The duration of the effect at the construction phase would be short term.

13.6.92. Furthermore, with the appropriate management of surface water runoff, especially the pollutant content, the construction phase would comply with objectives of the Water Framework Directive.

Groundwater Body: Soar - PT Sandstone Water Body

13.6.93. The MCO Application's interaction with this groundwater body is limited to changes in the maximum height of the existing rail interchange gantry cranes. No additional mitigation is required.

Operational Phase

13.6.94. As discussed previously, the embedded mitigation addresses any potential significant impacts on groundwater quality. No additional mitigation is required.

EMG2 Project

13.6.95. There are no further additional mitigation measures required, and no changes to the significance of the impacts already discussed, when the DCO Application and MCO Application are considered jointly.

13.7. Residual Effects

DCO Application

13.7.1. After the embedded and additional mitigation measures have been applied there are not expected to be any significant residual environmental impacts at the construction or operational phase.

MCO Application

13.7.2. After the embedded and additional mitigation measures have been applied there are not expected to be any significant residual environmental impacts at the construction or operational phase.

EMG2 Project

13.7.3. There are no changes to the residual effects when the DCO Application and MCO Application are considered jointly.

13.8. Cumulative Impacts

Inter-Project Related Impacts

13.8.1. It is considered that there will be no cumulative impacts for the **EMG2 Project** and any committed development within the area from a flood risk and drainage perspective. All new developments are required to adhere to the same principles as outlined in the NNNPS, NPPF, PPG and WFD with regard to reducing flood risk, limiting surface water runoff, and protecting the quality of water bodies.

13.8.2. The only cumulative impacts may be beneficial in terms of further attenuating and restricting surface water runoff into the nearby watercourses, and improvements in water quality from appropriate SuDS designs, and a general reduction in agricultural land management leading to a reduction in phosphate and nitrate diffuse pollution.

Intra-Project Related Impacts (combined effects)

Bird strike

13.8.3. The formation of new waterbodies in the form of sustainable drainage basins has the potential to attract birds, potentially increasing the risk of bird strike at the EMA. However, the basins have been designed to hold no permanent water and with a rough base to discourage birds. Additionally, the basins will be planted to discourage birds. This is discussed further in **Chapter 9: Ecology and Biodiversity (Document DCO 6.9/MCO 6.9)** and the associated Bird Strike Hazard Management Plan provided at **Appendix 9K (Document DCO 6.9K/MCO 6.9K)**.

Climate Change

13.8.4. The analysis of flood risk and drainage impacts has considered the impact of climate change through application of an appropriate uplift to estimated river flows and rainfall intensities in accordance with the latest projections. The impact of climate change on the **EMG2 Project** is discussed within **Chapter 19: Energy and Climate Change (Document DCO 6.19/MCO 6.19)**.

Surface Water Body Ecology

13.8.5. The low quality of the existing on site drainage channel/ditches is discussed within this chapter in relation to their contribution to the local surface water body WFD classification. The ecology of the site and the potential impact of the **EMG2 Project**, including the potential interactions with local SSSIs, is discussed more within **Chapter 9: Ecology and Biodiversity (Document DCO 6.9/MCO 6.9)**.

Groundwater and Ground Conditions

13.8.6. The local groundwater bodies and the **EMG2 Project's** potential impact on their WFD status are discussed within this chapter. **Chapter 14: Ground Conditions (Document DCO 6.14/MCO 6.14)** provides a more detailed appraisal of the ground conditions and the **EMG2 Project's** potential environmental impacts on these.

Water Supply / Resources

13.8.7. The water demands of the **EMG2 Project** and the proposed source of potable water supply are discussed within **Chapter 16: Utilities (Document DCO 6.16/MCO 6.16)**.

13.9. Summary of Effects and Conclusions

13.9.1. In summary, with appropriate mitigation measures in place, the DCO Application and the MCO Application will not have significant adverse effects upon the flood risk and drainage in the study area, if they delivered individually or jointly. A summary of the assessment for

the DCO Application is provided in **Table 13.10**, for the MCO Application in **Table 13.11**, and for the **EMG2 Project** in **Table 13.12**.

13.9.2. The **EMG2 Project** is located outside of or above the fluvial floodplain, and any necessary culverted crossings of minor watercourses for the purpose of footpath crossings, will be designed appropriately to convey flood events without any adverse attenuation.

13.9.3. Surface water runoff from the construction and operational phases will be managed in terms of quantity to ensure that surface water discharged to the downstream waterbody does not exceed the equivalent greenfield (pre-development) conditions.

13.9.4. Moreover, on the **EMG2 Works**, the DCO Application will divert surface water runoff downstream of Diseworth offering a **Moderate-Minor** benefit to flood risk. Additionally, to comply with National Highway guidance, the outfall from the **EMG2 Works** will be restricted to the 1 in 1-year greenfield runoff rate from just the southern half of the site (the area that currently drains to the A42 culvert). As a result, the total peak discharge rate from the **EMG2 Works** will be reduced below the baseline conditions. This will result in a **Moderate-Minor** benefit to flood risk to the Diseworth Brook floodplain.

13.9.5. Surface water runoff from the construction and operational phases will also be managed in terms of quality to ensure that surface water discharged to the downstream water body has been appropriately treated to removal sediments and pollutants. This ensures that the **EMG2 Project** complies with the objectives of the WFD.

13.9.6. Further to this, the **EMG2 Works** will replace the existing agriculture land use, a potential significant source of pollutants to the downstream water body. A reduction in agricultural land use in the catchment, combined with the surface treatment measures included as embedded mitigation, is expected to provide a **Moderate-Minor** benefit to the downstream water body.

13.9.7. With appropriate mitigation in place, as highlighted within this chapter, no significant residual effects will remain as a result of the DCO Application, MCO Application and the **EMG2 Project.**

Table 13.10 The DCO Application - Summary of Potential Environment Impacts, Mitigation, Effects and Monitoring

Description of Impact	Receptor	Sensitivity of Receptor	Embedded Mitigation	Magnitude of Impact, with Embedded Mitigation	Additional Mitigation	Magnitude of Impact, with Additional Mitigation	Significance of Effect	Residual effect	Proposed monitoring
Construction phase									
Alteration or Loss of Floodplain	Hall Brook, Diseworth Brook, and Long Whatton Brook Floodplain	High	The DCO Application has been located outside of or above the floodplain.	Negligible	N/A	Negligible	Negligible	Negligible	None
	Lockington Brook Floodplain	Moderate	The DCO Application has been located outside of or above the floodplain.	Negligible	N/A	Negligible	Negligible	Negligible	None
	River Trent & River Soar Floodplain	High	The DCO Application has been located outside of or above the floodplain.	Negligible	N/A	Negligible	Negligible	Negligible	None
	Minor Tributary of the River Soar	Moderate	The DCO Application has been largely located outside of or above the floodplain. Any necessary culverted crossings will be designed appropriately to convey flood events.	Negligible	N/A	Negligible	Negligible	Negligible	None
	Hemington Brook Floodplain	High	The DCO Application has been largely located outside of or above the floodplain. Any necessary culverted crossings will be designed	Negligible	N/A	Negligible	Negligible	Negligible	None

Description of Impact	Receptor	Sensitivity of Receptor	Embedded Mitigation	Magnitude of Impact, with Embedded Mitigation	Additional Mitigation	Magnitude of Impact, with Additional Mitigation	Significance of Effect	Residual effect	Proposed monitoring
			appropriately to convey flood events.						
Surface Water Quantity	Hall Brook, Diseworth Brook, and Long Whatton Brook Floodplain	High	-	Moderate Adverse	CEMP and construction stage surface water drainage strategy, including attenuated storage discharging at a rate below the baseline conditions.	Low Beneficial	Moderate-Minor Beneficial	Moderate-Minor Beneficial	None
	Strategic Road Network Drainage Infrastructure	Moderate	-	Moderate Adverse	CEMP and construction stage surface water drainage strategy, including attenuated storage.	Negligible	Negligible	Negligible	None

Description of Impact	Receptor	Sensitivity of Receptor	Embedded Mitigation	Magnitude of Impact, with Embedded Mitigation	Additional Mitigation	Magnitude of Impact, with Additional Mitigation	Significance of Effect	Residual effect	Proposed monitoring
	Lockington Brook Floodplain	Moderate	-	Moderate Adverse	CEMP and construction stage surface water drainage strategy, including attenuated storage.	Negligible	Negligible	Negligible	None
Surface Water Quality, Including WFD Status	Operational Surface Water Body: Long Whatton Brook Catchment (trib of Soar)	Low	-	Moderate Adverse	CEMP and construction stage surface water drainage strategy, including sediment and pollution control measures.	Negligible	Negligible	Negligible	Water quality monitoring of the downstream waterbody to ensure the treatment process are sufficient.

Description of Impact	Receptor	Sensitivity of Receptor	Embedded Mitigation	Magnitude of Impact, with Embedded Mitigation	Additional Mitigation	Magnitude of Impact, with Additional Mitigation	Significance of Effect	Residual effect	Proposed monitoring
	Operational Surface Water Body: Hemington Brook Catchment (trib of the Soar)	Low	-	Moderate Adverse	CEMP and construction stage surface water drainage strategy, including sediment and pollution control measures.	Negligible	Negligible	Negligible	Water quality monitoring of the downstream waterbody to ensure the treatment process are sufficient.
	Operational Surface Water Body: Soar from Long Whatton Brook to Trent	Moderate	-	Moderate Adverse	CEMP and construction stage surface water drainage strategy, including sediment and pollution control measures.	Negligible	Negligible	Negligible	Water quality monitoring of the downstream waterbody to ensure the treatment process are sufficient.
Additional Foul Water Flows	Foul Drainage Infrastructure	Moderate	-	Moderate Adverse	CEMP and construction stage foul water drainage strategy.	Negligible	Negligible	Negligible	None

Description of Impact	Receptor	Sensitivity of Receptor	Embedded Mitigation	Magnitude of Impact, with Embedded Mitigation	Additional Mitigation	Magnitude of Impact, with Additional Mitigation	Significance of Effect	Residual effect	Proposed monitoring
Groundwater Quantity & Quality	Groundwater body: Soar - Secondary Combined	Low	-	Minor Adverse	CEMP and construction stage surface water drainage strategy, including sediment and pollution control measures.	Negligible	Negligible	Negligible	None
	Groundwater body: Soar - PT Sandstone	Moderate	-	Moderate Adverse	CEMP and construction stage surface water drainage strategy, including sediment and pollution control measures.	Negligible	Negligible	Negligible	None
Operational phase									
Alteration or Loss of Floodplain	Hall Brook, Diseworth Brook, and Long Whatton Brook Floodplain	High	The DCO Application has been located outside of or above the floodplain	Negligible	N/A	Negligible	Negligible	Negligible	None
	Lockington Brook Floodplain	Moderate	The DCO Application has been located outside of or above the floodplain	Negligible	N/A	Negligible	Negligible	Negligible	None

Description of Impact	Receptor	Sensitivity of Receptor	Embedded Mitigation	Magnitude of Impact, with Embedded Mitigation	Additional Mitigation	Magnitude of Impact, with Additional Mitigation	Significance of Effect	Residual effect	Proposed monitoring
	River Trent & River Soar Floodplain	High	The DCO Application has been located outside of or above the floodplain	Negligible	N/A	Negligible	Negligible	Negligible	None
	Minor Tributary of the River Soar	Moderate	The DCO Application has been largely located outside of or above the floodplain. Any necessary culverted crossings will be designed appropriately to convey flood events.	Negligible	N/A	Negligible	Negligible	Negligible	None
	Hemington Brook Floodplain	High	The DCO Application has been largely located outside of or above the floodplain. Any necessary culverted crossings will be designed appropriately to convey flood events.	Negligible	N/A	Negligible	Negligible	Negligible	None
Surface Water Quantity	Hall Brook, Diseworth Brook, and Long Whatton Brook Floodplain	High	Surface water drainage strategy, including attenuated storage discharging at a rate below the baseline conditions.	Minor Beneficial	N/A	Minor Beneficial	Moderate-Minor Beneficial	Moderate-Minor Beneficial	None
	Strategic Road Network Drainage Infrastructure	Moderate	Surface water drainage strategy, including attenuated storage discharging at the greenfield QBAR.	Negligible	N/A	Negligible	Negligible	Negligible	None

Description of Impact	Receptor	Sensitivity of Receptor	Embedded Mitigation	Magnitude of Impact, with Embedded Mitigation	Additional Mitigation	Magnitude of Impact, with Additional Mitigation	Significance of Effect	Residual effect	Proposed monitoring
	Lockington Brook Floodplain	Moderate	Surface water drainage strategy, including attenuated storage discharging at the greenfield QBAR.	Negligible	N/A	Negligible	Negligible	Negligible	None
Surface Water Quality, Including WFD Status	Operational Surface Water Body: Long Whatton Brook Catchment (trib of Soar)	Low	Surface water drainage strategy, including sediment and pollution control measures.	Low Beneficial	N/A	Low Beneficial	Moderate-Minor Beneficial	Moderate-Minor Beneficial	None
	Operational Surface Water Body: Hemington Brook Catchment (trib of the Soar)	Low	Surface water drainage strategy, including sediment and pollution control measures.	Negligible	N/A	Negligible	Negligible	Negligible	None
	Operational Surface Water Body: Soar from Long Whatton Brook to Trent	Moderate	Surface water drainage strategy, including sediment and pollution control measures.	Negligible	N/A	Negligible	Negligible	Negligible	None

Description of Impact	Receptor	Sensitivity of Receptor	Embedded Mitigation	Magnitude of Impact, with Embedded Mitigation	Additional Mitigation	Magnitude of Impact, with Additional Mitigation	Significance of Effect	Residual effect	Proposed monitoring
Additional Foul Water Flows	Foul Drainage Infrastructure	Moderate	-	Moderate Adverse	Work with sewer operator to ensure any necessary reinforcement works are in place prior to occupation.	Negligible	Negligible	Negligible	None
Groundwater Quality, Including WFD Status	Groundwater body: Soar - Secondary Combined	Low	Surface water drainage strategy, including pollution control measures.	Low Beneficial	N/A	Low Beneficial	Minor-Negligible	Minor-Negligible	None
	Groundwater body: Soar - PT Sandstone	Moderate	Surface water drainage strategy, including pollution control measures.	Negligible	N/A	Negligible	Negligible	Negligible	None

Table 13.11 The MCO Application - Summary of Potential Environment Impacts, Mitigation, Effects and Monitoring

Description of Impact	Receptor	Sensitivity of Receptor	Embedded Mitigation	Magnitude of Impact, with Embedded Mitigation	Additional Mitigation	Magnitude of Impact, with Additional Mitigation	Significance of Effect	Residual effect	Proposed monitoring
Construction phase									
Surface Water Quantity	EMG1 Surface Water Drainage Infrastructure	Moderate	-	Moderate Adverse	Phase specific CEMP and construction stage surface water drainage strategy, including attenuated storage.	Negligible	Negligible	Negligible	None
	Lockington Brook Floodplain	Moderate	-	Moderate Adverse	Phase specific CEMP and construction stage surface water drainage strategy, including attenuated storage.	Negligible	Negligible	Negligible	None

Description of Impact	Receptor	Sensitivity of Receptor	Embedded Mitigation	Magnitude of Impact, with Embedded Mitigation	Additional Mitigation	Magnitude of Impact, with Additional Mitigation	Significance of Effect	Residual effect	Proposed monitoring
Surface Water Quality, Including WFD Status	Operational Surface Water Body: Hemington Brook Catchment (trib of the Soar)	Low	-	Moderate Adverse	Phase specific CEMP and construction stage surface water drainage strategy, including sediment and pollution control measures.	Negligible	Negligible	Negligible	Water quality monitoring of the downstream waterbody to ensure the treatment process are sufficient.
Additional Foul Water Flows	Foul Drainage Infrastructure	Moderate	-	Moderate Adverse	Phase specific CEMP and construction stage foul water drainage strategy.	Negligible	Negligible	Negligible	None
Groundwater Quantity & Quality	Groundwater body: Soar - Secondary Combined	Low	-	Minor Adverse	Phase specific CEMP and construction stage surface water drainage strategy, including sediment and pollution control measures.	Negligible	Negligible	Negligible	None

Description of Impact	Receptor	Sensitivity of Receptor	Embedded Mitigation	Magnitude of Impact, with Embedded Mitigation	Additional Mitigation	Magnitude of Impact, with Additional Mitigation	Significance of Effect	Residual effect	Proposed monitoring
	Groundwater body: Soar - PT Sandstone	Moderate	-	Moderate Adverse	Phase specific CEMP and construction stage surface water drainage strategy, including sediment and pollution control measures.	Negligible	Negligible	Negligible	None
Operational phase									
Surface Water Quantity	EMG1 Surface Water Drainage Infrastructure	Moderate	Surface water drainage strategy, including attenuated storage discharging at the greenfield QBAR.	Negligible	N/A	Negligible	Negligible	Negligible	None
	Lockington Brook Floodplain	Moderate	Surface water drainage strategy, including attenuated storage discharging at the greenfield QBAR.	Negligible	N/A	Negligible	Negligible	Negligible	None
Surface Water Quality, Including WFD Status	Operational Surface Water Body: Hemington Brook Catchment (trib of the Soar)	Low	Surface water drainage strategy, including sediment and pollution control measures.	Negligible	N/A	Negligible	Negligible	Negligible	None

Description of Impact	Receptor	Sensitivity of Receptor	Embedded Mitigation	Magnitude of Impact, with Embedded Mitigation	Additional Mitigation	Magnitude of Impact, with Additional Mitigation	Significance of Effect	Residual effect	Proposed monitoring
Additional Foul Water Flows	Foul Drainage Infrastructure	Moderate	-	Moderate Adverse	Work with sewer operator to ensure any necessary reinforcement works are in place prior to occupation.	Negligible	Negligible	Negligible	None
Groundwater Quality, Including WFD Status	Groundwater body: Soar - Secondary Combined	Low	Surface water drainage strategy, including pollution control measures.	Low Beneficial	N/A	Low Beneficial	Minor-Negligible	Minor-Negligible	None
	Groundwater body: Soar - PT Sandstone	Moderate	Surface water drainage strategy, including pollution control measures.	Negligible	N/A	Negligible	Negligible	Negligible	None

Table 13.12 The EMG2 Project - Summary of Potential Environment Impacts, Mitigation, Effects and Monitoring

Description of Impact	Receptor	Sensitivity of Receptor	Embedded Mitigation	Magnitude of Impact, with Embedded Mitigation	Additional Mitigation	Magnitude of Impact, with Additional Mitigation	Significance of Effect	Residual effect	Proposed monitoring
Construction phase									
Alteration or Loss of Floodplain	Hall Brook, Diseworth Brook, and Long Whatton Brook Floodplain	High	The **EMG2 Project** has been located outside of or above the floodplain.	Negligible	N/A	Negligible	Negligible	Negligible	None
	Lockington Brook Floodplain	Moderate	The **EMG2 Project** has been located outside of or above the floodplain.	Negligible	N/A	Negligible	Negligible	Negligible	None
	River Trent & River Soar Floodplain	High	The **EMG2 Project** has been located outside of or above the floodplain.	Negligible	N/A	Negligible	Negligible	Negligible	None
	Minor Tributary of the River Soar	Moderate	The **EMG2 Project** has been largely located outside of or above the floodplain. Any necessary culverted crossings will be designed appropriately to convey flood events.	Negligible	N/A	Negligible	Negligible	Negligible	None
	Hemington Brook Floodplain	High	The **EMG2 Project** has been largely located outside of or above the floodplain. Any necessary culverted crossings will be designed	Negligible	N/A	Negligible	Negligible	Negligible	None

Description of Impact	Receptor	Sensitivity of Receptor	Embedded Mitigation	Magnitude of Impact, with Embedded Mitigation	Additional Mitigation	Magnitude of Impact, with Additional Mitigation	Significance of Effect	Residual effect	Proposed monitoring
			appropriately to convey flood events.						
Surface Water Quantity	Hall Brook, Diseworth Brook, and Long Whatton Brook Floodplain	High	-	Moderate Adverse	CEMP and construction stage surface water drainage strategy, including attenuated storage discharging at a rate below the baseline conditions.	Low Beneficial	Moderate-Minor Beneficial	Moderate-Minor Beneficial	None
	EMG1 Surface Water Drainage Infrastructure	Moderate	-	Moderate Adverse	CEMP and construction stage surface water drainage strategy, including attenuated storage.	Negligible	Negligible	Negligible	None

Description of Impact	Receptor	Sensitivity of Receptor	Embedded Mitigation	Magnitude of Impact, with Embedded Mitigation	Additional Mitigation	Magnitude of Impact, with Additional Mitigation	Significance of Effect	Residual effect	Proposed monitoring
	Strategic Road Network Drainage Infrastructure	Moderate	-	Moderate Adverse	CEMP and construction stage surface water drainage strategy, including attenuated storage.	Negligible	Negligible	Negligible	None
	Lockington Brook Floodplain	Moderate	-	Moderate Adverse	CEMP and construction stage surface water drainage strategy, including attenuated storage.	Negligible	Negligible	Negligible	None

Description of Impact	Receptor	Sensitivity of Receptor	Embedded Mitigation	Magnitude of Impact, with Embedded Mitigation	Additional Mitigation	Magnitude of Impact, with Additional Mitigation	Significance of Effect	Residual effect	Proposed monitoring
Surface Water Quality, Including WFD Status	Operational Surface Water Body: Long Whatton Brook Catchment (trib of Soar)	Low	-	Moderate Adverse	CEMP and construction stage surface water drainage strategy, including sediment and pollution control measures.	Negligible	Negligible	Negligible	Water quality monitoring of the downstream waterbody to ensure the treatment process are sufficient.
	Operational Surface Water Body: Hemington Brook Catchment (trib of the Soar)	Low	-	Moderate Adverse	CEMP and construction stage surface water drainage strategy, including sediment and pollution control measures.	Negligible	Negligible	Negligible	Water quality monitoring of the downstream waterbody to ensure the treatment process are sufficient.

Description of Impact	Receptor	Sensitivity of Receptor	Embedded Mitigation	Magnitude of Impact, with Embedded Mitigation	Additional Mitigation	Magnitude of Impact, with Additional Mitigation	Significance of Effect	Residual effect	Proposed monitoring
	Operational Surface Water Body: Soar from Long Whatton Brook to Trent	Moderate	-	Moderate Adverse	CEMP and construction stage surface water drainage strategy, including sediment and pollution control measures.	Negligible	Negligible	Negligible	Water quality monitoring of the downstream waterbody to ensure the treatment process are sufficient.
Additional Foul Water Flows	Foul Drainage Infrastructure	Moderate	-	Moderate Adverse	CEMP and construction stage foul water drainage strategy.	Negligible	Negligible	Negligible	None
Groundwater Quantity & Quality	Groundwater body: Soar - Secondary Combined	Low	-	Minor Adverse	CEMP and construction stage surface water drainage strategy, including sediment and pollution control measures.	Negligible	Negligible	Negligible	None

Description of Impact	Receptor	Sensitivity of Receptor	Embedded Mitigation	Magnitude of Impact, with Embedded Mitigation	Additional Mitigation	Magnitude of Impact, with Additional Mitigation	Significance of Effect	Residual effect	Proposed monitoring
	Groundwater body: Soar - PT Sandstone	Moderate	-	Moderate Adverse	CEMP and construction stage surface water drainage strategy, including sediment and pollution control measures.	Negligible	Negligible	Negligible	None
Operational phase									
Alteration or Loss of Floodplain	Hall Brook, Diseworth Brook, and Long Whatton Brook Floodplain	High	The **EMG2 Project** has been located outside of or above the floodplain	Negligible	N/A	Negligible	Negligible	Negligible	None
	Lockington Brook Floodplain	Moderate	The **EMG2 Project** has been located outside of or above the floodplain	Negligible	N/A	Negligible	Negligible	Negligible	None
	River Trent & River Soar Floodplain	High	The **EMG2 Project** has been located outside of or above the floodplain	Negligible	N/A	Negligible	Negligible	Negligible	None
	Minor Tributary of the River Soar	Moderate	The **EMG2 Project** has been largely located outside of or above the floodplain. Any necessary culverted crossings will be designed	Negligible	N/A	Negligible	Negligible	Negligible	None

Description of Impact	Receptor	Sensitivity of Receptor	Embedded Mitigation	Magnitude of Impact, with Embedded Mitigation	Additional Mitigation	Magnitude of Impact, with Additional Mitigation	Significance of Effect	Residual effect	Proposed monitoring
			appropriately to convey flood events.						
	Hemington Brook Floodplain	High	The **EMG2 Project** has been largely located outside of or above the floodplain. Any necessary culverted crossings will be designed appropriately to convey flood events.	Negligible	N/A	Negligible	Negligible	Negligible	None
Surface Water Quantity	Hall Brook, Diseworth Brook, and Long Whatton Brook Floodplain	High	Surface water drainage strategy, including attenuated storage discharging at a rate below the baseline conditions.	Minor Beneficial	N/A	Minor Beneficial	Moderate-Minor Beneficial	Moderate-Minor Beneficial	None
	EMG1 Surface Water Drainage Infrastructure	Moderate	Surface water drainage strategy, including attenuated storage discharging at the greenfield QBAR.	Negligible	N/A	Negligible	Negligible	Negligible	None
	Strategic Road Network Drainage Infrastructure	Moderate	Surface water drainage strategy, including attenuated storage discharging at the greenfield QBAR.	Negligible	N/A	Negligible	Negligible	Negligible	None
	Lockington Brook Floodplain	Moderate	Surface water drainage strategy, including attenuated storage discharging at the greenfield QBAR.	Negligible	N/A	Negligible	Negligible	Negligible	None

Description of Impact	Receptor	Sensitivity of Receptor	Embedded Mitigation	Magnitude of Impact, with Embedded Mitigation	Additional Mitigation	Magnitude of Impact, with Additional Mitigation	Significance of Effect	Residual effect	Proposed monitoring
Surface Water Quality, Including WFD Status	Operational Surface Water Body: Long Whatton Brook Catchment (trib of Soar)	Low	Surface water drainage strategy, including sediment and pollution control measures.	Low Beneficial	N/A	Low Beneficial	Moderate-Minor Beneficial	Moderate-Minor Beneficial	None
	Operational Surface Water Body: Hemington Brook Catchment (trib of the Soar)	Low	Surface water drainage strategy, including sediment and pollution control measures.	Negligible	N/A	Negligible	Negligible	Negligible	None
	Operational Surface Water Body: Soar from Long Whatton Brook to Trent	Moderate	Surface water drainage strategy, including sediment and pollution control measures.	Negligible	N/A	Negligible	Negligible	Negligible	None
Additional Foul Water Flows	Foul Drainage Infrastructure	Moderate	-	Moderate Adverse	Work with sewer operator to ensure any necessary reinforcement works are in place prior to occupation.	Negligible	Negligible	Negligible	None

Description of Impact	Receptor	Sensitivity of Receptor	Embedded Mitigation	Magnitude of Impact, with Embedded Mitigation	Additional Mitigation	Magnitude of Impact, with Additional Mitigation	Significance of Effect	Residual effect	Proposed monitoring
Groundwater Quality, Including WFD Status	Groundwater body: Soar - Secondary Combined	Low	Surface water drainage strategy, including pollution control measures.	Low Beneficial	N/A	Low Beneficial	Minor-Negligible	Minor-Negligible	None
	Groundwater body: Soar - PT Sandstone	Moderate	Surface water drainage strategy, including pollution control measures.	Negligible	N/A	Negligible	Negligible	Negligible	None