East Midlands Gateway
Phase 2 (EMG2)

Document [6.14]

ENVIRONMENTAL STATEMENT

Volume 1 Main Statement

Chapter 13

Flood Risk and Drainage

[January] 2025

13

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 **Scheme** on the environment in respect of Flood Risk and Drainage.

13.1.2. Figures relevant to this chapter are as follows:

- Figure 13.1: Flood Risk and Drainage Study Area.
- Figure 13.2: Surface Water Bodies.
- Figure 13.3: Environment Agency (EA) Flood Map for Planning.
- Figure 13.4: Hall Brook, Diseworth Brook and Long Whatton Brook Floodplain
- Figure 13.5: Lockington Brook Floodplain
- Figure 13.6: River Trent and River Soar Floodplain
- Figure 13.7: EA Risk of Flooding from Surface Water Mapping

13.1.3. The following information accompanies this chapter as technical appendices: [Note: Appendices 13e-j are still subject to work are refinement]

- Appendix 13a: Flood Risk & Drainage Interim Information
- Appendix 13b: Water Framework Directive Screening
- Appendix 13c: A553/M1 Culvert Capacity Assessment
- Appendix 13d: L57 Footpath Culvert Capacity Assessment
- Appendix 13e: Flood Risk Assessment – **EMG2 Main Site**
- Appendix 13f: Flood Risk Assessment – **Highway Works**
- Appendix 13g: Flood Risk Screening –**EMG1 Works**
- Appendix 13h: Sustainable Drainage Statement – **EMG2 Main Site**
- Appendix 13i: Sustainable Drainage Statement – **Highway Works**
- Appendix 13j: Sustainable Drainage Statement – **EMG1 Works**

13.1.4. This chapter will describe the sources of flood risk that could affect the **Scheme**. It will identify the flood risk and drainage receptors that could potentially be affected by the **Scheme**, 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

Consultations

[section to be completed on receipt of final consultation responses]

Lead Local Flood Authority

13.2.1. On the 31st March 2022 a telephone conversation was held with Leicestershire County Council (LCC) Lead Local Flood Authority (LLFA). During the call, the **EMG2 Main Site** and the surrounding flood risk issues in the village of Diseworth were discussed as outlined below. These points were also confirmed by email dated 4th April 2022.

- A hydraulic model of the Diseworth Brook catchment is available from the LLFA, and a copy will be made available for use in the assessment of the **EMG2 Main Site**.
- The Hall Brook flows down the western boundary of the **EMG2 Main Site**, but this is not the main source of flood risk to the village of Diseworth.
- The surface water discharge rate from the **EMG2 Main Site** must not exceed the greenfield runoff rate, and there was agreement over the potential benefit of outfalling all surface water runoff from a development to the minor watercourse (and the A42 culvert) in the east of the Main Site, thereby bypassing the village of Diseworth entirely.
- It will be necessary to provide at least a 5m standoff from the watercourse top of bank to any development.
- Due to the proximity of the airport and the risk of bird strike, it may not be possible to accommodate all of the required surface water storage within above ground Sustainable Drainage Systems (SuDS) features – below ground storage of surface water runoff is acceptable.

13.2.2. On the 25th July 2024 another meeting was held with the LLFA in which the items above were reconfirmed in light of proposed changes to the consenting route via DCO. It was also reconfirmed that the hydraulic model of the Diseworth Brook catchment, as previously made available from the LLFA, is still the best available data.

13.2.3. On the 24th September 2024 Leicestershire LLFA provided input to the PINS **Scoping Opinion**. In their response they recognised that the EA is the statutory consultee in the DCO process, and that their response only relates to the surface water flood risk and drainage strategy. Their comments were as follows:

- The LLFA welcomed the proposal to discharge surface water at greenfield QBAR (annual average runoff rate), mimicking runoff from the undeveloped site. The proposal additionally includes the discharge of surface water downstream of the village of Diseworth via the existing ditch network in the south-east of the **EMG2 Main Site**. This is welcomed by the LLFA and should be retained by the applicant throughout the construction and operational phases of development.
- With reference to the proposed realignment of ordinary watercourses within the **EMG2 Main Site** boundary, and in accordance with LCC's culvert policy, it was noted that extents of watercourse disruption should be kept to an absolute minimum. Where

watercourse diversion is required, appropriate modelling and justification should be supplied. This work will be subject to Land Drainage Consent from the LLFA in accordance with Section 23(a) of the Land Drainage Act (1991), and provision for this approval should be included within any DCO.

- Modelling supplied by the applicant demonstrates no increase in flood level within Diseworth Village, with some flood levels predicted to be lower than the pre-development level. This is welcomed by the LLFA. Any modelling should be reviewed and approved by the EA or an appropriately qualified independent third-party consultant.
- 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.

13.2.4. On the 21st November 2024 a technical note providing further information was submitted to the LLFA for their consideration, a copy of this is provided as Appendix 13a. This included a description of the drainage ditches/ordinary watercourses present in the **EMG2 Main Site**. This identified that these features are associated draining surface water runoff from the existing farmland from just within the site itself and are isolated from the downstream surface water body (the Diseworth Brook) by 380m of culverting. Therefore, they are not considered to represent watercourses of any significant value. It was identified that in the latest proposals all the existing ditches/minor channels are to be removed. The reprofiling of the **EMG2 Main Site** will alter the topography requiring a different drainage approach. It was identified that the ditches will be replaced by a series of cascading basins and swales (SuDS) that will manage surface water runoff from the site instead. These will also offer improved surface water storage and pollution control, and so are considered an improvement over the baseline conditions.

13.2.5. At the time of writing, a response to this information has not yet been received.

Environment Agency

13.2.6. On the 1st July 2022 the EA were approached to discuss the available flood risk data at, and their expectations for a development of, the **EMG2 Main Site**. The anticipated mitigation measures were also outlined, which included attenuation and treatment of surface water runoff. The EA responded on 22nd July 2022 to confirm that they do not hold any data of relevance. In their response the importance of appropriate surface water treatment was emphasised to protect downstream water quality. It was stated that appropriate measures to prevent contaminated runoff from soil stockpiles and bare ground should be considered. It was identified that the typical suspended solid limit of 40 mg/l would likely apply when discharging surface water from the site, which should be confirmed at the permitting stage. Based on the anticipated mitigation measures outlined, the EA did not raise any Flood Risk or Water Framework Directive concerns or assessment requirements.

13.2.7. On the 24th September 2024 the EA provided input to the Scoping Opinion. This made a number of comments on flood risk and drainage and the scope of the ES. To allow the ES to focus on the key environmental impacts a note addressing a number of the more minor EA comments was prepared and issued to the EA on the 25th November 2024. A copy of this note is provided as Appendix 13a. A response from the EA was received on the 13th January 2025, which confirmed that the majority of items raised in the note were agreed. The EA did still request

further information on the A42 drainage culvert, and also the EA Flood Assets beneath the M1 and A50 which form part of the A50 and M1 Highway drainage. BWB requested a meeting to discuss the outstanding issues. At the time of writing, a response to this request has not yet been received.

13.2.8. On the 23rd December 2024 a Water Framework Directive (WFD) Screening report was submitted to the EA for their consideration. A copy of this report is provided as Appendix 13b. In this report the emerging Scheme was screened to identify elements that could detrimentally affect the local waterbodies. The report concluded that the Scheme would not cause any deterioration. At the time of writing, a response has not yet been received

Severn Trent Water

13.2.9. A development enquiry request was submitted to Severn Trent Water (STW) in relation to the **EMG2 Main Site**, who responded on the 10th June 2022. The presence of a pressurised sewer within the **EMG2 Main Site** was identified which requires a 10m protective strip. STW identified that foul water generated from the **EMG2 Main Site** could be directed to a 225mm sewer on Grimes Gate, but that the network does not currently have capacity for the anticipated flows from the fully occupied development. It was identified that hydraulic sewer modelling will be required to identify what reinforcement works are required on the network to accommodate the development. STW has identified that this would be undertaken once the **Scheme** had received approval.

13.2.10. A second developer enquiry was submitted to STW on 19th November 2024, to refresh the original enquiry on the **EMG2 Main Site** and also include a new enquiry in relation to 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 reconfirmed for the **Scheme.** STW again identified that hydraulic sewer modelling will be required to identify what reinforcement works are required on the network to accommodate the **EMG2 Main Site** and **EMG1 Works**, and that this would be undertaken once the **Scheme** had received approval.

National Highways

13.2.11. An email was submitted to National Highways 4th June 2024 enquiring about the A42 drainage culvert and its proposed continued use by the **Scheme**. A meeting with a representative was held on the 24th 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 02/2013 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 Main 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 understand 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.

- National Highways records show that the culvert between the site and the downstream watercourse runs diagonally from north-west to south-east beneath the A42 and the M1 before outfalling to the watercourse. However, as shown in the provided CCTV survey, and described in the previous point, this is not the case.
- The **EMG2 Main Site** is bisected by Hyam's Lane. Land to the south currently drains to the culvert. Land to the north of Hyam's informally drains to the west, through the village of Diseworth before eventually making its way to the A42 culvert. Diseworth has a historical flooding problem, and to try and offer them relief, we would like to divert all surface water runoff from the development to the culvert (thereby bypassing the village entirely). This would represent an increase to the catchment draining into the culvert, however, the flow rate could be restricted at a rate that National Highways is comfortable with.

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

Assessment Methodology

13.2.13. 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.

13.2.14. This assessment follows the methodology set out in **Chapter 1** of this ES, the criteria that has been used to establish the sensitivity of receptors, magnitude of impact and significance of effect, and as outlined below in **Table 13.1 – 13.4**.

Table 13.1: 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

13.2.15. The descriptions for magnitude of impact as outlined in **Table 13.2** shall be applied in this assessment. An impact has the potential to either be beneficial or adverse.

Table 13.2: 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.

Magnitude of Impact	Criteria for Assessing Impact
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.

13.2.16. The approach to deriving an effect's significance from receptor value and magnitude of impacts shall be based on **Table 10.3**.

Table 13.3: 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

13.2.17. Effects can be of different duration. The general approach is as defined in **Table 13.4** below:

Table 13.4: 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

13.2.18. A 250m buffer has been applied to the order limits to identify the potential flood risk and drainage receptors, this is illustrated within **Figure 13.1.**

13.2.19. An initial screening of the **Scheme** 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 **Scheme** 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 13.5**:

Table 13.5: Screened Out Development Component

Component of the Proposed Development	Reason for Screening Out
Sub-station upgrade (EMG1 Works No. 3B)	Proposed works limited to upgrading an existing sub-station within EMG1. No significant alterations that could affect flood risk or drainage receptors are proposed.
M1 J24 minor works (EMG2 Works No. 12)	Proposed works limited to amendments to signage and line markings on the existing highway. No significant alterations that could affect flood risk or drainage receptors are proposed.
M1 NB alterations (EMG2 Works No. 8)	Proposed works comprises providing the new M1 northbound exit and associated gantry/signage improvements on the M1. No significant alterations that could affect flood risk or drainage receptors are proposed.
EMG1 access improvements (EMG2 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 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 / The Green improvements (EMG2 Works No. 16)	The proposed works are limited to minor capacity improvements to the junction requiring a minor widening and alterations to the lane markings. At this stage works are expected to be limited to a minor and localised increase in impermeable area which has been estimated at less than 35m^2. Additional runoff generated to be accommodated within existing highway drainage, with capacity improvements added where there is a shortfall.

Component of the Proposed Development	Reason for Screening Out
A453 EMA junction uncontrolled crossing (EMG2 Works No. 15)	The proposed works are limited to the formation of a short length of footpath, estimated at 60m, between the **EMG2 Main Site** and the A453. No significant alterations that could affect flood risk or drainage receptors are proposed.
Long Holden works (EMG2 Works No.17)	The proposed works are limited to the formation of a footpath connections between the Long Holden (track/footpath) and the **EMG2 Main Site** landscape area. No significant alterations that could affect flood risk or drainage receptors are proposed.
Grimes Gate Signage (EMG2 Works No 7)	Proposed works limited to amendments to signage. No significant alterations that could 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 Main Site** for the purpose of this chapter.
Finger Farm Roundabout (EMG2 Works No. 18)	Proposed works limited to amendments to signage and line markings on the existing highway. No significant alterations that could affect flood risk or drainage receptors are proposed.

13.2.20. The components of the **Scheme** included within the assessment 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.

- EMG2 Main Site (Works No. 1 to 5), for the purpose of this chapter the following highway works were also considered as part of this component due to their close proximity:
    - A453 EMG2 access junction (EMG2 Works No. 6)
    - EMG2 principal access alteration location.
    - Hyam's Lane works (EMG2 Works No. 7)
- **EMG1 Work**s (Works No. 3A, 3C, 5A, 5B, 5C, 6A):
- M1 southbound & A50 eastbound link to J24 widening (EMG2 Works No. 11) – referred to as the 'M1 SB & A50 EB link' within this chapter;
- A50 westbound merge (EMG2 Works No. 10) - referred to as the 'A50 WB merge' within this chapter
- M1 northbound to A50 westbound link (EMG2 Works No. 9) - referred to as the 'M1 NB to A50 WB link' within this chapter
- Active Travel Link (EMG2 Works No. 14) – referred to as the 'Active Travel Link' within this chapter.
- L57 Footpath upgrade (EMG Works No. 19)

13.2.21. The components of the **Scheme** considered within this chapter are located within **Figure 13.1.**

Receptors

13.2.22. The flood risk and drainage receptors for each of the identified components are identified within **Table 13.6** along with their sensitivity. The sensitivity of each is discussed further in the Baseline Conditions section.

Table 13.6: Flood Risk & Drainage Receptors

Development Component	Receptor	Sensitivity
EMG2 Main Site	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
	Foul Drainage Infrastructure	Moderate
	Groundwater Body: Soar - Secondary Combined Water Body	Low
EMG1 Works	Lockington Brook Floodplain, and the flood risk it poses to third parties.	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
M1 SB & A50 EB link	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

Development Component	Receptor	Sensitivity
A50 WB merge	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	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
Active Travel Link	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	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

Maximum design envelope parameters for assessment

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

- Flood risk and drainage assessments are based upon the Parameter Plan Documents 2.5 and MCO 2.5 provided as **Figures [xx and xx]** which identities the maximum potential extent of development.

Uncertainties and/or data limitations

13.2.24. This chapter is based upon a current understanding of flood risk and drainage in relation to the **Scheme**. In the future, this assessment will be confirmed through further work, including:

- the preparation of phase specific Flood Risk Assessments,
- the preparation of phase specific Sustainable Drainage Statements (drainage reports),
- finalising the design detail.

13.2.25. [The chapter has made a number of assumptions due to the preliminary stage of the **Scheme** and assessments; these include:

- The assessments made in this preliminary chapter have been made in advance of completion of full Flood Risk Assessments and Sustainable Drainage Statements, which will be completed for the application submission. The information currently available is sufficiently advanced such that the production of these reports is unlikely to change the conclusions of the chapter.
- The location of the **Highway Works** has been assessed based upon the emerging proposals which may be subject to change.
- The Construction Environmental Management Plan (CEMP) will be imposed and will include appropriate surface water management measures to control surface water quantity and quality from the construction sites, as well as measure to control sediments.
- The drainage commentary for the **Highway Works** is based upon the current understanding of the highway drainage catchments].

13.3. Policy, Guidance and Legislative Context

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

Legislative Context

Water Resources Act (1991)

13.3.2. 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.

1 The Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009

Flood and Water Management Act (2010)

13.3.3. 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.

13.3.4. 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.

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

Water Framework Directive

13.3.6. 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 **Scheme** is the Humber River Basin District River Basin Management Plan 2022 - 2027.

National Planning Policy Context

National Planning Policy Framework (2024)

13.3.7. The National Planning Policy Framework (NPPF)[4] 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.

13.3.8. The accompanying Planning Practice Guidance (PPG)[5] sets out the vulnerability and suitability of different land uses to flood risk. It encourages development to be located in areas of lower

2 Flood and Water Management Act (2010)
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 Planning Policy Framework (2024)
5 Planning Practice Guidance (2024)

flood risk where possible and stresses the importance of preventing increases in flood risk to the wider catchment.

National Policy Statement for National Networks (2024)

13.3.9. The Department of Transport National Policy Statement for National Networks[6] (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.

13.3.10. 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.

Regional and Local Planning Policy Context

North West Leicestershire Local Plan (2021)

13.3.11. 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.

[6] National Policy Statement for National Networks, Department for Transport (March 2024)

- 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)

13.3.12. 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.

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

13.3.14. 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)

13.3.15. 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.

13.3.16. 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)

13.3.17. 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.

[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)

Other Relevant Guidance

Flood risk assessments: climate change allowances

13.3.18. 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 **Scheme** should be considered.

13.3.19. The **Scheme** 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.

13.3.20. The **Scheme** 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 as a credible maximum flood/storm event. The applicable climate change allowances assessed within this chapter are summarised below in Table 13.6.

Table 13.6: 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%

[9] Environment Agency, Flood risk assessments: climate change allowances: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances. Last Accessed November 2024

Flood Risk to People and New Developments

13.3.21. 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.

13.3.22. 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

13.3.23. A supplementary note[12] provides clarification of the hazard rating thresholds which should be used for development planning and control use. Table 13.7 identifies the thresholds of the flood hazard categories.

Table 13.7: 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

13.3.24. 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.

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)
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)

13.3.25. 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.

13.3.26. 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.

13.3.27. 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

13.3.28. 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.

13.3.29. 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.

13.3.30. 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.

13.3.31. 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

Hall Brook, Diseworth Brook, and Long Whatton Brook Floodplain

13.4.1. The Hall Brook, an ordinary watercourse, outfalls from the East Midlands International Airport (EMIA) and flows alongside the western boundary of the **EMG2 Main Site** 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 **Figure 13.2**. The potential contributing flows from the EMIA 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 Main Site** 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 Main Site** 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

[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)

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 **Figure 13.2**.

13.4.3. The Flood Zones of the Diseworth Brook are located approximately 240m south of the **EMG2 Main Site**; this is illustrated within **Figure 13.3**. The **EMG2 Main Site** at its lowest point is elevated approximately 3m above the Diseworth Brook. The Hall Brook is too small to have been included 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 the Main Site. The model includes fluvial, surface water, and sewer interactions, and it includes the drainage network of the EMIA and the Hall Brook. The model identifies that within the vicinity of the **EMG2 Main Site**, the Hall Brook floodplain is essentially contained to the channel – confirming that the **EMG2 Main Site** is at a low fluvial flood risk.

13.4.8. The model identifies that rainwater falling on the **EMG2 Main Site** 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 Main Site** 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 Main Site** from the integrated Diseworth and Long Whatton catchment hydraulic model is presented in **Figure 13.4.**

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 Main Site** 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 site itself. 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 Main Site.

Lockington Brook Floodplain

13.4.10. The Lockington Brook issues from the land located to the north of the EMIA 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 **Highways Works** at its most northerly point (the A50 WB merge). The route of the watercourse is illustrated within the **Figure 13.2**.

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 **Scheme**. The data identifies that the watercourse poses a flood risk to the village of Lockington, Lockington Park and the open fields upstream of the **Scheme**. Downstream of the **Scheme**, the floodplain is predominately confined to its channel and agricultural fields and gravel extraction quarries located to the north-east of the **Scheme**. The brook poses no flood risk to the railway line, the A50 or the M1. The modelled Lockington Brook floodplain is presented in **Figure 13.5**.

13.4.12. Due to the flood risk to Lockington, the sensitivity of the receptor upstream of the **Scheme** is High. However, the **Scheme** 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 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, 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 **Figure 13.2**.

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 **Scheme**. 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 **Scheme**, this is illustrated within **Figure 13.6**.

13.4.16. The flood data identifies that the **Scheme** is generally removed from the design event floodplain of these large rivers with two exceptions. **Figure 13.6** identities that the order limits at the M1 SB & A50 EB link fall partially within 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 (on top of the existing highway embankment). The works location is also outside of the 1 in 1000-year and the credible maximum flood (the 1 in 100-year+62% climate change) floodplain.

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

Hemington Brook Floodplain

13.4.18. The Hemington Brook issues from the land located to the north of the Airport, 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 **Figure 13.2**.

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 **Scheme**; however, the **Scheme** 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 Scheme, the sensitivity of this receptor is considered to be High.

13.4.20. The **Scheme** 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 **Figure 13.7**.

13.4.21. Footpath L57 crosses the footpath over a 0.5m diameter pipe culvert. An assessment has identified that the culvert has potential capacity for the 1 in 100-year flood flows (prorated from the downstream EA model). Larger events would 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 **Appendix 13d**.

Minor Tributary of the River Soar Floodplain

13.4.22. A small ordinary watercourse issues from the eastern side of the EMIA. 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 **Scheme**. The route of the watercourse is illustrated within the **Figure 13.2**.

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 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. However, in this instance the RoFSW mapping does not include for the culverted connection 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 **Figure 13.7**.

13.4.24. A large proportion of the EMIA 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 capacity assessment of the capacity of the A453 and M1 culverts 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 **Scheme** is expected to be largely contained within channel and culvert. The culvert capacity assessment is included as **Appendix 13c**.

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. 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:

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

- 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)
- 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 Main Site** is 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 Main Site**, 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 Main Site** 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 Main Site** is currently 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.

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

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

13.4.32. The Lockington Brook and Hemington Brook fall within the "Hemington Brook Catchment (trib of the Soar)" operational surface water body. The **EMG1 Works**, M1 SB & A50 EB link, A50 WB link, M1 NB to A50 WB link, and the L57 footpath also 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
- 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. The proposed Active Travel Link and the Minor Tributary of the River Soar 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 A50 WB merge, the M1 SB & A50 EB Link, and the M1 north bound carriageway at J 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 will be sensitive to change. Additional inflows from new impermeable areas could increase the risk of exceedance flows on the carriageway and overflows into the downstream watercourse. Therefore this receptor is considered to be of a Moderate sensitivity.

EMG1 Surface Water Drainage Infrastructure

13.4.42. 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.

13.4.43. 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.

13.4.44. The EMG1 surface water drainage infrastructure was designed to manage a specific drainage catchment to a specific design standard. Therefore, this will be sensitive to change. Additional inflows from new impermeable areas will increase the risk of exceedance and overflowing into the downstream watercourses. 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).

13.4.45. 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.

Foul Drainage Infrastructure

13.4.46. STW sewer records shows there to be public foul sewer assets within the boundary of the **EMG2 Main Site**. A foul water rising main bisects the centre of the **EMG2 Main Site** 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.

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

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

13.4.49. 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 Main Site** and 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

13.4.50. The majority of the **Scheme** is 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.

13.4.51. 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 **Scheme**. The BGS identify that the aquifer is of low productivity and that flow is limited to through fractures and other discontinuities.

13.4.52. The water body includes a source protection zone at Melton Mowbray, approximately 30km to the east of the site, and at Coalville 7.5km to the south of the site, both of these are located upstream of the **Scheme**.

13.4.53. The water body includes drinking water protected areas 1.3km to the west and 13km to the south-east. These areas are also located upstream of the **Scheme**.

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

13.4.55. Soakaway tests at EMG1 and at the **EMG2 Main Site** have identified a low permeability of the soils within these areas which is typical in areas underlain by mudstone and siltstone areas.

13.4.56. Given the size of the waterbody, its limited productivity and flow, and because the Source Protection Zones and Drinking Water protected areas are located upstream of the **Scheme**, this is considered to have a low sensitivity.

Groundwater Body: Soar - PT Sandstone Water Body

13.4.57. A proportion of the **EMG1 Works** and the J24 Improvements (M1 NB to A50 WB merge) and the L57 footpath 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.

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

- Poor livestock management, and
- Poor nutrient management from rural areas.

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

13.4.60. BGS mapping identities that the water body is comprised of a mix of Triassic sandstones within the vicinity of the Site. The BGS identify that the aquifer is highly productive and that significant intergranular flow occurs.

13.4.61. The water body includes a source protection zone at Coalville 7.5km to the south in disparate region located upstream of the site.

13.4.62. The water body includes drinking water protected areas 1.3km to the west and 6.6km to the south, again in disparate regions located upstream of the site.

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

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

13.5. Potential Impacts

Alteration or Loss of Floodplain

13.5.1. Building 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.

13.5.2. However, the **Scheme** includes 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.

13.5.3. Additionally, any necessary culverted crossings of minor watercourse will be designed appropriately to convey flood flows, so that there is no adverse attenuation of flood flows. This is a standard requirement and as such is considered to be embedded mitigation.

Hall Brook, Diseworth Brook, and Long Whatton Brook Floodplain

13.5.4. The **EMG2 Main Site** is located in proximity to the Hall Brook. However, the location of the built development is offset significantly from the Hall Brook and Diseworth Brook and their respective floodplains. Therefore, the floodplain will not be impacted by the works – 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.

Lockington Brook Floodplain

13.5.6. The EA modelled data of the Lockington Brook, **Figure 13.5**, identifies that the **Scheme** is located almost entirely outside of outside of the modelled floodplain. The exception to this is the north-eastern most area of the **Highway Works** which encroaches slightly upon the 1 in 1000-year and the 1 in 100-year+60% climate change floodplain. However, the J24 Improvements 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.

13.5.7. 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

13.5.8. The northern extent of the J24 Improvements extends into the River Trent and River Soar Flood Zones, as identified in **Figure 13.3**. However, the highway widening works in this location are located upon the existing highway embankments which are generally located above the floodplain, as identified in **Figure 13.6**.

13.5.9. 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). Therefore, this will not result in any loss of floodplain storage or interruption of overland flow pathways in either the construction or operational phases.

13.5.10. 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.

13.5.11. 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.

13.5.12. 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

13.5.13. 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.

13.5.14. 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 **Scheme** is expected to be largely contained within the channel and culvert.

13.5.15. 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.

13.5.16. 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.

Hemington Brook Floodplain

13.5.17. 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.

13.5.18. 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 **Scheme** includes replacing the existing 0.5m diameter culvert with a larger diameter culvert that will convey all the predicted flood flows up to the predicted 1 in 1000-year, thus preserving the existing flow regime. Therefore, the L57 Footpath upgrade will not result in any significant loss of floodplain storage or interruption of overland flow pathways in either the construction or operational phases.

13.5.19. 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

13.5.20. 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

13.5.21. An increase in the rate and volume of surface water runoff from the **EMG2 Main Site** has the potential to increase flood risk to the receptor. However, the **EMG2 Main Site** 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**.

EMG1 Surface Water Drainage Infrastructure

13.5.22. The **EMG1 Works** are located within the EMG1 surface water drainage catchment. Without mitigation, the additional runoff generated at the construction and operational phases 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**.

Strategic Road Network Drainage Infrastructure

13.5.23. 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.

13.5.24. 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.

13.5.25. 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.

13.5.26. 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

13.5.27. 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. Additionally, the **EMG1 Works** will also direct construction and operational phase surface water runoff to the Lockington Brook, via the EMG1 surface water drainage infrastructure.

13.5.28. 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 and

EMG1 drainage infrastructure. Without mitigation this has the potential to adversely affect flood risk to the receptor.

13.5.29. The Scheme 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

13.5.30. 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.

13.5.31. However, the **Scheme** includes surface water drainage infrastructure as embedded mitigation that will manage the quantity of runoff from the operational phase of the **EMG2 Main Site**, **EMG1 Works** and the **Highway Works**. This will mimic, or improve upon, the baseline conditions.

13.5.32. Regular inspection and maintenance of the drainage systems will take place throughout the life span of the **Scheme** 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

13.5.33. At the **EMG2 Main Site** 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. 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 Main Site**, 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.

13.5.34. To comply with National Highway guidance, the outfall from the **EMG2 Main Site** will be restricted to QBAR 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 Main Site** will be reduced below the baseline conditions – a reduction of approximately 35%. This will result in a beneficial effect to the Diseworth Brook floodplain to the south of the **EMG2 Main Site**.

13.5.35. 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 development plots, 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 to south-eastern outfall and away from the village of Diseworth.

13.5.36. 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.

EMG1 Surface Water Drainage Infrastructure

13.5.37. The Scheme at the **EMG1 Works** also includes an embedded surface water drainage strategy within its design.

13.5.38. The relatively minor alterations in impermeable area introduced to the EMG1 drainage catchment, 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).

13.5.39. 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.

13.5.40. 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.

Strategic Road Network Drainage Infrastructure

13.5.41. At this stage 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.

13.5.42. The new 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.

13.5.43. 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 J24 Improvements and at **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

13.5.45. At the construction phase the **Scheme** 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 **Scheme** 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 Main Site** 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 **Scheme** 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 Main Site** 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 this stage, the construction phases at **EMG1 Works**, and the J24 Improvements at M1 SB & A50 EB link, A50 WB merge, M1 NB to A50 WB link, and the L57 Footpath are expected to discharge surface water to the "Operational Surface Water Body: Hemington Brook Catchment (trib of the Soar)".

13.5.55. The surface water runoff from the **EMG1 Works** will pass through the existing EMG1 drainage infrastructure, and the runoff from the J24 Improvements will first pass through the existing highway treatment basins and swales, before outfalling to the surface water body. These existing drainage networks have the potential to remove pollutants before runoff is discharged to the surface water body. However, as already discussed, these drainage networks were not designed with the **Scheme** 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.

13.5.56. The **L57 Footpath** does not have any formal drainage, and due to its location next to the watercourse surface water runoff has the potential outfall directly to the Hemington Brook.

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

13.5.58. 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

13.5.59. 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".

13.5.60. 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**.

13.5.61. 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

13.5.62. At the operational phase, the **Scheme** 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.

13.5.63. However, the **Scheme** includes surface water drainage infrastructure as embedded mitigation that will manage the quality of runoff from operational phase of the **EMG2 Main Site**, **EMG1 Works** and the **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.

13.5.64. 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 so that be isolated from the downstream drainage system should a spillage occur.

13.5.65. Regular inspection and maintenance of the drainage systems will take place throughout the life span of the Scheme 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 Main Site** 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 Main Site**, 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 **Scheme** would comply with objectives of the Water Framework Directive.

13.5.69. The **EMG2 Main Site** will require 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.

13.5.71. **The EMG1 Works** and the J24 Improvements at M1 SB & A50 EB link, A50 WB merge, M1 NB to A50 WB link 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.

13.5.72. Furthermore, with the appropriate management of surface water runoff, especially the sediment and pollutant content of the runoff, the **Scheme** would comply with objectives of the Water Framework Directive.

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

13.5.73. 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.

13.5.74. Furthermore, the **Scheme** would comply with objectives of the Water Framework Directive.

Additional Foul Water Flows

Foul Drainage Infrastructure

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 Main Site** and **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

13.5.78. 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. Additionally, 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

13.5.80. 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 infiltration rate brought about by the **Scheme** at the construction phase would have a **negligible** impact at the scale of the groundwater body.

13.5.81. While the construction site has the potential to introduce new sources of pollution to the catchment, the **Scheme** 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.

13.5.82. 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.

13.5.83. 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

13.5.84. The permeability of the aquifer associated with this groundwater body is greater, but based on the local infiltration testing, the local soils are still likely to have low permeability. Additionally, the **Scheme's** interaction with this waterbody is limited to enhancements to existing impermeable infrastructure and development at J24 of the M1, at Footpath L57 and at EMG1. Therefore, while the construction site could lead to localised compaction of soils and a reduction in the infiltration rate, any change to the groundwater recharge rate brought about by the Scheme at the construction phase would be **negligible** at the scale of the groundwater body.

13.5.85. 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.

13.5.86. 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

13.5.87. 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.

13.5.88. Additionally, the **Scheme** 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 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.

13.5.89. However, the **Scheme** includes surface water drainage infrastructure as embedded mitigation that will manage the quality of runoff from operational phase of the **EMG2 Main Site**, **Highways Works** and 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), or, in the case of the Highway Works, a Highways Agency Water Risk Assessment Tool (HAWRAT) analysis.

13.5.90. 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 so that be isolated from the downstream drainage system should a spillage occur.

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

Groundwater Body: Soar - Secondary Combined Water Body

13.5.92. While the additional impermeable area introduced by the **Scheme** 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 **Scheme** only represents a very small proportion of the groundwater body area. Additionally, the surface water from the **Scheme** will be discharged to the downstream surface water body, which has hydraulic connectivity with the groundwater body.

13.5.93. The development of the **EMG2 Main Site** 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.

13.5.94. Furthermore, with the appropriate management of surface water runoff, especially the pollutant content, the **Scheme** would comply with objectives of the Water Framework Directive.

Groundwater Body: Soar - PT Sandstone Water Body

13.5.95. The Scheme's interaction with this groundwater body is limited to enhancements to existing impermeable infrastructure and development at J24 of the M1, **the EMG1 Works**, and at Footpath L57. Therefore, while the operation phase will lead to an increase in impermeable areas, any change to the groundwater recharge rate would be **negligible** at the scale of the groundwater body.

13.5.96. 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.

13.5.97. Furthermore, with the appropriate management of surface water runoff, especially the sediment and pollutant content of the runoff, the **Scheme** would comply with objectives of the Water Framework Directive.

13.6. Additional Mitigation Measures

Alteration or Loss of Floodplain

13.6.1. As discussed previously, the **Scheme** 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 3[x]. This is a standard requirement, but is considered additional mitigation.

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 designated pathways for large vehicles to limit the areas of sediment compaction, and the implementation of temporary attenuated storage measures which will ensure surface water runoff is intercepted, safely stored, and discharged from the construction sites at a rate no greater than existing.

Hall Brook, Diseworth Brook, and Long Whatton Brook Floodplain

13.6.4. At the **EMG2 Main Site**, 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 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 strategy also includes directing all surface water runoff to the minor watercourse/A42 culvert in the southern-eastern corner of the **EMG2 Main Site**, 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 Main Site** will need to be restricted to the annual average runoff rate (QBAR) 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 Main Site** will be reduced below the baseline conditions – a reduction of approximately 35%. This will result in a beneficial effect to the Diseworth Brook floodplain.

13.6.7. The excess surface water runoff above the discharge rate will be stored on the construction site, within the basins and swales, or 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. 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. 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.

EMG1 Surface Water Drainage Infrastructure

13.6.9. In accordance with the CEMP 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.

13.6.10. 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.

13.6.11. 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.

Strategic Road Network Drainage Infrastructure

13.6.12. In accordance with the CEMP 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.

13.6.13. 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.

13.6.14. 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

13.6.15. 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. Additionally, **EMG1 Works** will also direct construction phase surface water runoff to the Lockington Brook, via the existing EMG1 surface water drainage infrastructure.

13.6.16. However, 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

13.6.17. 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

13.6.18. 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.

13.6.19. All construction activities will be undertaken by a competent contractor in accordance with an appropriate detailed Construction Environmental Management Plan (CEMP) included as **Appendix [xx]**X.

13.6.20. The CEMP includes surface water and silt 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.

13.6.21. 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.

13.6.22. A Soil Management Plan, included as **Appendix 15c**, will ensure topsoils and subsoils are stripped, moved, stockpiled, monitored, and respread in a manner that minimises erosion and entrainment.

13.6.23. 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.

13.6.24. 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. 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.

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

13.6.27. 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.

13.6.28. 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 from the site.

13.6.29. 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.

13.6.30. 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.

13.6.31. 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.

13.6.32. 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.

13.6.33. At the **EMG2 Main Site,** the cascading drainage basins and swales along the western and southern boundaries 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. These SuDS may need to be rehabilitated after the construction phase, to remove any significant sediment depositions and pollutant concentrations.

13.6.34. 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 Main Site** prematurely.

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 of the **Scheme** 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 of the **Scheme** 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 of the **Scheme** 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 **Scheme** 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.

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 of the **Scheme** 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 of the **Scheme** 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.

13.7. Residual Effects

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

13.8. Cumulative Impacts

[section to be completed]

Inter-Project Related Impacts

13.8.1. It is considered that there will be no cumulative impacts associated with 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

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 EMIA. 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)** and the associated Bird Strike Hazard Management Plan provided at **Appendix 9[x]**. .

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 **Scheme** is discussed within **Chapter 19 (Energy and Climate Change)**.

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 Scheme, including the potential interactions with local SSSIs, is discussed more within **Chapter 9 (Ecology and Biodiversity)**.

Groundwater and Ground Conditions

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

Water Supply / Resources

13.8.7. The water demands of the **Scheme** and the proposed source of potable water supply are discussed within **Chapter 16 (Utilities)**.

13.9. Summary of Effects and Conclusions

13.9.1. In summary, with appropriate mitigation measures in place, the **Scheme** will not have significant adverse effects upon the flood risk and drainage in the study area. A summary is set out in **Table 13.8**.

13.9.2. The **Scheme** is located outside of or above the 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 QBAR.

13.9.4. Moreover, on the **EMG2 Main Site**, the **Scheme** 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 Main Site** will be restricted to QBAR 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 Main Site** will be reduced below the baseline conditions – a reduction of approximately 35%. 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 **Scheme** complies with the objectives of the WFD.

13.9.6. Further to this, the **EMG2 Main Site** 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 **Scheme**.

Table 13.8 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 Scheme has been located outside of or above the floodplain.	Negligible	N/A	Negligible	Negligible	Negligible	None
	Lockington Brook Floodplain	Moderate	The Scheme has been located outside of or above the floodplain.	Negligible	N/A	Negligible	Negligible	Negligible	None
	River Trent & River Soar Floodplain	High	The Scheme has been located outside of or above the floodplain.	Negligible	N/A	Negligible	Negligible	Negligible	None
	Minor Tributary of the River Soar	Moderate	The Scheme 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 Scheme 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

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 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 Scheme has been located outside of or above the floodplain	Negligible	N/A	Negligible	Negligible	Negligible	None
	Lockington Brook Floodplain	Moderate	The Scheme has been located outside of or above the floodplain	Negligible	N/A	Negligible	Negligible	Negligible	None
	River Trent & River Soar Floodplain	High	The Scheme has been located outside of or above the floodplain	Negligible	N/A	Negligible	Negligible	Negligible	None
	Minor Tributary of the River Soar	Moderate	The Scheme 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

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
	Hemington Brook Floodplain	High	The Scheme 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