In Parliament – Session 2022 - 2023

HS2

High Speed Rail (Crewe – Manchester)

Supplementary Environmental Statement 1 and Additional Provision 1 Environmental Statement

Volume 5: Appendix WR-003-0MA03

Water resources and flood risk

Water resources assessment

MA03: Pickmere to Agden and Hulseheath

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Department for Transport

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1 Introduction

1.1 Structure of this appendix

1.1.1 This report is an appendix to the water resources and flood risk assessment which forms part of Volume 5 of the Supplementary Environmental Statement 1 (SES1) and Additional Provision 1 Environmental Statement (AP1 ES) for the Pickmere to Agden and Hulseheath area (MA03).

1.1.2 This appendix provides details of changes to the water resources assessment since the production of the High Speed Two (HS2) High Speed Rail (Crewe – Manchester) Environmental Statement (ES)[1] (the main ES) and Background Information and Data (BID)[2] (the main BID reports) which accompanied the main ES published in 2022.

1.1.3 An assessment on the impact of the original scheme on water resources was undertaken as part of the water resources and flood risk assessment reported in the main ES (see Volume 2, Community Area report: Pickmere to Agden and Hulseheath (MA03) and Volume 5, Appendix: WR-003-0MA03) referred to hereafter as 'the original water resources assessment'.

1.1.4 This report is structured into three parts: Part 1 – SES1, Part 2 – AP1 ES and Part 3 – Combined effects. This appendix should be read in conjunction with Volume 5, Appendix: WR-003-0MA03 of the main ES.

1.1.5 Maps relevant to this appendix are contained in the SES1 and AP1 ES Volume 5, Water resources and flood risk Map Book: Map Series WR-02.

1.1.6 In order to differentiate between the original scheme and subsequent changes, the following terms are used:

- 'the original scheme' – the Bill scheme submitted to Parliament in January 2022, which was assessed in the main ES;
- 'the SES1 scheme' – the original scheme with the changes described in SES1 that are within the existing powers of the Bill; and
- 'the AP1 revised scheme' – the original scheme as amended by the SES1 changes and AP1 amendments.

[1] High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Environmental Statement.* Available online at: https://www.gov.uk/government/collections/hs2-phase2b-crewe-manchester-environmental-statement.

[2] High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Background Information and Data*. Available online at: https://www.gov.uk/government/collections/hs2-phase2b-crewe-manchester-environmental-statement.

1.2 Purpose of this appendix

1.2.1 The purpose of this document is to report any changes or updates to environmental information and scheme design or assumptions that have occurred since the main ES, which will result in a change in effects and/or the introduction of new effects on water resources receptors.

1.2.2 The route-wide Water Framework Directive (WFD) compliance assessment (see Volume 5, Appendix: WR-001-00000 of the main ES) has also been updated to take into account the SES1 changes and AP1 amendments. This is presented in SES1 and AP1 ES Volume 5, Appendix: WR-001-00000.

1.3 Assessment and methodology

1.3.1 The scope, assumptions and limitations for the water resources assessment are set out in the Environmental Impact Assessment Scope and Methodology Report (SMR) which is set out in the main ES[3].

[3] High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Environmental Statement, Environmental Impact Assessment Scope and Methodology Report,* Volume 5, Appendix: CT-001-00001. Available online at: https://www.gov.uk/government/collections/hs2-phase2b-crewe-manchester-environmental-statement.

Part 1: Supplementary Environmental Statement 1

2 New environmental baseline information relevant to water resources

2.1.1 The existing and future baseline is described in the water resources and flood risk chapter of the main ES (see Volume 2, Community Area report: Pickmere to Agden and Hulseheath (MA03)) and the original water resources assessment in the main ES (see Volume 5, Appendix: WR-003-0MA03). These baselines will remain largely unchanged.

2.1.2 Since the submission of the Bill, additional information relating to the groundwater receptor well at Heyrose Farm has become available.

2.1.3 The well at Heyrose Farm, Over Tabley, Knutsford was a potential unlicenced private water abstraction (historical licence number 2568003036). Due to a lack of survey data, this abstraction was assessed as a high value groundwater receptor in the main BID report, WFD compliance assessment baseline data (see BID WR-004-0MA03[4]), which accompanied the main ES.

2.1.4 Subsequent engagement with the landowner at Heyrose Farm has led to the confirmation that this well is sealed and is no longer in use. This well is therefore no longer considered a groundwater receptor. This receptor is no longer shown, and has been removed from the SES1 and AP1 ES Volume 5, Water resources and flood risk Map Book: Map Series WR-02, map WR-02-303.

[4] High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Background Information and Data, Water resources assessment baseline data,* BID WR-004-0MA03. Available online at: https://www.gov.uk/government/collections/hs2-phase2b-crewe-manchester-environmental-statement.

3 Changes to design or construction assumptions which do not require changes to the Bill relevant to water resources

3.1.1 Since submission of the main ES, the need to make changes to the design and to construction assumptions has been identified. The changes in the Pickmere to Agden and Hulseheath area (MA03) relevant to water resources and flood risk relate to:

- change to the diversion of a Scottish Power 132kV underground route, near Belt Wood (SES1-003-001); and
- the removal of the HS2 West Coast Main Line (WCML) connection (SES1-004-001) and its:
  - construction programme;
  - civil engineering and railway systems compounds associated with the construction of the HS2 WCML connection; and
  - SES1 engineering design and utility design changes.

3.1.2 The changes, which are described below, do not require a change to the Bill.

3.1.3 As a result of the removal of the HS2 WCML connection, the construction of a 2.3km section of the HS2 WCML connection, including line of route elements, in the Pickmere to Agden and Hulseheath area will not be provided as part of the SES1 scheme. These features are shown in the SES1 and AP1 ES Volume 2, MA02 Map Book: Map Series CT-05 maps CT-05-321 to CT-05-322a, and Map Series CT-06 maps CT-06-321 to CT-06-321L1.

3.1.4 The section of the HS2 WCML connection in the original scheme within the Pickmere to Agden and Hulseheath area would be 2.3km of the HS2 route including Hoo Green North, High Legh and Agden cuttings and Lymm South and Lymm North embankments with associated infrastructure including M56 West overbridge and A56 Lymm viaduct at the northern extent of the area. Further details of the changes are set out in Volume 2, Community Area report: Pickmere to Agden and Hulseheath (MA03), Section 2.1, of the main ES.

4 Assessment of impacts and effects during construction

4.1 Avoidance and mitigation

4.1.1 The avoidance and mitigation measures specific to water resources and flood risk are set out in the Volume 2, Community Area report: Pickmere to Agden and Hulseheath (MA03). No additional avoidance and mitigation measures are relevant to these design changes.

4.2 Temporary effects

4.2.1 Changes in temporary effects associated with the SES1 scheme design changes are set out below. A revised detailed impact table (revision of Table 1 and Table 2 of main ES Volume 5, Appendix: WR-003-0MA03) is presented in Annex A.

Watercourses

4.2.2 The removal of the HS2 WCML connection (SES1-004-001) will lead to a shortening of the Hoo Green North cutting. This leads to the removal of works around Tributary of Millington Clough 3 and 4. Therefore, no construction works will be required within these watercourses. The main ES reported minor temporary impacts on water quality, flow and morphology in these watercourses, leading to negligible effects, which were not significant. The removal of the HS2 WCML connection (SES1-004-001), will remove these negligible effects.

4.2.3 The temporary diversion of the M56 will also be removed, which will remove the potential temporary minor impacts on water quality, flow and morphology in Froghall Lane Drains, which was assessed to be negligible effect, not significant in the main ES.

4.2.4 There will be no new or different temporary effects on watercourses due to the removal of the HS2 WCML connection (SES1-004-001).

4.2.5 No temporary impacts on water courses were reported in the main ES due to the original utility diversion. There will be no new or different temporary effects on watercourses due to the change to the diversion of a Scottish Power 132kV underground route, near Belt Wood (SES1-003-001).

Discharges to surface water

4.2.6 No temporary impacts on discharges to surface water were reported in the main ES, due to the design elements associated with the HS2 WCML connection. There will be no new or different temporary effects on discharges to surface water due to the removal of the HS2 WCML connection (SES1-004-001).

4.2.7 No temporary impacts on discharges to surface water were reported in the main ES due to the original utility diversion. There will be no new or different temporary effects on discharges to surface water due to the change to the utility diversion (SES1-003-001).

Aquifers

4.2.8 Potential temporary moderate impacts on groundwater quality in Shirdley Hill Sand Formation, glacial till, Bollin Mudstone Member, Tarporley Siltstone Formation and Helsby Sandstone Formation, leading to moderate adverse effects which were significant, are reported in the main ES (see Volume 5, Appendix: WR-003-0MA03) due to excavation works for the Hoo Green North cutting, A56 Lymm Road, High Legh cutting, High Legh retaining wall, Agden cutting, Lymm South embankment and Lymm North embankment. These effects were reduced to negligible due to the implementation of the measures embedded in the design or set out in the draft Code of Construction Practice (CoCP) in the main ES (see Volume 5, Appendix: CT-002-00000 in the main ES). Removal of the HS2 WCML connection (SES1-004-001) will lead to a shortening of the Hoo Green North cutting and removal of A56 Lymm Road diversion, High Legh cutting, High Legh retaining wall, Agden cutting, Lymm South embankment and Lymm North embankment. Therefore, these negligible impacts on groundwater quality will be removed. There will be no new or different temporary effects on aquifers due to removal of the HS2 WCML connection (SES1-004-001).

4.2.9 No temporary impacts on aquifers were reported in the main ES due to the original utility diversion. There will be no new or different temporary effects on aquifers due to the change to the utility diversion (SES1-003-001).

Abstractions

4.2.10 No temporary impacts on abstractions were reported in the main ES, due to the design elements associated with the HS2 WCML connection. There will be no new or different temporary effects on abstractions due to the removal of the HS2 WCML connection (SES1-004-001).

4.2.11 Updated baseline data has shown that the unlicensed abstraction well at Heyrose Farm has been sealed and therefore this well is no longer considered a groundwater receptor. The main ES (see Volume 5, Appendix: WR-003-0MA03) reported major temporary impacts on water quality in this abstraction leading to a major effect, which were significant, due to the construction of the adjacent Heyrose embankment. The updated baseline data, which no longer considers this abstraction to be a groundwater receptor, will remove this significant temporary effect.

4.2.12 No temporary impacts on abstractions were reported in the main ES due to the original utility diversion. There will be no new or different temporary effects on abstractions due to the change to the utility diversion (SES1-003-001).

Discharges to groundwater

4.2.13 Potential negligible impacts on groundwater discharges were reported in the main ES (see Volume 5, Appendix: WR-003-0MA03) due to potential changes in the groundwater quality in the Helsby Sandstone Formation from below ground works for the Lymm South embankment and Lymm North embankment, leading to negligible effects. The removal of HS2 WCML connection means that the Lymm South embankment and Lymm North embankment will no longer be constructed, removing these negligible effects. There will be no new or different temporary effects on discharges to groundwater due to removal of the HS2 WCML connection (SES1-004-001).

4.2.14 No temporary effects on discharges to groundwater were reported in the main ES due to the original utility diversion. There will be no new or different temporary effects on discharges to groundwater due to the change to the diversion of a Scottish Power 132kV underground route, near Belt Wood (SES1-003-001).

Groundwater – surface water interactions

4.2.15 Potential moderate impacts on water quality in Tributary of Millington Clough 3 and 4, were reported in the main ES (see Volume 5, Appendix: WR-003-0MA03), due to potential changes in groundwater quality in the underlying glacial till. These effects were reduced to negligible due to the implementation of the measures embedded in the design or set out in the draft CoCP. The removal of HS2 WCML connection (SES1-004-001) will lead to a shortening of the Hoo Green North cutting and therefore, there is no longer a pathway for an impact in water quality in Tributary of Millington Clough 3 and 4. These negligible effects are therefore removed. There will be no new or different temporary effects on groundwater – surface water interactions due to the removal of the HS2 WCML connection (SES1-004-001).

4.2.16 No significant temporary effects to groundwater – surface water interactions were reported in the main ES due to the original utility diversion. There will be no new or different temporary effects on groundwater – surface water interactions due to the change to the utility diversion (SES1-003-001).

4.3 Permanent effects

4.3.1 Changes in permanent effects associated with the SES1 scheme design changes are set out below. A revised detailed impact table (revision of Table 2 of main ES Volume 5, Appendix: WR-003-0MA03) is presented in Annex A.

Watercourses

4.3.2 Minor impacts on flow and morphology were reported in Tributary of Millington Clough 3 and 4 due to diversion and culverting of these watercourses, leading to negligible effects, which are not significant. The removal of HS2 WCML connection (SES1-004-001) will lead to a

shortening of the Hoo Green North cutting and no works will now be required within these watercourses. This will remove the negligible effects on these watercourses. There will be no new or different permanent effects on watercourses due to the removal of the HS2 WCML connection.

4.3.3 No permanent impacts on watercourses were reported in the main ES due to the original utility diversion. There will be no new or different permanent effects on watercourses due to the change to the utility diversion (SES1-003-001).

Discharges to surface water

4.3.4 No permanent impacts on discharges to surface water were reported in the main ES, due to the design elements associated with the HS2 WCML connection. There will be no new or different permanent effects on discharges to surface water due to the removal of the HS2 WCML connection (SES1-004-001).

4.3.5 No permanent impacts on discharges to surface water were reported in the main ES due to the original utility diversion. There will be no new or different permanent effects on discharges to surface water due to the change to the utility (SES1-003-001).

Aquifers

4.3.6 The main ES (see Volume 5, Appendix: WR-003-0MA03) reported a minor impact, leading to minor adverse effect (not significant) on glacial till due to High Legh cutting, High Legh retaining wall and Agden cutting. Negligible impacts, leading to negligible effects (not significant) were reported on Bollin Mudstone Member and Tarporley Siltstone Formation. With the removal of the HS2 WCML connection (SES1-004-001), these effects are removed.

4.3.7 In addition, negligible impacts, leading to negligible effects (not significant) were reported on the Helsby Sandstone Formation from the Lymm South embankment and Lymm North embankment and Shirdley Hill Sand Formation from the A56 Lymm Road viaduct in the main ES. With the removal of the HS2 WCML connection (SES1-004-001), these effects are removed. There will be no new or different permanent effects on aquifers due to the removal of the HS2 WCML connection (SES1-004-001).

4.3.8 No permanent impacts on aquifers were reported in the main ES due to the original utility diversion. There will be no new or different permanent effects on aquifers due to the change to the utility diversion (SES1-003-001).

Abstractions

4.3.9 No permanent impacts on abstractions were reported in the main ES, due to the design elements associated with the HS2 WCML connection. There will be no new or different permanent effects on abstractions due to the removal of the HS2 WCML connection (SES1-004-001).

4.3.10 Updated baseline data has shown that the unlicensed abstraction well at Heyrose Farm has been sealed and therefore this well is no longer considered a groundwater receptor. The main ES (see Volume 5, Appendix: WR-003-0MA03) reported major permanent impacts on this abstraction due to the potential loss of this abstraction during construction, leading to major effects, which were significant. The updated baseline data, which no longer considers this abstraction to be a groundwater receptor, will remove this significant permanent effect.

4.3.11 No permanent impacts on abstractions were reported in the main ES due to the original utility diversion. There will be no new or different permanent effects on abstractions due to the change to the utility diversion (SES1-003-001).

Discharges to groundwater

4.3.12 No permanent impacts on discharges to groundwater were reported in the main ES (see Volume 5, Appendix: WR-003-0MA03), due to the design elements associated with the HS2 WCML connection. There will be no new or different permanent effects on discharges to groundwater due to the removal of the HS2 WCML connection (SES1-004-001).

4.3.13 No permanent impacts on discharges to groundwater were reported in the main ES due to the original utility diversion. There will be no new or different permanent effects on discharges to groundwater due to the change to the utility diversion (SES1-003-001).

Groundwater – surface water interactions

4.3.14 The Hoo Green North cutting extends through the Bollin Mudstone Member and the Tarporley Siltstone Formation. The main ES (see Volume 5, Appendix: WR-003-0MA03) reported that the presence of this cutting would reduce groundwater levels and thereby potential reduce baseflow into Tributary of Millington Clough 3 and 4 and Agden Brook. These were assessed to be moderate impacts on flow in Tributary of Millington Clough 3 and 4, leading to minor adverse effects, which were not significant. The impacts on Agden Brook were assessed to be minor impacts leading to minor adverse effects which are not significant. With the removal of the HS2 WCML connection (SES1-004-001), these effects are removed.

4.3.15 There will be no new or different permanent effects on aquifers due to the removal of the HS2 WCML connection (SES1-004-001).

4.3.16 The main ES (see Volume 5, Appendix: WR-003-0MA03) reported a minor impact, leading to a moderate adverse effect (significant) on the potential spring at Belt Wood East due to construction of a new pylon to carry overhead power lines. With the change to the utility diversion (SES1-003-001), this new pylon will no longer be required, which will remove the permanent significant effect.

4.4 Additional mitigation measures

4.4.1 There are no additional mitigation measures required due to the change in baseline or the removal of the HS2 WCML connection (SES1-004-001).

4.4.2 There are no additional mitigation measures required due to the change to the utility diversion (SES1-003-001).

4.5 Summary of likely residual effects

4.5.1 There are no residual significant effects arising from the SES1 design changes.

4.6 Cumulative effects

4.6.1 There are no new or different likely significant cumulative effects for water resources and flood risk as a result of the SES1 changes acting in combination with any AP1 amendments or any relevant committed development.

5 Assessment of impacts and effects during operation

5.1.1 No new or different operational effects are foreseen from those presented in the main ES.

Part 2: Additional Provision 1 Environmental Statement

6 Summary of amendments to scheme design and construction assumptions relevant to water resources

6.1.1 There are no AP1 amendments or construction assumptions relevant to water resources.

Part 3: Combined effects of changes and amendments in the Pickmere to Agden and Hulseheath area (MA03) due to changes in traffic flows

7 Introduction

7.1.1 This section sets out the assessment combined assessment of new or different significant construction traffic effects, as a result of changes in construction traffic flows. These relate to situations where the change in traffic flows cannot be directly attributed to an SES1 change or an AP1 amendment. The assessment has also considered any impacts in the Pickmere to Agden and Hulseheath area (MA03) associated with SES1 changes and AP1 amendments in the adjoining Wimboldsley to Lostock Gralam area (MA02).

7.1.2 Roads are designed to drain freely to prevent the build-up of standing water on the carriageway whilst avoiding exposure to, or causing, flooding. Contaminants deposited on the road surface are quickly washed off during rainfall. Where traffic levels are high, the level of contamination increases and therefore the potential for unacceptable harm being caused to the receiving water also increases. There are many circumstances in which runoff from roads is likely to have no discernible effect, however a precautionary and best practice approach indicates the need for the assessment of the possible impact of pollutant discharges on the water environment from roads affected by the AP1 revised scheme. These effects can either be through spillage and routine runoff pollution from new roads that are used during the construction and operational phases or changes in traffic movements on the existing road network.

7.1.3 The AP1 revised scheme makes provision for two methods for draining new sections of highway: direct runoff to soakaway and drainage via an attenuation pond to an existing watercourse. Where changes in traffic volumes have been identified along the existing road network, steps have been taken to identify the type of drainage in place and an assessment has been made of whether the highway works proposed have implications for pollution risk within the Pickmere to Agden and Hulseheath area (MA03).

8 Methodology and assessment criteria

8.1 Routine runoff pollution risk

8.1.1 Where highway drainage is discharged to local watercourses, the assessment for determining whether routine runoff is likely to have a detrimental impact on water quality uses the Highways England Water Risk Assessment Tool (HEWRAT), part of the Design Manual for Roads and Bridges (DMRB)[5].

8.1.2 Where highway realignments are to discharge to kerb side ditches which do not have a baseflow, the Groundwater Assessment (Appendix C of DMRB – LA 113 Road Drainage and the Water Environment Revision 1[5]) has been used.

8.1.3 The significance of the impact of the predicted effects on surface water and groundwater receptors has been assessed in accordance with the methodology described in the SMR set out in the main ES.

8.2 Spillage pollution risk

8.2.1 In addition to assessing the potential for adverse effects of routine surface water runoff from highways, an assessment of the potential spillage risk to water quality has been undertaken for highway realignments. The methodology for assessing spillage risk follows the Spillage Risk Assessment (Appendix D of DMRB – LA 113 Road Drainage and the Water Environment Revision 1[5]).

[5] Standards for Highways (2020), *Design Manual for Roads and Bridges (DMRB) – LA 113 Road Drainage and the Water Environment Revision 1*. Available online at: https://www.standardsforhighways.co.uk/prod/attachments/d6388f5f-2694-4986-ac46-b17b62c21727?inline=true.

9 Detailed assessment

9.1 Screening results

9.1.1 A screening exercise identified the need for a groundwater risk assessment in MA03 during the construction phase, relating to the AP1 revised scheme combined changes in construction traffic flow on the A556 (see Figure 1), which discharge to Chapel Lane Drain.

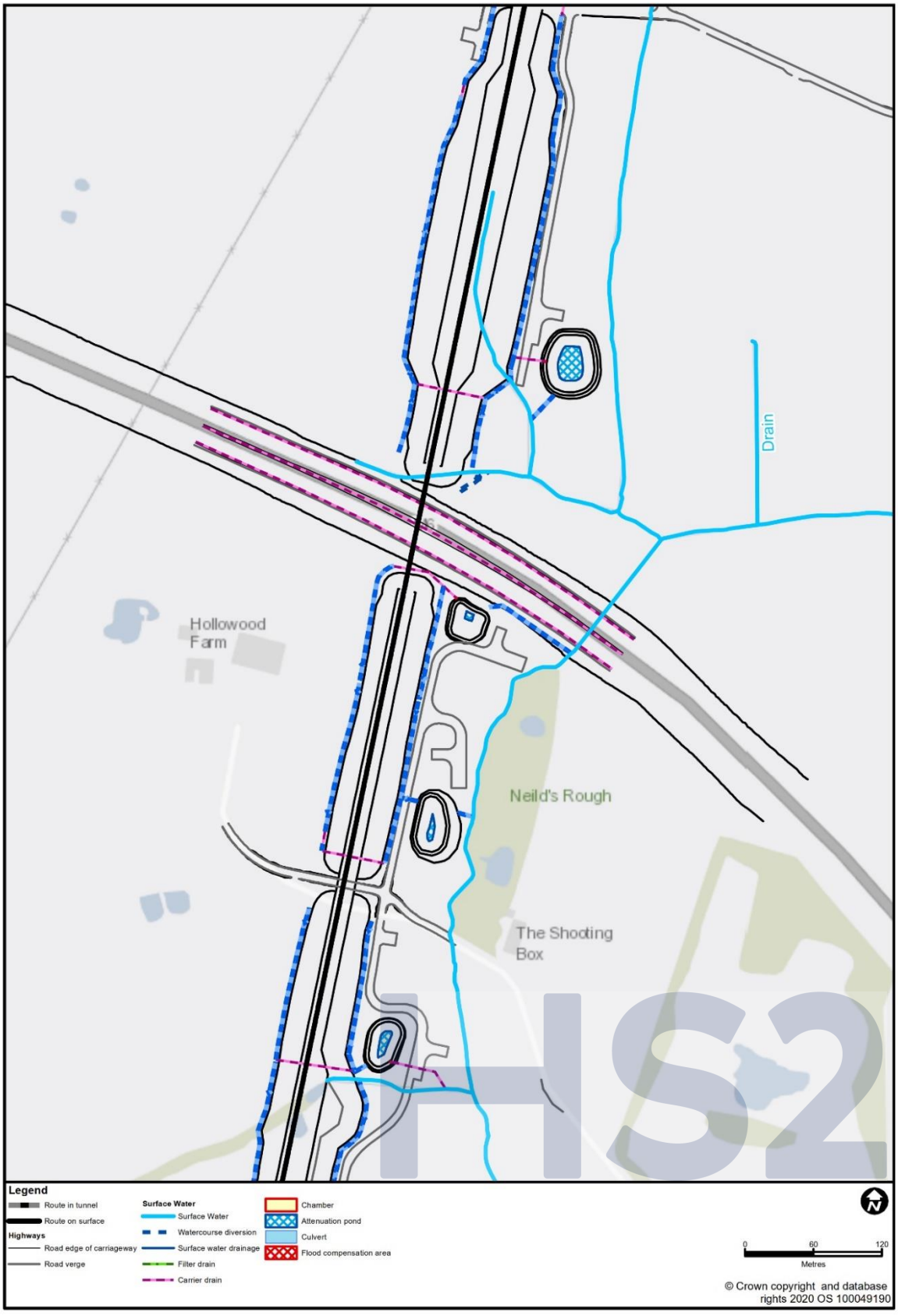
9.1.2 The main ES reported a precautionary moderate effect, which was significant, on the Tributary of River Weaver 2 due to traffic flows on the A530 Nantwich Road realignment. The main ES also reported a precautionary moderate effect, which was significant, on the Tributary of Gad Brook 3 due to traffic flows on the Penny's Lane realignment. The screening results no longer identify the need for routine runoff assessments for the A530 Nantwich Road or Penny's Lane. Therefore, the moderate effects reported in the main ES on Tributary of River Weaver 2 and Tributary of Gad Brook 3 have been removed.

9.1.3 A screening exercise identified the need for one routine runoff pollution risk assessment in MA03 during the operational phase. This relates to the AP1 revised scheme combined changes in traffic flow on the additional land permanently required to lengthen the realignment of the M6 between junction 19 and junction 20 (AP1-003-003) (see Figure 2). The screening exercise also identified the need for a spillage pollution risk assessment in MA03 during the operational phase associated with this road.

9.1.4 The screening exercise identified the need for a spillage pollution risk assessment in MA03 during the constructional phase associated with the combined changes in construction traffic flow on A556, which discharge to Chapel Lane Drain.

Figure 1: A556 existing drainage to Chapel Lane Drain

Figure 2: M6 realignment



9.2 Routine runoff pollution risk

A556 construction traffic changes

9.2.1 The combined changes to traffic on the A556 during construction has been assessed. At this time no information is available on the drainage arrangements on the existing A556. Therefore, on a precautionary basis it is assumed that drainage goes to local watercourses (at the low points in the road) and that no mitigation is in place. For the A556, the outfall is assumed to be Chapel Lane Drain. Chapel Lane Drain is expected to have a low flow and could be dry in some climatic conditions, therefore, a groundwater assessment has been carried out for this outfall.

9.2.2 The groundwater assessment identified that the routine runoff from the increased construction traffic on the existing A556 would result in a new moderate adverse impact, to the moderate value glacial till aquifer. This would therefore result in a new moderate adverse effect, which is significant.

9.2.3 The DMRB guidance suggests that a precautionary approach should be adopted in such circumstances and a detailed assessment will be needed to identify if additional measures are required to mitigate the risk of deterioration in groundwater quality. During design development further investigations, such as surveys, monitoring, identification of receptors and detailed analysis of the impact of metals, will be carried out, where reasonably practicable, to identify whether additional mitigation measures are required. If mitigation is required these will be designed in consultation with the Environment Agency and other stakeholders to mitigate any significant effects on water quality. On a precautionary basis, pending results from the additional investigations, a residual effect will remain.

M6 realignment

9.2.4 The additional land permanently required to lengthen the realignment of the M6 between junction 19 and junction 20 (AP1-003-003) involves the widening of the M6 by up to 7m along its existing alignment over a length of 830m, 1.6km to the north-west of junction 19 to accommodate a pier in the central reservation for the M6 Mere viaduct, while enabling a 70mph speed limit during the majority of the construction period. The existing drainage arrangement is assumed to consist of kerb and gullies on both side of each carriageway. The proposed drainage will remain as kerb and gullies which will discharge to an attenuation pond located to the south of the realignment.

9.2.5 Tributary of Tabley Brook 4 is expected to have a low flow and could be dry in some climatic conditions, therefore, a groundwater assessment has been carried out for this outfall. With the combined changes in traffic flows related to the AP1 revised scheme, the groundwater assessment identified new moderate impacts to the moderate value glacial till aquifer, leading to a new moderate adverse effect, which is significant.

9.2.6 The DMRB guidance suggests that a precautionary approach should be adopted in such circumstances and a detailed assessment will be needed to identify if additional measures are required to mitigate the risk of deterioration in groundwater quality. It is assumed there is sufficient space available if such measures are required. This assessment will be carried out in design development and any mitigation measures will be considered in consultation with the relevant highway authority. On a precautionary basis, pending results from the additional investigations, a residual effect will remain.

9.3 Spillage pollution risk

9.3.1 The evaluation of spillage risk for the A556 outfall during construction is presented in Table 1. The risk of a serious pollution incident occurring is identified as negligible. The combined changes to construction traffic will not result in significant effects related to spillage risk and no further mitigation is required.

Table 1: Spillage risk assessment for construction traffic flows on A556, discharging to Chapel Lane Drain

Assessment	No junction	Notes
Water body type	Groundwater	
Length of road drainage to outfall (km)	1.106	The length of the road was measured based on topography
Road type (A-road or Motorway)	A-road	
If A road, is the site urban or rural?	Urban	
Junction type	No junction	
Location	<20 mins	A response time of less than 1 hour is expected for emergency services.
Traffic flow (AADT two way)	32524	The highest traffic flow (AADT two way) along the whole road realignment was selected which represents a conservative approach.
% HGV	8.00	The corresponding HGV percentage value to the selected AADT value was chosen to represent the whole road realignment. This represents a conservative approach.
Spillage factor (no/109HGVkm/year)	0.31	This spillage factor was taken from Table D.1 as presented in LA 113 Road Drainage and the Water Environment Revision 1.
Risk of accidental spillage	0.00033	This represents the total annual probability of a spillage.
Risk of pollution incident	0.00015	This represents the total annual probability of a spillage causing a pollution incident.
Is risk greater than 0.01?	No	This is the considered overall risk for the length of the realignment.
Total probability	0.0001	

Assessment	No junction	Notes
Return period (years)	6,825	

9.3.2 The evaluation of spillage risk for the M6 realignment (AP1-003-003) and combined changes in traffic flow is presented in Table 2. The risk of a serious pollution incident occurring is identified as negligible. The highway realignment will not result in significant effects related to spillage risk and no further mitigation is required.

Table 2: Spillage risk assessment for M6 realignment (AP1-003-003)

Assessment	No junction	Notes
Water body type	Groundwater	
Length of road draining to outfall (km)	1.12	The length of the road draining to this point is based on topographical data.
Road type (A-road or Motorway)	Motorway	
If A road, is site urban or rural?	Urban	
Junction type	No junction	
Location	<20 mins	A response time of less than 1 hour is expected for emergency services.
Traffic flow (AADT two way)	77,390	The highest traffic flow (Annual Average Daily Traffic (AADT) two way) along the whole road realignment was selected which represents a conservative approach.
% HGV	13	The corresponding Heavy Goods Vehicles (HGV) percentage value to the selected AADT value was chosen to represent the whole road realignment. This represents a conservative approach.
Spillage factor (no/10^9HGVkm/year)	0.36	This spillage factor was taken from Table D.1 as presented in LA 113 Road Drainage and the Water Environment Revision 1[5].
Risk of accidental spillage	0.00148	This represents the total annual probability of a spillage.
Risk of pollution incident	0.00067	This represents the total annual probability of a spillage causing a pollution incident.
Is risk greater than 0.01?	No	This is the considered overall risk for the length of the realignment.
Total probability	0.0007	
Return period (years)	1,501	

Annex A: Revised detailed impact assessment table

Table A1: Revised detailed impact assessment table

Water feature/ receptor	Receptor value	Design element	Discussion of potential impact to water receptor	Magnitude of potential impact and effect reported in main ES	Magnitude of potential impact and effect reported in main ES post avoidance and mitigation measures	New magnitude of potential impact and effect reported in SES1/AP1	Duration of effect
Tributary of Millington Clough 3	Low	Removal of: • Part of Hoo Green North cutting • Diversion (335m) including an unnamed culvert (23m) • Watercourse crossing by proposed road and access road • Utility diversion • Temporary works such as compounds, worksites, stockpiles and access routes	Removal of construction works in the area of this watercourse will remove any potential impact on flow dynamics, water quality and risk of deterioration, to the existing water environment and the ecology supported, through the disturbance of silt or direct contamination by polluting materials.	Magnitude of impact – Minor Significance of effect – Negligible, not significant	Magnitude of impact – Negligible Significance of effect – Negligible, not significant	No impact	Construction (temporary)
		Removal of: • Hoo Green North cutting • Diversion (335m) including an unnamed culvert (23m)	Removal of construction works in the area of this watercourse will remove any potential deterioration to the watercourse flow, morphology, and water quality (due to routine discharges or accidental spills)	Magnitude of impact – Minor Significance of effect – Negligible, not significant	Magnitude of impact – Negligible Significance of effect – Negligible, not significant	No impact	Construction (permanent)

Water feature/ receptor	Receptor value	Design element	Discussion of potential impact to water receptor	Magnitude of potential impact and effect reported in main ES	Magnitude of potential impact and effect reported in main ES post avoidance and mitigation measures	New magnitude of potential impact and effect reported in SES1/AP1	Duration of effect
		• Watercourse crossing by proposed road and access road	due to the presence of the AP1 revised scheme.				
		Hoo Green North Cutting (Deeper excavation (>1mbgl))	Removal of construction works will ensure no change in groundwater quality.	Magnitude of impact – Moderate Significance of effect – Minor adverse, not significant	Magnitude of impact – Negligible Significance of effect – Negligible, not significant	No impact	Construction (temporary)
			Removal of this part of the cutting will ensure no reduction in flow due to dewatering.	Magnitude of impact – Moderate Significance of effect – Minor adverse, not significant	Magnitude of impact – Minor Significance of effect – Negligible, not significant	No impact	Construction (temporary and permanent)
Tributary of Millington Clough 4	Low	Removal of: • Part of Hoo Green North cutting • Realignment (435m) including Millington Clough aqueduct (79m) • Utility diversion • Temporary works such as compounds, worksites,	Removal of construction works in the area of this watercourse will remove any potential impact on flow dynamics, water quality and risk of deterioration, to the existing water environment and the ecology supported, through the disturbance of silt or direct contamination by polluting materials.	Magnitude of impact – Minor Significance of effect – Negligible, not significant	Magnitude of impact – Negligible Significance of effect – Negligible, not significant	No impact	Construction (temporary)

Water feature/ receptor	Receptor value	Design element	Discussion of potential impact to water receptor	Magnitude of potential impact and effect reported in main ES	Magnitude of potential impact and effect reported in main ES post avoidance and mitigation measures	New magnitude of potential impact and effect reported in SES1/AP1	Duration of effect
		stockpiles and access routes					
		Removal of: • Part of Hoo Green North cutting • Realignment (435m) including Millington Clough aqueduct (79m)	The removal of HS2 WCML connection will mean that approximately 100m of this watercourse will no longer be lost during construction of the Hoo Green North cutting. Removal of construction works in the area of this watercourse will remove any potential deterioration to the watercourse flow, morphology, and water quality (due to routine discharges or accidental spills) due to the presence of the AP1 revised scheme.	Magnitude of impact – Moderate Significance of effect – Minor adverse, not significant	Magnitude of impact – Negligible Significance of effect – Negligible, not significant	No impact	Construction (permanent)
		Hoo Green North cutting (deeper excavation (>1mbgl))	Removal of construction works will ensure no change in groundwater quality.	Magnitude of impact – Moderate Significance of effect – Minor adverse, not significant	Magnitude of impact – Negligible Significance of effect – Negligible, not significant	No impact	Construction (temporary)

Water feature/ receptor	Receptor value	Design element	Discussion of potential impact to water receptor	Magnitude of potential impact and effect reported in main ES	Magnitude of potential impact and effect reported in main ES post avoidance and mitigation measures	New magnitude of potential impact and effect reported in SES1/AP1	Duration of effect
			Removal of this part of the cutting will ensure no reduction in flow due to dewatering.	Magnitude of impact – Moderate Significance of effect – Minor adverse, not significant	Magnitude of impact – Moderate Significance of effect – Minor adverse, not significant	No impact	Construction (temporary and permanent)
Froghall Lane Drains	Low	Removal of: • Watercourse crossing by proposed temporary road • Temporary works such as compounds, worksites, stockpiles and access routes	Removal of construction works in the area of this watercourse will remove any potential impact on flow dynamics, water quality and risk of deterioration, to the existing water environment and the ecology supported, through the disturbance of silt or direct contamination by polluting materials.	Magnitude of impact – Minor Significance of effect – Negligible, not significant	Magnitude of impact – Negligible Significance of effect – Negligible, not significant	No impact	Construction (temporary)
Agden Brook	Moderate	Removal of Hoo Green North cutting (deeper excavation (>1mbgl))	Removal of permanent cuttings will remove the potential impact on groundwater flow.	Magnitude of impact – Minor Significance of effect – Minor adverse, not significant	Magnitude of impact – Minor Significance of effect – Minor adverse, not significant	No impact	Construction (temporary and permanent)

Water feature/ receptor	Receptor value	Design element	Discussion of potential impact to water receptor	Magnitude of potential impact and effect reported in main ES	Magnitude of potential impact and effect reported in main ES post avoidance and mitigation measures	New magnitude of potential impact and effect reported in SES1/AP1	Duration of effect
Shirdley Hill Sand Formation – Secondary A aquifer	Moderate	Removal of A56 Lymm Road viaduct (deeper excavation (>1mbgl))	Removal of the deeper temporary works in this area, removes the potential localised and temporary effect on groundwater quality.	Magnitude of impact – Moderate Significance of effect – Moderate adverse, significant	Magnitude of impact – Negligible Significance of effect – Negligible, not significant	No impact	Construction (temporary)
			Removal of the deeper excavation works removes the potential for alteration to groundwater flow pathways around new viaduct piers.	Magnitude of impact – Negligible Significance of effect – Negligible, not significant	Magnitude of impact – Negligible Significance of effect – Negligible, not significant	No impact	Construction (permanent)
Glacial till – Secondary (Undifferentiated) aquifer	Moderate	Removal of Lymm South embankment (above ground elements and shallow excavation (<1mbgl))	Removal of construction works in the area will remove the potential impact on water quality relating to this design element.	Magnitude of impact – Moderate Significance of effect – Moderate adverse, significant	Magnitude of impact – Negligible Significance of effect – Negligible, not significant	No impact	Construction (temporary)
		Removal of deeper excavation (>1mbgl) including: • High Legh cutting retaining wall • High Legh cutting	Removal of permanent cuttings will remove the potential impact on groundwater flow.	Magnitude of impact – Minor Significance of effect – Minor adverse, not significant	Magnitude of impact – Minor Significance of effect – Minor	No impact	Construction (permanent)

Water feature/ receptor	Receptor value	Design element	Discussion of potential impact to water receptor	Magnitude of potential impact and effect reported in main ES	Magnitude of potential impact and effect reported in main ES post avoidance and mitigation measures	New magnitude of potential impact and effect reported in SES1/AP1	Duration of effect
		• Agden cutting			adverse, not significant		
Mercia Mudstone Group – Sidmouth Mudstone Formation – Bollin Mudstone Member – Secondary B aquifer Mercia Mudstone Group – Tarporley Siltstone Formation – Secondary B aquifer	Moderate	Removal of deeper excavation (>1mbgl) including: • Part of Hoo Green North cutting • High Legh cutting retaining wall • High Legh cutting	Removal of permanent cuttings will remove the potential impact on groundwater flow.	Magnitude of impact – Negligible Significance of effect – Negligible, not significant	Magnitude of impact – Negligible Significance of effect – Negligible, not significant	No impact	Construction (permanent)
			Removal of construction works in the area will remove the potential impact on water quality relating to this design element.	Magnitude of impact – Moderate Significance of effect – Moderate adverse, significant	Magnitude of impact – Negligible Significance of effect – Negligible, not significant	No impact	Construction (temporary)
Sherwood Sandstone Group – Helsby Sandstone Formation – Principal aquifer	High	Removal of above ground elements and shallow excavation (<1mbgl) including: • Lymm South embankment	Removal of construction works in the Sherwood Sandstone Group will remove the potential impact on water quality in this aquifer.	Magnitude of impact – Moderate Significance of effect – Moderate adverse, significant	Magnitude of impact – Negligible Significance of effect – Negligible, not significant	No impact	Construction (temporary)

Water feature/ receptor	Receptor value	Design element	Discussion of potential impact to water receptor	Magnitude of potential impact and effect reported in main ES	Magnitude of potential impact and effect reported in main ES post avoidance and mitigation measures	New magnitude of potential impact and effect reported in SES1/AP1	Duration of effect
		• Lymm North embankment	Removal of permanent cuttings will remove the potential impact on groundwater flow.	Magnitude of impact – Negligible Significance of effect – Negligible, not significant	Magnitude of impact – Negligible Significance of effect – Negligible, not significant	No impact	Construction (permanent)
Discharges to ground Discharge 01C/31 Discharge 01C/79 Discharge 0173/2093	Low	Removal of above ground elements and shallow excavation (<1mbgl) including: • Lymm South embankment • Lymm North embankment	Removal of the construction works upgradient of these discharges will remove the potential for changes in water quality which could affect these discharges.	Magnitude of impact – Negligible Significance of effect – Negligible, not significant	Magnitude of impact – Negligible Significance of effect – Negligible, not significant	No impact	Construction (temporary)
Potential spring at Belt Wood east	High	Diversion of Scottish Power 132kV power lines	Removal of the permanent below ground structures of the utility diversion will remove the potential impact on groundwater flow pathways to the potential spring.	Magnitude of impact – Minor Significance of effect – Moderate adverse, significant	Magnitude of impact – Minor Significance of effect – Moderate adverse, significant	No impact	Construction (permanent)

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