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-003-0MA02

Water resources and flood risk

Water resources assessment

MA02: Wimboldsley to Lostock Gralam

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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 Wimboldsley to Lostock Gralam area (MA02).

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 the 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 (Volume 2, Community Area report: Wimboldsley to Lostock Gralam (MA02) and Volume 5, Appendix: WR-003-0MA02) 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 of changes and amendments in the Wimboldsley to Lostock Gralam area (MA02) due to changes in traffic flows. This appendix should be read in conjunction with the Volume 5, Appendix: WR-003-0MA02 of the main ES.

1.1.5 Additional information relevant to this assessment is set out in the Background Information and Data accompanying SES1 and AP1 ES, see Water resources assessment baseline data (BID WR-004-0MA02 SES1 and AP1 ES)[3].

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;

[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.

[3] High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Background Information and Data accompanying Supplementary Environmental Statement 1 and Additional Provision 1 Environmental Statement, Water resources assessment baseline data,* BID WR-004-0MA02 SES1 and AP1 ES. Available online at: https://www.gov.uk/government/collections/hs2-phase-2b-crewe-manchester-supplementary-environmental-statement-1-and-additional-provision-1-environmental-statement.

- 'the SES1 scheme' – the original scheme with any changes described in the 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.

1.2 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[4]. The study area was extended to include all areas potentially affected by temporary groundwater dewatering during construction of borrow pits and potential changes in groundwater flow due to restoration of borrow pits.

[4] High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *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 New environmental baseline data of relevance to this assessment are provided in SES1 and AP1 ES Background Information and Data, Water resources assessment baseline data (see BID WR-004-0MA02 SES1 and AP1 ES[3]). This new baseline information includes water quality sampling results for Puddinglake Brook, Gad Brook and Wade Brook.

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

3.1.1 The need to make changes to the design and to construction assumptions has been identified since submission of the Bill. The changes in the Wimboldsley to Lostock Gralam area (MA02) relevant to water resources and flood risk relate to borrow pits and changes in traffic data.

3.1.2 The SES1 design changes which give rise to changes in the water resources and flood risk assessment relate to the removal of MA02 Borrow Pit D, north of Moss Lane (SES1-002-002).

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 main ES Volume 2, Community Area report: Wimboldsley to Lostock Gralam (MA02). No additional avoidance and mitigation measures are relevant to these SES1 design changes.

4.2 Temporary effects

4.2.1 A summary of the changes in temporary effects associated with the SES1 design changes are set out below. Table A1 of Annex A presents the changes to the detailed impact tables presented in Table 1 and Table 2 of the Water resource assessment in the main ES (see Volume 5, Appendix: WR-003-0MA02) associated with the SES1 design changes.

Watercourses

4.2.2 Potential minor impacts on water quality from uncontrolled site runoff, disturbance of silt and changes in flow characteristics in Puddinglake Brook, resulting in a moderate adverse effect were reported in the main ES (see Volume 5, Appendix: WR-003-0MA02). Similarly, a minor impact on water quality from uncontrolled site runoff and disturbance of silt in Tributary of Gad Brook 1 and 2 was reported in the main ES. All of these impacts were reduced to negligible impacts due to the implementation of the measures embedded in the design or set out in the draft Code of Construction Practice (CoCP)[5], which is in the main ES.

4.2.3 With the removal of the MA02 Borrow Pit D (SES1-002-002) these potential significant (temporary) effects on Puddinglake Brook and Tributary of Gad Brook 1 and 2 will be removed.

Discharges to surface water

4.2.4 Dewatering of the excavations for MA02 Borrow Pit D in the original scheme may reverse the hydraulic gradient between the aquifer and surface water features. Minor adverse impacts on seven discharges (licence numbers NPSWQS009429, 016890854, 016810058, 016892112, NPSWQD009396, 016892042 and 01CON0060) were reported in the main ES (see Volume 5,

[5] High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Environmental Statement, Draft Code of Construction Practice,* Volume 5, Appendix: CT-002-00000. Available online at: https://www.gov.uk/government/collections/hs2-phase2b-crewe-manchester-environmental-statement.

Appendix: WR-003-0MA02), but were reduced to negligible impacts due to the implementation of the measures set out in the draft CoCP.

4.2.5 With the removal of the MA02 Borrow Pit D (SES1-002-002), the potential significant effects on these discharges will be removed.

Aquifers

4.2.6 Moderate impacts on the glaciofluvial sheet deposits, a Secondary A aquifer, were reported in the main ES (see Volume 5, Appendix: WR-003-0MA02) due to dewatering for the excavation of the MA02 Borrow Pit D in the original scheme. This resulted in a moderate adverse effect on the glaciofluvial sheet deposits aquifer. With the removal of the MA02 Borrow Pit D (SES1-002-002), the effects on this aquifer will be avoided.

Abstractions

4.2.7 In the main ES it was reported that dewatering of the MA02 Borrow Pit D excavation would have reversed the hydraulic gradient within the aquifer potentially impacting on local groundwater features. A negligible impact on Lagoon at Rudheath Woods groundwater abstraction was reported in the main ES (see Volume 5, Appendix: WR-003-0MA02), as a result of the excavation of the MA02 Borrow Pit D, leading to negligible effect.

4.2.8 With the removal of the MA02 Borrow Pit D (SES1-002-002), the potential effects on this abstraction will be removed.

Discharges to groundwater

4.2.9 No impacts on discharges to groundwater were reported in the main ES, due to the MA02 Borrow Pit D. There will be no new or different effects on discharges to groundwater due to the removal of the MA02 Borrow Pit D (SES1-002-002).

Groundwater – surface water interactions

4.2.10 Due to the anticipated dewatering activities as part of the original scheme, a temporary moderate adverse impact to the Puddinglake Brook was reported in the main ES. This resulted in a moderate adverse effect related to the Puddinglake Brook. In addition, negligible effects on Tributary of Gad Brook 1 and 2 along with the potential spring south-west of caravan park, Allostock and potential sink east of Woodside Farm, Allostock were reported in the main ES.

4.2.11 With the removal of the MA02 Borrow Pit D (SES1-002-002), the potential effects on the groundwater – surface water interactions set out above will be removed.

4.3 Permanent effects

4.3.1 Changes in permanent effects associated with the SES1 design changes are set out below. A revised detailed impact table (revision of Table 2 of main ES Volume 5, Appendix: WR-003-0MA02) is presented in Table A1 in Annex A.

Watercourses

4.3.2 Following construction, the borrow pit would have been backfilled with lower permeability material, which could impact on groundwater flows. Negligible permanent effects were reported in the main ES on flows in Puddinglake Brook and Tributaries of Gad Brook 1 and 2 due to:

- inclusion of a 50m buffer between the borrow pit and all surface watercourses; and
- the implementation of the measures in the draft CoCP and the Borrow pit report set out in the main ES (see Volume 5, Appendices: CT-002-00000 and CT-008-00000 respectively).

4.3.3 With the removal of the MA02 Borrow Pit D (SES1-002-002), the potential effects on flow in Puddinglake Brook and Tributary of Gad Brook 1 and 2 will be removed.

Discharges to surface water

4.3.4 No permanent impacts on discharges to surface water were reported in the main ES, due to the MA02 Borrow Pit D. There will be no new or different effects on discharges to surface water due to the removal of the MA02 Borrow Pit D (SES1-002-002).

Aquifers

4.3.5 Moderate impacts on groundwater flow in the glaciofluvial sheet deposits, a Secondary A aquifer, were reported in the main ES due to the backfilling of the MA02 Borrow Pit D with lower permeability material. This resulted in a moderate adverse effect on the glaciofluvial sheet deposits aquifer. This impact on groundwater flow was reduced to negligible due to the implementation of the measures set out in the draft CoCP and the Borrow pit report of the main ES (see Volume 5, Appendices: CT-002-00000 and CT-008-00000 respectively).

4.3.6 With the removal of the MA02 Borrow Pit D (SES1-002-002), the permanent effects on flow in this aquifer will be removed.

Discharges to groundwater

4.3.7 No permanent impacts on discharges to groundwater were reported in the main ES, due to the MA02 Borrow Pit D. There will be no new or different effects on discharges to groundwater due to the removal of the MA02 Borrow Pit D (SES1-002-002).

Groundwater – surface water interactions

4.3.8 No permanent impacts on groundwater – surface water interactions were reported in the main ES, due to the MA02 Borrow Pit D. There will be no new or different effects on groundwater – surface water interactions due to the removal of the MA02 Borrow Pit D (SES1-002-002).

4.4 Additional mitigation measures

4.4.1 No other mitigation measures are required for the SES1 design changes in MA02 for water resources and flood risk.

4.5 Summary of likely residual effects

4.5.1 The removal of MA02 Borrow Pit D (SES1-001-002) SES1 design change will lead to the removal of the temporary moderate adverse effect reported in the main ES on the local glaciofluvial deposits and Puddinglake Brook.

4.5.2 The SES1 design changes in this community area will not result in new or different significant effects additional to those reported in the main ES.

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 design 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 resulting from the SES1 design change described in Section 3 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 Wimboldsley to Lostock Gralam area (MA02) due to changes in traffic flows

7 Introduction

7.1.1 This section sets out the 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 considered any impacts in the Wimboldsley to Lostock Gralam area (MA02) associated with SES1 changes and AP1 amendments in the adjoining Hough to Walley's Green area (MA01) and Pickmere to Agden and Hulseheath area (MA03).

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 run-off pollution from new roads that are used during the operational phase 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 MA02.

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)[6].

8.1.2 Where drainage from highway realignments are to discharge to kerb side ditches which do not have a baseflow, the Groundwater Assessment (see Appendix C of DMRB – LA 113 Road Drainage and the Water Environment Revision 1[6]) is 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 (see Appendix D of DMRB – LA 113 Road Drainage and the Water Environment Revision 1[6]).

[6] 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

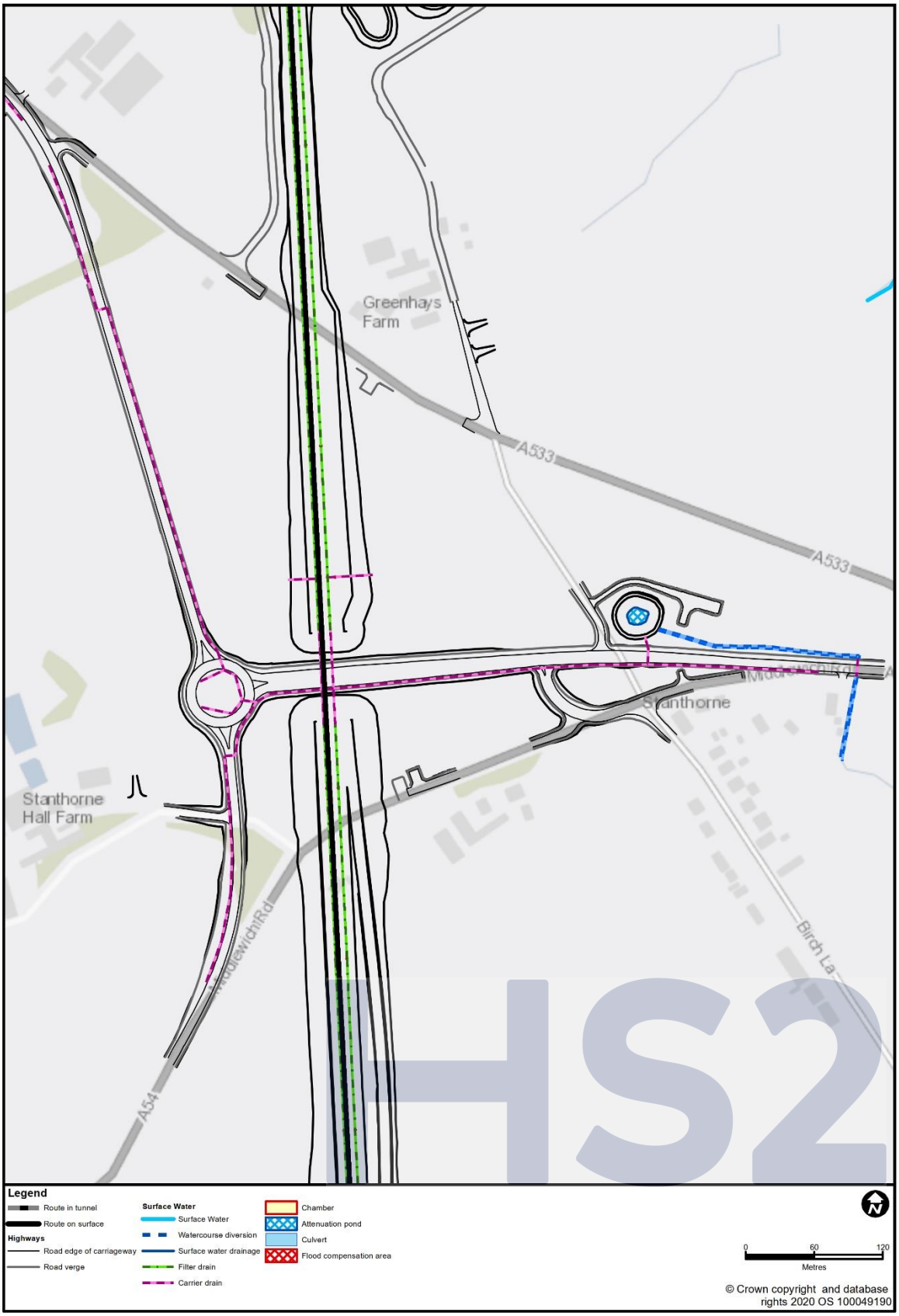
9.1 Screening results

9.1.1 A screening exercise identified the need for routine runoff and pollution risk assessments in MA02 during the operational phase of the AP1 revised scheme. This is related to the combined changes in traffic flows at the realignment of A556 Shurlach Road and Clive Green Lane (as set out in the main ES), and A54 Middlewich Road junction modifications (AP1-002-009) (see Figure 1).

9.1.2 The screening exercise shows no new or different effects relating to the combined changes in traffic flows at the realignment of the A556 Shurlach Road and Clive Green Lane to those reported in the main ES.

9.1.3 The main ES reported a precautionary moderate effect, which was significant, on the Tributary of River Weaver 2 due to routine runoff from 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 routine runoff from the Penny's Lane realignment. The screening exercise of the new combined traffic data no longer identifies the need for routine runoff assessments for the A530 Nantwich Road or Penny's Lane. Therefore, the moderate effects on Tributary of River Weaver 2 and Tributary of Gad Brook 3 have been removed.

Figure 1: A54 Middlewich Road diversion



9.1.4 The main ES reported precautionary temporary significant moderate effects on Puddinglake Brook, Gad Brook and Tributary of Gad Brook 3 due to routine runoff from construction traffic on the A530 King Street. The changes to traffic flows mean that there is no longer a need for routine runoff assessments of pollution risk for the A530 Kings Street. Therefore, the temporary moderate significant effects on Puddinglake Brook, Gad Brook and Tributary of Gad Brook 3 have been removed.

9.2 Routine runoff pollution risk

A54 Middlewich Road junction modifications (AP1-002-009)

9.2.1 The realignment of the A54 Middlewich Road involves the realignment of the carriageway along a total length of approximately 470m, approximately 120m north of where the existing highway is intersected by the route of the AP1 revised scheme. 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 north of the realignment, around 230m west of the SES1 scheme and AP1 revised scheme. The pond will outfall to Birch Lane Drain. Since the flow in this watercourse is expected to be low, a groundwater assessment has been carried out.

9.2.2 With the updated traffic data, the groundwater assessment results identified new moderate impacts to the moderate value glacial till aquifer, leading to a new moderate adverse effect which is significant.

9.2.3 The Design Manual for Roads and Bridges (DMRB) guidance[6] 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.

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
Puddinglake Brook	High	Removal of Granular MA02 Borrow Pit D, (SES1-002-002)	Removal of Granular MA02 Borrow Pit D, will lead to the removal of potential impacts on water quality due to uncontrolled site runoff, mobilisation and disturbance of sediments and direct contamination by polluting materials.	Magnitude of impact – Minor Significance of effect – Moderate adverse, significant	Magnitude of impact – Negligible Significance of effect – Negligible, not significant	No impact	Construction (temporary)
			Removal of Granular MA02 Borrow Pit D will mean no dewatering is required in the glaciofluvial sheet deposits in this area. This removes the potential impact on lowering of groundwater levels, and therefore the potential impact on local watercourses.	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 Granular MA02 Borrow Pit D will remove the necessity to backfill the pit with lower permeability material, which will remove the potential impact of on groundwater flow in this area, which could impact on flows in local watercourses.	Magnitude of impact –Negligible 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
Tributary of Gad Brook 1 Tributary of Gad Brook 2	Moderate High	Removal of Granular MA02 Borrow Pit D, (SES1-002-002)	Removal of Granular MA02 Borrow Pit D will mean no dewatering is required in the glaciofluvial sheet deposits in this area. This removes the potential impact on lowering of groundwater levels, and therefore the potential impact on local watercourses.	Magnitude of impact –Negligible Significance of effect – Negligible, not significant	Magnitude of impact – Negligible Significance of effect – Negligible, not significant	No impact	Construction (temporary)
Byley Road	Low	Removal of Granular MA02 Borrow Pit D, (SES1-002-002)	Removal of Granular MA02 Borrow Pit D, will lead to the removal of potential impacts on water quality due to uncontrolled site runoff, mobilisation and disturbance of sediments and 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)
Discharge NPSWQS009429 Discharge 016890854 Discharge 016810058 Discharge 016892112 Discharge NPSWQD009396 Discharge 016892042	Low	Removal of Granular MA02 Borrow Pit D, (SES1-002-002)	Removal of Granular MA02 Borrow Pit D will ensure that there is no impact on these discharges due to changes in flow or water quality.	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
Discharge 01CON0060							
Glaciofluvial sheet deposits – Secondary A aquifer	Moderate	Removal of Granular MA02 Borrow Pit D, (SES1-002-002)	Removal of Granular MA02 Borrow Pit D will mean no dewatering is required in the glaciofluvial sheet deposits in this area. This removes the potential impact on lowering of groundwater levels.	Magnitude of impact – Moderate Significance of effect – Moderate adverse, significant	Magnitude of impact – Moderate Significance of effect – Moderate adverse, significant	No impact	Construction (temporary)
			Removal of Granular MA02 Borrow Pit D will mean no excavation of the glaciofluvial sheet deposits in this area. This removes the potential increase in groundwater flood risk due to increased groundwater levels if wet excavation is used.	Magnitude of impact –Negligible Significance of effect – Negligible, not significant	Magnitude of impact – Negligible Significance of effect – Negligible, not significant	No impact	Construction (temporary)
			Removal of Granular MA02 Borrow Pit D will remove the necessity to backfill the pit with lower permeability material, which will remove the potential impact of on groundwater flow in this area.	Magnitude of impact – Moderate Significance of effect – Moderate adverse, significant	Magnitude of impact – Negligible Significance of effect – Negligible, not significant	No impact	Construction (permanent)
Groundwater abstraction: Lagoon at Rudheath Woods,	Moderate	Removal of Granular MA02 Borrow Pit D, (SES1-002-002)	Removal of Granular MA02 Borrow Pit D will mean no dewatering is required in the glaciofluvial sheet deposits in this area. This removes the potential impact on lowering of groundwater levels, and	Magnitude of impact –Negligible	Magnitude of impact – Negligible	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
Cranage, Knutsford			therefore the potential impact local groundwater features.	Significance of effect – Negligible, not significant	Significance of effect – Negligible, not significant		
Potential spring south-west of caravan park, Allostock Potential sink east of Woodside Farm, Allostock	High	Removal of Granular MA02 Borrow Pit D, (SES1-002-002)	Removal of Granular MA02 Borrow Pit D will mean no dewatering is required in the glaciofluvial sheet deposits in this area. This removes the potential impact on lowering of groundwater levels, and therefore the potential impact local groundwater features.	Magnitude of impact –Negligible Significance of effect – Negligible, not significant	Magnitude of impact – Negligible Significance of effect – Negligible, not significant	No impact	Construction (temporary)

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