In Parliament – Session 2022 - 2023

HS2

High Speed Rail (Crewe – Manchester)

Supplementary Environmental Statement 2 and Additional Provision 2 Environmental Statement

Volume 5: Appendix WR-003-00000

Water resources and flood risk

Combined effects of changes and amendments in the MA01-MA03 areas due to changes in construction traffic flows

S112

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Department for Transport

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1 Introduction

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 2 (SES2) and Additional Provision 2 Environmental Statement (AP2 ES). The report sets out the combined assessment of new or different significant construction traffic effects, as a result of changes in construction traffic flows on the following community areas:

- Hough to Walley's Green (MA01);
- Wimboldsley to Lostock Gralam (MA02); and
- Pickmere to Agden and Hulseheath (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 the Supplementary Environmental Statement 1 (SES1) and Additional Provision 1 Environmental Statement (AP1 ES) also published in 2022[2].

1.1.3 The effects relate to situations where the change in traffic flows cannot be directly attributed to an SES2 change or an AP2 amendment. The assessment has considered any impacts associated with SES2 changes and AP2 amendments in the adjoining community areas.

1.1.4 An assessment of the impact of the original scheme on construction traffic was undertaken as part of the water resources and flood risk assessment reported in the main ES (Volume 5, Appendices: WR-003). The assessment was updated in the SES1 and AP1 ES (SES1 and AP1 ES Volume 2, Community Area reports and SES1 and AP1 ES Volume 5, Appendices: WR-003).

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

- 'the original scheme' – the hybrid Bill (the Bill) scheme submitted to Parliament in 2022, which was assessed in the main ES;
- 'the SES1 scheme' – the original scheme with any changes described in SES1 that are within the existing powers of the Bill;
- 'the AP1 revised scheme' – the original scheme as amended by 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), *Supplementary Environmental Statement 1 and Additional Provision 1 Environmental Statement*. 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 SES2 scheme' – the original scheme with any changes described in SES1 (submitted in July 2022) and the SES2; and
- 'the AP2 revised scheme' – the original scheme as amended by SES1 and SES2 changes (as relevant) and AP2 amendments.

1.2 Scope, assumptions and limitations

1.2.1 This assessment considers any new or different significant effects on water quality in local water bodies from:

- changes to spillage risk on the existing road network due to increases in heavy goods vehicle (HGV) movements resulting from construction traffic; and
- changes to the quantity and quality of routine runoff discharged from the existing road network due to changes in daily traffic movements resulting from the construction of the AP2 revised scheme.

1.2.2 The assessment scope, key assumptions and limitations for water resources and flood risk are as set out in Volume 1 and the EIA SMR[3] in the main ES. This report sets out the combined assessment of new or different significant construction traffic effects, as a result of changes in construction traffic flows.

[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.

2 Hough to Walley's Green (MA01)

2.1 Environmental baseline

Existing baseline

2.1.1 The baseline water resources and flood risk information is as described in Section 15 of Volume 2, Community Area report: Hough to Walley's Green area (MA01) of the main ES, as amended by the SES1 and AP1 ES Volume 2, Community Area report: Hough to Walley's Green area (MA01).

Future baseline

2.1.2 The Planning data report of the main ES (see Volume 5, Appendix: CT-004-00000) and the SES1 and AP1 ES (see SES1 and AP1 ES Volume 5, Appendix: CT-004-00000) provide details of committed developments assumed to have been implemented by 2025.

2.1.3 This information has been supplemented by the committed developments listed in the equivalent Volume 5 planning report of the SES2 and AP2 ES (see SES2 and AP2 Volume 5, Appendix: CT-004-00000). These committed developments have been considered as a future baseline where relevant and their potential to give rise to cumulative effects has been assessed.

2.1.4 None of the identified developments affect the assessment of the AP2 revised scheme's likely construction impacts on water resources and flood risk.

2.2 Effects arising during construction

Avoidance and mitigation measures

2.2.1 No further avoidance or mitigation measures, additional to those reported in the main ES are required.

Assessment of impacts and effects

2.2.2 Where highway drainage for existing roads is discharged to local watercourses and where traffic numbers are likely to increase due to construction traffic, assessments for determining whether routine runoff and spillage risk are likely to have detrimental impacts on water quality are carried out using the Highways England Water Risk Assessment Tool (HEWRAT). These assessments have been updated to identify the effects arising from traffic flows for the AP2 revised scheme.

2.2.3 The main ES reported a temporary precautionary moderate effect, which was significant, on the Basford Brook. In the SES1 and AP1 ES, the effects on this watercourse were removed due to updated traffic flow data for the AP1 revised scheme.

2.2.4 For the combined SES2 and AP2 revised construction traffic, a screening exercise has identified the need for routine runoff and pollution risk assessment on the A500 Shavington Bypass, due to changes in construction traffic from the AP2 revised scheme. No information is available on the existing drainage on this road, so drainage locations have been estimated based on topography, assuming that drainage discharges occur at the lowest points along the road. It is therefore assumed, on a precautionary basis, that the A500 Shavington Bypass may discharge road drainage to Basford Brook. Similarly, as no information is available on potential treatment prior to discharge, on a precautionary basis, it is assumed that there is no existing treatment prior to discharge to these watercourses.

2.2.5 Historical Environment Agency water quality monitoring data is available for Basford Brook, from the monitoring point at Weston Hall, which is approximately 250m upstream of the A500 Shavington Bypass. This indicates that the background concentration of copper in Basford Brook is above the Environmental Quality Standard (EQS) of 1µg/l and varies between 1.34µg/l and 6.80µg/l (in the period from 2004 to 2008). Applying the average background concentration into HEWRAT (2.84µg/l) the assessment has been carried out for the discharge location to Basford Brook.

2.2.6 The tier 2 HEWRAT assessment for this assumed outfall identified that the potential outfall passes the acute soluble and sediment-bound pollutants assessments. However, an EQS exceedance for copper is assessed, due to the background concentration being higher than EQS. The average baseline concentration of copper in the watercourse is 2.84µg/l, which would rise to 2.86µg/l due to the AP2 revised scheme construction traffic. A concentration change of 0.02µg/l due to the AP2 revised scheme is considered to have a negligible impact on water quality in the context of background concentrations recorded over a period of five years, which already exceed the EQS by between 0.34µg/l and 5.80µg/l. Therefore, this is assessed to be a negligible impact on a high value Basford Brook watercourse, resulting in a negligible effect, which is not significant.

2.2.7 In addition, the combined changes in construction traffic as a result of the AP2 revised scheme have led to the requirement to assess potential drainage discharges from the A500 Shavington Bypass into Tributary of Gresty Brook 1 and Tributary of Swill Brook 1. These watercourses may be dry under some conditions; therefore, the discharge is considered to be to the underlying moderate value glacial till aquifer. As a result, a HEWRAT groundwater assessment has been undertaken. For both discharges, the increased contaminant loading in highway discharges from the combined changes in construction traffic, as a result of the AP2 revised scheme, has been assessed as having a negligible impact on the moderate value glacial till aquifer, leading to a negligible effect, which is not significant.

2.2.8 On a precautionary basis, this assessment has not identified any significant effects due to changes in traffic flows arising from construction of the AP2 revised scheme. However, this assessment is based on a number of precautionary assumptions. During the passage of the Bill, further investigations will be carried out, where reasonably practicable, to validate these assumptions. These investigations may include the collection of existing highways drainage data, to validate the presence/location of the drainage outfalls, the presence of any existing pollution prevention measures and the collection of additional background water quality data.

2.2.9 There are no other new, different or removed significant effects due to the combined changes in construction traffic, as a result of the AP2 revised scheme, compared to those reported in the main ES and SES1 and AP1 ES.

Highways spillage risk assessment

2.2.10 The evaluation of spillage risk to Basford Brook from the A500 Shavington Bypass is presented in Table 1. The risk of a serious pollution incident occurring is identified as negligible. The increased traffic on the A500 Shavington Bypass will not result in significant effects related to spillage risk and no further mitigation is required.

Table 1: Spillage risk assessment for A500 Shavington Bypass discharging to Basford Brook

Assessment criteria	Data	Notes
Water body type	Surface	
Is outfall associated with a sensitive area?	No	
Length of road draining to outfall (km)	0.695	The length of the road was measured based on AP2 general arrangement drawings.
Road type (A-road or motorway)	A-road	
If A road, is site urban or rural?	Urban	
Junction type	No junction	
Response time to reach emergency services location	<20 mins	A response time of less than 1 hour is expected for emergency services.
Traffic flow (annual average daily traffic (AADT) two-way)	21,231	The highest traffic flow (AADT two-way) along the road was selected which represents a conservative approach.
% HGV	5.5	The corresponding HGV percentage value to the selected AADT value was chosen to represent the road. This represents a conservative approach.
Spillage factor (no/10^9HGVkm/year)	0.31	This spillage factor was taken from Table D.1 as presented in LA 113 Road Drainage and the Water Environment Revision 16.
Risk of accidental spillage	0.00009	This represents the total annual probability of a spillage (compared to 1 which represents risk of spillage every year).
Risk of pollution incident	0.00004	This represents the total annual probability of a spillage causing a pollution incident (where the spillage does not affect a sensitive area, the risk of a serious pollution incident is deemed acceptable if the annual probability is less than 0.01 (or 1%)).
Is risk greater than an annual probability of 1%?	No	Is there an overall risk for the length of the road draining to this outfall?
Total probability	0.45	
Return period (years)	24,201	

2.2.11 The evaluation of spillage risk to Tributary of Gresty Brook 1 from the A500 Shavington Bypass is presented in Table 2. The risk of a serious pollution incident occurring is identified as negligible. The increased traffic on the A500 Shavington Bypass will not result in significant effects related to spillage risk and no further mitigation is required.

Table 2: Spillage risk assessment for A500 Shavington Bypass discharging to Tributary of Gresty Brook 1

Assessment criteria	Data	Notes
Water body type	Ground	
Is outfall associated with a sensitive area?	No	
Length of road draining to outfall (km)	0.920	The length of the road was measured based on AP2 general arrangement drawings.
Road type (A-road or motorway)	A-road	
If A road, is site urban or rural?	Urban	
Junction type	No junction	
Response time to reach emergency services location	<20 mins	A response time of less than 1 hour is expected for emergency services.
Traffic flow (annual average daily traffic (AADT) two-way)	21,231	The highest traffic flow (AADT two-way) along the road was selected which represents a conservative approach.
% HGV	5.5	The corresponding HGV percentage value to the selected AADT value was chosen to represent the road. This represents a conservative approach.
Spillage factor (no/10^9HGVkm/year)	0.31	This spillage factor was taken from Table D.1 as presented in LA 113 Road Drainage and the Water Environment Revision 16.
Risk of accidental spillage	0.00012	This represents the total annual probability of a spillage (compared to 1 which represents risk of spillage every year).
Risk of pollution incident	0.00005	This represents the total annual probability of a spillage causing a pollution incident (where the spillage does not affect a sensitive area, the risk of a serious pollution incident is deemed acceptable if the annual probability is less than 0.01 (or 1%)).
Is risk greater than an annual probability of 1%?	No	Is there an overall risk for the length of the road draining to this outfall?
Total probability	0.45	
Return period (years)	18,282	

2.2.12 The evaluation of spillage risk to Tributary of Swill Brook 1 from the A500 Shavington Bypass is presented in Table 3. The risk of a serious pollution incident occurring is identified as negligible. The increased traffic on the A500 Shavington Bypass will not result in significant effects related to spillage risk and no further mitigation is required.

Table 3: Spillage risk assessment for A500 Shavington Bypass discharging to Tributary of Swill Brook 1

Assessment criteria	Data	Notes
Water body type	Ground	
Is outfall associated with a sensitive area?	No	
Length of road draining to outfall (km)	0.920	The length of the road was measured based on AP2 general arrangement drawings.
Road type (A-road or motorway)	A-road	
If A road, is site urban or rural?	Urban	
Junction type	No junction	
Response time to reach emergency services location	<20 mins	A response time of less than 1 hour is expected for emergency services.
Traffic flow (annual average daily traffic (AADT) two-way)	21,231	The highest traffic flow (AADT two-way) along the road was selected which represents a conservative approach.
% HGV	5.5	The corresponding HGV percentage value to the selected AADT value was chosen to represent the road. This represents a conservative approach.
Spillage factor (no/10^9HGVkm/year)	0.31	This spillage factor was taken from Table D.1 as presented in LA 113 Road Drainage and the Water Environment Revision 16.
Risk of accidental spillage	0.00012	This represents the total annual probability of a spillage (compared to 1 which represents risk of spillage every year).
Risk of pollution incident	0.00005	This represents the total annual probability of a spillage causing a pollution incident (where the spillage does not affect a sensitive area, the risk of a serious pollution incident is deemed acceptable if the annual probability is less than 0.01 (or 1%)).
Is risk greater than an annual probability of 1%?	No	Is there an overall risk for the length of the road draining to this outfall?
Total probability	0.45	
Return period (years)	18,282	

Other mitigation measures

2.2.13 No other mitigation measures are required in addition to those reported in the main ES.

Summary of likely residual significant effects

2.2.14 No new or different construction traffic significant effects are anticipated for water resources and flood risk.

Cumulative effects

2.2.15 No new, removed or different construction traffic significant cumulative effects have been identified.

3 Wimboldsley to Lostock Gralam (MA02)

3.1 Environmental baseline

Existing baseline

3.1.1 The baseline water resources and flood risk information is as described in Section 15 of Volume 2, Community Area report: Wimboldsley to Lostock Gralam area (MA02) of the main ES, as amended by the SES1 and AP1 ES Volume 2, Community Area report: Wimboldsley to Lostock Gralam area (MA02).

3.1.2 No water quality data was available for the Highways England Water Risk Assessment Tool[4] assessments carried out for the main ES and SES1 and AP1 ES. Therefore, precautionary significant effects on water quality in Wade Brook were reported in the SES1 and AP1 ES relating to changes in traffic flows due to construction and operation of the scheme. Since the SES1 and AP1 ES was published, water quality data has been collected for Wade Brook to better understand the effects of highways drainage discharges on water quality. The results of the laboratory analysis of the water quality sampling are shown in Table 4.

Table 4: Water quality sampling results – Wade Brook

Determinant (unit)	Limit of detection (LoD)	Wade Brook				Average concentrations		
pH	N/A	-	8.3	7.9	8.4	7.6	7.7	7.88
Total Calcium (mg/l)	5	78	56	63	70	79	67	68.6
Copper (dissolved) (µg/l)	0.5	5.5	5.8	6.3	4.7	6.4	8.2	6.44
Zinc (dissolved) (µg/l)	2.5	2.5	5.4	36	3	4.7	4.9	10.7
Dissolved Organic Carbon (mg/l)	2	-	16	46	-	55	18	32*

*BDL = below detection limit, N/A = not applicable, * DOC this is the median value*

3.1.3 This information has been used in the water resources and flood risk assessment, where relevant.

[4] 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/tses/attachments/d6388f5f-2694-4986-ac46-b17b62c21727?inline=true.

Future baseline

3.1.4 The Planning data report of the main ES (see Volume 5, Appendix: CT-004-00000) and the SES1 and AP1 ES (see SES1 and AP1 ES Volume 5, Appendix: CT-004-00000) provide details of committed developments assumed to have been implemented by 2025.

3.1.5 This information has been supplemented by the committed developments listed in the equivalent Volume 5 planning report of the SES2 and AP2 ES (see SES2 and AP2 Volume 5, Appendix: CT-004-00000). These committed developments have been considered as a future baseline where relevant and their potential to give rise to cumulative effects has been assessed.

3.1.6 None of the identified developments affect the assessment of the AP2 revised scheme's likely construction impacts on water resources and flood risk.

3.2 Effects arising during construction

Avoidance and mitigation measures

3.2.1 No further avoidance or mitigation measures additional to those reported in the main ES are required.

Assessment of impacts and effects

3.2.2 Where highway drainage for existing roads is discharged to local watercourses and where traffic numbers are likely to increase due to construction traffic, assessments for determining whether routine runoff and spillage risk are likely to have detrimental impacts on water quality are carried out using HEWRAT. These assessments have been updated to identify the effects arising from traffic flows for the AP2 revised scheme.

3.2.3 The main ES reported temporary precautionary 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. However, the temporary moderate significant effects on Puddinglake Brook, Gad Brook and Tributary of Gad Brook 3 were removed in AP1 due to updated traffic flow data for the AP1 revised scheme.

A530 King Street

3.2.4 For the combined SES2 and AP2 revised construction traffic, a screening exercise has identified the need for routine runoff and pollution risk assessment on the A530 King Street, due to changes in construction traffic from the AP2 revised scheme. No information is available on the existing drainage on this road, so drainage locations have been estimated based on topography; assuming that drainage discharges occur at the lowest points along

the road. It is therefore assumed, on a precautionary basis, that the A530 King Street may discharge road drainage to Tributary of River Weaver 2. Similarly, as no information is available on potential treatment prior to discharge, on a precautionary basis, it is assumed that there is no existing treatment prior to discharge to this watercourse.

3.2.5 Tributary of River Weaver 2 may be dry under some conditions; therefore, the discharge is considered to be to the underlying moderate value glacial till aquifer. As a result, a HEWRAT groundwater assessment has been undertaken. This assessment suggests that the increased contaminant loading in highway discharge from the combined changes in construction traffic, as a result of the AP2 revised scheme, have been assessed as having a minor impact on the moderate value glacial till aquifer, leading to a minor adverse effect, which is not significant.

A556 Shurlach Road

3.2.6 For the combined SES2 and AP2 revised construction traffic, a screening exercise has also identified the need for routine runoff and pollution risk assessment on the A556 Shurlach Road, due to changes in construction traffic from the AP2 revised scheme. No information is available on the existing drainage on this road, so drainage locations have been estimated based on topography, assuming that drainage discharges occur at the lowest points along the road. It is therefore assumed, on a precautionary basis, that the A556 Shurlach Road may discharge road drainage to Broken Cross Drains and Wade Brook. Similarly, as no information is available on existing pollution prevention measures, it is assumed, on a precautionary basis, that there is no existing treatment prior to discharge to these watercourses.

Broken Cross Drains

3.2.7 Broken Cross Drains may be dry under some conditions; therefore, the discharge is considered to be to the underlying moderate value glacial till aquifer. As a result, a HEWRAT groundwater assessment has been undertaken. This assessment suggests that the increased contaminant loading in highway discharge from the combined changes in construction traffic, as a result of the AP2 revised scheme, has been assessed as having a minor impact on the moderate value glacial till aquifer, leading to a new minor adverse effect, which is not significant.

Wade Brook

3.2.8 Some water quality monitoring data has been collected from Wade Brook (as set out in the environmental baseline section above). Under the baseline conditions (prior to the scheme), the data varies between 4.7µg/l and 8.2µg/l in the period August 2021 to November 2022. Applying the average background concentration into HEWRAT (6.44µg/l), the assessment has been carried out for the two assumed discharge locations to Wade Brook.

3.2.9 The cumulative tier 2 HEWRAT assessment for the two assumed outfalls identified that while the outfalls pass the acute soluble and sediment-bound pollutants assessments, an EQS exceedance for copper is assessed due to the background concentration being higher than the EQS. The average baseline concentration of copper from the monitoring is 6.44µg/l, which would rise to 6.48µg/l due to the AP2 revised scheme construction traffic.

3.2.10 A metal bioavailability assessment has been carried out using the Environment Agency metal bioavailability assessment tool (M-BAT). This assessment uses average concentrations of calcium and pH along with a median concentration of dissolved organic carbon to estimate the concentrations of copper and zinc which would be bioavailable (i.e. in a form which could impact on the biology in the watercourse).

3.2.11 For the two outfalls assessed at Wade Brook, under the baseline conditions (prior to the scheme), the average concentration of copper from the monitoring is 6.44µg/l. The HEWRAT assessment for the Wade Brook shows that the changes in construction traffic data associated with the AP2 revised scheme, would lead to an increase in average concentration of copper to 6.48µg/l. These concentrations have been input to the M-BAT to estimate the bioavailable concentration of copper. The M-BAT estimates the concentration of bioavailable copper as 0.22µg/l in baseline conditions and 0.24µg/l for the AP2 revised scheme. The values are below the EQS of 1µg/l. Therefore, this additional assessment shows that the impact of the combined changes in construction traffic, as a result of the AP2 revised scheme, on highways discharges to Wade Brook is negligible, leading to a negligible effect, which is not significant.

A556 Chester Road

3.2.12 For the combined SES2 and AP2 revised construction traffic, a screening exercise has also identified the need for routine runoff and pollution risk assessment on the A556 Chester Road, due to changes in construction traffic from the AP2 revised scheme. No information is available on the existing drainage on this road, so drainage locations have been estimated based on topography, assuming that drainage discharges occur at the lowest points along the road. It is therefore assumed, on a precautionary basis, that the A556 Chester Road may discharge road drainage Peover Eye and Tributary of Peover Eye. Similarly, as no information is available on existing pollution prevention measures, on a precautionary basis, it is assumed that there is no existing treatment prior to discharge to these watercourses.

Peover Eye and Tributary of Peover Eye

3.2.13 Some historical Environment Agency water quality monitoring data is available for Peover Eye, for the monitoring point at 'A556 Road bridge above Brook', which is at the location of the A556 Chester Road crossing. This indicates that the background concentration of copper in Peover Eye is above the EQS of 1µg/l and varies between 1.33µg/l and 5.32µg/l (in the period from 2000 to 2004). Applying the average background concentration into HEWRAT

(2.82µg/l), the assessment has been carried out for the discharge location to Peover Eye and Tributary of Peover Eye.

3.2.14 The tier 2 HEWRAT assessment for the assumed outfall to Peover Eye identified that the outfall passes the acute soluble and sediment-bound pollutants assessments. However, an EQS exceedance for copper is assessed, due to the background concentration being higher than EQS. The average baseline concentration of copper in the watercourse is 2.82µg/l, which would rise to 2.83µg/l due to the AP2 construction traffic. A 0.01µg/l change in concentration due to the AP2 revised scheme is considered to have a negligible impact on water quality in the context of background concentrations recorded over a period of five years which already exceed the EQS by between 0.33µg/l and 4.32µg/l. Therefore, this is assessed to be a negligible impact, on the high value Peover Eye, resulting in a negligible effect, which is not significant.

3.2.15 The tier 2 HEWRAT assessment for the assumed outfall to Tributary of Peover Eye identified that while the outfall passes the acute soluble and sediment-bound pollutants assessments; an EQS exceedance for copper is assessed, largely due to the background concentration being higher than EQS. The average baseline concentration of copper in the watercourse is 2.82µg/l, which would rise to 2.86µg/l due to the AP2 construction traffic (2.86µg/l). A 0.04µg/l change in concentration due to the AP2 revised scheme is considered to have a negligible impact on water quality in the context of background concentrations recorded over a period of five years which already exceed the EQS by between 0.33µg/l and 4.32µg/l. Therefore, this is assessed to be a negligible impact, on the moderate value Tributary of Peover Eye, resulting in a negligible effect, which is not significant.

3.2.16 There are no other new, different or removed significant effects, due to the combined changes in construction traffic, as a result of the AP2 revised scheme, compared to those reported in the main ES and SES1 and AP1 ES.

Highways spillage risk assessment

3.2.17 The evaluation of spillage risk to Tributary of River Weaver 2 from the A530 King Street is presented in Table 5. The risk of a serious pollution incident occurring is identified as negligible. The increased traffic on the A530 King Street will not result in significant effects related to spillage risk and no further mitigation is required.

Table 5: Spillage risk assessment for A530 King Street discharging to Tributary of River Weaver 2

Assessment criteria	Data	Notes
Water body type	Ground	
Is outfall associated with a sensitive area?	No	
Length of road draining to outfall (km)	0.450	The length of the road was measured based on AP2 general arrangement drawings.
Road type (A-road or motorway)	A-road	
If A road, is site urban or rural?	Rural	
Junction type	No junction	
Response time to reach emergency services location	<1 hour	A response time of less than one hour is expected for emergency services.
Traffic flow (annual average daily traffic (AADT) two-way)	12,269	The highest traffic flow (AADT two-way) along the road was selected which represents a conservative approach.
% HGV	5.2	The corresponding HGV percentage value to the selected AADT value was chosen to represent the road. This represents a conservative approach.
Spillage factor (no/10^9HGVkm/year)	0.29	This spillage factor was taken from Table D.1 as presented in LA 113 Road Drainage and the Water Environment Revision 16.
Risk of accidental spillage	0.00003	This represents the total annual probability of a spillage (compared to 1 which represents risk of spillage every year).
Risk of pollution incident	0.00002	This represents the total annual probability of a spillage causing a pollution incident (where the spillage does not affect a sensitive area, the risk of a serious pollution incident is deemed acceptable if the annual probability is less than 0.01 (or 1%)).
Is risk greater than an annual probability of 1%?	No	Is there an overall risk for the length of the road draining to this outfall?
Total probability	0.6	
Return period (years)	54,849	

3.2.18 The evaluation of spillage risk to Broken Cross Drains from the A556 Shurlach Road – outfall 2 is presented in Table 6. The risk of a serious pollution incident occurring is identified as negligible. The increased traffic on A556 Shurlach Road will not result in significant effects related to spillage risk and no further mitigation is required.

Table 6: Spillage risk assessment for A556 Shurlach Road discharging to Broken Cross Drains

Assessment criteria	Data	Notes
Water body type	Ground	
Is outfall associated with a sensitive area?	No	
Length of road draining to outfall (km)	0.765	The length of the road was measured based on AP2 general arrangement drawings.
Road type (A-road or motorway)	A-road	
If A road, is site urban or rural?	Rural	
Junction type	No junction	
Response time to reach emergency services location	<1 hour	A response time of less than one hour is expected for emergency services.
Traffic flow (annual average daily traffic (AADT) two-way)	17,523	The highest traffic flow (AADT two-way) along the road was selected which represents a conservative approach.
% HGV	3.2	The corresponding HGV percentage value to the selected AADT value was chosen to represent the road. This represents a conservative approach.
Spillage factor (no/10^9HGVkm/year)	0.29	This spillage factor was taken from Table D.1 as presented in LA 113 Road Drainage and the Water Environment Revision 16.
Risk of accidental spillage	0.00005	This represents the total annual probability of a spillage (compared to 1 which represents risk of spillage every year).
Risk of pollution incident	0.00003	This represents the total annual probability of a spillage causing a pollution incident (where the spillage does not affect a sensitive area, the risk of a serious pollution incident is deemed acceptable if the annual probability is less than 0.01 (or 1%)).
Is risk greater than an annual probability of 1%?	No	Is there an overall risk for the length of the road draining to this outfall?
Total probability	0.6	
Return period (years)	36,708	

3.2.19 The evaluation of spillage risk to Wade Brook from the A556 Shurlach Road – outfall 1 is presented in Table 7. The risk of a serious pollution incident occurring is identified as negligible. The increased traffic on the A556 Shurlach Road will not result in significant effects related to spillage risk and no further mitigation is required.

Table 7: Spillage risk assessment for A556 Shurlach Road discharging to Wade Brook – outfall 1

Assessment criteria	Data	Notes
Water body type	Surface	
Is outfall associated with a sensitive area?	No	
Length of road draining to outfall (km)	1.200	The length of the road was measured based on AP2 general arrangement drawings.
Road type (A-road or motorway)	A-road	
If A road, is site urban or rural?	Rural	
Junction type	No junction	
Response time to reach emergency services location	<1 hour	A response time of less than one hour is expected for emergency services.
Traffic flow (annual average daily traffic (AADT) two-way)	18,858	The highest traffic flow (AADT two-way) along the road was selected which represents a conservative approach.
% HGV	3.1	The corresponding HGV percentage value to the selected AADT value was chosen to represent the road. This represents a conservative approach.
Spillage factor (no/10^9HGVkm/year)	0.29	This spillage factor was taken from Table D.1 as presented in LA 113 Road Drainage and the Water Environment Revision 16.
Risk of accidental spillage	0.00007	This represents the total annual probability of a spillage (compared to 1 which represents risk of spillage every year).
Risk of pollution incident	0.00004	This represents the total annual probability of a spillage causing a pollution incident (where the spillage does not affect a sensitive area, the risk of a serious pollution incident is deemed acceptable if the annual probability is less than 0.01 (or 1%)).
Is risk greater than an annual probability of 1%?	No	Is there an overall risk for the length of the road draining to this outfall?
Total probability	0.6	
Return period (years)	22,446	

3.2.20 The evaluation of spillage risk to Wade Brook from the A556 Shurlach Road – outfall 2 is presented in Table 8. The risk of a serious pollution incident occurring is identified as negligible. The increased traffic on the A556 Shurlach Road will not result in significant effects related to spillage risk and no further mitigation is required.

Table 8: Spillage risk assessment for A556 Shurlach Road discharging to Wade Brook – outfall 2

Assessment criteria	Data	Notes
Water body type	Surface	
Is outfall associated with a sensitive area?	No	
Length of road draining to outfall (km)	1.200	The length of the road was measured based on AP2 general arrangement drawings.
Road type (A-road or motorway)	A-road	
If A road, is site urban or rural?	Rural	
Junction type	No junction	
Response time to reach emergency services location	<1 hour	A response time of less than one hour is expected for emergency services.
Traffic flow (annual average daily traffic (AADT) two-way)	18,858	The highest traffic flow (AADT two-way) along the road was selected which represents a conservative approach.
% HGV	3.1	The corresponding HGV percentage value to the selected AADT value was chosen to represent the road. This represents a conservative approach.
Spillage factor (no/10^9HGVkm/year)	0.29	This spillage factor was taken from Table D.1 as presented in LA 113 Road Drainage and the Water Environment Revision 16.
Risk of accidental spillage	0.00007	This represents the total annual probability of a spillage (compared to 1 which represents risk of spillage every year).
Risk of pollution incident	0.00004	This represents the total annual probability of a spillage causing a pollution incident (where the spillage does not affect a sensitive area, the risk of a serious pollution incident is deemed acceptable if the annual probability is less than 0.01 (or 1%)).
Is risk greater than an annual probability of 1%?	No	Is there an overall risk for the length of the road draining to this outfall?
Total probability	0.6	
Return period (years)	22,446	

3.2.21 The evaluation of spillage risk to Peover Eye from the A556 Chester Road is presented in Table 9. The risk of a serious pollution incident occurring is identified as negligible. The increased traffic on the A556 Chester Road will not result in significant effects related to spillage risk and no further mitigation is required.

Table 9: Spillage risk assessment for A556 Chester Road discharging to Peover Eye

Assessment criteria	Data	Notes
Water body type	Surface	
Is outfall associated with a sensitive area?	No	
Length of road draining to outfall (km)	0.750	The length of the road was measured based on AP2 general arrangement drawings.
Road type (A-road or motorway)	A-road	
If A road, is site urban or rural?	Rural	
Junction type	No junction	
Response time to reach emergency services location	<1 hour	A response time of less than 1 hour is expected for emergency services.
Traffic flow (annual average daily traffic (AADT) two-way)	22,545	The highest traffic flow (AADT two-way) along the road was selected which represents a conservative approach.
% HGV	3.2	The corresponding HGV percentage value to the selected AADT value was chosen to represent the road. This represents a conservative approach.
Spillage factor (no/10^9HGVkm/year)	0.29	This spillage factor was taken from Table D.1 as presented in LA 113 Road Drainage and the Water Environment Revision 16.
Risk of accidental spillage	0.00006	This represents the total annual probability of a spillage (compared to 1 which represents risk of spillage every year).
Risk of pollution incident	0.00003	This represents the total annual probability of a spillage causing a pollution incident (where the spillage does not affect a sensitive area, the risk of a serious pollution incident is deemed acceptable if the annual probability is less than 0.01 (or 1%)).
Is risk greater than an annual probability of 1%?	No	Is there an overall risk for the length of the road draining to this outfall?
Total probability	0.6	
Return period (years)	29,100	

3.2.22 The evaluation of spillage risk to Tributary of Peover Eye from the A556 Chester Road is presented in Table 10. The risk of a serious pollution incident occurring is identified as negligible. The increased traffic on the A556 Chester Road will not result in significant effects related to spillage risk and no further mitigation is required.

Table 10: Spillage risk assessment for A556 Chester Road discharging to Tributary of Peover Eye

Assessment criteria	Data	Notes
Water body type	Surface	
Is outfall associated with a sensitive area?	No	
Length of road draining to outfall (km)	0.650	The length of the road was measured based on AP2 general arrangement drawings.
Road type (A-road or motorway)	A-road	
If A road, is site urban or rural?	Rural	
Junction type	No junction	
Response time to reach emergency services location	<1 hour	A response time of less than 1 hour is expected for emergency services.
Traffic flow (annual average daily traffic (AADT) two-way)	22,545	The highest traffic flow (AADT two-way) along the road was selected which represents a conservative approach.
% HGV	3.2	The corresponding HGV percentage value to the selected AADT value was chosen to represent the road. This represents a conservative approach.
Spillage factor (no/10^9HGVkm/year)	0.29	This spillage factor was taken from Table D.1 as presented in LA 113 Road Drainage and the Water Environment Revision 16.
Risk of accidental spillage	0.00005	This represents the total annual probability of a spillage (compared to 1 which represents risk of spillage every year).
Risk of pollution incident	0.00003	This represents the total annual probability of a spillage causing a pollution incident (where the spillage does not affect a sensitive area, the risk of a serious pollution incident is deemed acceptable if the annual probability is less than 0.01 (or 1%)).
Is risk greater than an annual probability of 1%?	No	Is there an overall risk for the length of the road draining to this outfall?
Total probability	0.6	
Return period (years)	33,577	

Other mitigation measures

3.2.23 No other mitigation measures are required in addition to those reported in the main ES.

Summary of likely residual significant effects

3.2.24 There are no new or different construction traffic significant effects for water resources and flood risk.

Cumulative effects

3.2.25 No new, removed or different construction traffic significant cumulative effects have been identified.

4 Pickmere to Agden and Hulseheath (MA03)

4.1 Environmental baseline

Existing baseline

4.1.1 The baseline water resources and flood risk information is as described in Section 15 of Volume 2, Community Area report: Pickmere to Agden and Hulseheath area (MA03) of the main ES, as amended by the SES1 and AP1 ES Volume 2, Community Area report: Pickmere to Agden and Hulseheath area (MA03).

Future baseline

4.1.2 The Planning data report of the main ES (see Volume 5, Appendix: CT-004-00000) and the SES1 and AP1 ES (see SES1 and AP1 ES Volume 5, Appendix: CT-004-00000) provide details of committed developments assumed to have been implemented by 2025.

4.1.3 This information has been supplemented by the committed developments listed in the equivalent Volume 5 planning report of the SES2 and AP2 ES (see SES2 and AP2 Volume 5, Appendix: CT-004-00000). These committed developments have been considered as a future baseline where relevant, and their potential to give rise to cumulative effects has been assessed.

4.1.4 None of the identified developments affect the assessment of the AP2 revised scheme's likely construction impacts on water resources and flood risk.

4.2 Effects arising during construction

Avoidance and mitigation measures

4.2.1 No further avoidance or mitigation measures, additional to those reported in the main ES are required.

Assessment of impacts and effects

4.2.2 Where highway drainage for existing roads is discharged to local watercourses and where traffic numbers are likely to increase due to construction traffic, assessments for determining whether routine runoff and spillage risk are likely to have detrimental impacts on water quality are carried out using HEWRAT. These assessments have been updated to identify the effects arising from traffic flows for the AP2 revised scheme.

4.2.3 The main ES identified no significant effects to watercourses in this area. However, SES1 and AP1 ES reported a potential moderate adverse effect, which is significant on the underlying till Secondary (Undifferentiated) aquifer at Chapel Lane Drain. Due to the changes in construction traffic in SES2 and AP2, the screening results no longer identify the need for routine runoff assessments for Chapel Lane Drain. Therefore, the temporary moderate adverse significant effect on the glacial till aquifer at Chapel Lane has been removed.

4.2.4 For the combined SES2 and AP2 revised construction traffic, a screening exercise has identified the need for routine runoff and pollution risk assessment on the A556, due to changes in construction traffic from the AP2 revised scheme. No information is available on the existing drainage on this road, so drainage locations have been estimated based on topography assuming that drainage discharges occur at the lowest points along the road. It is therefore assumed, on a precautionary basis, that the A556 may discharge road drainage to Tributary of Tabley Brook 9 at two locations. Similarly, as no information is available on existing pollution control measures, on a precautionary basis, it is assumed that there is no existing treatment prior to discharge to this watercourse.

4.2.5 No historical Environment Agency water quality data is available for Tributary of Tabley Brook 9, or any other location on Tabley Brook. Water quality data is available on Waterless Brook downstream of B5391 (located approximately 3.5km downstream of the potential discharge locations). This data indicates that the copper concentrations are above the EQS of 1µg/l and vary between 2.8µg/l and 7.9µg/l (during the course of 2021). Applying the average background concentration into HEWRAT (5.0µg/l), the assessment has been carried out for the discharge locations to Tributary of Tabley brook 9.

4.2.6 The cumulative tier 2 HEWRAT assessment for the assumed outfalls to Tributary of Tabley Brook 9 identified that the outfalls pass the acute soluble and sediment-bound pollutants assessments. However, an EQS exceedance for copper is assessed, due to the background concentration being higher than EQS. The average baseline concentration of copper in the watercourse is 5.0µg/l, which would rise to 5.08µg/l due to the AP2 revised scheme construction traffic. A 0.08µg/l change in concentration due to the AP2 revised scheme is considered to have a negligible impact on water quality in the context of background concentrations recorded over a period of five years which already exceed the EQS by between 1.8µg/l and 6.9µg/l. Therefore, this is assessed to be a negligible impact, on the moderate value Tributary of Tabley Brook 9, resulting in a negligible effect, which is not significant.

4.2.7 There are no other new or different significant effects due to the combined changes in construction traffic, as a result of the AP2 revised scheme, compared to those reported in the main ES, as amended by the SES1 and AP1 ES.

4.2.8 The combined changes in construction traffic, as a result of the AP2 revised scheme, will remove the significant effect reported in the SES1 and AP1 ES on the glacial till aquifer at Chapel Lane Drain.

Highways spillage risk assessment

4.2.9 The evaluation of spillage risk to Tributary of Tabley Brook 9 from the A556 – outfall 1 is presented in Table 11. The risk of a serious pollution incident occurring is identified as negligible. The changes in construction traffic on A556 will not result in significant effects related to spillage risk and no further mitigation is required.

Table 11: Spillage risk assessment for the A556 discharging to Tributary of Tabley Brook 9 – outfall 1

Assessment criteria	Data	Notes
Water body type	Surface	
Is outfall associated with a sensitive area?	No	
Length of road draining to outfall (km)	0.240	The length of the road was measured based on AP2 general arrangement drawings.
Road type (A-road or motorway)	A-road	
If A road, is site urban or rural?	Rural	
Junction type	No junction	
Response time to reach emergency services location	<1 hour	A response time of less than 1 hour is expected for emergency services.
Traffic flow (annual average daily traffic (AADT) two-way)	39,140	The highest traffic flow (AADT two-way) along the road was selected which represents a conservative approach.
% HGV	5	The corresponding HGV percentage value to the selected AADT value was chosen to represent the road. This represents a conservative approach.
Spillage factor (no/10^9HGVkm/year)	0.29	This spillage factor was taken from Table D.1 as presented in LA 113 Road Drainage and the Water Environment Revision 1[6].
Risk of accidental spillage	0.00005	This represents the total annual probability of a spillage (compared to 1 which represents risk of spillage every year).
Risk of pollution incident	0.00003	This represents the total annual probability of a spillage causing a pollution incident (where the spillage does not affect a sensitive area, the risk of a serious pollution incident is deemed acceptable if the annual probability is less than 0.01 (or 1%)).
Is risk greater than an annual probability of 1%?	No	Is there an overall risk for the length of the road draining to this outfall?
Total probability	0.6	
Return period (years)	31,361	

4.2.10 The evaluation of spillage risk to Tributary of Tabley Brook 9 from the A556 – outfall 2 is presented in Table 12. The risk of a serious pollution incident occurring is identified as negligible. The changes in construction traffic on the A556 will not result in significant effects related to spillage risk and no further mitigation is required.

Table 12: Spilling risk assessment for the A556 discharging to Tributary of Tabley Brook 9 – outfall 2

Assessment criteria	Data	Notes
Water body type	Surface	
Is outfall associated with a sensitive area?	No	
Length of road draining to outfall (km)	0.100	The length of the road was measured based on AP2 general arrangement drawings.
Road type (A-road or motorway)	A-road	
If A road, is site urban or rural?	Rural	
Junction type	No junction	
Response time to reach emergency services location	<1 hour	A response time of less than 1 hour is expected for emergency services.
Traffic flow (annual average daily traffic (AADT) two-way)	39,140	The highest traffic flow (AADT two-way) along the road was selected which represents a conservative approach.
% HGV	5	The corresponding HGV percentage value to the selected AADT value was chosen to represent the road. This represents a conservative approach.
Spillage factor (no/10^9HGVkm/year)	0.29	This spillage factor was taken from Table D.1 as presented in LA 113 Road Drainage and the Water Environment Revision 1[6].
Risk of accidental spillage	0.00002	This represents the total annual probability of a spillage (compared to 1 which represents risk of spillage every year).
Risk of pollution incident	0.00001	This represents the total annual probability of a spillage causing a pollution incident (where the spillage does not affect a sensitive area, the risk of a serious pollution incident is deemed acceptable if the annual probability is less than 0.01 (or 1%)).
Is risk greater than an annual probability of 1%?	No	Is there an overall risk for the length of the road draining to this outfall?
Total probability	0.6	
Return period (years)	80,458	

Other mitigation measures

4.2.11 No other mitigation measures are required in addition to those reported in the main ES.

Summary of likely residual significant effects

4.2.12 No new or different construction traffic significant cumulative effects have been identified.

4.2.13 The changes in construction traffic due to the AP2 revised scheme has led to the removal of the moderate adverse significant effects on the glacial till aquifer at Chapel Lane reported in SES1 and AP1 ES.

Cumulative effects

4.2.14 No new, removed or different significant cumulative effects have been identified.

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