A47 Wansford to Sutton Dualling

Scheme Number: TR010039

Volume 6
6.3 Environmental Statement Appendices
Appendix 13.3 – Water quality assessment

APFP Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

A47 Wansford to Sutton Development Consent Order 202[x]

ENVIRONMENTAL STATEMENT APPENDICES
Appendix 13.3 – Water quality assessment

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Rev 0	July 2021	Application Issue

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Captions

Tables

1. Introduction

1.1.1. This appendix describes the approach and findings of the surface water quality impact assessment for the Proposed Scheme. This appendix should be read in conjunction with Chapter 13 (Road Drainage and Water Environment) (**TR010039/APP/6.1**). The methodologies are presented in this appendix, whilst the assessment of the magnitude and significance of impacts and any subsequent requirements for mitigation are presented in Chapter 13 (Road Drainage and Water Environment) (**TR010039/APP/6.1**).

1.1.2. The Proposed Scheme would utilise two existing outfalls and five new outfalls which discharge to the River Nene, Wittering Brook, Mill Stream, an unnamed watercourse at the east of the Proposed Scheme and a tributary of Wittering Brook that drains through the Sutton Heath and Bog Site of Special Scientific Interest (SSSI). Two sections of the Proposed Scheme would discharge to ground via infiltration basins. These have been discussed in Volume 3, Appendix 13.4 (Groundwater assessment) (**TR010039/APP/6.3**). The assessment methodology for estimating the routine runoff impacts and accidental spillage risk to the water features during the operational phase of the Proposed Scheme is described in Section 3 and 4, respectively. The approach follows the guidance within the Design Manual for Roads and Bridges (DMRB) LA113 (Highways England, 2020). The purpose of the assessment is to determine whether mitigation measures in the form of pollution control devices or spillage containment are required during the operational phase. Surface water quality impacts during construction are considered in Chapter 13 (Road Drainage and Water Environment) (**TR010039/APP/6.1**).

1.1.3. The DMRB LA113 standard proposes the use of the Highways England Water Risk Assessment Tool (HEWRAT), a pollution risk screening tool to determine the routine runoff impacts of surface water discharges.

2. Discharge locations

2.1.1. The Proposed Scheme comprises of 10 drainage catchment areas (see Caption 2.1):

- drainage catchment A, B, D, E and Q
- drainage catchment F
- drainage catchment G
- drainage catchment H and I
- drainage catchment J
- drainage catchment K
- drainage catchment L
- drainage catchment N and M
- drainage catchment P123

2.1.2. Catchments F and L would discharge to ground via infiltration basins. These have been discussed in Volume 3, Appendix 13.4 (Groundwater assessment) (**TR010039/APP/6.3**).

2.1.3. The remaining catchments would discharge to the River Nene, Wittering Brook, Mill Stream, an unnamed watercourse at the east of the Proposed Scheme and a tributary of Wittering Brook via seven outfalls. Wittering Brook and the unnamed watercourse are tributaries of the River Nene and Mill Stream is a tributary of Wittering Brook.

2.1.4. Two existing Highways England outfalls, as identified on Highways Agency Drainage Data Management System (HA DDMS) (Highways England, 2020) would be utilised by the Proposed Scheme in order to tie into the existing drainage:

- drainage catchment ABDEQ which discharges to Mill Stream- outfall reference TF0700_4011d
- drainage catchment P123 which discharges, via the existing A47 drainage to an unnamed watercourse – outfall reference TL1099_5514b, which is located outside of the Proposed Scheme boundary

2.1.5. Due to lack of information and a virtual assessments using Google Earth street view confirmed there are no roadside gullies. It is assumed there is no existing drainage and it is likely the road drainage currently drains off the kerb to the grassed verges. Due to this, the existing up-gradient drainage area was not included in the assessment for this catchment. However, this is subject to confirmation following further drainage surveys.

2.1.6. The drainage catchment areas and outfall locations of the existing drainage tie-in are to be confirmed once the drainage survey has been completed. The existing drainage areas for catchments ABDEQ and P123 have been estimated from the topography, measuring between the high points along the carriageway. The majority of the drainage catchments identified to be outside of the Proposed Scheme boundary for both catchments. The outfall for the P123 catchment is also located outside of the Proposed Scheme boundary and ties into existing drainage after attenuation and treatment. For both catchments only the impermeable area was assessed as a worst case scenario.

2.1.7. The approximate location of the proposed outfalls and existing outfalls can be seen in Annex A. These are to be confirmed once a drainage survey has been completed at detailed design stage.

2.1.8. Prior to the runoff reaching the outfall, filter drains and / or attenuation basins are proposed in the drainage design. However, these were omitted from the surface water HEWRAT assessment to represent a worst case scenario for surface water pollution risk, unless they were required. The inclusion of filter drains as part of the proposed drainage is to be reviewed at detailed design stage due to the potential for groundwater pollution risk. The drainage strategy for the Proposed Scheme is described in Volume 3, Appendix 13.2 (Drainage Strategy) (**TR010039/APP/6.3**).

3. Routine runoff quality

3.1. Overview

3.1.1. This section presents the results of HEWRAT assessment that considers the risk of routine runoff from the road drainage catchments that discharge to the River Nene, Wittering Brook and Mill Stream.

3.1.2. Due to the outfalls discharging into, or near to, sensitive designated sites, HEWRAT was undertaken on all outfalls that receive drainage from the Proposed Scheme.

3.2. Method

3.2.1. The water quality impacts of routine road drainage on surface water bodies have been assessed using HEWRAT as described in LA113. The HEWRAT assessment adopts a tiered approach assessing the impacts of both soluble and sediment-bound pollutants and determines whether the drainage system would 'pass' or 'fail' (or prompt an 'alert') in terms of water quality in the receiving water features during operation. The three-step approach is as follows:

- Step 1 assesses the quality of direct highway runoff against toxicity thresholds, assuming no in-river dilution, treatment or attenuation.
- Step 2 assesses the diluting capacity of the watercourse for acute impacts of soluble pollutants, and the likelihood and extent of sediment deposition for chronic impacts of sediment-bound pollutants.
- Step 3 assesses the effectiveness of existing and proposed treatment systems for soluble pollutants and if the site is predicted to accumulate sediments, the percentage of settlement required to ensure that the extent of sediment coverage complies with the threshold deposition index value.

3.2.2. Step 2 and 3 also contain two tiers of assessment for sediment accumulation: Tier 1 is a simple assessment requiring only an estimate of the river width, while Tier 2 is a more detailed assessment which requires further watercourse parameters including Manning's roughness, bed gradient, side slopes and channel width. Tier 2 assessments are only undertaken where outfalls fail for sediment impacts under Tier 1.

3.2.3. For assessment of impacts associated with soluble pollutants, outfalls within 1km (measured along the watercourse) shall be aggregated for purposes of cumulative assessment. For assessment of impacts associated with sediment related pollutants, outfalls within 100m (measured along the watercourse) shall be aggregated for purposes of cumulative assessment.

3.2.4. The assessment considers the impact of dissolved copper and zinc on the water quality of the receiving waters. These metals are used as indicators of the level of impact as they are generally the main metallic pollutants associated with road drainage and can be toxic to aquatic life.

3.2.5. An alert is given for outfalls that would otherwise pass the assessment for sediment-bound pollutants, were it not for the following features being present downstream:

- a protected site within 1km of the point of discharge; and
- a structure, lake or pond within 100m of the point of discharge.

3.2.6. If any specific issues are raised then further measures should be agreed, otherwise the alert message can then be dismissed.

3.2.7. Where the discharge fails the HEWRAT assessment for annual average concentrations of soluble pollutants, and proportionate mitigation cannot be readily incorporated, a detailed assessment shall be carried out using the UKTAG Rivers and Lakes Metal Bioavailability Assessment Tool (M-BAT).

3.2.8. The annual average concentrations predicted by HEWRAT or M-BAT must be lower than the Environmental Quality Standards (EQS) to achieve compliance with the Water Framework Directive (2000/60/EC). The ambient background copper concentrations can be manually input into HEWRAT, if known. Water quality sampling has been undertaken by the Environment Agency upstream of the Proposed Scheme on the River Nene at Wansford Bridge (Environment Agency, 2021). Results obtained indicate the average ambient background concentrations for copper in this reach of the River Nene is 0.14 µg/l for 2018 and 2019.

3.2.9. The EQS for dissolved copper in freshwaters is 1 µg/l and 10.9 µg/l for dissolved zinc (UKTAG, 2014).

3.2.10. The rainfall site selected for the HEWRAT assessment is Huntingdon, as it is the closest rainfall gauge geographically. The standard average annual rainfall (SAAR) for Huntingdon is identified in HEWRAT as 600mm. The site-specific SAAR at the River Nene within the area of the Proposed Scheme is 620mm which is sufficiently similar to the value at Huntingdon.

3.3. Assessment results

3.3.1. A summary of the parameters used in the HEWRAT assessment can be found in Table 3.1.

Table 3.1 Parameters used in the HEWRAT assessment

Network	Discharge location	Proposed Scheme		Existing road area tie in (ha)	Total impermeable area (ha)	Required water quality mitigation	Proposed scheme mitigation
		Road Area	Green/verge Area				
ABDEQ	Mill Stream	1.345	0	4.8	6.145	Not required	Filter drains, vegetated attenuation basin and penstock
G	River Nene	0.793	0.962	N/A	0.793	Not required	Filter drains, vegetated attenuation basin and penstock
H & I	River Nene	2.779	0.58	N/A	2.779	Not required	Filter drains, vegetated attenuation basin and penstock
J	Wittering Brook	0.941	0.312	N/A	0.941	Not required	Filter drains, vegetated attenuation basin and penstock
K	Mill Stream	0.12	0.123	N/A	0.12	Not required	Filter drains and penstock
N&M	Tributary of Wittering Brook	0.46	0.43	N/A	0.46	Not required	Filter drains and penstock
P123	Unnamed watercourse	1.89	0	3.738	5.628	Vegetated attenuation basin	Vegetated attenuation basin, filter drains and penstock
G, H and I (cumulative)	River Nene	3.572	1.542	N/A	3.572	Not required	Filter drains, attenuation basin and penstocks

3.3.2. A summary of the HEWRAT assessment for each outfall is provided below:

- Drainage catchment ABDEQ outfall passed the HEWRAT assessment for soluble pollutants and sediment bound pollutants (see Caption 3.1).
- Drainage catchment G outfall passed the HEWRAT assessment for soluble pollutants and sediment bound pollutants (see Caption 3.2).
- Drainage catchment H and I outfall passed the HEWRAT assessment for soluble pollutants and sediment bound pollutants (see Caption 3.3.
- Drainage catchment J outfall passed the HEWRAT assessment for soluble pollutants and sediment bound pollutants (see Caption 3.4).
- Drainage catchment K outfall passed the HEWRAT assessment for soluble pollutants and sediment bound pollutants (see Caption 3.5).
- Drainage catchment N and M outfall passed the HEWRAT assessment for soluble pollutants and sediment bound pollutants. However, an alert was raised as it discharges into a watercourse which runs through Sutton Heath Bog Site of Special Scientific Interest (SSSI) (see Caption 3.6).
- Drainage catchment P123 outfall is part of a larger existing drainage catchment, where the majority of the drainage area (approximately 66%) and the outfalls are located outside of the Proposed Scheme boundary. Filter drains and vegetated ditches, as existing treatment measures, are currently in place within this drainage catchment area. The HEWRAT assessment was revied under baseline and proposed conditions:
  - The baseline assessment indicates that the outfalls are failing for copper (EQS and acute) and sediment. The results can be seen in Table 5-1.
  - The proposed drainage catchment P123 including the existing catchment and existing treatment measures (filter drains and vegetated ditches) failed the HEWRAT assessment due to soluble pollutants (copper EQS and acute copper) and sediment bound pollutants (see Caption 3.7). When a vegetated attenuation basin was included as proposed mitigation (on the P123 Proposed Scheme drainage catchment area only, which accounts for approximately 34% of the drainage catchment) in line with the proposed drainage design the catchment also failed, but only for copper (EQS and acute) (see Caption 3.8). Although the outfall is still failing once mitigation is included, it does show an improvement on the baseline which is currently failing for copper (EQS and acute) and sediment. Given there is an existing pollution risk identified at the existing outfall (where the majority of the drainage area and the outfalls are outside of the Proposed Scheme boundary), the Proposed Scheme results in a reduction in pollutant loads, in turn, improving an already failing outfall.
  - P123 Proposed Scheme drainage catchment was assessed without the existing drainage area. The results indicated it passed the HEWRAT assessment, both pre and post mitigation (see Caption 3.9), confirming there is no impact from the Proposed Scheme on the already failing outfall.

3.3.3. A cumulative assessment was undertaken for catchments G, H and I as they are within 1km of each other. The outfalls passed the HEWRAT assessment for soluble pollutants and sediment bound pollutants (Caption 3.10).

3.3.4. Vegetated attenuation basins have also been included in the design for catchments A, B, D, E, Q, G, H, I and J, in addition to the one that is required on catchment P123. The additional treatment will have a beneficial impact at Mill Stream and Wittering Brook for catchment A, B, D, E and Q and J (see Captions 3.11 and 3.12 respectively). There is also an assumed benefit for catchments G, H and I. However, HEWRAT assessment outputs have not been presented as the benefit would not be visible due to the predicted low pollution concentrations compared to the ambient background concentration applied.

3.3.5. The attenuation basins would be grassed and dry except at times of heavy rainfall. The vegetated attenuation basin provides the same or better removal rate of copper than a grass channel due to it being flatter and wider, more likely to disperse the water over the surface area and will have a longer detention time. For the purpose of the HEWRAT assessment, the removal rate of a grassed channel for copper (50%) has been included in step 3 of the assessment.

3.3.6. There is also an intention in the proposed drainage design to provide filter drains. However, these are to be considered further during detailed design.

Soluble				Sediment - Chronic Impact
EQS – Annual Average Concentration			Acute Impact	
	Copper	Zinc		Pass
Step 2	0.37	0.92 ug/l	Copper: Pass; Zinc: Pass	Sediment deposition for this site is judged as:
Step 3	–	– ug/l		Accumulating? No 0.11 Low flow Vel m/s
				Extensive? No – Deposition Index

Road number	A47		HE Area / DBFO number		
Assessment type	Non-cumulative assessment (single outfall)				
OS grid reference of assessment point (m)	Easting	507440	Northing	300123	
OS grid reference of outfall structure (m)	Easting	507440	Northing	300123	
Outfall number	Network ABDEQ		List of outfalls in cumulative assessment		
Receiving watercourse	Mill Stream, a tributary of Wittering Brook				
EA receiving water Detailed River Network ID	eaew1001000000540081		Assessor and affiliation	KD Sweco	
Date of assessment	12/11/2020		Version of assessment	1	
Notes	Q95 scaled from the gauging station 32020 - Wittering Brook at Wansford and assessment point is assumed to be Mill Stream, a tributary of Wittering Brook. BFI taken from the gauging station. Water hardness taken from EA water quality archive. Tier 1 river information taken from Google Earth. Ambient copper concentrations taken from EA water quality archive on the River Nene at Wansford. Outfall locations still TBC. Exisiting drainage area calculated via topography but TBC with drainage survey.				

Step 1 Runoff Quality

AADT: >=100,000 | Climatic region: Warm Dry | Rainfall site: Huntingdon (SAAR 600mm)

Step 2 River Impacts

(Enter zero in Annual Q_{95} river flow box to assess Step 1 runoff quality only)

Annual Q_{95} river flow (m^3/s)	0.0416
Impermeable road area drained (ha)	6.185
Permeable area draining to outfall (ha)	0
Base Flow Index (BFI)	0.86

Freshwater EQS limits:

Bioavailable dissolved copper (µg/l)	1
Bioavailable dissolved zinc (µg/l)	10.9

Is the discharge in or within 1 km upstream of a protected site for conservation? No

For dissolved zinc only — Water hardness: High = >200mg CaCO3/l

For dissolved copper only — Ambient background concentration (µg/l): 0.14

For sediment impact only — Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? No

Tier 1 — Estimated river width (m): 2

Tier 2 — Bed width (m): 3 | Manning's n: 0.07 | Side slope (m/m): 0.5 | Long slope (m/m): 0.0001

Step 3 Mitigation

	Brief description	Estimated effectiveness: Treatment for solubles (%)	Attenuation for solubles - restricted discharge rate (l/s)	Settlement of sediments (%)
Existing measures		0	No restriction	0
Proposed measures		0	No restriction	0

Caption 3.1 Routine runoff assessment results for the outfall at Catchment ABDEQ (prior to mitigation)

EQS - Annual Average Concentration	Copper	Zinc	
Step 2	0.14	0.00	ug/l
Step 3	-	-	ug/l

Acute Impact	Copper	Zinc
	Pass	Pass

Pass

Sediment deposition for this site is judged as:

Accumulating?	No	0.11	Low flow Vel m/s
Extensive?	No	-	Deposition Index

Road number	A47		HE Area / DBFO number		
Assessment type	Non-cumulative assessment (single outfall)				
OS grid reference of assessment point (m)	Easting	507863	Northing	299491	
OS grid reference of outfall structure (m)	Easting	507863	Northing	299491	
Outfall number	Network G		List of outfalls in cumulative assessment		
Receiving watercourse	River Nene				
EA receiving water Detailed River Network ID	eaew1001000000540085		Assessor and affiliation	KD Sweco	
Date of assessment	11/11/2020		Version of assessment	1	
Notes	Q95 scaled from the gauging station 32010 - Nene at Wansford and assessment point is assumed to be the River Nene. BFI taken from the gauging station. Water hardness taken from EA water quality archive. Tier 1 river information taken from Google Earth. Ambient copper concentrations taken from EA water quality archive on the River Nene at Wansford. Outfall locations still TBC.				

Step 1 Runoff Quality

AADT: >10,000 and <50,000 | Climatic region: Warm Dry | Rainfall site: Huntingdon (SAAR 600mm)

Step 2 River Impacts

(Enter zero in Annual Q_{95} river flow box to assess Step 1 runoff quality only)

Annual Q_{95} river flow (m^3/s)	2.8735
Impermeable road area drained (ha)	0.793
Permeable area draining to outfall (ha)	0.962
Base Flow Index (BFI)	0.86

Freshwater EQS limits:

Bioavailable dissolved copper (µg/l)	1
Bioavailable dissolved zinc (µg/l)	10.9

Is the discharge in or within 1 km upstream of a protected site for conservation? No

For dissolved zinc only — Water hardness: High = >200mg CaCO3/l

For dissolved copper only — Ambient background concentration (µg/l): 0.14

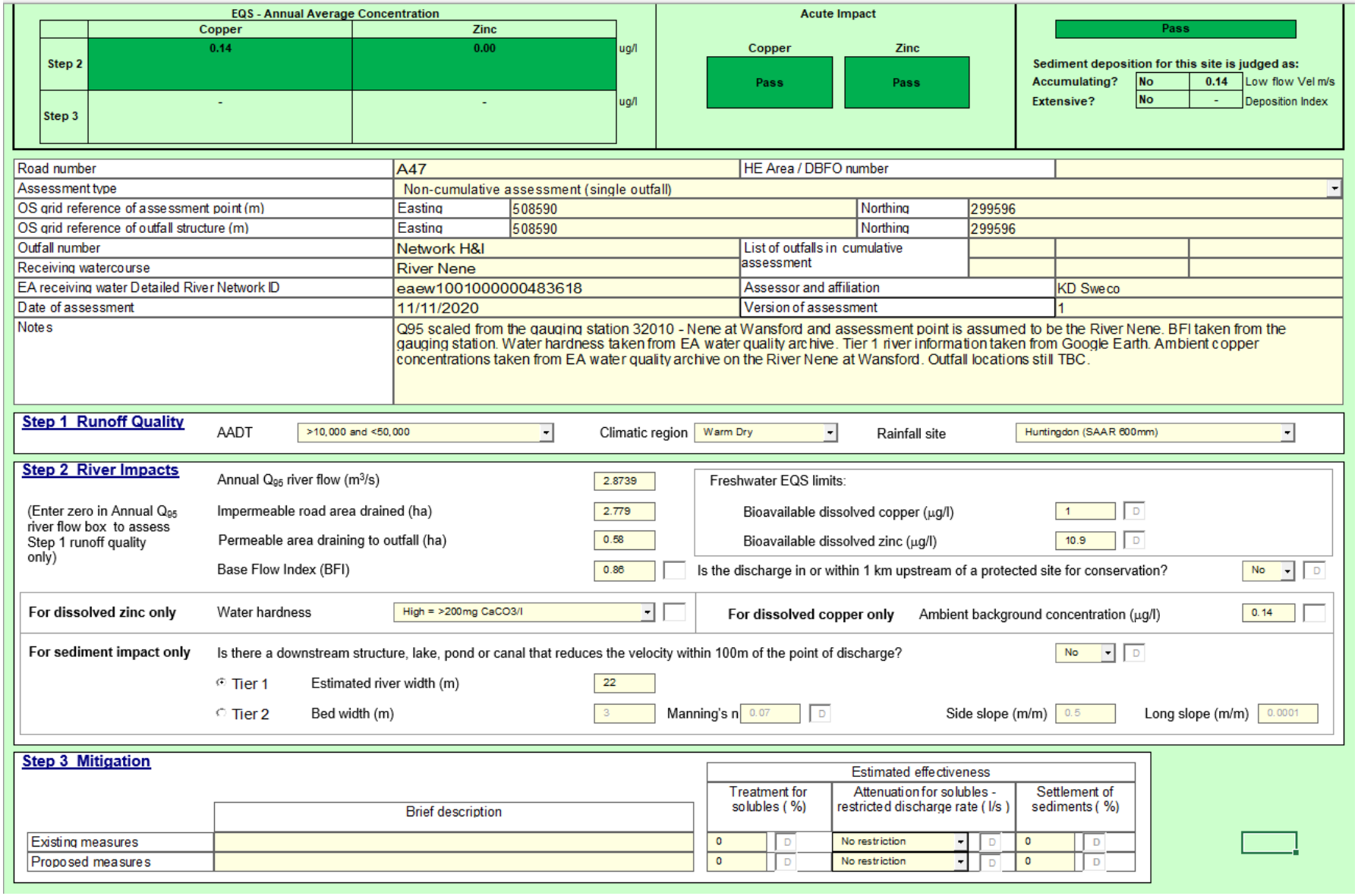
For sediment impact only — Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? No

- Tier 1 — Estimated river width (m): 26
- Tier 2 — Bed width (m): 3 | Manning's n: 0.07 | Side slope (m/m): 0.5 | Long slope (m/m): 0.0001

Step 3 Mitigation

	Brief description	Estimated effectiveness: Treatment for solubles (%)	Attenuation for solubles - restricted discharge rate (l/s)	Settlement of sediments (%)
Existing measures		0	No restriction	0
Proposed measures		0	No restriction	0

Caption 3.2 Routine runoff assessment results for the outfall at Catchment G (prior to mitigation)



EQS - Annual Average Concentration

	Copper	Zinc	
Step 2	0.14	0.00	ug/l
Step 3	-	-	ug/l

Acute Impact

Copper	Zinc
Pass	Pass

Pass

Sediment deposition for this site is judged as:

Accumulating?	No	0.14	Low flow Vel m/s
Extensive?	No	-	Deposition Index

Road number	A47		HE Area / DBFO number		
Assessment type	Non-cumulative assessment (single outfall)				
OS grid reference of assessment point (m)	Easting	508590	Northing	299596	
OS grid reference of outfall structure (m)	Easting	508590	Northing	299596	
Outfall number	Network H&I		List of outfalls in cumulative assessment		
Receiving watercourse	River Nene				
EA receiving water Detailed River Network ID	eaew1001000000483618		Assessor and affiliation	KD Sweco	
Date of assessment	11/11/2020		Version of assessment	1	
Notes	Q95 scaled from the gauging station 32010 - Nene at Wansford and assessment point is assumed to be the River Nene. BFI taken from the gauging station. Water hardness taken from EA water quality archive. Tier 1 river information taken from Google Earth. Ambient copper concentrations taken from EA water quality archive on the River Nene at Wansford. Outfall locations still TBC.				

Step 1 Runoff Quality

AADT: >10,000 and <50,000 | Climatic region: Warm Dry | Rainfall site: Huntingdon (SAAR 600mm)

Step 2 River Impacts

(Enter zero in Annual Q_{95} river flow box to assess Step 1 runoff quality only)

Annual Q_{95} river flow (m^3/s)	2.8739
Impermeable road area drained (ha)	2.779
Permeable area draining to outfall (ha)	0.58
Base Flow Index (BFI)	0.86

Freshwater EQS limits:

Bioavailable dissolved copper (µg/l)	1
Bioavailable dissolved zinc (µg/l)	10.9

Is the discharge in or within 1 km upstream of a protected site for conservation? No

For dissolved zinc only — Water hardness: High = >200mg CaCO3/l

For dissolved copper only — Ambient background concentration (µg/l): 0.14

For sediment impact only — Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? No

- Tier 1 — Estimated river width (m): 22
- Tier 2 — Bed width (m): 3; Manning's n: 0.07; Side slope (m/m): 0.5; Long slope (m/m): 0.0001

Step 3 Mitigation

	Brief description	Estimated effectiveness: Treatment for solubles (%)	Attenuation for solubles - restricted discharge rate (l/s)	Settlement of sediments (%)
Existing measures		0	No restriction	0
Proposed measures		0	No restriction	0

Caption 3.3 Routine runoff assessment results for the outfall at Catchment H and I (prior to mitigation)

highways england

Highways England Water Risk Assessment Tool Version 2.0.4 June 2019

Soluble			Sediment - Chronic Impact
EQS – Annual Average Concentration	Acute Impact		Pass
Copper / Zinc	Copper	Zinc	Sediment deposition for this site is judged as:
Step 2: 0.15 ug/l / 0.02 ug/l	Pass	Pass	Accumulating? No 0.13 Low flow Vel m/s
Step 3: - ug/l / - ug/l			Extensive? No - Deposition Index

Road number	A47	HE Area / DBFO number		
Assessment type	Non-cumulative assessment (single outfall)			
OS grid reference of assessment point (m)	Easting 508867	Northing	299564	
OS grid reference of outfall structure (m)	Easting 508867	Northing	299564	
Outfall number	Network J	List of outfalls in cumulative assessment		
Receiving watercourse	Wittering Brook			
EA receiving water Detailed River Network ID	eaew1001000000542708	Assessor and affiliation	KD Sweco	
Date of assessment	11/11/2020	Version of assessment	1	
Notes	Q95 taken from the gauging station 32020 - Wittering Brook at Wansford and assessment point is assumed to be the Wittering Brook. BFI taken from the gauging station. Water hardness taken from EA water quality archive. Tier 1 river information taken from Google Earth. Ambient copper concentrations taken from EA water quality archive on the River Nene at Wansford. Outfall locations still TBC.			

Step 1 Runoff Quality

AADT: >10,000 and <50,000 | Climatic region: Warm Dry | Rainfall site: Huntingdon (SAAR 600mm)

Step 2 River Impacts

(Enter zero in Annual Q_{95} river flow box to assess Step 1 runoff quality only)

Annual Q_{95} river flow (m^3/s)	0.091
Impermeable road area drained (ha)	0.941
Permeable area draining to outfall (ha)	0.312
Base Flow Index (BFI)	0.86

Freshwater EQS limits:

Bioavailable dissolved copper (µg/l)	1
Bioavailable dissolved zinc (µg/l)	10.9

Is the discharge in or within 1 km upstream of a protected site for conservation? No

For dissolved zinc only — Water hardness: High = >200mg CaCO3/l

For dissolved copper only — Ambient background concentration (µg/l): 0.14

For sediment impact only — Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? No

Tier 1 — Estimated river width (m): 3

Tier 2 — Bed width (m): 3 | Manning's n: 0.07 | Side slope (m/m): 0.5 | Long slope (m/m): 0.0001

Step 3 Mitigation

	Brief description	Estimated effectiveness: Treatment for solubles (%)	Attenuation for solubles - restricted discharge rate (l/s)	Settlement of sediments (%)
Existing measures		0	No restriction	0
Proposed measures		0	No restriction	0

Caption 3.4 Routine runoff assessment results for the outfall at Catchment J (prior to mitigation)

EQS - Annual Average Concentration

	Copper	Zinc	
Step 2	0.14	0.01	ug/l
Step 3	-	-	ug/l

Acute Impact

Copper	Zinc
Pass	Pass

Pass

Sediment deposition for this site is judged as:

Accumulating?	No	0.11	Low flow Vel m/s
Extensive?	No	-	Deposition Index

Road number	A47		HE Area / DBFO number		
Assessment type	Non-cumulative assessment (single outfall)				
OS grid reference of assessment point (m)	Easting	507894	Northing	300018	
OS grid reference of outfall structure (m)	Easting	507894	Northing	300018	
Outfall number	Network K		List of outfalls in cumulative assessment		
Receiving watercourse	Mill Stream, a tributary of Wittering Brook				
EA receiving water Detailed River Network ID	eaew1001000000540075		Assessor and affiliation	KD Sweco	
Date of assessment	12/11/2020		Version of assessment	1	
Notes	Q95 scaled from the gauging station 32020 - Wittering Brook at Wansford and assessment point is assumed to be Mill Stream, a tributary of Wittering Brook. BFI taken from the gauging station. Water hardness taken from EA water quality archive. Tier 1 river information taken from Google Earth. Ambient copper concentrations taken from EA water quality archive on the River Nene at Wansford. Outfall location still TBC.				

Step 1 Runoff Quality

AADT: >10,000 and <50,000 | Climatic region: Warm Dry | Rainfall site: Huntingdon (SAAR 600mm)

Step 2 River Impacts

(Enter zero in Annual Q_{95} river flow box to assess Step 1 runoff quality only)

Annual Q_{95} river flow (m^3/s)	0.0424
Impermeable road area drained (ha)	0.12
Permeable area draining to outfall (ha)	0.123
Base Flow Index (BFI)	0.86

Freshwater EQS limits:

Bioavailable dissolved copper (µg/l)	1
Bioavailable dissolved zinc (µg/l)	10.9

Is the discharge in or within 1 km upstream of a protected site for conservation? No

For dissolved zinc only — Water hardness: High = >200mg CaCO3/l

For dissolved copper only — Ambient background concentration (µg/l): 0.14

For sediment impact only — Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? No

- Tier 1 — Estimated river width (m): 2
- Tier 2 — Bed width (m): 3; Manning's n: 0.07; Side slope (m/m): 0.5; Long slope (m/m): 0.0001

Step 3 Mitigation

	Brief description	Estimated effectiveness: Treatment for solubles (%)	Attenuation for solubles - restricted discharge rate (l/s)	Settlement of sediments (%)
Existing measures		0	No restriction	0
Proposed measures		0	No restriction	0

Caption 3.5 Routine runoff assessment results for the outfall at Catchment K (prior to mitigation)

highways england

Highways England Water Risk Assessment Tool Version 2.0.4 June 2019

Soluble

EQS – Annual Average Concentration

	Copper	Zinc	
Step 2	0.31	0.45	ug/l
Step 3	-	-	ug/l

Acute Impact

Copper	Zinc
Pass	Pass

Sediment - Chronic Impact

Alert. Protected Area.

Sediment deposition for this site is judged as:

Accumulating?	Yes	0.00	Low flow Vel m/s
Extensive?	No	42	Deposition Index

Road number	A47		HE Area / DBFO number		
Assessment type	Non-cumulative assessment (single outfall)				
OS grid reference of assessment point (m)	Easting	509116	Northing	300198	
OS grid reference of outfall structure (m)	Easting	509116	Northing	300198	
Outfall number	Network M&N		List of outfalls in cumulative assessment		
Receiving watercourse	Tributary of Wittering Brook				
EA receiving water Detailed River Network ID	eaew1001000000571939		Assessor and affiliation	KD Sweco	
Date of assessment	12/11/2020		Version of assessment	1	
Notes	Q95 scaled from the gauging station 32020 - Wittering Brook at Wansford and assessment point is assumed to be a tributary of Wittering Brook. BFI taken from the gauging station. Water hardness taken from EA water quality archive. Tier 1 river information taken from Google Earth. Ambient copper concentrations taken from EA water quality archive on the River Nene at Wansford. Outfall location still TBC but assumed to be within Sutton Heath SSSI. Existing drianage area not included.				

Step 1 Runoff Quality

AADT: >10,000 and <50,000 | Climatic region: Warm Dry | Rainfall site: Huntingdon (SAAR 600mm)

Step 2 River Impacts

(Enter zero in Annual Q_{95} river flow box to assess Step 1 runoff quality only)

Annual Q_{95} river flow (m^3/s)	0.0018
Impermeable road area drained (ha)	0.46
Permeable area draining to outfall (ha)	0.43
Base Flow Index (BFI)	0.86

Freshwater EQS limits:

Bioavailable dissolved copper (µg/l)	1
Bioavailable dissolved zinc (µg/l)	10.9

Is the discharge in or within 1 km upstream of a protected site for conservation? Yes

For dissolved zinc only — Water hardness: High = >200mg CaCO3/l

For dissolved copper only — Ambient background concentration (µg/l): 0.14

For sediment impact only — Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? No

Tier 1 — Estimated river width (m): 2

Tier 2 — Bed width (m): 3 | Manning's n: 0.07 | Side slope (m/m): 0.5 | Long slope (m/m): 0.0001

Step 3 Mitigation

	Brief description	Estimated effectiveness: Treatment for solubles (%)	Attenuation for solubles - restricted discharge rate (l/s)	Settlement of sediments (%)
Existing measures		0	No restriction	0
Proposed measures		0	No restriction	0

Caption 3.6 Routine runoff assessment results for the outfall at Catchment N and M (prior to mitigation)

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Highways England Water Risk Assessment Tool

Version 2.0.4 June 2019

Soluble

EQS – Annual Average Concentration

	Copper	Zinc	
Step 2	1.57 Tier 1 fail. Go to Tier 2 (using UK TAG M-BAT tool), or Step 3 mitigation.	3.30	ug/l
Step 3	1.35 Tier 1 fail. Go to Tier 2 (using UK TAG M-BAT tool), or increase Step 3 mitigation.	2.81	ug/l

Acute Impact

Copper	Zinc
River Fails Toxicity Test. Try more mitigation	Pass

Sediment - Chronic Impact

Fail. Try Tier 2 for Velocity

Settlement needed = 81 %, proposed = 60 %

Sediment deposition for this site is judged as:

Accumulating?	Yes	0.00	Low flow Vel m/s
Extensive?	Yes	208	Deposition Index

Road number	A47		HE Area / DBFO number		
Assessment type	Non-cumulative assessment (single outfall)				
OS grid reference of assessment point (m)	Easting	510553	Northing	299160	
OS grid reference of outfall structure (m)	Easting	510553	Northing	299160	
Outfall number	Network P123		List of outfalls in cumulative assessment		
Receiving watercourse	Tributary of the River Nene				
EA receiving water Detailed River Network ID	eaew1001000000542712		Assessor and affiliation	KD Sweco	
Date of assessment	20/04/2021		Version of assessment	2	
Notes	Q95 taken from WHS LowFlows Enterprise at point of assumed discharge. BFI taken from FEH. Assessment point is assumed to be a tributary of the River Nene. Water hardness taken from EA water quality archive. Tier 1 river information taken from Google Earth. Ambient copper concentrations taken from EA water quality archive on the River Nene at Wansford. Outfall locations still TBC. Exisiting drainage area calculated via topography but TBC with drainage survey.				

Step 1 Runoff Quality

AADT: >10,000 and <50,000 | Climatic region: Warm Dry | Rainfall site: Huntingdon (SAAR 600mm)

Step 2 River Impacts

(Enter zero in Annual Q_{95} river flow box to assess Step 1 runoff quality only)

Annual Q_{95} river flow (m^3/s)	0.0011
Impermeable road area drained (ha)	5.628
Permeable area draining to outfall (ha)	0
Base Flow Index (BFI)	0.69

Freshwater EQS limits:

Bioavailable dissolved copper (µg/l)	1
Bioavailable dissolved zinc (µg/l)	10.9

Is the discharge in or within 1 km upstream of a protected site for conservation? No

For dissolved zinc only — Water hardness: High = >200mg CaCO3/l

For dissolved copper only — Ambient background concentration (µg/l): 0.14

For sediment impact only — Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? No

Tier 1 — Estimated river width (m): 2

Tier 2 — Bed width (m): 3 — Manning's n: 0.07 — Side slope (m/m): 0.5 — Long slope (m/m): 0.0001

Step 3 Mitigation

	Brief description	Estimated effectiveness: Treatment for solubles (%)	Attenuation for solubles - restricted discharge rate (l/s)	Settlement of sediments (%)
Existing measures	Filter drains and vegetated ditches on the exisiting catchment	15	No restriction	60
Proposed measures		15	No restriction	60

Caption 3.7 Routine runoff assessment results for the outfall at Catchment P123 (including tie in, prior to mitigation but including existing measures)

Highways England Water Risk Assessment Tool Version 2.0.4 June 2019

Soluble				Sediment - Chronic Impact
EQS – Annual Average Concentration			Acute Impact	
	Copper	Zinc		Pass
Step 2	1.57 Tier 1 fail. Go to Tier 2 (using UK TAG M-BAT tool), or Step 3 mitigation.	3.30 ug/l	Copper: River Fails Toxicity Test. Try more mitigation	Sediment deposition for this site is judged as:
Step 3	1.11 Tier 1 fail. Go to Tier 2 (using UK TAG M-BAT tool), or increase Step 3 mitigation.	2.25 ug/l	Zinc: Pass	Accumulating? Yes 0.00 Low flow Vel m/s; Extensive? No 68 Deposition Index

Road number	A47		HE Area / DBFO number		
Assessment type	Non-cumulative assessment (single outfall)				
OS grid reference of assessment point (m)	Easting	510553	Northing	299160	
OS grid reference of outfall structure (m)	Easting	510553	Northing	299160	
Outfall number	Network P123		List of outfalls in cumulative assessment		
Receiving watercourse	Tributary of the River Nene				
EA receiving water Detailed River Network ID	eaew1001000000542712		Assessor and affiliation	KD Sweco	
Date of assessment	20/04/2021		Version of assessment	2	
Notes	Q95 taken from WHS LowFlows Enterprise at point of assumed discharge. BFI taken from FEH. Assessment point is assumed to be a tributary of the River Nene. Water hardness taken from EA water quality archive. Tier 1 river information taken from Google Earth. Ambient copper concentrations taken from EA water quality archive on the River Nene at Wansford. Outfall locations still TBC. Exisiting drainage area calculated via topography but TBC with drainage survey.				

Step 1 Runoff Quality

AADT: >10,000 and <50,000 | Climatic region: Warm Dry | Rainfall site: Huntingdon (SAAR 600mm)

Step 2 River Impacts

(Enter zero in Annual Q_{95} river flow box to assess Step 1 runoff quality only)

Annual Q_{95} river flow (m^3/s)	0.0011	Freshwater EQS limits:	
Impermeable road area drained (ha)	5.628	Bioavailable dissolved copper (µg/l)	1 D
Permeable area draining to outfall (ha)	0	Bioavailable dissolved zinc (µg/l)	10.9 D
Base Flow Index (BFI)	0.69	Is the discharge in or within 1 km upstream of a protected site for conservation?	No D
For dissolved zinc only Water hardness	High = >200mg CaCO3/l	**For dissolved copper only** Ambient background concentration (µg/l)	0.14
For sediment impact only Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge?			No D
Tier 1 Estimated river width (m)	2		
Tier 2 Bed width (m)	3	Manning's n 0.07 D; Side slope (m/m) 0.5; Long slope (m/m) 0.0001	

Step 3 Mitigation

	Brief description	Estimated effectiveness: Treatment for solubles (%)	Attenuation for solubles - restricted discharge rate (l/s)	Settlement of sediments (%)
Existing measures	Filter drains and vegetated ditches on the exisiting catchment	15	No restriction D	60
Proposed measures	Attenuation basin (grass lined) on 34% of the catchment	32	No restriction D	87

Caption 3.8 Routine runoff assessment results for the outfall at Catchment P123 (including tie in) with proposed measures included

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Highways England Water Risk Assessment Tool Version 2.0.4 June 2019

Soluble				Sediment - Chronic Impact
EQS – Annual Average Concentration			Acute Impact	Pass
	Copper	Zinc	Copper: Pass; Zinc: Pass	Sediment deposition for this site is judged as:
Step 2	0.88	1.77 ug/l		Accumulating? Yes 0.00 Low flow Vel m/s
Step 3	0.51	0.88 ug/l		Extensive? No 35 Deposition Index

Road number	A47		HE Area / DBFO number		
Assessment type	Non-cumulative assessment (single outfall)				
OS grid reference of assessment point (m)	Easting	510553	Northing	299160	
OS grid reference of outfall structure (m)	Easting	510553	Northing	299160	
Outfall number	Network P123		List of outfalls in cumulative assessment		
Receiving watercourse	Tributary of the River Nene				
EA receiving water Detailed River Network ID	eaew1001000000542712		Assessor and affiliation	KD Sweco	
Date of assessment	20/04/2021		Version of assessment	2	
Notes	Q95 taken from WHS LowFlows Enterprise at point of assumed discharge. BFI taken from FEH. Assessment point is assumed to be a tributary of the River Nene. Water hardness taken from EA water quality archive. Tier 1 river information taken from Google Earth. Ambient copper concentrations taken from EA water quality archive on the River Nene at Wansford. Outfall locations still TBC.				

Step 1 Runoff Quality

AADT: >10,000 and <50,000 | Climatic region: Warm Dry | Rainfall site: Huntingdon (SAAR 600mm)

Step 2 River Impacts

(Enter zero in Annual Q_{95} river flow box to assess Step 1 runoff quality only)

Annual Q_{95} river flow (m^3/s)	0.0011
Impermeable road area drained (ha)	1.89
Permeable area draining to outfall (ha)	0.8313
Base Flow Index (BFI)	0.69

Freshwater EQS limits:
- Bioavailable dissolved copper (µg/l): 1
- Bioavailable dissolved zinc (µg/l): 10.9

Is the discharge in or within 1 km upstream of a protected site for conservation? No

For dissolved zinc only — Water hardness: High = >200mg CaCO3/l

For dissolved copper only — Ambient background concentration (µg/l): 0.14

For sediment impact only — Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? No

- Tier 1 — Estimated river width (m): 2
- Tier 2 — Bed width (m): 3; Manning's n: 0.07; Side slope (m/m): 0.5; Long slope (m/m): 0.0001

Step 3 Mitigation

	Brief description	Estimated effectiveness: Treatment for solubles (%)	Attenuation for solubles - restricted discharge rate (l/s)	Settlement of sediments (%)
Existing measures	Filter drains and vegetated ditch on the existing catchment	15	No restriction	60
Proposed measures	Attenuation basin (grass lined)	50	No restriction	80

Caption 3.9 Routine runoff assessment results for the outfall at Catchment P123 (excluding tie in) with proposed measures included

Highways England Water Risk Assessment Tool Version 2.0.4 June 2019

Soluble – EQS – Annual Average Concentration	Copper	Zinc	
Step 2	0.14	0.00	ug/l
Step 3	-	-	ug/l

Acute Impact	Copper	Zinc
	Pass	Pass

Sediment - Chronic Impact			
Pass			
Sediment deposition for this site is judged as:			
Accumulating?	No	0.14	Low flow Vel m/s
Extensive?	No	-	Deposition Index

Road number	A47		HE Area / DBFO number			
Assessment type	Cumulative assessment including sediments (outfalls within 100m)					
OS grid reference of assessment point (m)	Easting	508590	Northing	299596		
OS grid reference of outfall structure (m)	Easting	508590	Northing	299596		
Outfall number	Network G,H&I		List of outfalls in cumulative assessment	G	507836	299491
Receiving watercourse	River Nene					
EA receiving water Detailed River Network ID	eaew1001000000483618		Assessor and affiliation	KD Sweco		
Date of assessment	11/11/2020		Version of assessment	1		
Notes	Q95 scaled from the gauging station 32010 - Nene at Wansford and assessment point is assumed to be the River Nene. BFI taken from the gauging station. Water hardness taken from EA water quality archive. Tier 1 river information taken from Google Earth. Ambient copper concentrations taken from EA water quality archive on the River Nene at Wansford. Outfall locations still TBC.					

Step 1 Runoff Quality

AADT: >10,000 and <50,000 | Climatic region: Warm Dry | Rainfall site: Huntingdon (SAAR 600mm)

Step 2 River Impacts

(Enter zero in Annual Q_{95} river flow box to assess Step 1 runoff quality only)

Annual Q_{95} river flow (m^3/s)	2.8739	
Impermeable road area drained (ha)	3.572	
Permeable area draining to outfall (ha)	1.542	
Base Flow Index (BFI)	0.86	

Freshwater EQS limits:

Bioavailable dissolved copper (µg/l)	1	D
Bioavailable dissolved zinc (µg/l)	10.9	D

Is the discharge in or within 1 km upstream of a protected site for conservation? No D

For dissolved zinc only — Water hardness: High = >200mg CaCO3/l

For dissolved copper only — Ambient background concentration (µg/l): 0.14

For sediment impact only — Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? No D

Tier 1: Estimated river width (m): 22

Tier 2: Bed width (m): 3 | Manning's n: 0.07 D | Side slope (m/m): 0.5 | Long slope (m/m): 0.0001

Step 3 Mitigation

	Brief description	Estimated effectiveness: Treatment for solubles (%)	Attenuation for solubles - restricted discharge rate (l/s)	Settlement of sediments (%)
Existing measures		0 D	No restriction D	0 D
Proposed measures		0 D	No restriction D	0 D

Caption 3.10 Cumulative routine runoff assessment results for the outfalls at Catchments G, H and I (prior to mitigation)

Highways England Water Risk Assessment Tool Version 2.0.4 June 2019

Soluble			Sediment - Chronic Impact
EQS – Annual Average Concentration		Acute Impact	Pass
	Copper / Zinc		Sediment deposition for this site is judged as:
Step 2	0.37 / 0.92 ug/l	Copper: Pass; Zinc: Pass	Accumulating? No 0.11 Low flow Vel m/s
Step 3	0.34 / 0.82 ug/l		Extensive? No – Deposition Index

Road number	A47		HE Area / DBFO number		
Assessment type	Non-cumulative assessment (single outfall)				
OS grid reference of assessment point (m)	Easting	507440	Northing	300123	
OS grid reference of outfall structure (m)	Easting	507440	Northing	300123	
Outfall number	Network ABDEQ		List of outfalls in cumulative assessment		
Receiving watercourse	Mill Stream, a tributary of Wittering Brook				
EA receiving water Detailed River Network ID	eaew1001000000540081		Assessor and affiliation	KD Sweco	
Date of assessment	12/11/2020		Version of assessment	1	
Notes	Q95 scaled from the gauging station 32020 - Wittering Brook at Wansford and assessment point is assumed to be Mill Stream, a tributary of Wittering Brook. BFI taken from the gauging station. Water hardness taken from EA water quality archive. Tier 1 river information taken from Google Earth. Ambient copper concentrations taken from EA water quality archive on the River Nene at Wansford. Outfall locations still TBC. Exisiting drainage area calculated via topography but BTC with drainage survey				

Step 1 Runoff Quality

AADT: >=100,000 | Climatic region: Warm Dry | Rainfall site: Huntingdon (SAAR 600mm)

Step 2 River Impacts

(Enter zero in Annual Q_{95} river flow box to assess Step 1 runoff quality only)

Annual Q_{95} river flow (m^3/s)	0.0416
Impermeable road area drained (ha)	6.185
Permeable area draining to outfall (ha)	0
Base Flow Index (BFI)	0.86

Freshwater EQS limits:

Bioavailable dissolved copper (µg/l)	1
Bioavailable dissolved zinc (µg/l)	10.9

Is the discharge in or within 1 km upstream of a protected site for conservation? No

For dissolved zinc only — Water hardness: High = >200mg CaCO3/l

For dissolved copper only — Ambient background concentration (µg/l): 0.14

For sediment impact only — Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? No

Tier 1: Estimated river width (m): 2

Tier 2: Bed width (m): 3 | Manning's n: 0.07 | Side slope (m/m): 0.5 | Long slope (m/m): 0.0001

Step 3 Mitigation

	Brief description	Estimated effectiveness: Treatment for solubles (%)	Attenuation for solubles - restricted discharge rate (l/s)	Settlement of sediments (%)
Existing measures		0	No restriction	0
Proposed measures	Attenuation basin (grass lined) on 22% of the catchment	11	No restriction	17

Caption 3.11 Routine runoff assessment results for the outfall at Catchment A, B, D, E (including additional measures)

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Highways England Water Risk Assessment Tool Version 2.0.4 June 2019

Soluble				Sediment - Chronic Impact
EQS – Annual Average Concentration			Acute Impact	Pass
	Copper	Zinc	Copper / Zinc	Sediment deposition for this site is judged as:
Step 2	0.15 ug/l	0.02 ug/l	Pass / Pass	Accumulating? No 0.13 Low flow Vel m/s
Step 3	0.14	0.01 ug/l		Extensive? No – Deposition Index

Road number	A47		HE Area / DBFO number		
Assessment type	Non-cumulative assessment (single outfall)				
OS grid reference of assessment point (m)	Easting	508867	Northing	299564	
OS grid reference of outfall structure (m)	Easting	508867	Northing	299564	
Outfall number	Network J		List of outfalls in cumulative assessment		
Receiving watercourse	Wittering Brook				
EA receiving water Detailed River Network ID	eaew1001000000542708		Assessor and affiliation	KD Sweco	
Date of assessment	11/11/2020		Version of assessment	1	
Notes	Q95 taken from the gauging station 32020 - Wittering Brook at Wansford and assessment point is assumed to be the Wittering Brook. BFI taken from the gauging station. Water hardness taken from EA water quality archive. Tier 1 river information taken from Google Earth. Ambient copper concentrations taken from EA water quality archive on the River Nene at Wansford. Outfall locations still TBC.				

Step 1 Runoff Quality

AADT: >10,000 and <50,000 | Climatic region: Warm Dry | Rainfall site: Huntingdon (SAAR 600mm)

Step 2 River Impacts

(Enter zero in Annual Q_{95} river flow box to assess Step 1 runoff quality only)

Annual Q_{95} river flow (m^3/s)	0.091	
Impermeable road area drained (ha)	0.941	
Permeable area draining to outfall (ha)	0.312	
Base Flow Index (BFI)	0.86	

Freshwater EQS limits:

Bioavailable dissolved copper (µg/l)	1	D
Bioavailable dissolved zinc (µg/l)	10.9	D

Is the discharge in or within 1 km upstream of a protected site for conservation? No D

For dissolved zinc only — Water hardness: High = >200mg CaCO3/l

For dissolved copper only — Ambient background concentration (µg/l): 0.14

For sediment impact only — Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? No D

- Tier 1 — Estimated river width (m): 3
- Tier 2 — Bed width (m): 3 | Manning's n: 0.07 D | Side slope (m/m): 0.5 | Long slope (m/m): 0.0001

Step 3 Mitigation

	Brief description	Estimated effectiveness: Treatment for solubles (%)	Attenuation for solubles - restricted discharge rate (l/s)	Settlement of sediments (%)
Existing measures		0 D	No restriction D	0 D
Proposed measures	Attenuation basin (grass lined)	50	No restriction D	80

Caption 3.12 Routine runoff assessment results for the outfall at Catchment J (including additional measures)

4. Accidental spillage assessment

4.1. Overview

4.1.1. This section presents the results of the accidental spillage assessment. This considers the risk of pollution impacts from accidental spillages onto the drainage catchments which discharge to the River Nene, Wittering Brook and Mill Stream.

4.2. Method

4.2.1. Spillage assessments were completed for all outfalls, using the approach as detailed within the DMRB LA113. The methodology uses a prepared spreadsheet to input parameters relating to waterbody type, road type, annual average daily traffic (AADT) and location. This determines an overall risk expressed as probability. For this methodology, the probability is defined in two ways:

- The probability that there would be a spillage with the potential to cause a serious pollution incident
- The probability, assuming such a spillage has occurred, that the pollutant would cause a serious pollution incident

4.2.2. The following formula is used to calculate the annual probability of a spillage for each section of road:

$$P_{SPL}=RL \times SS \times(AADT \times 365 \times 10^{-9})\times(\%HGV/100)$$

4.2.3. Where:

- P_{SPL} = annual probability of a spillage with the potential to cause a serious pollution incident
- RL = Road Length (in km)
- SS = Spillage rates from Table D1 (which is included with the results below)
- AADT = annual average daily traffic (design year for new road used)
- %HGV = Percentage of heavy goods vehicles

4.2.4. The predicted annual probability of a serious pollution incident for each section of road, using this formula:

$$P_{INC}= P_{SPL} \times P_{POL}$$

4.2.5. Where:

- P_{INC} = the probability of a spillage with an associated risk of a serious pollution incident occurring
- P_{POL} = the probability, given a spillage, that a serious pollution incident would result. An appropriate value for this is selected from Table D2 in LA113 for outfalls. This would depend on the sensitivity of the water course and how soon it can be reached by the emergency services.

4.3. Assessment results

4.3.1. All of the outfalls passed the accidental spillage assessment with the results indicating all drainage areas would have <0.5% annual risk of pollution, which is the annual acceptable threshold for discharge to a sensitive designated site. The annual acceptable pollution risk threshold is set at 0.5% due to the presence of coastal and floodplain grazing priority habitats and the Sutton Heath and Bog SSSI located within the vicinity of, and downstream of, the outfalls.

4.3.2. In addition to the measures noted in section 3.3, pollution control devices, such as a penstocks, shall also be included on all catchments. These are not required for mitigation as the spillage assessments do not fail without them, however, they have been included to provide additional pollution protection and enhancement. The penstocks shall also provide additional protection to Sutton Heath and Bog SSSI, where an alert was raised on the routine runoff assessment (see Caption 3.6).

4.3.3. All outfalls pass the spillage assessment without mitigation or additional measures included. However, these assessments include the required mitigation noted in section 3.3 and penstocks, as additional measures, which reduce the spillage risk further.

4.3.4. The results from each accidental spillage assessment can be seen in Captions 4.1 to 4.7.

View Parameters | Reset Spillage Risk | Go To Interface

Assessment of Priority Outfalls

Method D - assessment of risk from accidental spillage

			Additional columns for use if other roads drain to the same outfall						
		A (main road)	B	C	D	E	F		
D1	Water body type	Surface watercourse	Surface watercourse	Surface watercourse	Surface watercourse	Surface watercourse			
D2	Length of road draining to outfall *(m)*	640.00	2,616.00	100.00	170.00	200.00			
D3	Road Type *(A-road or Motorway)*	A	A	A	A	A			
D4	If A road, is site urban or rural?	Rural	Rural	Rural	Rural	Rural			
D5	Junction type	Slip road	No junction	Roundabout	Slip road	Roundabout			
D6	Location (response time for emergency services)	< 1 hour	< 1 hour	< 1 hour	< 1 hour	< 1 hour			
D7	Traffic flow (AADT two way)	8,365	73,062	29,590	3,434	5,352			
D8	% HGV	10.00%	16	10	3	12			
D8	Spillage factor *(no/10^9 HGVkm/year)*	0.83	0.29	3.09	0.83	3.09			
D9	Risk of accidental spillage	0.00000	0.00324	0.00033	0.00001	0.00014	0.00000		
D10	Probability factor	0.60	0.60	0.60	0.60	0.60			
D11	Risk of pollution incident	0.00000	0.00194	0.00020	0.00000	0.00009	0.00000		
D12	Is risk greater than 0.01?	**No**	**No**	**No**	**No**	**No**		**Totals**	**Return Period (years)**
D13	Return period without pollution reduction measures	0.00000	0.00194	0.00020	0.00000	0.00009	0.00000	0.0022	448
D14	Existing measures factor	1	1	1	1	1			
D15	Return period with existing pollution reduction	0.00000	0.00194	0.00020	0.00000	0.00009	0.00000	0.0022	448
D16	Proposed measures factor	0.4	0.4	0.4	0.4	0.4			
D17	Residual with proposed Pollution reduction measures	0.00000	0.00078	0.00008	0.00000	0.00003	0.00000	0.0009	1119

Justification for choice of existing measures factors:

Justification for choice of proposed measures factors:

Penstock

Spillage Factor

Location	Serious Accidental Spillages *(Billion HGV km/ year)*	Motorways	Rural Trunk	Urban Trunk
	No junction	0.36	0.29	0.31
	Slip road	0.43	0.83	0.36
	Roundabout	3.09	3.09	5.35
	Cross road	-	0.88	1.46
	Side road	-	0.93	1.81
	Total	0.37	0.45	0.85

Indicative Pollution Risk Reduction Factors for Spillages

System	Optimum Risk Reduction Factor
Filter Drain	0.6
Grassed Ditch / Swale	0.6
Pond	0.5
Wetland	0.4
Soakaway / Infiltration basin	0.6
Sediment Trap	0.6
Unlined Ditch	0.7
Penstock / valve	0.4
Notched Weir	0.6
Oil Separator	0.5

The worksheet should be read in conjunction with DMRB 11.3.10.

Caption 4.1 Accidental spillage assessment results for the outfall at Catchment ABDEQ

View Parameters | Reset Spillage Risk | Go To Interface

Assessment of Priority Outfalls

Method D - assessment of risk from accidental spillage

			Additional columns for use if other roads drain to the same outfall						
		A (main road)	B	C	D	E	F		
D1	Water body type	Surface watercourse	Surface watercourse						
D2	Length of road draining to outfall *(m)*	250.00	450.00						
D3	Road Type *(A-road or Motorway)*	A	A						
D4	If A road, is site urban or rural?	Rural	Rural						
D5	Junction type	Roundabout	Side road						
D6	Location (response time for emergency services)	< 1 hour	< 1 hour						
D7	Traffic flow (AADT two way)	540	1,002						
D8	% HGV	4.00%	8						
D8	Spillage factor *(no/10^8 HGVkm/year)*	3.09	0.93						
D9	Risk of accidental spillage	0.00000	0.00001	0.00000	0.00000	0.00000	0.00000		
D10	Probability factor	0.60	0.60						
D11	Risk of pollution incident	0.00000	0.00001	0.00000	0.00000	0.00000	0.00000		
D12	Is risk greater than 0.01?	**No**	**No**					**Totals**	**Return Period (years)**
D13	Return period without pollution reduction measures	0.00000	0.00001	0.00000	0.00000	0.00000	0.00000	0.0000	135440
D14	Existing measures factor	1	1						
D15	Return period with existing pollution reduction	0.00000	0.00001	0.00000	0.00000	0.00000	0.00000	0.0000	135440
D16	Proposed measures factor	0.4	0.4						
D17	Residual with proposed Pollution reduction measures	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.0000	338601

Justification for choice of existing measures factors:

Justification for choice of proposed measures factors:

Penstock

Spillage Factor

Location	Serious Accidental Spillages *(Billion HGV km/ year)*	Motorways	Rural Trunk	Urban Trunk
	No junction	0.36	0.29	0.31
	Slip road	0.43	0.83	0.36
	Roundabout	3.09	3.09	5.35
	Cross road	-	0.88	1.46
	Side road	-	0.93	1.81
	Total	0.37	0.45	0.85

Indicative Pollution Risk Reduction Factors for Spillages

System	Optimum Risk Reduction Factor
Filter Drain	0.6
Grassed Ditch / Swale	0.6
Pond	0.5
Wetland	0.4
Soakaway / Infiltration basin	0.6
Sediment Trap	0.6
Unlined Ditch	0.7
Penstock / valve	0.4
Notched Weir	0.6
Oil Separator	0.5

The worksheet should be read in conjunction with DMRB 11.3.10.

Caption 4.2 Accidental spillage assessment results for the outfall at Catchment G

View Parameters | Reset Spillage Risk | Go To Interface

Assessment of Priority Outfalls

Method D - assessment of risk from accidental spillage

		A (main road)	Additional columns for use if other roads drain to the same outfall: B	C	D	E	F	Totals	Return Period (years)
D1	Water body type	Surface watercourse	Surface watercourse						
D2	Length of road draining to outfall *(m)*	260.00	980.00						
D3	Road Type *(A-road or Motorway)*	A	A						
D4	If A road, is site urban or rural?	Rural	Rural						
D5	Junction type	Side road	No junction						
D6	Location (response time for emergency services)	< 1 hour	< 1 hour						
D7	Traffic flow (AADT two way)	1,002	35,374						
D8	% HGV	10.00%	9						
D8	Spillage factor *(no/10^9 HGVkm/year)*	0.93	0.29						
D9	Risk of accidental spillage	0.00000	0.00033	0.00000	0.00000	0.00000	0.00000		
D10	Probability factor	0.60	0.60						
D11	Risk of pollution incident	0.00000	0.00020	0.00000	0.00000	0.00000	0.00000		
D12	Is risk greater than 0.01?	**No**	**No**						
D13	Return period without pollution reduction measures	0.00000	0.00020	0.00000	0.00000	0.00000	0.00000	0.0002	5045
D14	Existing measures factor	1	1						
D15	Return period with existing pollution reduction	0.00000	0.00020	0.00000	0.00000	0.00000	0.00000	0.0002	5045
D16	Proposed measures factor	0.4	0.4						
D17	Residual with proposed Pollution reduction measures	0.00000	0.00008	0.00000	0.00000	0.00000	0.00000	0.0001	12613

Justification for choice of existing measures factors:

Justification for choice of proposed measures factors:

Penstock

Spillage Factor

Location	Serious Accidental Spillages *(Billion HGV km/ year)*	Motorways	Rural Trunk	Urban Trunk
	No junction	0.36	0.29	0.31
	Slip road	0.43	0.83	0.36
	Roundabout	3.09	3.09	5.35
	Cross road	-	0.88	1.46
	Side road	-	0.93	1.81
	Total	0.37	0.45	0.85

Indicative Pollution Risk Reduction Factors for Spillages

System	Optimum Risk Reduction Factor
Filter Drain	0.6
Grassed Ditch / Swale	0.6
Pond	0.5
Wetland	0.4
Soakaway / Infiltration basin	0.6
Sediment Trap	0.6
Unlined Ditch	0.7
Penstock / valve	0.4
Notched Weir	0.6
Oil Separator	0.5

The worksheet should be read in conjunction with DMRB 11.3.10.

Caption 4.3 Accidental spillage assessment results for the outfall at Catchment H and I

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View Parameters | Reset Spillage Risk | Go To Interface

Assessment of Priority Outfalls

Method D - assessment of risk from accidental spillage

		Additional columns for use if other roads drain to the same outfall							
		A (main road)	B	C	D	E	F		
D1	Water body type	Surface watercourse	Surface watercourse						
D2	Length of road draining to outfall *(m)*	400.00							
D3	Road Type *(A-road or Motorway)*	A							
D4	If A road, is site urban or rural?	Rural							
D5	Junction type	No junction							
D6	Location (response time for emergency services)	< 1 hour							
D7	Traffic flow (AADT two way)	35,374							
D8	% HGV	9.00%							
D8	Spillage factor *(no/10^9 HGVkm/year)*	0.29							
D9	Risk of accidental spillage	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000		
D10	Probability factor	0.60	0.60						
D11	Risk of pollution incident	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000		
D12	Is risk greater than 0.01?	**No**	**No**					**Totals**	**Return Period (years)**
D13	Return period without pollution reduction measures	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.0000	1236435
D14	Existing measures factor	1	1						
D15	Return period with existing pollution reduction	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.0000	1236435
D16	Proposed measures factor	0.4	0.6						
D17	Residual with proposed Pollution reduction measures	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.0000	3091087

Justification for choice of existing measures factors:

Justification for choice of proposed measures factors:

filter drain and attenuation basin

Spillage Factor

	Serious Accidental Spillages *(Billion HGV km/ year)*	Motorways	Rural Trunk	Urban Trunk
Location	No junction	0.36	0.29	0.31
	Slip road	0.43	0.83	0.36
	Roundabout	3.09	3.09	5.35
	Cross road	-	0.88	1.46
	Side road	-	0.93	1.81
	Total	0.37	0.45	0.85

Indicative Pollution Risk Reduction Factors for Spillages

System	Optimum Risk Reduction Factor
Filter Drain	0.6
Grassed Ditch / Swale	0.6
Pond	0.5
Wetland	0.4
Soakaway / Infiltration basin	0.6
Sediment Trap	0.6
Unlined Ditch	0.7
Penstock / valve	0.4
Notched Weir	0.6
Oil Separator	0.5

The worksheet should be read in conjunction with DMRB 11.3.10.

Caption 4.4 Accidental spillage assessment results for the outfall at Catchment J

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View Parameters | Reset Spillage Risk | Go To Interface

Assessment of Priority Outfalls

Method D - assessment of risk from accidental spillage

		A (main road)	Additional columns for use if other roads drain to the same outfall B	C	D	E	F		
D1	Water body type	Surface watercourse							
D2	Length of road draining to outfall *(m)*	240.00							
D3	Road Type *(A-road or Motorway)*	A							
D4	If A road, is site urban or rural?	Rural							
D5	Junction type	Side road							
D6	Location (response time for emergency services)	< 1 hour							
D7	Traffic flow (AADT two way)	540							
D8	% HGV	400.00%							
D8	Spillage factor *(no/10^9 HGVkm/year)*	0.93							
D9	Risk of accidental spillage	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000		
D10	Probability factor	0.60	0.60						
D11	Risk of pollution incident	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000		
D12	Is risk greater than 0.01?	**No**	**No**					**Totals**	**Return Period (years)**
D13	Return period without pollution reduction measures	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.0000	947126
D14	Existing measures factor	1							
D15	Return period with existing pollution reduction	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.0000	947126
D16	Proposed measures factor	0.4							
D17	Residual with proposed Pollution reduction measures	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.0000	2367816

Justification for choice of existing measures factors:

Justification for choice of proposed measures factors:

Penstock

Spillage Factor

Location	Serious Accidental Spillages *(Billion HGV km/ year)*	Motorways	Rural Trunk	Urban Trunk
	No junction	0.36	0.29	0.31
	Slip road	0.43	0.83	0.36
	Roundabout	3.09	3.09	5.35
	Cross road	-	0.88	1.46
	Side road	-	0.93	1.81
	Total	0.37	0.45	0.85

Indicative Pollution Risk Reduction Factors for Spillages

System	Optimum Risk Reduction Factor
Filter Drain	0.6
Grassed Ditch / Swale	0.6
Pond	0.5
Wetland	0.4
Soakaway / Infiltration basin	0.6
Sediment Trap	0.6
Unlined Ditch	0.7
Penstock / valve	0.4
Notched Weir	0.6
Oil Separator	0.5

The worksheet should be read in conjunction with DMRB 11.3.10.

Caption 4.5 Accidental spillage assessment results for the outfall at Catchment K

View Parameters | Reset Spillage Risk | Go To Interface

Assessment of Priority Outfalls

Method D - assessment of risk from accidental spillage

			Additional columns for use if other roads drain to the same outfall						
		A (main road)	B	C	D	E	F		
D1	Water body type	Surface watercourse	Surface watercourse						
D2	Length of road draining to outfall *(m)*	1,099.00	1,000.00						
D3	Road Type *(A-road or Motorway)*	A	A						
D4	If A road, is site urban or rural?	Rural	Rural						
D5	Junction type	Side road	Side road						
D6	Location (response time for emergency services)	< 1 hour	< 1 hour						
D7	Traffic flow (AADT two way)	3,480	1,502						
D8	% HGV	800.00%	7						
D8	Spillage factor *(no/10^8 HGVkm/year)*	3.09	0.93						
D9	Risk of accidental spillage	0.00035	0.00004	0.00000	0.00000	0.00000	0.00000		
D10	Probability factor	0.60	0.60						
D11	Risk of pollution incident	0.00021	0.00002	0.00000	0.00000	0.00000	0.00000		
D12	Is risk greater than 0.01?	**No**	**No**					**Totals**	**Return Period (years)**
D13	Return period without pollution reduction measures	0.00021	0.00002	0.00000	0.00000	0.00000	0.00000	0.0002	4377
D14	Existing measures factor	1	1						
D15	Return period with existing pollution reduction	0.00021	0.00002	0.00000	0.00000	0.00000	0.00000	0.0002	4377
D16	Proposed measures factor	0.4	0.4						
D17	Residual with proposed Pollution reduction measures	0.00008	0.00001	0.00000	0.00000	0.00000	0.00000	0.0001	10943

Justification for choice of existing measures factors:

Justification for choice of proposed measures factors:

Penstock

Spillage Factor

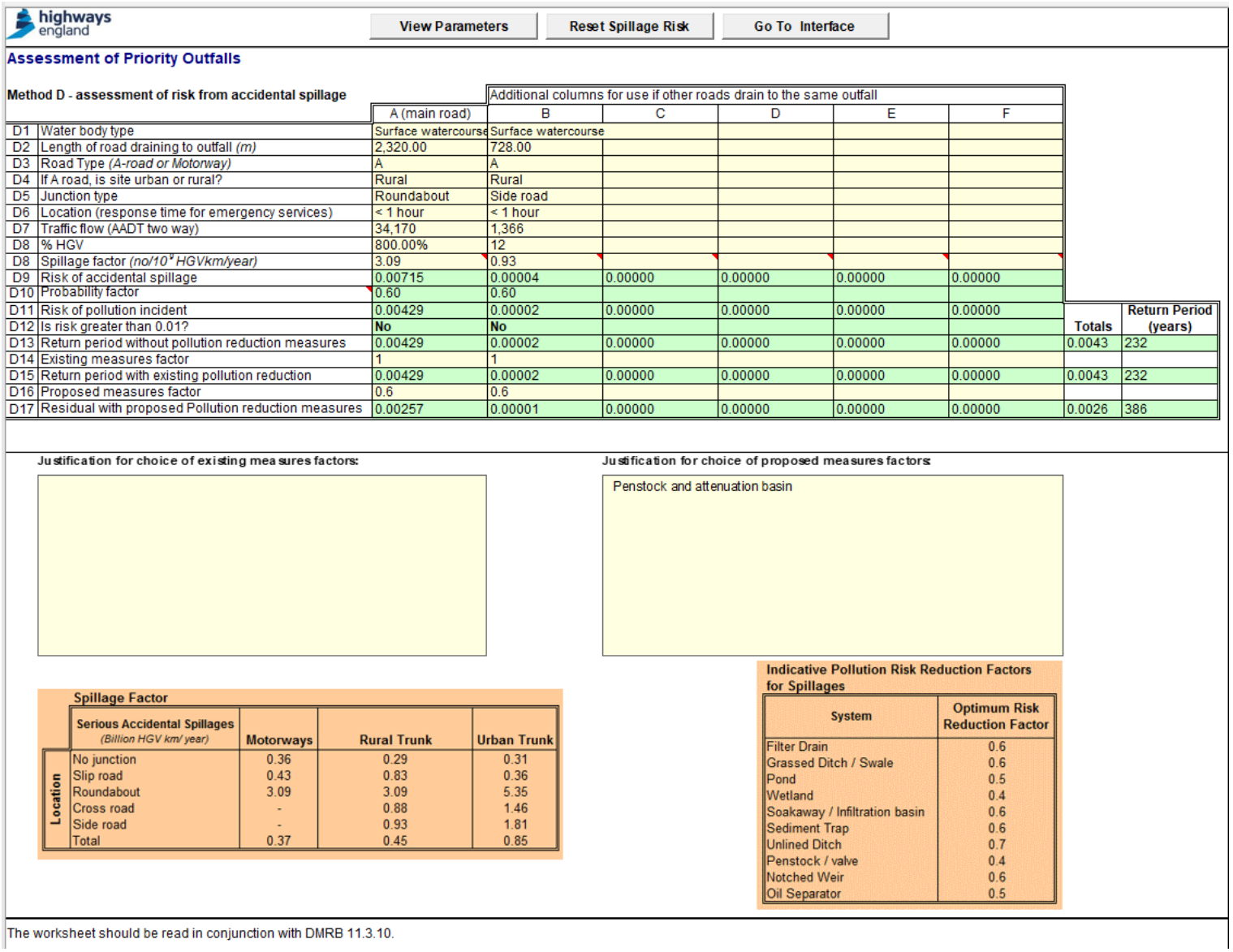
Location	Serious Accidental Spillages *(Billion HGV km/ year)*	Motorways	Rural Trunk	Urban Trunk
	No junction	0.36	0.29	0.31
	Slip road	0.43	0.83	0.36
	Roundabout	3.09	3.09	5.35
	Cross road	-	0.88	1.46
	Side road	-	0.93	1.81
	Total	0.37	0.45	0.85

Indicative Pollution Risk Reduction Factors for Spillages

System	Optimum Risk Reduction Factor
Filter Drain	0.6
Grassed Ditch / Swale	0.6
Pond	0.5
Wetland	0.4
Soakaway / Infiltration basin	0.6
Sediment Trap	0.6
Unlined Ditch	0.7
Penstock / valve	0.4
Notched Weir	0.6
Oil Separator	0.5

The worksheet should be read in conjunction with DMRB 11.3.10.

Caption 4.6 Accidental spillage assessment results for the outfall at Catchment N and M



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View Parameters | Reset Spillage Risk | Go To Interface

Assessment of Priority Outfalls

Method D - assessment of risk from accidental spillage

		A (main road)	B	C	D	E	F	Totals	Return Period (years)
		Additional columns for use if other roads drain to the same outfall							
D1	Water body type	Surface watercourse	Surface watercourse						
D2	Length of road draining to outfall *(m)*	2,320.00	728.00						
D3	Road Type *(A-road or Motorway)*	A	A						
D4	If A road, is site urban or rural?	Rural	Rural						
D5	Junction type	Roundabout	Side road						
D6	Location (response time for emergency services)	< 1 hour	< 1 hour						
D7	Traffic flow (AADT two way)	34,170	1,366						
D8	% HGV	800.00%	12						
D8	Spillage factor *(no/10^9 HGVkm/year)*	3.09	0.93						
D9	Risk of accidental spillage	0.00715	0.00004	0.00000	0.00000	0.00000	0.00000		
D10	Probability factor	0.60	0.60						
D11	Risk of pollution incident	0.00429	0.00002	0.00000	0.00000	0.00000	0.00000		
D12	Is risk greater than 0.01?	**No**	**No**						
D13	Return period without pollution reduction measures	0.00429	0.00002	0.00000	0.00000	0.00000	0.00000	0.0043	232
D14	Existing measures factor	1	1						
D15	Return period with existing pollution reduction	0.00429	0.00002	0.00000	0.00000	0.00000	0.00000	0.0043	232
D16	Proposed measures factor	0.6	0.6						
D17	Residual with proposed Pollution reduction measures	0.00257	0.00001	0.00000	0.00000	0.00000	0.00000	0.0026	386

Justification for choice of existing measures factors:

Justification for choice of proposed measures factors:

Penstock and attenuation basin

Spillage Factor

Location	Serious Accidental Spillages *(Billion HGV km/ year)*	Motorways	Rural Trunk	Urban Trunk
	No junction	0.36	0.29	0.31
	Slip road	0.43	0.83	0.36
	Roundabout	3.09	3.09	5.35
	Cross road	-	0.88	1.46
	Side road	-	0.93	1.81
	Total	0.37	0.45	0.85

Indicative Pollution Risk Reduction Factors for Spillages

System	Optimum Risk Reduction Factor
Filter Drain	0.6
Grassed Ditch / Swale	0.6
Pond	0.5
Wetland	0.4
Soakaway / Infiltration basin	0.6
Sediment Trap	0.6
Unlined Ditch	0.7
Penstock / valve	0.4
Notched Weir	0.6
Oil Separator	0.5

The worksheet should be read in conjunction with DMRB 11.3.10.

Caption 4.7 Accidental spillage assessment results for the outfall at Catchment P123

5. Summary of impacts

5.1.1. The routine runoff assessment for outfalls was undertaken using HEWRAT. The assessment indicates that there is a negligible to beneficial impact following mitigation (where required) and dilution in the channel for both soluble and sediment-bound pollutants for all of the outfalls. An attenuation basin has been provided on catchment P123 to provide treatment for soluble copper. The results of the HEWRAT assessment can be seen in Table 5-1.

5.1.2. The existing outfall for catchment P123, and the majority of the drainage catchment area, is located outside of the Proposed Scheme boundary to the east of the Proposed Scheme. When the existing catchment is examined under baseline conditions it fails for copper (EQS and acute) and sediment (see Table 5-1). The proposed P123 catchment drains into the existing drainage associated with this outfalls and when assessed as part of the Proposed Scheme, including the existing drainage tie in it fails for soluble pollutants (copper EQS and acute). The Proposed Scheme incorporates a vegetated attenuation basin on the P123 catchment to provide treatment. This results in a reduction in pollutant load from the proposed P123 catchment compared to the baseline scenario and improves an already failing outfall thus providing a benefit.

5.1.3. Drainage catchment N and M outfall passed the HEWRAT, however, an alert was raised as it discharges into a watercourse which runs through Sutton Heath Bog SSSI. In order to provide protection to the SSSI, a penstock would be included as an additional measure.

5.1.4. Vegetated attenuation basins have also been included in the design for the catchments A, B, D, E, Q, G, H, I and J, in addition to the one that is required on catchment P123. The additional treatment will have a beneficial impact, as identified by HEWRAT, at Mill Stream for catchment A, B, D, E, Q, and J. There is also an assumed benefit for catchments G, H, and I. However, HEWRAT assessments have not been presented as the benefit would not be visible due to the predicted low pollution concentrations.

5.1.5. There is an intention in the proposed drainage design to also provide filter drains as indicated in Table 5-1. The provision of filter drains is to be considered further during detailed design. Should filter drains remain in the design, it is considered these will provide further suspended sediment and dissolved zinc removal benefits.

5.1.6. The accidental spillages assessment was undertaken using the HEWRAT spillage assessment. The assessment indicates that the risk of serious pollution incident is considerably less than the annual acceptable threshold of 0.5% for

discharge to a sensitive designated site (see Table 5-1) with the inclusion of the additional measures proposed in the drainage design.

5.1.7. As much of the Proposed Scheme is online and currently without / with-limited attenuation and treatment, the measures noted above would have a beneficial impact across the Proposed Scheme.

Table 5-1 Routine runoff and accidental spillages assessment summary

Drainage catchment	Required water quality mitigation	Mitigation proposed in drainage design	Soluble				Sediment	Spillage assessment
			EQS annual average concentration		Acute impact			
			Copper (µg/l)	Zinc (µg/l)	Copper	Zinc		
ABDEQ (including existing catchment)	Not required	Filter drains, attenuation basin and penstock	Pass (0.34)	Pass (0.83)	Pass	Pass	Pass	Pass
G	Not required	Filter drains, attenuation basin and penstock	Pass (0.14)	Pass (0.00)	Pass	Pass	Pass	Pass
H and I	Not required	Filter drains, attenuation basin and penstock	Pass (0.14)	Pass (0.00)	Pass	Pass	Pass	Pass
J	Not required	Filter drains, attenuation basin and penstock	Pass (0.15)	Pass (0.02)	Pass	Pass	Pass	Pass
K	Not required	Filter drains and penstock	Pass (0.14)	Pass (0.01)	Pass	Pass	Pass	Pass
N and M	Not required	Filter drains and penstock	Pass (0.23)	Pass (0.25)	Pass	Pass	Pass	Pass
P123 (including existing catchment) - baseline		-	Fail (1.20)	Pass (2.92)	Fail	Pass	Fail	Pass
P123 (including existing catchment) – Proposed Scheme	Vegetated attenuation basin	Vegetated attenuation basin, filter drains and penstock	Fail (1.11)	Pass (2.81)	Fail	Pass	Pass	Pass
G, H and I (cumulative)	Not required	Filter drains, attenuation basin and penstock	Pass (0.14)	Pass (0.00)	Pass	Pass	Pass	N/A

6. References

- Environment Agency (2020) Water Quality Archive; R. Nene Wansford Old Rd.Br. Available at: https://environment.data.gov.uk/water-quality/view/sampling-point/AN-NENE550W, accessed December 2020
- Highways England (2020) Design Manual for Roads and Bridges LA 113 Road Drainage and the Water Environment. Revision 1. March 2020. Available at https://www.standardsforhighways.co.uk/ha/standards/dmrb/vol11/section3/LA%20113%20Road%20drainage%20and%20the%20water%20environment-web.pdf , accessed November 2020
- Highways England (2020) Highways Agency Drainage Data Management System v5.12.0 (HADDMS). Available at: http://www.haddms.com , accessed November 2020
- UKTAG (2014) Updated recommendations on environmental standards; river basin management (2015-21). Available at: http://www.wfduk.org/sites/default/files/Media/Environmental%20standards/UKTAG%20Environmental%20Standards%20Phase%203%20Final%20Report%2004112013.pdf, accessed January 2021

Annex A. Drainage catchment plan

NOTES

1. THIS DRAWING SHALL BE USED FOR THE PURPOSE SHOWN IN THE TITLE BOX ONLY.
2. ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE.
3. ALL LEVELS ARE ABOVE ORDNANCE DATUM.
4. DO NOT SCALE FROM THIS DRAWING.

KEY TO SYMBOLS

- CATCHMENT A
- CATCHMENT B
- CATCHMENT D
- CATCHMENT E
- CATCHMENT F
- CATCHMENT G
- CATCHMENT H
- CATCHMENT I
- CATCHMENT J
- CATCHMENT K
- CATCHMENT L
- CATCHMENT M
- CATCHMENT N
- CATCHMENT P
- CATCHMENT Q

REV	DATE	REVISION NOTE	ORG	CHK'D	APP'D
P01	25/05/21	SGAR 3 ISSUE	CDye	AWoo	SCM
C01	25/05/21	SGAR 3 ISSUE	CDye	AWoo	SCM

DESIGNER

SWECO

CONTRACTOR

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CLIENT

highways england

PROJECT TITLE

A47 WANSFORD TO SUTTON DUALLING

PROJECT STAGE

PCF STAGE 3

DRAWING TITLE

DRAINAGE CATCHMENT LAYOUT PLAN

SUITABILITY

AUTHORISED AS STAGE 3 COMPLETED

SHEET SIZE	SCALE	STATUS	REVISION
A1	1:5000	A3	C01

DRAWING NUMBER

HE551494-GTY-HDG-000-DR-CD-30008

1:5000 0 250m 500m