

# A47 Wansford to Sutton Dualling

Scheme Number: TR010039

**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

July 2021



### 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

Regulation Number:	Regulation 5(2)(a)
Planning Inspectorate Scheme	TR010039
Reference	
Application Document Reference	TR010039/APP/6.3
BIM Document Reference	HE551494-GTY-EWE-000-RP-LE-30007
Author:	A47 Wansford to Sutton Project Team, Highways England

Version	Date	Status of Version
Rev 0	July 2021	Application Issue



### Table of contents

1.	Introduction	5
2.	Discharge locations	6
3.	Routine runoff quality	8
3.1.	Overview	8
3.2.	Method	8
3.3.	Assessment results	9
4.	Accidental spillage assessment	25
4.1.	Overview	25
4.2.	Method	25
4.3.	Assessment results	26
5.	Summary of impacts	34
6.	References	37

## Captions

Caption 3.1 Routine runoff assessment results for the outfall at Catchment ABDEC	2
(prior to mitigation)	13
Caption 3.2 Routine runoff assessment results for the outfall at Catchment G (prior	
to mitigation)	14
Caption 3.3 Routine runoff assessment results for the outfall at Catchment H and I	15
(prior to mitigation)	15
Caption 3.4 Routine runoit assessment results for the outrall at Catchment J (prior	10
	16
Caption 3.5 Routine runoff assessment results for the outfall at Catchment K (prior	
to mitigation)	17
Caption 3.6 Routine runoff assessment results for the outfall at Catchment N and N	Λ
(prior to mitigation)	18
Caption 3.7 Routine runoff assessment results for the outfall at Catchment P123	
(including tie in, prior to mitigation but including existing measures)	19
Caption 3.8 Routine runoff assessment results for the outfall at Catchment P123	
(including tie in) with proposed measures included	20
Caption 3.9 Routine runoff assessment results for the outfall at Catchment P123	
(excluding tie in) with proposed measures included	21
Caption 3.10 Cumulative routine runoff assessment results for the outfalls at	
Catchments G, H and I (prior to mitigation)	22
Caption 3.11 Routine runoff assessment results for the outfall at Catchment A, B, I	D,
E (including additional measures)	23
Caption 3.12 Routine runoff assessment results for the outfall at Catchment J	
(including additional measures)	24
Caption 4.1 Accidental spillage assessment results for the outfall at Catchment	
ABDEQ	27
Caption 4.2 Accidental spillage assessment results for the outfall at Catchment G	28



Caption 4.3 Accidental spillage assessment results for the outfall at Catchment H	
and I	29
Caption 4.4 Accidental spillage assessment results for the outfall at Catchment J	30
Caption 4.5 Accidental spillage assessment results for the outfall at Catchment K.	31
Caption 4.6 Accidental spillage assessment results for the outfall at Catchment N	
and M	32
Caption 4.7 Accidental spillage assessment results for the outfall at Catchment	
P123	33

### Tables

Table 3.1 Parameters used in the HEWRAT assessment	10
Table 5-1 Routine runoff and accidental spillages assessment summary	36



## 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

	Discharge	Proposed S	cheme	Existing road	Total	Required water	Bronocod cohomo
Network	location	Road Area	Green/verge Area	area tie in (ha)	impermeable area (ha)	quality mitigation	mitigation
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
К	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.

## A47 WANSFORD TO SUTTON DUALLING

**highways** england

									Sediment - C	Unronic Impact				
	Concentration	۱ <u>ــــــــــــــــــــــــــــــــــــ</u>			Acute Impact									
	Copper		Zinc				· · · · · · · · · · · · · · · · · · ·					Pa	ass	
		0.37		0.92		ug/l		Co	pper	Zinc				
Step 2												Se	diment deposition for	this site is judged as:
								Pa	ass	Pass		Ac	cumulating? No	0.11 Low flow Vel m/s
		-		-		ug/l						Ex	tensive? No	- Deposition Index
Step 3														
Dead available a				0.47				lue		O mumela a				
Road number				A47				INC	Alea / DDF	Onumber				
Assessment type				Non-cumulative as	ssessment (sin	ngle out	all)			N. all				
OS grid reference o	ofassessmen	t point (m)		Easting 5	507440					Northing		300123		
OS grid reference of	of outfall struct	ure (m)		Easting 5	507440					Northing		300123		
Outfall number				Network ABDEQ	1			List	of outfalls in	n cumulative				
Receiving watercou	irse			Mill Stream, a trib	outary of Witte	ering B	irook	asse	ssment					
EA receiving water	Detailed Rive	r Network ID		eaew100100000	0540081			Ass	essor and a	ffiliation			KD Sweco	
Date of assessmen	nt			12/11/2020				Ver	sion of asse	ssment			1	
Notes				Q95 scaled from th	ne gauging sta	tion 32	020 - Wit	ttering Bro	ook at War	nsford and ass	essme	nt point is as	sumed to be Mill St	ream, a tributary of
				Wittering Brook. B	FI taken from t	he gau	ging stati	ion. Wate	r hardness	taken from EA	A water	quality archi	ive. Tier 1 river infor	mation taken from Google
				Earth. Ambient cop	oper concentra	ations ta	ken from	n EA wate	er quality a	rchive on the F	liver Ne	ene at Wansf	ford. Outfall locations	s still TBC. Exisiting
				drainage area caic	ulated via topo	ograpny		2 with dra	inage surv	ey.				
Step 1 Runoff	Quality	4.0DT	b = 100,000					Marrie Day		1		11	(	
		AADT	>=100,000		<u> </u>	limatic	region 🔽	/varm Dry	•	] Rainfall	site	Hunt	ingdon (SAAR ouumm)	
Stop 2 Divor In	maate													
Step 2 River II	npacts	Annual Q <sub>95</sub> r	iver flow (m <sup>3</sup>	(S)	0	0.0416	1	Freshwat	er EQS limit	ts:				
(F. )							1							
(Enter zero in Ani	nuai to	Impermeable	e road area d	rained (na)	_ c	Bioavailable dissolved copper (µg/l)								
assess Step 1 rur	noff	Permeable a	area draining	to outfall (ha)	(	Bioavailable dissolved zinc (µq/l)								
quality only)														
		Base Flow In	ndex (BFI)		<b>C</b>	186 Is the discharge in or within 1 km upstream of a protected site for conservation?								
For dissolved zi	inc only	Water hardn	ess	High = >200mg CaCO3	И	-	For dissolved copper only Ambient background concentration (µg/l)							
For sediment im	npact only	Is there a do	wnstream st	ructure, lake, pond or cana	al that reduces	the velo	city within	n 100m of	the point of	discharge?			No 🔻 D	
		© Tior 1	Ectimato	d river width (m)		2	1							
		I I I I	Loundle	a na ci widun (nii)	-	2								
		Tier 2	Bed widt	ו (m)	3	3	Mannin	ng's n <mark>0.01</mark>	7 D		Side	e slope (m/m)	0.5 Long	slope (m/m) 0.0001
							-							
Step 3 Mitigati	ion						-							
otep o mitugati							[			Estimated ef	fectiven	ie ss		
							[	Treatn	nent for	Attenuation	for solub	oles - S	ettlement of	
				Brief description				solubl	es(%)	restricted disch	narge rat	te (l/s) se	diments (%)	
Existing measure	es							0	D	No restriction	-			
Proposed measu	ires							0	D	No restriction	-	D 0	D	

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



T			EQS - Annual A	Average Conce	entration				Acute	Impact			
		(	Copper		Zinc								Pass
	Step 2		0.14		0.00		ug/l		Copper Pass	Zinc Pass	Se Ad	ediment deposition ccumulating?	for this site is judged as:
:	Step 3		-		-		ug/l				Ex	tensive? No	Deposition Index
Road	l numbe	er			A47				HE Area / DBF	O number			
Asse	ssment	type			Non-cumulative	assessment (	single outfa	all)					-
OSo	rid refe	rence of a sse ssmer	t point (m)		Easting	507863				Northing	299491		
OSo	rid refe	rence of outfall struc	ture (m)		Easting	507863				Northing	299491		
Outfa	all numb	er			Network G				List of outfalls in	cumulative			
Rece	eiving wa	atercourse			River Nene				assessment				
EAr	eceivino	water Detailed Riv	er Network ID		eaew1001000	000540085			Assessor and a	ffiliation		KD Swe co	
Date	ofasse	essment			11/11/2020				Version of asse	ssment		1	
Notes Q95 scaled from the gauging station 32010 - Nene at Wansford and assessment point is assumed to be the River Nene. BFI taken gauging station. Water hardness taken from EA water quality archive. Tier 1 river information taken from Google Earth. Ambient concontrations taken from EA water quality archive on the River Nene at Wansford. Outfall locations still TBC.								e. BFI taken from the Ambient copper					
<u>Ste</u>	p 1 R	unoff Quality	AADT 🔁	10,000 and <50,0	000	•	Climatic r	egion Warm (	)ry <mark>-</mark>	Rainfall site	Hun	tingdon (SAAR 600mm	n) <mark>-</mark>
Ste	p2R	iver Impacts	Annual Q <sub>95</sub> river	flow (m <sup>3</sup> /s)			2.8735	Fres	water EQS limit	S:			
(Er	ter zero er flow b	o in Annual Q <sub>95</sub> box to assess	Impermeable ro	ad area draine	ed (ha)		0.793	D.793 Bioavailable dissolved copper (µg/l) 1 □					
Ste	p 1 run	off quality	Permeable area	draining to ou	utfall (ha)	0.982		Bioavailable dissolved zinc (µg/l)					
on	y)		Base Flow Index	k (BFI)			0.86	Is the c	Is the discharge in or within 1 km upstream of a protected site for conservation?				
Fo	r disso	lved zinc only	Water hardness		High = >200mg CaC	:03/I	-	For dissolved copper only Ambient background concentration (µg/l)					l) 0.14
Fo	r sedin	nent impact only	Is there a downs	stream structu	re, lake, pond or c	anal that reduce	es the veloc	ity within 100	n of the point of	discharge?		No 🔻 D	
			Tier 1	Estimated rive	er width (m)		26						
			ੰ Tier 2	Bed width (m)	)		3	Manning's n	0.07 D	Sie	de slope (m/m	) 0.5 L	ong slope (m/m) 0.0001
Ste	p 3 M	itigation											
					Brief description			T	reatment for plubles ( %)	Estimated effective Attenuation for solu restricted discharge r	ness ubles - S ate (I/s) se	Settlement of ediments ( %)	
	usting m	measures						0		No restriction			
	oposed	measures							0	No restriction		0	

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



	EQS - Annual Average Conc	entration			Acute Imp	act				
	Copper	Zinc			Connor	Zino		Pa	ss	
Step 2	0.14	0.00	ug/i		Copper	Zinc	Sed	liment deposition for t	this site is judged as:	
					Pass	Pass	Acc	umulating? No	0.14 Low flow Vel m/s	
Step 3	-	-	ug/i				Exte	ensive?	- Deposition index	
Road number		A47			HE Area / DBFO nu	mber				
Assessment type		Non-cumulative	assessment (single o	utfall)					-	
OS grid reference of a sse ssme	nt point (m)	Easting	508590			Northing	299596			
OS grid reference of outfall struc	ture (m)	Easting	508590			Northing	299596			
Outfall number		Network H&I			List of outfalls in cu	mulative				
Receiving watercourse		River Nene			assessment					
EA receiving water Detailed Riv	er Network ID	eaew10010000	000483618		Assessor and affilia	tion		KD Sweco		
Date of assessment		11/11/2020			Version of assessn	ent		1		
Notes		Q95 scaled from	the gauging station 3 Water bardness take	2010 - Nen Ifrom FA w	e at Wansford and ass ater quality archive Tid	essment point is er 1 river informat	assumed to b	be the River Nene. B In Google Farth Am	Fl taken from the	
		concentrations ta	aken from EA water q	uality archive	e on the River Nene at	Wansford. Outfall	l locations still	TBC.	bicité oppei	
Step 1 Runoff Quality	AADT >10,000 and <5(	0.000	- Climat	e region	arm Dry	Dainfall aita	Huntin	nadon (SAAR 800mm)	_	
	AAD1	0,000		c region		Rainfall site	Hunar	ngdon (SAAR doomin)		
Step 2 River Impacts	Annual Oce river flow (m <sup>3</sup> /s)		2 8739		reshwater EOS limits				]	
(E.)			2.0735	_   '						
river flow box to assess	Impermeable road area drair	ned (na)	2.779		Bioavailable dissolved copper (µg/l)					
Step 1 runoff quality	Permeable area draining to	outfall (ha)	0.58		Bioavailable dissolved zinc (µg/l)					
only)	Base Flow Index (BFI)		0.88	0.86 Is the discharge in or within 1 km upstream of a protected site for conservation?						
For dissolved zinc only	Water hardness	High = >200mg CaC0	03/I	•	For dissolved copper only Ambient background concentration (µg/l)					
· · · · · · · · · · · · · · · · · · ·					i or allosoffed coppe	i only vincion	i buokground o	sincentration (µgn)		
For sediment impact only	Is there a downstream struct	ture, lake, pond or ca	anal that reduces the ve	elocity within	100m of the point of dis	charge?		No 🔻 D		
	Tier 1 Estimated riv	ver width (m)	22							
	ঁ Tier 2 Bed width (m	n)	З	Manning	j's n 0.07 D	Sid	e slope (m/m)	0.5 Long	slope (m/m) 0.0001	
	-	·								
Step 3 Mitigation				-						
Step 3 Mitigation					E	stimated effectiver	iess			
Step 3 Mitigation		Drief deservetion		F	Treatment for solubles (%)	Estimated effectiver Attenuation for solut cricted discharge ra	ness bles - Se te (I/s) sed	ettlement of liments (%)		
Step 3 Mitigation		Brief description			Treatment for solubles (%)	Estimated effectiver Attenuation for solut ricted discharge ra	ness bles - Se te (I/s) sed	ettlement of liments (%)		
Step 3 Mitigation		Brief description			Treatment for solubles (%)	Estimated effectiver Attenuation for solul ricted discharge ra	ness bles - Se te ( I/s ) sed	ettlement of liments (%)		

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

### A47 WANSFORD TO SUTTON DUALLING



Appendix 13.3 Surface water quality assessment

h e	ighways ngland		Highways Engl	land Water Risk Assessment Te	loo	Version 2.0.4 June 2019					
				Soluble		Sediment - Chronic Impact					
			EQS - Annual Averag	e Concentration		Acute Impact					
			Copper	Zinc		Pass					
	Step 2		0.15	0.02	ug/l	Copper Zinc Sediment deposition for this site is judged as:					
			-	-	ug/l	Pass Pass Accumulating? No 0.13 Low flow Velm/s Extensive? No - Deposition Index					
	Step 3										
Roa	d numbe	r		A47		HE Area / DBFO number					
Ass	essment	type		Non-cumulative assessmen	t (single outfall)	•					
OS	grid refe	ence of assessmer	nt point (m)	Easting 508867		Northing 299564					
OS	arid refe	ence of outfall struc	ture (m)	Easting 508867		Northing 299564					
Out	fall numb	er		Network J		List of outfalls in cumulative					
Rec	eiving wa	tercourse		Wittering Brook		asse ssment					
FA	receiving	water Detailed Rive	er Network ID	020wd10010000054270	8	Assessor and affiliation KD Swaco					
Dat	o of acco	comont	er Network ib	11/11/2020	5	Varian of accessment 1					
Not	00 01 0330	sameni		005 taken from the gauging	station 22020	Wittering Prook at Maneford and appearance point is assumed to be the Wittering Prook. BELteken					
				concentrations taken from E	ater nardness ta A water quality :	iken from EA water quality archive. Her 1 river information taken from Google Earth. Ambient copper archive on the River Nene at Wansford. Outfall locations still TBC.					
St	ep 1 R	unoff Quality	AADT >10,000	and <50,000	Climatic regio	on Warm Dry Rainfall site Huntingdon (SAAR 600mm)					
St	ep 2 Ri	ver Impacts	Annual Q <sub>95</sub> river flow (	m³/s)	0.091	Freshwater EQS limits:					
(E	inter zero	in Annual	Impermeable road are	a drained (ha)	0.941 Bioavailable dissolved copper (µg/l)						
as	sess Ste	p 1 runoff	Permeable area draini	ing to outfall (ha)	0.312	Bioavailable dissolved zinc (µg/l)					
Ľ	anty only	,	Base Flow Index (BFI)		0.86	Is the discharge in or within 1 km upstream of a protected site for conservation?					
F	or disso	ved zinc only	Water hardness	High = ≻200mg CaCO3/I	•	For dissolved copper only         Ambient background concentration (µg/l)         0.14					
F	or sedim	ent impact only	Is there a downstream	structure, lake, pond or canal that red	uces the velocity	within 100m of the point of discharge?					
			Tier 1 Estimation	ated river width (m)	3						
			○ Tier 2 Bed w	idth (m)	3 M	Image:					
C+		tination									
30	ep sivi	ugauon				Estimated effectiveness					
				Brief description		solubles ( %) Attenuation for solubles - Settlement of solubles ( %)					
	victics	0.000									
	xisting m	easures									
민면	roposed	measures									

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



	EOS Annual Average Cone	antration		Acuto Impact	
Copp	er	Zinc		Acute impact	Pass
0.14		0.01	ug/l	Copper Zinc	
Step 2					Sediment deposition for this site is judged as:
				Pass Pass	Accumulating? No 0.11 Low flow Vel m/s
-		-	ug/l		Extensive? No - Deposition Index
Step 3					
Road number		A47		HE Area / DBFO number	
Assessment type		Non-cumulative assessment	(single outfall)		-
OS grid reference of a sse ssment poi	nt (m)	Easting 507894		Northing 30	0018
OS grid reference of outfall structure (	(m)	Easting 507894		Northing 30	0018
Outfall number		Network K		List of outfalls in cumulative	
Receiving watercourse		Mill Stream, a tributary of V	Vittering Broo	assessment	
EA receiving water Detailed River Ne	etwork ID	eaew100100000540075		Assessor and affiliation	KD Swe co
Date of assessment		12/11/2020		Version of assessment	1
Notes		Q95 scaled from the gauging	station 32020	- Wittering Brook at Wansford and assessment p	point is assumed to be Mill Stream, a tributary of
		Wittering Brook. BFI taken fro	om the gauging	station. Water hardness taken from EA water qu	ality archive. Tier 1 river information taken from Google
		Earth. Ambient copper conce	ntrations take	n from EA water quality archive on the River Nene	e at Wansford. Outfall location still TBC.
Step 1 Runoff Quality	DT >10 000 and <50	000	Climatic regi	on Warm Dry Painfall site	Huntingdon (SAAR 600mm)
~			Cilinatic regi		
Step 2 River Impacts					· · · · · · · · · · · · · · · · · · ·
Ar	nual Q <sub>95</sub> river flow (m³/s)		0.0424	Freshwater EQS limits:	
(Enter zero in Annual Qos Im	permeable road area drain	ed (ha)	0.12	Bioavailable dissolved copper (ug/l)	
river flow box to assess				Elouranable accorred coppor (Lg.)	
Step 1 runoff quality Pe	ermeable area draining to o	utfall (ha)	0.123	Bioavailable dissolved zinc (µg/l)	10.9
oniy) Ba	se Flow Index (BFI)		0.88	Is the discharge in or within 1 km upstream of a p	protected site for conservation?
	. ,				
For dissolved zinc only W	ater hardness	High = >200mg CaCO3/I	-	Eor dissolved copper only Ambient ba	
				For dissolved copper only Ambient ba	
For sediment impact only Is	there a downstream structu	ire, lake, pond or canal that reduc	ces the velocity	within 100m of the point of discharge?	No V D
	Tior 1 Estimated rive	or width (m)	2		, ,
3.7	TIEL I LSuinated IN		2		
Ċ.	Tier 2 Bed width (m)	)	З М	/anning's n 0.07 🛛 🔹 Side sle	ope (m/m) 0.5 Long slope (m/m) 0.0001
Step 3 Mitigation					
<u></u>				Estimated effectiveness	<u>S</u>
				Treatment for Attenuation for solubles	s - Settlement of
		Brief description		solubles (%) restricted discharge rate (	i/s ) seaiments ( %)
Existing measures				0 D No restriction	
Proposed measures				0 D No restriction	

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



highways england	Highways Englar	nd Water Risk Assessment To	ol	Version 2.0.4 June 2019
		Soluble		Sediment - Chronic Impact
Step 2 Step 3	EQS - Annual Average ( Copper 0.31 -	Concentration Zinc 0.45 -	ugil	Acute Impact       Copper     Zinc       Pass     Pass       Pass     Pass       Extensive?     No     42       Deposition Index
Road number		A47		HE Area / DBFO number
Assessment type		Non-cumulative assessment	(single outfal	/all)
OS grid reference of assessmer	t point (m)	Easting 509116		Northing 300198
OS grid reference of outfall struc	ture (m)	Easting 509116		Northing 300198
Outfall number		Network M&N		List of outfalls in cumulative
Receiving watercourse		Tributary of Wittering Broo	k	assessment
EA receiving water Detailed Rive	er Network ID	eaew100100000571939		Assessor and affiliation KD Sweco
Date of assessment		12/11/2020		Version of assessment 1
		BFI taken from the gauging s copper concentrations taken Heath SSSI. Existing drianag	tation. Water from EA wate je area not in	ar hardness taken from EA water quality archive. Tier 1 river information taken from Google Earth. Ambient ater quality archive on the River Nene at Wansford. Outfall location still TBC but assumed to be within Sutton included.
Step 1 Runoff Quality	AADT >10,000 and	J <50,000 ▼	Climatic re	region Warm Dry  Rainfall site Huntingdon (SAAR 600mm)
Step 2 River Impacts	Annual Q <sub>95</sub> river flow (m <sup>3</sup>	/s)	0.0018	Freshwater EQS limits:
(Enter zero in Annual	Impermeable road area o	frained (ha)	0.46	Bioavailable dissolved copper (µg/l)
assess Step 1 runoff	Permeable area draining	to outfall (ha)	0.43	Bioavailable dissolved zinc (µg/l)
quality only)	Base Flow Index (BFI)		0.86	Is the discharge in or within 1 km upstream of a protected site for conservation?
For dissolved zinc only	Water hardness	High = >200mg CaCO3/I	•	For dissolved copper only Ambient background concentration (µg/l)
For sediment impact only	Is there a downstream st	ructure, lake, pond or canal that redu	ces the velocit	city within 100m of the point of discharge?
	• Tier 1 Estimate	d river width (m)	2	
	CTier 2 Bed widt	h (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 (%) Settlement of solubles (%) Settlement of Settlements (%) Settlements (%)
Pronosed measures				
r toposeu measules				

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



highways england	Highways England V	Water Risk Assessment To	ol		Version 2.0.4 June 2	019			
		Soluble						Sediment -	Chronic Impact
	EQS - Annual Average Conc	entration			Acute Imp	pact			
C	opper	Zine			_	_		Fail. Try Tie	r 2 for Velocity
Stop 2 Tigr 1 fail Go to	1.57 Tior 2 (using UK TAG	3.30	ug/l		Copper	Zinc		Settlement needed	= 81 %, proposed = 60 %
M-BAT tool) o	r Sten 3 mitigation			Rive	r Fails Toxicity est Try more	Pass		cumulating? Yes	0.00 Low flow Velm/s
	1.35	2.81	uall		mitigation		Ea	tensive? Yes	208 Deposition Index
Step 3 Tier 1 fail. Go to	Tier 2 (using UK TAG								
M-BAT tool), or inc	rease Step 3 mitigation.								
Road number		A47			HE Area / DBFO nu	umber			
Assessment type		Non-cumulative assessment	(single outfa	all)					-
OS grid reference of assessmen	t point (m)	Easting 510553	(engle con	,		Northing	299160		
OS grid reference of outfall struct	ure (m)	Easting 510553				Northing	299160		
Outfall number		Network P123			List of outfalls in cu	imulative			
Receiving watercourse		Tributary of the River Nene	;		asse ssment				
EA receiving water Detailed Rive	r Network ID	eaew100100000542712	2		Assessor and affilia	ation		KD Sweco	
Date of assessment		20/04/2021			Version of assessm	nent		2	
Notes		Q95 taken from WHS LowFlo	ows Enterpri	ise at point o	fassumed dischar	ge. BFI taken fror	m FEH. Asse	ssment point is as	sumed to be a tributary of
		the River Nene. Water hardne	ess taken fro	om EA water	quality archive. Tie	er 1 river informati	ion taken fror	n Google Earth. An	nbient copper
		topography but TBC with drai	A water quai inage surve	ity arcnive or v	the River Nene at	vvanstord. Outrai	li locations st	III TBC. Exisiting an	ainage area caiculated via
Step 1 Rupoff Quality		·							
Step 1 Runon Quanty	AADT >10,000 and <50	• 0.000	Climatic r	egion Warm I	Dry 💌	Rainfall site	Hun	tingdon (SAAR 600mm)	•
Step 2 River Impacts	Annual Q <sub>95</sub> river flow (m <sup>3</sup> /s)		0.0011	Fres	hwater EQS limits:				
(Enter nore in Annual	Importantia road area drain	ad (ba)	5.000						
Q <sub>os</sub> river flow box to	impermeable road area drain	eu (na)	0.028		Bloavallable dissol	/ea copper (µg/I)			
assess Step 1 runoff	Permeable area draining to o	outfall (ha)	0		Bioavailable dissolv	/ed zinc (µg/l)		10.9 D	
quality only)	Base Flow Index (BEI)		0.69	Is the o	lischarge in or within	1 km upstream of	f a protected s	ite for conservation?	No 🔻 🖸
	Baser for mask (BFI)						a protostoa o		
For dissolved zinc only	Water hardness	High = >200mg CaCO3/I	-	E F	or dissolved coppe	eroniv Ambien	t background	concentration (ug/l)	0.14
For sediment impact only	Is there a downstream structu	ure, lake, pond or canal that redu	ces the veloc	ty within 100	m of the point of dis	charge?		No - D	
	Tior 1 Estimated riv	er width (m)	2						
	Estimated fiv								
	C Tier 2 Bed width (m	)	3	Manning's n	0.07 D	Sid	le slope (m/m)	0.5 Lon	g slope (m/m) 0.0001
Step 3 Mitigation						stimated effective	nace		
				- T	reatment for	Attenuation for solu	hlas S	ettlement of	
		Brief description		s	olubles (%) res	tricted discharge ra	ate (Vs) se	diments (%)	
Existing measures	Filter drains and vegetated ditches	on the exisiting catchment		15	No	restriction -	D 60		-
Proposed measures				15	No	restriction -	D 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	Highways England V	Vater Risk Assessment Tool		Version 2.0.4 June 20	019			
		Soluble					Sedimen	t - Chronic Impact
Step 2 Step 3 Tier 1 fail. Go to M-BAT tool), or inc	EQS - Annual Average Conc opper 1.57 Tier 2 (using UK TAG r Step 3 mitigation. 1.11 Tier 2 (using UK TAG rease Step 3 mitigation.	Zinc Zinc 3.30 2.25	ug/l	Acute Imp Copper River Fails Toxicity Test. Try more mitigation	aat Zinc Pass		Sediment deposition Accumulating? Ye Extensive? No	for this site is judged as:       s     0.00       Low flow Velm/s       68
Road number		A47		HE Area / DBFO nu	mber			
Assessment type		Non-cumulative assessment (sing	le outfall)					<u>•</u>
OS grid reference of assessmen	t point (m)	Easting 510553			Northing	299160		
OS grid reference of outfall struct	ure (m)	Easting 510553			Northing	299160		
Outfall number		Network P123		List of outfalls in cu	mulative			
Receiving watercourse		Tributary of the River Nene		asse ssment				
EA receiving water Detailed Rive	er Network ID	eaew100100000542712		Assessor and affilia	tion		KD Sweco	
Date of assessment		20/04/2021		Version of assessm	ient		2	
Step 4 Dupoff Quality		concentrations taken from EAs wat topography but TBC with drainage	er quality arc survey.	hive on the River Nene at	Wansford. Outfa	ll locations	still TBC. Exisiting	drainage area calculated via
	AADT >10,000 and <50,	000 Cli	imatic region [	Warm Dry 🔽	Rainfall site	F	Huntingdon (SAAR 600mm	)
Step 2 River Impacts	Annual Q <sub>95</sub> river flow (m <sup>3</sup> /s)	0.0	0011	Freshwater EQS limits:				
(Enter zero in Annual	Impermeable road area drain	ed (ha) 5.0	828	Bioavailable dissolv	red copper (µg/l)		1	
Q <sub>95</sub> river flow box to assess Step 1 runoff	Permeable area draining to o	utfall (ha)		Bioavailable dissolv	red zinc (µg/l)		10.9 D	
quality only)	Base Flow Index (BFI)	0.0	69	Is the discharge in or within	1 km upstream o	f a protecte	d site for conservation	n? No 🔽 🗖
For dissolved zinc only	Water hardness	High = >200mg CaCO3/I	•	For dissolved coppe	ronly Ambier	nt backgrour	nd concentration (µg/	l) 0.14
For sediment impact only	Is there a downstream structu	ire, lake, pond or canal that reduces th	ne velocity with	hin 100m of the point of disc	charge?		No 🔻 D	
	Tier 1 Estimated riv	er width (m)						
	C Tier 2 Bed width (m	)	Manr	ning's n 0.07 D	Sie	de slope (m/	/m) 0.5 Lo	ong slope (m/m) 0.0001
Step 3 Mitigation		Brief description		Treatment for A solubles (%)	stimated effective Attenuation for solu ricted discharge r	ness ubles - ate (Vs)	Settlement of sediments (%)	
Existing measures	Filter drains and vegetated ditches	on the exisiting catchment		15 No	restriction		80 00	
Proposed measures	Attenuation bas in (grass lined) on	34% of the catchment		32 No	restriction		37	

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



highways england	Highways England	Water Risk Assessment Too	bl	Version 2.0.4 June 2019
		Soluble		Sediment - Chronic Impact
	EQS - Annual Average Con	centration		Acute Impact
C	Copper	Zinc		Pass
Stee 2	0.88	1.77	ug/l	Copper Zinc Sadiment depending for this site is indeed on
Step 2				Pass Pass Accumulating? Yes 0.00 Low flow Velm/s
	0.51	0.88	ug/l	Extensive? No 35 Deposition Index
Step 3				
Road number		A47		HE Area / DBFO number
Assessment type		Non-cumulative assessment	(single outfa	all) 🔄
OS grid reference of assessmen	t point (m)	Easting 510553		Northing 299160
OS grid reference of outfall struct	ture (m)	Easting 510553		Northing 299160
Outfall number		Network P123		List of outfalls in cumulative
Receiving watercourse		Tributary of the River Nene		asse ssment
EA receiving water Detailed Rive	er Network ID	eaew100100000542712		Assessor and affiliation KD Sweco
Date of assessment		20/04/2021		Version of assessment 2
Notes		Q95 taken from WHS LowFlow	wsEnterpris	ise at point of assumed discharge. BFI taken from FEH. Assessment point is assumed to be a tributary of
		the River Nene. Water hardne	ss taken fro water quali	om EA water quality archive. Her 1 river information taken from Google Earth. Ambient copper ity archive on the River Nene at Wansford. Outfall locations still TBC.
		concentrations taken nom Ext	water quai	
Step 1 Runoff Quality				
	AADT >10,000 and <50	0,000	Climatic re	egion Warm Dry  Rainfall site Huntingdon (SAAR 600mm)
Step 2 River Impacts				
otep 2 retter impacto	Annual Q <sub>95</sub> river flow (m <sup>3</sup> /s)		0.0011	Freshwater EQS limits:
(Enter zero in Annual	Impermeable road area drair	ned (ha)	1.89	Bioavailable dissolved copper (µg/l)
Q <sub>95</sub> river flow box to assess Step 1 runoff	Permeable area draining to (	outfall (ha)	0.8313	Bioavailable dissolved zinc (µg/l)
quality only)				
	Base Flow Index (BFI)		0.69	Is the discharge in or within 1 km upstream of a protected site for conservation?
For dissolved zinc only	Water hardness	High = >200mg CaCO3/I	-	For dissolved copper only Ambient background concentration (µg/l)
For sediment impact only	Is there a downstream struct	ure, lake, pond or canal that reduc	es the veloc	ty within 100m of the point of discharge?
	Tier 1 Estimated riv	ver width (m)	2	
	Tier 2 Bed width (m	1)	3	Manning's n 0.07 D Side slope (m/m) 0.5 Long slope (m/m) 0.0001
		•		
Step 3 Mitigation				
				Estimated effectiveness
				Treatment for Attenuation for solubles - Settlement of
		Brief description		Solubles (70) [Pestificied discriarge rate (78)] Sediments (70)
Existing measures	Filter drains and vegetated ditch of	on the existing catchment		15 No restriction
Proposed measures	Attenuation bas in (grass lined)			50 No restriction
	-			

Caption 3.9 Routine runoff assessment results for the outfall at Catchment P123 (excluding tie in) with proposed measures included Planning Inspectorate Scheme Ref: TR010039 Application Document Ref: TR010039/APP/6.3



Soluble     Sediment - Chronic Impact       Copper     Zinc       0.14     0.00     upil     Acute Impact       Step 2     0.14     0.00     upil       Step 3     -     -     upil       Step 3     -     -     upil       Road number     A47     HE Area / DBFO number       Road number     A47     HE Area / DBFO number       Contrained eposition for this site is judged at a seasesment including sediments (outfalls within 100m)     Object of this site is judged at a seasesment type       Condition number     A47     HE Area / DBFO number       Road number     A47     Its Area / DBFO number       Octal lativity assessment type     Cumulative assessment including sediments (outfalls within 100m)       OC grid reference of assessment point (m)     Easting     508590       Oxidal number     Northing     299596       Oxidal number     Network (C,IN48     List of outfals in cumulative assessment       Receiving water Detailed River Network ID     easer100100000483618     Assessment       Date of assessment     Old 1/11/11/2020     Version of assessment     KD Sweco       Date of assessment     Off or the assessment from EA water quality achive nite assessment outfall locations stall TBC.     Easting assesston the assessment outfall locations stall TBC.
Acute Impact         Copper       Zinc         Step 2       0.14       0.00       ugl       Pass       Sediment deposition for this site is judged as Accumulating?         Step 3       -       -       ugl       HE Area /DBFO number       Sediment deposition for this site is judged as Accumulating?       Mo       0.14       Low flow flow flow flow flow flow flow fl
Road number       A47       HE Area / DBFO number         Assessment type       C umulative assessment including sediments (outfalls within 100m)         OS grid reference of assessment point (m)       Easting       \$08590       Northing       299596         OS grid reference of outfall structure (m)       Easting       \$08590       Northing       299596         Outfal number       Network G, H&I       List of outfalls in cumulative       G       \$07836       299491         Receiving water Detailed River Network ID       ea eavr1001000000483618       Assessor and affiliation       KD Sweco         Date of assessment       11/11/2020       Version of assessment       1         Notes       Q95 scaled from the gauging station 32010 - Nee at Wansford and assessment point is assumed to be the River Neene. BFI taken from the gauging station. Water names 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       C Climatic region       Warm Dry       Rainfall site       Hurtingdon (SAAR 600mm)       •         Step 2 River Impacts       Annual Q <sub>85</sub> river flow (m <sup>3</sup> /s)       28739       Freshwater EQS limits:       —
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         Outfal number       Network G, H&I       List of outfalls in cumulative       6       507836       299491         Receiving water course       River Nene       assessment       Image: Course assessment
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       G       507836       299491         Receiving watercourse       River Nene       assessment       G       507836       299491         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 Coogle E arth. 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       Hurtingdon (SAAR 800mm)          Step 2 River Impacts       Annual Q <sub>95</sub> river flow (m <sup>3</sup> /s)       28739       Freshwater EQS limits:       E
OS grid reference of outfall structure (m)       Easting       508590       Northing       299596         Outfall number       Network G,H&l       List of outfalls in cumulative       6       507836       299491         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       Hurtingdon (SAAR 600mm)       •         Step 2 River Impacts       Annual Q <sub>85</sub> river flow (m <sup>3</sup> /s)       28739       Freshwater EQS limits:       Freshwater EQS limits:
Outfall number       Network G,H&I       List of outfalls in cumulative assessment       G       507836       299491         Receiving water Outfall number       River Nene       assessment       Image: Comparison of the com
Receiving watercourse       River Nene       asse ssment       asse ssment         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 TB C.         Step 1 Runoff Quality       AADT       ≥10,000 and <50,000       Climatic region       Warm Dry       Rainfall site       Hurtingdon (SAAR 600mm)       ▼         Step 2 River Impacts       Annual Q <sub>95</sub> river flow (m³/s)       28739       Freshwater EQS limits:       Freshwater EQS limits:
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       Hurtingdon (SAAR 600mm)          Step 2 River Impacts       Annual Q <sub>95</sub> river flow (m³/s)       28739       Freshwater EQS limits:       Freshwater EQS limits:
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 E arth. 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
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       Hurtingdon (SAAR 600mm)       •         Step 2 River Impacts       Annual Q <sub>95</sub> river flow (m <sup>3</sup> /s)       28739       Freshwater EQS limits:       Freshwater EQS limits:
Step 2 River Impacts     Annual Q <sub>95</sub> river flow (m <sup>3</sup> /s)     28739     Freshwater EQS limits:
Step 2 River Impacts         Annual Q <sub>95</sub> river flow (m <sup>3</sup> /s)         28739         Freshwater EQS limits:
(Enter zero in Annual Impermeable road area drained (ha) 3.572 Bioavailable dissolved copper (μg/l) 1 □
Q <sub>95</sub> river flow box to assess Step 1 runoff Permeable area draining to outfall (ha) 1.542 Bioavailable dissolved zinc (µg/l) 10.9
quality only)       Base Flow Index (BFI)         0.86       Is the discharge in or within 1 km upstream of a protected site for conservation?
For dissolved zinc only       Water hardness       High = >200mg CaCO3/I       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?
© Tier 1 Estimated river width (m) 22
C Tier 2         Bed width (m)         3         Manning's n 0.07         □         Side slope (m/m)         0.0001
Step 3 Mitigation
Estimated effectiveness
Treatment for Attenuation for solubles - Settlement of
Brief description Solubles ( %) restricted discharge rate ( vs.) sediments ( %)
Existing measures

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



highways england	Highways Englan	d Water Risk Assessment	Tool		Version 2.0.4 June	2019			
		Soluble						Sediment	- Chronic Impact
Step 2 Step 3	EQS - Annual Average C copper 0.37 0.34	Concentration Zinc 0.92 0.82	ugil		Acute Im Copper Pass	ppaot Zinc Pass		Sediment deposition f Accumulating? No Extensive? No	Pass or this site is judged as: 0.11 Low flow Velm/s - Deposition Index
Road number		A47			HE Area / DBFO n	number			
Assessment type		Non-cumulative assessme	ent (single outfa	ID					-
OS grid reference of assessmen	nt point (m)	Easting 507440	(			Northing	300123		
OS grid reference of outfall struct	ture (m)	Easting 507440				Northing	300123		
Outfall number		Network ABDEQ			List of outfalls in c	umulative			
Receiving watercourse		Mill Stream, a tributary o	f Wittering Bro	ook	asse ssment				
EA receiving water Detailed Rive	er Network ID	eaew1001000005400	81		Assessor and affili	iation		KD Sweco	
Date of assessment		12/11/2020			Version of assess	ment		1	
		Wittering Brook, BFI taken Earth. Ambient copper cor drainage area calculated y	from the gaugi incentrations tak ia topography b	ng station. \ en from EA but BTC with	Vater hardness ta water quality arch n drainage survey	ken from EA wate hive on the River N	r quality an ene at War	chive. Tier 1 river info nsford. Outfall locatio	ormation taken from Google ns still TBC. Exisiting
Step 1 Runoff Quality	AADT >=100,000	V	Climatic re	gion Warm	Dry 💌	Rainfall site	Н	luntingdon (SAAR 600mm)	•
Step 2 River Impacts	Annual Q <sub>95</sub> river flow (m <sup>3</sup> /	/s)	0.0416	Fres	hwater EOS limits				
(Enter zero in Annual	Impermeable road area d				indici Edo innio.				
digs invertion box to	impermeable road area d	rained (ha)	6.185		Bioavailable disso	lved copper (µg/l)		1 D	
assess Step 1 runoff	Permeable area draining	rained (ha) to outfall (ha)	6.185 0		Bioavailable disso Bioavailable disso	lved copper (µg/l) lved zinc (µg/l)		1 D	
assess Step 1 runoff quality only)	Permeable area draining Base Flow Index (BFI)	rained (ha) to outfall (ha)	6.185 0 0.86	Is the d	Bioavailable disso Bioavailable disso lischarge in or withi	llved copper (µg/l) llved zinc (µg/l) in 1 km upstream of	a protected	1 District for conservation?	? No 🗸 🖸
assess Step 1 runoff quality only) For dissolved zinc only	Permeable area draining Base Flow Index (BFI) Water hardness	rained (ha) to outfall (ha) High = >200mg CaCO3/I	6.185 0 0.86	Is the o	Bioavailable disso Bioavailable disso lischarge in or withi or dissolved copp	lved copper (μg/l) lved zinc (μg/l) in 1 km upstream of er only Ambien	a protecteo t backgroun	1 D.9 D 1 site for conservation d concentration (μg/l)	? No y D 0.14
assess Step 1 runoff quality only) For dissolved zinc only For sediment impact only	Permeable area draining Base Flow Index (BFI) Water hardness Is there a downstream str	rained (ha) to outfall (ha) High = >200mg CaCO3/I ucture, lake, pond or canal that re	6.185 0 0.86 v duces the veloci	Is the o	Bioavailable disso Bioavailable disso discharge in or withi or dissolved copp m of the point of dis	lved copper (µg/l) lved zinc (µg/l) in 1 km upstream of eer only Ambien scharge?	a protected	1 □ 10.9 □ d site for conservation' d concentration (μg/l) No •	? No y D 0.14
assess Step 1 runoff quality only) For dissolved zinc only For sediment impact only	Permeable area draining Base Flow Index (BFI) Water hardness Is there a downstream str	rained (ha) to outfall (ha) High = >200mg CaCO3/I ructure, lake, pond or canal that re d river width (m)	0.86 0.86 duces the veloci	Is the o	Bioavailable disso Bioavailable disso discharge in or withi or dissolved copp m of the point of dis	lved copper (µg/l) lved zinc (µg/l) in 1 km upstream of eer only Ambien scharge?	a protected	1 □ 10.9 □ d site for conservation' d concentration (μg/l) No •	? No T D 0.14
assess Step 1 runoff quality only) For dissolved zinc only For sediment impact only	Permeable area draining Base Flow Index (BFI) Water hardness Is there a downstream str © Tier 1 Estimated © Tier 2 Bed width	rained (ha) to outfall (ha) High = >200mg CaCO3/I ucture, lake, pond or canal that re d river width (m) h (m)		Is the o	Bioavailable disso Bioavailable disso discharge in or withi or dissolved copp m of the point of dis	lived copper (µg/l) lived zinc (µg/l) in 1 km upstream of eer only Ambien scharge? Sid	a protected t backgroun le slope (m/	1 D.9 D 1 site for conservation d concentration (μg/l) No • D m) 0.5 Lor	? No y D 0.14
Assess Step 1 runoff quality only) For dissolved zinc only For sediment impact only Step 3 Mitigation	Permeable area draining Base Flow Index (BFI) Water hardness Is there a downstream str © Tier 1 Estimated © Tier 2 Bed width	rained (ha) to outfall (ha) High = >200mg CaCO3/1 ructure, lake, pond or canal that re d river width (m) h (m) Brief description	6.185 0 0.86 0.86 0.86 0.86 0.86 0.86 0.86 0.	Is the o	Bioavailable disso Bioavailable disso lischarge in or within or dissolved copp m of the point of dis 0.07 P reatment for olubles (%) re	lved copper (µg/l) lved zinc (µg/l) in 1 km upstream of er only Ambien scharge? Sid Estimated effectiver Attenuation for solu stricted discharge ra	i a protected t backgroun ie slope (m/ ness bles - ite ( Vs )	1 D.9 D 10.9 D 1 site for conservation' d concentration (μg/l) No • D m) 0.5 Lor Settlement of sediments (%)	? No y D 0.14
Assess Step 1 runoff quality only) For dissolved zinc only For sediment impact only Step 3 Mitigation	Permeable area draining Base Flow Index (BFI) Water hardness Is there a downstream str © Tier 1 Estimated © Tier 2 Bed width	rained (ha) to outfall (ha) High = >200mg CaCO3/1 ructure, lake, pond or canal that re d river width (m) h (m) Brief description	6.185 0 0.86 0 duces the veloci 2 3	Is the o	Bioavailable disso Bioavailable disso lischarge in or within or dissolved copp m of the point of dis 0.07 P reatment for olubles (%) re	lved copper (µg/l) lved zinc (µg/l) in 1 km upstream of er only Ambien scharge? Sid Estimated effectiver Attenuation for solu stricted discharge ra	i a protected t backgroun ie slope (m/ ness bles - ite ( Vs )	1 D.9 D 1 site for conservation? d concentration (μg/l) No • D m) 0.5 Lor Settlement of sediments (%)	? No y D 0.14

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

#### A47 WANSFORD TO SUTTON DUALLING



ppendix 13.3 Surfac	ce water quality ass	sessment			engian	u		
highways england	Highways England	Water Risk Assessm	ent Tool	Version 2.0.4 June 201	9			
		Soluble	•				Sediment - Cl	hronic Impact
Step 2	EQS - Annual Average Con Copper 0.15	centration Zinc 0.02	ugil	Acute Impa Copper Pass	ct Zinc Pass	S	Par ediment deposition for t ccumulating? No	his site is judged as:
Step 3	0.14	0.01	ug/l			E	stensive? No	- Deposition Index
Road number		A47		HE Area / DBFO nun	iber			
Assessment type		Non-cumulative asse	ssment (single outfall)				1	•
OS grid reference of assessme	nt point (m)	Easting 508	367	1	lorthing	299564		
OS grid reference of outfall struc	ture (m)	Easting 508	367	1	lorthing	299564		
Outfall number		Network J		List of outfalls in cum	ulative			
Receiving watercourse		Wittering Brook		assessment				
EA receiving water Detailed Riv	er Network ID	eaew1001000005	42708	Assessor and affiliati	on		KD Sweco	
Date of assessment		11/11/2020		Version of assessme	nt		1	
Step 1 Runoff Quality	AADT >10,000 and <8	50,000	Climatic reg	ON Warm Dry	Rainfall site	Hun	tingdon (SAAR 600mm)	
Step 2 River impacts	Annual Q <sub>95</sub> river flow (m <sup>3</sup> /s)		0.091	Freshwater EQS limits:				
(Enter zero in Annual $Q_{95}$ river flow box to	Impermeable road area drai	ned (ha)	0.941	Bioavailable dissolve	d copper (µg/l)		1	
assess Step 1 runoff quality only)	Permeable area draining to	outfall (ha)	0.312	Bioavailable dissolve	d zinc (µg/l)		10.9 D	
	Base Flow Index (BFI)		0.86	Is the discharge in or within a	km upstream of	f a protected s	ite for conservation?	No 🗸 D
For dissolved zinc only	Water hardness	High = >200mg CaCO3/I	•	For dissolved copper	only Ambien	nt background	concentration (µg/l)	0.14
For sediment impact only	Is there a downstream struc	ture, lake, pond or canal th	at reduces the velocity	within 100m of the point of disch	arge?		No - D	
	Tier 1 Estimated ri	ver width (m)	3					
	C Tier 2 Bed width (n	n)	3	1anning's n <mark>0.07</mark> D	Sic	de slope (m/m)	) 0.5 Long s	slope (m/m) 0.0001
Step 3 Mitigation				Es Treatment for At	timated effective	ness ubles - S	Settlement of	
		Brief description		solubles (%) restri	cted discharge ra	ate (Vs) se	ediments (%)	
Existing measures				0 D Nore	s triction	• 0 0	D	
Proposed measures	Attenuation bas in (grass lined)			50 Nore	s triction	• 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<sub>SPL</sub> = 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:



- PINC = the probability of a spillage with an associated risk of a serious pollution incident occurring
- P<sub>POL</sub> = 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.

#### A47 WANSFORD TO SUTTON DUALLING

Appendix 13.3 Surface water quality assessment



high engl	<b>hways</b> land		View Param	eters	Reset	t Spillage Risk	Go To Inter	face			
sessr	ment of Priority Outfalls										
hod D	accoremont of rick from a	coidontal enilla		Additiona	Leolumne	for use if other re-	de drain to the can	a outfall			
liou D	- 45565511611 01 1156 11 011 4	ccidental spilla	A (main road)		R	C.			F	-	
Wate	er body type		Surface watercour	se Surface w	atercourse	Surface watercours	Surface watercours	Surface watercour	rse		
Lend	gth of road draining to outfall (	m)	640.00	2,616.00	atoroouroe	100.00	170.00	200.00			
Roa	d Type (A-road or Motorway)		A	A		A	A	A			
lfAr	road, is site urban or rural?		Rural	Rural		Rural	Rural	Rural			
Juno	ction type		Slip road	No juncti	on	Roundabout	Slip road	Roundabout			
Loca	ation (response time for emer	gency services	) < 1 hour	< 1 hour		< 1 hour	< 1 hour	< 1 hour			
Traff	fic flow (AADT two way)		8,365	73,062		29,590	3,434	5,352			
% H	IGV		10.00%	16		10	3	12			
Spill	lage factor (no/10" HGVKm/ye	ar)	0.83	0.29		3.09	0.83	3.09	0.00000	_	
Prob	hability factor		0.00000	0.00324		0.00033	0.00001	0.00014	0.00000	-	
1 Risk	k of pollution incident		0.0000	0.00194		0.00020	0.0000	0.00009	0 00000	_	Return Peri
2 Is ris	sk greater than 0.01?		No	No		No	No	No	0.00000	Totals	(vears)
3 Retu	urn period without pollution re-	duction measu	res 0.00000	0.00194		0.00020	0.00000	0.00009	0.00000	0.0022	448
4 Exis	ting measures factor		1	1		1	1	1			
5 Retu	urn period with existing pollution	on reduction	0.00000	0.00194		0.00020	0.00000	0.00009	0.00000	0.0022	448
6 Prop	posed measures factor		0.4	0.4		0.4	0.4	0.4			
_	idual with proposed Pollution	reduction mea	sures 0.00000	0.00078		0.00008	0.00000	0.00003	0.00000	0.0009	1119
Justi	ification for choice of existin	g mea sures fa (	ctors:			Justification for cl Penstock	noice of proposed n	neasures factors:			
Justi	fication for choice of existin	g mea sures fac	ctors:			Justification for cl	noice of proposed n	neasures factors:			
Justi	fication for choice of existin	g mea sures fao	ctors:			Justification for cl	noice of proposed r Indicative for Spillag	neasures factors Pollution Risk Re	duction Factors		
Ju sti	Spillage Factor	g mea sures fac	ctors:			Justification for cl	Indicative	Pollution Risk Re jes	eduction Factors		
Justi	Spillage Factor Serious Accidental Spillages (Billion HGV km/ year)	g mea sures fac	ctors:	Urban Trun	ık	Justification for cl	Indicative for Spillag	Pollution Risk Re jes	duction Factors Optimum Risk Reduction Factor 0.6		
Justi	Spillage Factor Serious Accidental Spillages (Billion HGV km/ year) No junction	g mea sures fac Motorways 0.36	Rural Trunk 0.29	Urban Trun 0.31	Ik	Justification for cl	Indicative for Spillar Filter Drain Grassed D	Pollution Risk Re ges System	eduction Factors Optimum Risk Reduction Factor 0.6		
Justi	Spillage Factor Serious Accidental Spillages (Billion HGV km/ year) No junction Slip road	g mea sures fac Motorways 0.36 0.43	Rural Trunk 0.29 0.83	Urban Trun 0.31 0.36	Ik	Justification for cl	Indicative for Spillag Filter Drain Grassed D Pond	Pollution Risk Re jes System	Optimum Risk Reduction Factor 0.6 0.5		
Justi	Spillage Factor Serious Accidental Spillages (Billion HGV km/ year) No junction Roundabout	g mea sures fac Motorways 0.36 0.43 3.09	Rural Trunk 0.29 0.83 3.09 0.65	Urban Trun 0.31 0.36 5.35	ık	Justification for cl	Indicative for Spillag Filter Drain Grassed D Pond Wetland	Pollution Risk Re pes System	Optimum Risk Reduction Factors 0.6 0.5 0.4		
Ju sti	Spillage Factor Serious Accidental Spillages (Billion HGV km/ year) No junction Slip road Roundabout Cross road	g mea sures fac Motorways 0.36 0.43 3.09 -	Rural Trunk 0.29 0.83 3.09 0.88	Urban Trun 0.31 0.36 5.35 1.46	ık	Justification for cl	Indicative for Spillar Filter Drain Grassed D Pond Wetland Soakaway	Pollution Risk Re ges System itch / Swale / Infiltration basin	Optimum Risk Reduction Factors 0.6 0.6 0.5 0.4 0.6		
Ju sti	Spillage Factor Serious Accidental Spillages (Billion HGV km/ year) No junction Slip road Roundabout Cross road Side road	g mea sures fac Motorways 0.36 0.43 3.09 - - 0.37	Rural Trunk 0.29 0.83 3.09 0.88 0.93 0.45	Urban Trun 0.31 0.36 5.35 1.46 1.81	ık	Justification for cl	Indicative for Spillar Filter Drain Grassed D Pond Wetland Soakaway Sediment	Pollution Risk Re Jes System Itch / Swale / Infiltration basin Frap	Optimum Risk Reduction Factor 0.6 0.5 0.4 0.6 0.6 0.6		
Ju sti	Spillage Factor Serious Accidental Spillages (Billion HGV km/ year) No junction Slip road Roundabout Cross road Side road Total	g mea sures fac Motorways 0.36 0.43 3.09 - - 0.37	Rural Trunk 0.29 0.83 3.09 0.88 0.93 0.45	Urban Trun 0.31 0.36 5.35 1.46 1.81 0.85	ık	Justification for cl	Indicative for Spillar Filter Drain Grassed D Pond Wetland Soakaway Sediment Unlined Dit	Pollution Risk Re pes System / Infiltration basin frap ch	Aduction Factors  Optimum Risk Reduction Factor  0.6  0.6  0.5  0.4  0.6  0.6  0.6  0.7  0.6  0.7  0.6  0.7  0.6  0.7  0.6  0.7  0.6  0.7  0.6  0.7  0.6  0.7  0.6  0.7  0.6  0.7  0.7		
Justi	Spillage Factor Serious Accidental Spillages (Billion HGV km/ year) No junction Slip road Roundabout Cross road Side road Total	g mea sures fac Motorways 0.36 0.43 3.09 - - 0.37	Rural Trunk 0.29 0.83 3.09 0.88 0.93 0.93 0.45	Urban Trun 0.31 0.36 5.35 1.46 1.81 0.85	ık	Justification for cl	Indicative for Spillag Filter Drain Grassed D Pond Wetland Soakaway Sediment Unlined Dit Penstock /	Pollution Risk Re pes System itch / Swale / Infiltration basin frap ch	Optimum Risk           Reduction Factor           0.6           0.5           0.4           0.6           0.6           0.7           0.4		
Justi	Spillage Factor Serious Accidental Spillages (Billion HGV km/ year) No junction Silip road Roundabout Cross road Side road Total	g mea sures fac Motorways 0.36 0.43 3.09 - 0.37	Rural Trunk 0.29 0.83 3.09 0.88 0.93 0.45	Urban Trun 0.31 0.36 5.35 1.46 1.81 0.85	ık	Justification for cl	Indicative for Spillag Filter Drain Grassed D Pond Wetland Soakaway Sediment Unlined Di Penstock / Notched W	Pollution Risk Re pes System itch / Swale / Infiltration basin frap ch / valve leir	Optimum Risk           Reduction Factors           0.6           0.5           0.4           0.6           0.7           0.4           0.6		

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



hig eng	hways land		View Parame	ters	Reset	Spillage Risk	Go To	Interface			
sess	ment of Priority Outfalls										
										=	
ethod D	) - assessment of risk from ac	ccidental spillag	e	Additional	columns	for use if other roa	ds drain to th	e same outfall	_		
			A (main road)	В		С	D	E	F		
1 Wat	ter body type		Surface watercourse	Surface wa	atercourse						
2 Len	igth of road draining to outfall (i	m)	250.00	450.00							
3 Roa	ad Type (A-road or Motorway)		A	A							
4 If A	road, is site urban or rural?		Rural	Rural						_	
5 Jun	ction type		Roundabout	Side road						_	
6 Loc	ation (response time for emerg	gency services)	< 1 hour	< 1 hour						-	
	flic flow (AAD I two way)		540	1,002						-	
3 % F	IGV	1	4.00%	18		,					
8 Spi	hage factor (no/10" HGVKm/ye	ar)	3.09	0.93		0.00000	0.00000	0.00000	0.00000	-	
9 RIS	hability factor		0.00000	0.00001		0.00000	0.00000	0.00000	0.00000	-	
11 Ric	k of pollution incident		0.000	0.0001		0,0000	0.00000	0.0000	0.00000		Return Dorio
12 Is ri	isk greater than 0.012		No	No		0.00000	0.00000	0.00000	0.00000	Totals	(vears)
13 Ret	urn period without pollution rec	fuction measure	s 0.00000	0.00001		0 00000	0 00000	0 00000	0 00000	0 0000	135440
14 Exis	sting measures factor		1	1				0.0000	0.00000	0.0000	
15 Ret	urn period with existing pollutio	on reduction	0.00000	0.00001		0.00000	0.00000	0.00000	0.00000	0.0000	135440
16 Pro	posed measures factor		0.4	0.4							
17 Res	sidual with proposed Pollution	reduction measu	ires 0.00000	0 00000		0 00000	0 00000	0 00000	0 00000	0 0000	338601
	Spillage Factor						Indic for S	ative Pollution Risk Re pillages	duction Factors		
	Spinage ractor							System	Optimum Risk		
	Serious Accidental Spillages (Billion HGV km/ year)	Motorways	Rural Trunk	rban Trunk	k		-	o i	Reduction Factor		
	No junction	0.36	0.29	0.31	1		Filter	ord Ditch / Swole	0.6		
=	Slip road	0.43	0.83	0.36			Bond		0.5		
tio	Roundabout	3.09	3.09	5.35			Weth	and	0.4		
Ca	Cross road	-	0.88	1.46			Soak	away / Infiltration basin	0.6		
12	Side road	-	0.93	1.81			Sedi	ment Trap	0.6		
	Total	0.37	0.45	0.85			Unlin	ed Ditch	0.7		
					-		Pens	tock / valve	0.4		
							Note	hed Weir	0.6		
									Contraction of the second s		

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

Planning Inspectorate Scheme Ref: TR010039 Application Document Ref: TR010039/APP/6.3



۶	hig engl	and		View Para	neters	Rese	t Spillage Risk	Go To Int	erface			
Ass	essr	nent of Priority Outfalls										
Meth	od D	assessment of risk from a	ccidental snill	909	Addition	al columns	for use if other ros	de drain to the ea	me outfall		٦	
mean	ou D		center april	A (main road		B	C		F	F	-	
D1	Wate	er body type		Surface waterco	urse Surface y	watercourse			-		-	
D2	Len	oth of road draining to outfall (	m)	260.00	980.00						1	
D3	Roa	d Type (A-road or Motorway)		A	A						1	
D4	lf A r	oad, is site urban or rural?		Rural	Rural							
D5	June	tion type		Side road	No junc	tion						
D6	Loca	ation (response time for emer	gency services	s) < 1 hour	< 1 hour	r i						
D7	Traff	ic flow (AADT two way)		1,002	35,374						-	
D8	% H	GV	1	10.00%	9				_			
08	Spill	age factor (no/10° HGVKm/ye	ar)	0.93	0.29		0.00000	0.00000	0.00000	0.00000	-	
D9	Proh	ability factor		0.00000	0.00033		0.00000	0.00000	0.00000	0.00000	-	
D11	Rick	of pollution incident		0.000	0.0020		0.00000	0.00000	0.00000	0.00000		Return Deriod
D12	Is ris	sk greater than 0.012		No	No	,	0.00000	0.00000	0.00000	0.00000	Totals	(vears)
D13	Retu	irn period without pollution rec	duction measu	res 0.00000	0 00020	)	0 00000	0 00000	0 00000	0 00000	0 0002	5045
D14	Exis	ting measures factor		1	1							
D15	Retu	irn period with existing pollution	on reduction	0.00000	0.00020	)	0.00000	0.00000	0.00000	0.00000	0.0002	5045
D16	Prop	oosed measures factor		0.4	0.4							
D17	Res	idual with proposed Pollution	reduction mea	asures 0.00000	0.00008	•	0.00000	0.00000	0.00000	0.00000	0.0001	12613
							Penstock					
						_		Indicativ for Spill	e Pollution Risk Re ages	duction Factors		
		Spillage Factor				_			Custom	Optimum Risk		
		Serious Accidental Spillages							System	Reduction Factor		
	_	(Billion HGV km/ year)	Motorways	Rural Trunk	Urban Tru	ink		Filter Dra	in	0.6		
		No junction	0.36	0.29	0.31			Grassed	Ditch / Swale	0.6		
	5	Slip road	0.43	0.83	0.36			Pond		0.5		
	i i i	Roundabout	3.09	3.09	5.35			Wetland		0.4		
	l ë	Cross road	-	0.88	1.46			Soakawa	y / Infiltration basin	0.6		
	1-	Side road	-	0.93	1.81			Sedimen	t Trap	0.6		
		lotal	0.37	0.45	0.85			Unlined [	Ditch	0.7		
								Penstocl	c / valve	0.4		
								Notched	Weir	0.6		
1								Oli Sépa	alof	0.5		
The v	vorks	heet should be read in conju	nction with DM	RB 11.3.10.								

Caption 4.3 Accidental spillage assessment results for the outfall at Catchment H and I Planning Inspectorate Scheme Ref: TR010039 Application Document Ref: TR010039/APP/6.3



engl	and		View Parame	eters	Reset Spillage R	isk Go To	Interface			
sessr	nent of Priority Outfalls	i								
				A statitions of					ח	
nou D	- assessment of risk from a	ccidental spillage	(main road)	Additional		ner roads drain to tr		E	-	
Wate	ar body type		Surface watercours	ed Surface w		0	E	F	-	
Len	oth of road draining to outfall (	(m)	400 00	se our lace w	atercourse					
Roa	d Type (A-road or Motorway)	,	A							
lfAr	oad, is site urban or rural?		Rural							
June	tion type		No junction							
Loca	ation (response time for emer	gency services)	< 1 hour							
Traff	ic flow (AADT two way)		35,374							
% H	GV	orl	9.00%						-	
Spill	age ractor (no/10" HGVKM/ye	dr)	0.29	0.00000	0.00000	0.00000	0.00000	0.00000	-	
Prot	ability factor		0.60	0.00000	0.00000	0.00000	0.00000	0.00000	-	
1 Risk	of pollution incident		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000		Return Per
2 Is ris	sk greater than 0.01?		No	No	0.00000	0.00000	0.00000	0.00000	Totals	(vears)
3 Retu	Irn period without pollution re-	duction measures	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.0000	1236435
4 Exis	ting measures factor		1	1						
5 Retu	Irn period with existing polluti	on reduction	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.0000	1236435
6 Prop	osed measures factor		0.4	0.6						
7 Res	idual with proposed Pollution	reduction measures	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.0000	3091087
Justi	fication for choice of existin	g mea sures factors:			Justification filter drain	n for choice of prop and attenuation basir	osed measures factors	s	]	
Justi	fication for choice of existin	g mea sures factors:			Ju stification	n for choice of prop and attenuation basir	osed measures factors	eduction Factors		
Justi	fication for choice of existin	g mea sures factors:			Ju stification filter drain	n for choice of prop and attenuation basir	osed measures factors	eduction Factors		
Justi	fication for choice of existin fication for choice of existin Spillage Factor	g mea sures factors:	ural Trunk		Justification filter drain	n for choice of prop and attenuation basir	osed measures factors	eduction Factors Optimum Risk Reduction Factor		
Justi	fication for choice of existin fication for choice of existin Spillage Factor Serious Accidental Spillages (Billion HGV km/ year)	g mea sures factors: Motorways 0 36	ural Trunk	Urban Trun	Ju stification filter drain	n for choice of prop and attenuation basir	cative Pollution Risk R Spillages System	eduction Factors Optimum Risk Reduction Factor 0.6		
Justi	fication for choice of existin fication for choice of existin Spillage Factor Serious Accidental Spillages (Billion HGV km/ year) No junction Silo road	g mea sures factors: Motorways 0.36 0.43	ural Trunk 1 0.29 0.83	Urban Trun 0.31 0.36	Ju stification filter drain	n for choice of prop and attenuation basir for t Filte Grat	osed measures factors cative Pollution Risk R Spillages System r Drain rsed Ditch / Swale	eduction Factors Optimum Risk Reduction Factor 0.6 0.6 0.5		
Justi	fication for choice of existin fication for choice of existin Spillage Factor Serious Accidental Spillages (Billion HGV km/ year) No junction Slip road Roundabout	g mea sures factors: Motorways 0.36 0.43 3.09	ural Trunk    0.29 0.83 3.09	Urban Trun 0.31 0.36 5.35	Ju stification filter drain	n for choice of prop and attenuation basir for the filte Gras Pon Web	cative Pollution Risk R Spillages System r Drain used Ditch / Swale	eduction Factors Optimum Risk Reduction Factor 0.6 0.6 0.5 0.4		
Justi	fication for choice of existin fication for choice of existin Spillage Factor Serious Accidental Spillages (Billion HGV km/year) No junction Slip road Roundabout Cross road	g mea sures factors: Motorways 0.36 0.43 3.09 -	ural Trunk 1 0.29 0.83 3.09 0.88	Urban Trun 0.31 0.36 5.35 1.46	Ju stification filter drain	n for choice of prop and attenuation basin for the second se	cative Pollution Risk R Spillages System r Drain Ised Ditch / Swale diand (sway / Infiltration bacin	eduction Factors Optimum Risk Reduction Factor 0.6 0.6 0.5 0.4 0.6		
Location	fication for choice of existin fication for choice of existin Serious Accidental Spillages (Billion HGV km/ year) No junction Slip road Roundabout Cross road	g mea sures factors: Motorways 0.36 0.43 3.09 -	ural Trunk ( 0.29 0.83 3.09 0.88 0.93	Urban Trun 0.31 0.36 5.35 1.46 1.81	Ju stification filter drain	n for choice of prop and attenuation basir for t Filte Gras Pon Wet Soal Soal	cative Pollution Risk R Spillages System r Drain used Ditch / Swale d and caway / Infiltration basin ment Tao	eduction Factors Optimum Risk Reduction Factor 0.6 0.6 0.5 0.4 0.6 0.6 0.5 0.4 0.6		
Justi	fication for choice of existin fication for choice of existin Spillage Factor Serious Accidental Spillages (Billion HGV km/ year) No junction Silip road Roundabout Cross road Side road Total	g mea sures factors: Motorways 0.36 0.43 3.09 - 0.37	ural Trunk 1 0.29 0.83 3.09 0.88 0.93 0.45	Urban Trun 0.31 0.36 5.35 1.46 1.81 0.85	Ju stification filter drain	n for choice of prop and attenuation basir for t Filte Gras Pon Wet Soal Sed Unli	cative Pollution Risk R Spillages System r Drain ised Ditch / Swale d and kaway / Infiltration basin ment Trap ted Ditch	eduction Factors  Optimum Risk Reduction Factor  0.6 0.6 0.5 0.4 0.6 0.6 0.6 0.7		
Justi	fication for choice of existin fication for choice of existin Spillage Factor Serious Accidental Spillages (Billion HGV km/ year) No junction Slip road Roundabout Cross road Side road Total	g mea sures factors: Motorways 0.36 0.43 3.09 - 0.37	ural Trunk I 0.29 0.83 3.09 0.88 0.93 0.45	Urban Truni 0.31 0.36 5.35 1.46 1.81 0.85	Ju stification filter drain	n for choice of prop and attenuation basin for s Filte Gras Pon Wet Soal Sed Unlin Pen	cative Pollution Risk R Spillages System r Drain rsed Ditch / Swale d land kaway / Infiltration basin ment Trap ned Ditch stock / valve	eduction Factors  Optimum Risk Reduction Factor  0.6 0.5 0.5 0.4 0.6 0.6 0.6 0.7 0.4		
Justi	fication for choice of existin fication for choice of existin Serious Accidental Spillages (Billion HGV km/ year) No junction Slip road Roundabout Cross road Side road Total	g mea sures factors: Motorways 0.36 0.43 3.09 - - 0.37	ural Trunk    0.29 0.83 3.09 0.88 0.93 0.45	Urban Trun 0.31 0.36 5.35 1.46 1.81 0.85	Ju stification	n for choice of prop and attenuation basir and attenuation basir for s Filte Gras Pon Wet Soal Sedi Unlin Pen Not	osed measures factors cative Pollution Risk R Spillages System r Drain used Ditch / Swale d land caway / Infiltration basin ment Trap ted Ditch stock / valve hed Weir	eduction Factors		

et should be read in conjunction with

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

A47 WANSFORD TO SUTTON DUALLING

Appendix 13.3 Surface water quality assessment





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

A47 WANSFORD TO SUTTON DUALLING

Appendix 13.3 Surface water quality assessment



highways england			View Parame	View Parameters Reset Spillage Risk			Go To Inte	rface			
Assessment of Priority Outfalls											
Metho	d D - assessment of risk from a	ccidental spilla	ine in the second se	Additional columns for use if other reads drain to the same outfall						ז	
meano	a b - assessment of fisk from a	A (main road)	/ dailerin	B	C	D	E	F			
D1 \	Water body type		Surface watercours	se Surface v	watercourse	9					
D2 I	_ength of road draining to outfall (	'm)	1,099.00	1,000.00	)						
D3 I	Road Type (A-road or Motorway)		A	A							
D4 1	t A road, is site urban or rural?		Rural	Rural	d					-	
	ocation (response time for emer	ancy convices	) < 1 hour	< 1 hour	u .					-	
D7 1	Eaffic flow (AADT two way)	gency services	3 480	1 502							
D8 9	% HGV		800.00%	7							
D8 \$	Spillage factor (no/10" HGVkm/ye	ar)	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	Tatal	Return Period
D12	s risk greater than 0.01? Poture period without pollution re-	duction measure	NO 0.00024	N0		0.00000	0.00000	0.00000	0.00000	I otais	(years)
D14	Evisting measures factor	uction measu	1	1		0.00000	0.00000	0.00000	0.00000	0.0002	43/1
D15	Return period with existing pollution	on reduction	0.00021	0 00002		0 00000	0 00000	0.00000	0 00000	0.0002	4377
D16	Proposed measures factor		0.4	0.4						0.0002	
D17	Residual with proposed Pollution	reduction mea	sures 0.00008	0.00001		0.00000	0.00000	0.00000	0.00000	0.0001	10943
J	ustification for choice of existin	g mea sures fa	ctors:			Justification for ch	oice of proposed	measures factors:			
						Penstock					
							Indicative	Pollution Risk Re	duction Factors		
					_		for Spilla	ges			
	Spillage Factor				_			Custom	Optimum Risk		
	Serious Accidental Spillages							system	Reduction Factor		
	(Billion HGV km/ year)	Motorways	Rural Trunk	Urban Tru	nk		Filter Drain	1	0.6		
	No junction	0.36	0.29	0.31			Grassed D	itch / Swale	0.6		
	Slip road	0.43	0.83	0.36			Pond		0.5		
	Roundabout	3.09	3.09	5.35			Wetland		0.4		
	Side read	-	0.88	1.46			Soakaway	/ Infiltration basin	0.6		
	Total	0.37	0.95	1.01			Sediment	Trap	0.6		
		0.57	0.45	0.05			Unlined Di	tch	0.7		
							Notchod V	Voir	0.4		
							Oil Separa	tor	0.5		
							Lon ocpara				
The w	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



	engla	iways and			View Param	eters	Rese	et Spillage Risk	G	io To Interfa	ce			
Asse	ssn	nent of Priority Outfalls	;											
													7	
Metho	d D	- assessment of risk from a	ccidental spill	lage	Additional column			s for use if other roa	ids drain	to the same	outfall		4	
					A (main road)		В	С		D	E	F	4	
	Nate	r body type	(		Surface watercour	rse Surface	watercours	e					-	
	Leng	trong (A read or Motorway)	(11)		2,320.00	128.00							-	
D3 1	f A r	and is site urban or rural?			A	Rural							-	
D5	D5 Junction type				Roundabout	Side ro:	ad	++					-	
D6 1	D6 Location (response time for emergency services)			s)	< 1 hour	< 1 hour			<u> </u>					
D7	D7 Traffic flow (AADT two way)			-/	34,170	1.366								
D8 9	% H0	GV			800.00%	12								
D8 3	Spill	age factor (no/10 <sup>°</sup> HGVkm/ye	ear)		3.09	0.93								
D9	Risk	of accidental spillage			0.00715	0.00004	4	0.00000	0.0000	0 (	0.00000	0.00000		
D10	Prob	ability factor			0.60	0.60								
D11	Risk	of pollution incident			0.00429	0.00002	2	0.00000	0.0000	0 (	0.00000	0.00000		Return Period
D12	s ris	k greater than 0.01?			No	No							Totals	(years)
D13	Retu	rn period without pollution ree	duction measu	ures	0.00429	0.00002	2	0.00000	0.0000	0 (	0.00000	0.00000	0.0043	232
D14	Exist	ing measures factor			1	1		0.00000	0.0000				0.0040	000
D15	Retu	rn period with existing pollutio	on reduction		0.00429	0.00002	2	0.00000	0.0000	0 0	0.00000	0.00000	0.0043	232
D10 I	Prop	osed measures factor	reduction me	0011500	0.0	0.0	4	0.00000	0.0000		00000	0.00000	0.0006	200
	tesi	dual with proposed Policiton	reduction mea	asures	0.00257	0.0000		0.00000	10.0000	ן וי	J.00000	0.00000	0.0020	380
			y mea sures ia					Penstock and atte	enuation	basin				
Ι.		Spillage Factor								Indicative P for Spillage	ollution Risk Re s	duction Factors		
		Serious Accidental Spillages (Billion HGV km/ year)	Motorways	R	ural Trunk	Urban Tru	unk			S)	ystem	Optimum Risk Reduction Factor		
	Location	No junction Slip road Roundabout Cross road Side road Total	0.36 0.43 3.09 - - 0.37		0.29 0.83 3.09 0.88 0.93 0.45	0.31 0.36 5.35 1.46 1.81 0.85				Grassed Dito Pond Wetland Soakaway / I Sediment Tra Unlined Ditch	h / Swale Infiltration basin ap	0.6 0.5 0.4 0.6 0.6 0.7		
										Penstock / va Notched Wei Oil Separator	alve ir r	0.4 0.6 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

			Soluble					
Drainage catchment	Required water quality mitigation	Mitigation proposed in drainage design	EQS annual avec	Acute imp	act	Sediment	Spillage assessment	
			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
к	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 attenua 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: <u>https://environment.data.gov.uk/water-</u> <u>quality/view/sampling-point/AN-NENE550W</u>, 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 <u>https://www.standardsforhighways.co.uk/ha/standards/dmrb/vol11/section3/L</u> <u>A%20113%20Road%20drainage%20and%20the%20water%20environmentweb.pdf</u>, accessed November 2020
- Highways England (2020) Highways Agency Drainage Data Management System v5.12.0 (HADDMS). Available at: <u>http://www.haddms.com</u>, accessed November 2020
- UKTAG (2014) Updated recommendations on environmental standards; river basin management (2015-21). Available at: <u>http://www.wfduk.org/sites/default/files/Media/Environmental%20standards/U KTAG%20Environmental%20Standards%20Phase%203%20Final%20Report</u> %2004112013.pdf, accessed January 2021



## Annex A. Drainage catchment plan



ority of Galliford Try being obtained.	NOTES									
	1.	THIS DRAWING	G SHALL BE USE	D FOR THE PURPOSE	SHOWN	IN				
	2.	ALL DIMENSIO	X ONLY. NS ARE IN METR	RES UNLESS STATED C	THERW	ISE.				
	3. <i>1</i> 4. I	ALL LEVELS AI DO NOT SCALI	RE ABOVE ORDN E FROM THIS DR	IANCE DATUM. AWING.						
	KEY	TO SYMBOL	S							
1		CATCHMENT A		CATCHMENT K						
		CATCHMENT B								
		CATCHINENT B								
		CATCHMENT D		CATCHMENT M						
		CATCHMENT E		CATCHMENT N						
		CATCHMENT F								
		CATCHMENT G		CATCHMENT Q						
/		CATCHMENT H								
		CATCHMENT I								
		CATCHMENT J								
0 Souther DAMANG TOOL Terrange Area to the too										
					_					
					_					
Bear										
	P01	25/05/21	SGAR 3 ISSUE		CDye	AWoo	SCM			
	C01	25/05/21	SGAR 3 ISSUE		CDye	AWoo	SCM			
	REV	DATE	<b>REVISION NOTE</b>		ORG	CHK'D	APP'D			
	DESIGN	NER								
			<u> </u>	×						
Č,			SWE	CO 🛆						
	CONTR	ACTOR								
		<b>C</b> -	<b>11:</b>							
		6		ΟΓΟΙ		V				
						J				
	CLIENT									
			📥 h	ighways						
			e	naland						
	PROJE	CT TITLE								
	A	47 WANS	FORD TO S	SUTTON DUAL	LING					
		CT STAGE	= 3							
	LÆ	ΑΥΟΟΙ ΡΙ	_AN							
	011171-									
		JTHORISE	ED AS STA	GE 3 COMPLET	ΓED					
	SHEET	SIZE	SCALE		REVIEW					
No.	A1		1:5000	A3		1				
J. H.	DRAWI	NG NUMBER								
m 500m	H	E551494	-GTY-HD	G-000-DR-CD	-300	08				