

# **A1** Birtley to Coal House

Scheme Number: TR010031

6.3 Environmental Statement – Appendix 13.3 Highways Agency Water Risk Assessment Tool

APFP Regulation 5(2)(a)

Planning Act 2008

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

Volume 6

August 2019



# Infrastructure Planning

Planning Act 2008

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

# **A1** Birtley to Coal House

Development Consent Order 20[xx]

# Environmental Statement - Appendix

Regulation Reference:	APFP Regulation 5(2)(a)
Planning Inspectorate Scheme Reference	TR010031
Application Document Reference	TR010031/APP/6.3
Author:	A1 Birtley to Coal House Project Team, Highways England

Version	Date	Status of Version
Rev 0	14 August 2019	Application Issue

# Appendix A

Method A Results (Runoff Assessment)



# Step 1 Whole Scheme

HIGHWAYS Highways Agency Water Risk Assessment Tool version 1.0 November 2009										
		oncentration Zinc Rt		Zinc unoff Fails Toxicity st. Try River Impact.		ff Fails Toxicity ry River Impact	Sedim	nulating?	•	s site is judged as:  - Low flow Vel m/s - Deposition Index
Location Details										
Road number		A1		HA Area / DBFO	number	**				(5)
Assessment type			sessment (single outfal	1)				I		
OS grid reference of assessment point		Easting	424935			Northing		558620		
OS grid reference of outfall structure (m	1)	Easting	424935			Northing		558620		
Outfall number		Whole scheme		List of outfal cumulative asse						
Receiving watercourse		River Team								
EA receiving water Detailed River Net	work ID		Assessor and aff	iliation			Beth wooll	ey WSP		
Date of assessment		20/04/2018		Version of asses	sment			V1		
Notes		Sum of all outfall im	permeable areas contr	ibuting.						
Step 1 Runoff Quality  AADT >=100,000  Climatic region  Colder Dry  Rainfall site  Newcastle upon tyne (SAAR 680mm)  Step 2 River Impacts  Annual 95%ile river flow (m³/s)						у)				
For dissolved zinc only Water h	nardness	Low = <50mg CaCO3/I	<b>▼</b> D							
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)  Tier 2 Bed width (m)  Manning's n  O.07  D Side slope (m/m)  O.5  Long slope (m/m)  O.0001										
Step 3 Mitigation		Brief description		Treatment for solubles ( %)	Atte	ed effectivene enuation for es - restricted arge rate ( l/s )	Settl sedin	ement of nents ( %)	Sh	Predict Impact
Existing measures				0 D	Unlimit	ed 🔻 🖸	0	D		
Proposed measures				0 D	Unlimit	ed 🔻 D	0	D		Exit Tool

**Summary of predictions** 

In Runoff

Prediction of impact	Step1
	Step2
	Step3

#### Soluble - Acute Impact

Zinc

#### \_\_\_\_

Return To Interface

Copper	Zinc	Cadmium	Total PAH	Pyrene	Fluoranthene	Anthracene	Phenanthrene

Sediment - Chronic Impact

#### **DETAILED RESULTS**

Allowable Exceedances/year
No. of exceedances/year
No. of exceedances/worst year

Allowable Exceedances/year
No. of exceedances/year
No. of exceedances/worst year

Thresholds
Thresholds
Event Statistics Mean
90%ile
95%ile
99%ile

Step 1		
	Copper RS	Zinc
	1	1
	76.50	99.20
	86	107

R516					
1	1				
28.80	63.00				
43	75				

	(ug/l)	(ug/l)
RST24	21	60
RST6	42	120
	31.55	173.85
	60.39	356.07
	73.53	485.30
	136.52	922.50

·	opper	Zinc	Cadmium	Total PAH Toxi	Pyrene city Threshold	Fluoranthene	Anthracene	Phenanthrene
	1	1	1	1	1	1	1	1
9	97.40	117.50	6.10	41.50	96.30	41.50	19.20	78.90
	109	138	12	51	104	51	28	88

	(mg/kg)	(mg/kg)	(mg/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	
cicity	197	315	3.5	16770	875	2355	245	515	
	526	2036	1	15858	2743	2632	168	742	
	1084	4499	3	35481	6138	5890	376	1661	
	1363	6145	3	54904	9498	9114	582	2569	
	2130	8873	5	89125	15419	14795	945	4171	
	1084 1363	4499 6145	1 3 3 5	35481 54904	6138 9498	5890 9114	376 582	1661 2569	

Tier 1 is used for the calculation

#### In River (no mitigation)

Allowable Exceedances/year
No. of exceedances/worst year
No. of exceedances/worst year
No. of exceedances/summer
No. of exceedances/worst summer

Allowable Exceedances/year
No. of exceedances/year
No. of exceedances/worst year
No. of exceedances/summer
No. of exceedances/worst summer
Annual average concentration (ug/l)

Thresholds Thresholds

Event Statistics Mean 90%ile 95%ile 99%ile

Step 2		
	Copper	Zinc
	RS <sup>*</sup>	Γ24
	2	2
	-	-

RS	T6
1	1
-	•
-	
-	-
-	-
-	-

	(ug/l)	(ug/l)	
RST24	21	60	
RST6	42	120	
	-	-	
		-	
	-	-	
	_	-	

#### Step 2

Velocity - m/s

% settlement needed - %

#### In River (with mitigation)

Allowable Exceedances/year

No. of exceedances/worst year

No. of exceedances/summer

No. of exceedances/worst summer

Allowable Exceedances/year
No. of exceedances/worst year
No. of exceedances/worst year
No. of exceedances/summer
No. of exceedances/worst summer

Annual average concentration (ug/l)

Thresholds hresholds
Thresholds

Event Statistics Mean 90%ile 95%ile 99%ile

Copper	Zinc
RS	Γ24
2	2
-	
-	-
-	
-	-

RS	ST6
1	1
-	
-	-
-	
-	-
-	

	(ug/l)	(ug/l)
RST24 RST6	21	60
RST6	42	120
	_	-
	-	-
	-	-
	_	_

DI

# Step 2 Whole Scheme

HIGHWAYS AGENCY	Highways A	gency Water	Risk Assessm	ent To	Version 1.0 Nove	mber 200	9					
AGENCY			oluble - Acute Imp	act				Sedime	nt - Chror	nic Impact		
	Annual Average Coppe		Copper	7	Zinc			Sedim	ent depos	sition for th	is site is	judged as:
	Step 2 0.06	0.39 ug/l	Pass		Pass		Pass	E/050.18 april - 1404	ulating?	No	0.15	Low flow Vel m/s
	Step 3 -	- ug/l						Exten	sive?	No		Deposition Index
Location Details Road number		10.4			HA Area / DBFO	number						
Copyright AL (Copyright Copyright Co		A1		1 (5.11)		number						
Assessment type			e assessment (sing	gle outfall)			N1 - 41-1		=====			_
OS grid reference of assessm		Easting	424935				Northing		558620			
OS grid reference of outfall str	ucture (m)	Easting	424935				Northing		558620			
Outfall number		Whole scheme	8		List of outfall cumulative asse							
Receiving watercourse		River Team			curidiative asse	SSITICIL						
EA receiving water Detailed R	tiver Network ID				Assessor and affi	iliation			Beth woo	olley WSP		
Date of assessment		20/04/2018			Version of assess	sment		2	V1			
Notes		Sum of all outfa	ll impermeable are	as contril	buting.							
Step 1 Runoff Quality	AADT >=100,000	<b>-</b>	Climatic region	Colde	r Dry 🔻	Rai	nfall site	Newcastle	upon tyne (S	SAAR 680mm	)	-
Step 2 River Impacts	Annual 95%ile river	flow (m <sup>3</sup> /s)	0.382	(Enter	zero in Annual 959	%ile rive	r flow box to	o assess St	ep 1 runof	f quality or	ılv)	
Impermeable road area drained (ha)  21.4  Permeable area draining to outfall (ha)  0					, ,	,,						
					_		_	ftt-			-0	N. III
	Base Flow Index (BFI)  Is the discharge in or within 1 km upstream of a protected site for conservation?  No					No ▼ D						
For dissolved zinc only	dissolved zinc only Water hardness Medium = 50-200 CaCO3/I											
For sediment impact only	Is there a downstrea	am structure, lak	e, pond or canal th	nat reduc	es the velocity with	in 100m	of the point	of discharg	e?	No	· •	D
	• Tier 1 Estimate	d river width (m)	6.5									·
	© Tier 2 Bed widt	h (m)	3	Manni	ng's n 0.07	D	Side slope	(m/m)	0.5	Long sl	ope (m/n	n) 0.0001
Step 3 Mitigation				Γ		Estimate	ed effectiven	ess				
		Brief description	on		Treatment for	Atte	enuation for	Settle	ement of		Predic	ct Impact
		•			solubles (%)	soluble	es - restricte		nents (%)			
							rge rate ( l/s			Sh	ow Det	ailed Results
Existing measures					0	Unlimite	ed 🔻 🗇	0	D			
Proposed measures					0 D	Unlimite	ed 🗸 🗅	0	D		Ex	it Tool

**Summary of predictions** 

rediction of impact	Step1
	Step2
	Step3

#### Soluble - Acute Impact

Copper	Zinc

## Return To Interface

Copper	Zinc	Cadmium	Total PAH	Pyrene	Fluoranthene	Anthracene	Phenanthrene

Sediment - Chronic Impact

#### **DETAILED RESULTS**

Allowable Exceedances/year
No. of exceedances/year
No. of exceedances/worst year

In Runoff

Allowable Exceedances/year
No. of exceedances/year
No. of exceedances/worst year

Thresholds
Thresholds
Event Statistics Mean
90%ile
95%ile
99%ile

Step 1		
	Copper RS	Zinc
	1	1
	76.50	99.20
	86	107

RST6							
1	1						
28.80	63.00						
43	75						

	(ug/l)	(ug/l)
RST24	21	92
RST6	42	184
	31.55	173.85
	60.39	356.07
	73.53	485.30
	136.52	922.50

Copper	opper Zinc C		Total PAH Toxi	Pyrene city Threshold	Fluoranthene	Anthracene	e Phenanthrene		
1	1	1	1	1	1	1	1		
97.40	117.50	6.10	41.50	96.30	41.50	19.20	78.90		
109	138	12	51	104	51	28	88		

	(IIIg/kg)	(IIIg/kg)	(IIIg/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
oxicity	197 315		315 3.5		16770 875		245	515
ſ	526	2036	1	15858	2743	2632	168	742
Ī	1084	4499	3	35481	6138	5890	376	1661
Ī	1363	6145	3	54904	9498	9114	582	2569
Ī	2130	8873	5	89125	15419	14795	945	4171

Tier 1 is used for the calculation

## In River (no mitigation)

Allowable Exceedances/year
No. of exceedances/worst year
No. of exceedances/worst year
No. of exceedances/summer
No. of exceedances/worst summer

Allowable Exceedances/year
No. of exceedances/year
No. of exceedances/worst year
No. of exceedances/summer
No. of exceedances/worst summer
Annual average concentration (ug/l)

Thresholds Thresholds

Event Statistics Mean 90%ile 95%ile 99%ile

Step 2

Zinc
Γ24
2
0.1
1
0.1
1
T6

1	1
0	0
0	0
0	0
0	0
0.06	0.39
(ua/l)	(ua/l)

	(ug/l)	(ug/l)
RST24	21	92
RST6	42	184
	0.27	1.55
	0.70	3.25
	1.19	6.38
	3.41	16.75

Step 2

Velocity 0.15 m/

% settlement needed -

#### In River (with mitigation)

Allowable Exceedances/year
No. of exceedances/year
No. of exceedances/worst year
No. of exceedances/summer
No. of exceedances/worst summer

Allowable Exceedances/year
No. of exceedances/year
No. of exceedances/worst year
No. of exceedances/summer
No. of exceedances/worst summer

Annual average concentration (ug/l)

Thresholds hresholds
Thresholds

Event Statistics Mean 90%ile 95%ile 99%ile Step 3

Zinc
Γ24
2
-
-

RS	ST6
1	1
-	
-	-
-	-
-	
-	-

	(ug/l)	(ug/l)
RST24 RST6	21	92
RST6	42	184
		_
	_	_
		-

DI

 Details of the chosen rainfall site

 SAAR (mm)
 680

 Altitude (m)
 75

 Easting
 4248

 Northing
 5648

 Coastal distance (km)
 18

# Step 2 Whole Scheme: Downstream structure alert

AGENCY Highways Agency Water Risk Assessment Tool version 1.0 November 2009															
- Ademoi			C-			le - Acute Impact		Zinc	Sediment - Chronic Impact						
	Annu		rage Co Copper		lion	Copper		ZINC			Sedin	nent deno	sition for	this site	is judged as:
	St	ep 2	0.06	0.39	ugil	Pass		Pass				mulating?		0.15	Low flow Vel m/s
	St	ep 3	-	-	ug/l					octucture.	Exten	sive?	No	-	Deposition Index
Location Details															
Road number				A1				HA Area / DBFO	num ber						
Assessment type				Non-cu	mulative as	sessment (single outf	all)								•
OS grid reference of assessme	ent poin	nt (m)		Easting		424935				Northing		558620			
OS grid reference of outfall stru	icture (r	m)		Easting		424935				Northing		558620			
Outfall number				Whole S	cheme			List o foutfal cumulative ass							
Receiving watercourse				RiverT	eam			cumulative assi	essment						
EA receiving water Detailed Ri	verNet	twork II	)					Assessor and a f	filiation			Beth Wool	ley WSP		
Date of assessment				20/04/2	018		Ì	Version of asses	sment			V1			
Notes															
C. 4 D. ((O. 1))															
Step 1 Runoff Quality	AADT	>=1	000,000		· CI	matic region C	older (	Dry -	Rai	infall site	Newcastle (	upon tyne (SA	AR 680mm	)	•
Step 2 River Impacts	Annua	l 95%il	le river f	low (m³	/s)	0.382 (En	ter z	ero in Annual 959	%ile river	flow box to a	ssess Ste	p 1 runoff	quality onl	y)	
	Impern	neable	road ar	ea drair	ned (ha)	21.4 Per	meal	ble area draining	to outfal	l (ha)					
	Base F	Flow In	dex (BF	1)	0	67 Is th	ne dis	scharge in or with	nin 1 km	upstream of a	protected	site for co	nservation	1?	No ▼ D
For dissolved zinc only	Water	hardne	ess	Medium :	= 50-200 CaC	03/1									
For sediment impact only	Is there	e a dov	wnstrea	m struct	ure, lake, po	and or canal that redu	uces	the velocity withi	in 100m	of the point of	discharge	?	Ye	≤ ▼	
	€ Tier	1 Es	stimated	l river w	idth (m)	6.5									·
	C Tier:	2 Be	ed width	(m)		3 Mar	nning	y's n 0.07	D	Side slope (r	m/m)	0.5	Long sl	ope (m/m	0.0001
Step 3 Mitigation							$\overline{}$		Estimate	ed effectivenes	SS.		7 -		
				Briefd	escription		+	Treatment for		enuation for		ement of	┥┃	Predic	t Impact
								solubles (%)		es - restricted		ents (%)			
							1		_	arge rate (Vs)	1		Sh	ow Det	alled Results
Existing measures							0	D	Unlimite	ed 🕝 D	0	D			
Proposed measures							0	D	Unlimite	ed 🕌 🖸	0	D		Exi	t Tool

**Summary of predictions** 

Prediction of impact	Step1
	Step2
	Step3

#### Soluble - Acute Impact

Copper	Zinc

#### Sediment - Chronic Impact

Copper	Zinc	Cadmium	Total PAH	Pyrene	Fluoranthene	Anthracene	Phenanthrene

#### **DETAILED RESULTS**

Allowable Exceedances/yea No. of exceedances/year No. of exceedances/worst year

In Runoff

Allowable Exceedances/year No. of exceedances/year No. of exceedances/worst year

> Thresholds Thresholds Mean 90%ile 95%ile 99%ile Event Statistics

Step 1		
	Copper RS	Zinc T24
	1	1
	76.50	99.20
	86	107

1 1				
28.80	63.00			
43	75			

	(ug/l)	(ug/l)
RST24	21	92
RST6	42	184
	31.55	173.85
	31.55	173.83
	60.39	356.07
	73.53	485.30
	136.52	922.50

Copper	Zinc	Cadmium	Total PAH	Pyrene	Fluoranthene	Anthracene	Phenanthrene
			Tox	icity Threshold			
1	1	1	1	1	1	1	1
97.40	117.50	6.10	41.50	96.30	41.50	19.20	78.90
109	138	12	51	104	51	28	88

(mg/kg)	(mg/kg)	(mg/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
197	315	3.5	16770	875	2355	245	515
526	2036	1	15858	2743	2632	168	742
1084	4499	3	35481	6138	5890	376	1661
1363	6145	3	54904	9498	9114	582	2569
2130	8873	5	89125	15419	14795	945	4171
	526 1084 1363	197 315 526 2036 1084 4499 1363 6145	197         315         3.5           526         2036         1           1084         4499         3           1363         6145         3	197         315         3.5         16770           526         2036         1         15858           1084         4499         3         35481           1363         6145         3         54904	197         315         3.5         16770         875           526         2036         1         15858         2743           1084         4499         3         35481         6138           1363         6145         3         54904         9498	197         315         3.5         16770         875         2355           526         2036         1         15858         2743         2632           1084         4499         3         35481         6138         5890           1363         6145         3         54904         9498         9114	197         315         3.5         16770         875         2355         245           526         2036         1         15858         2743         2632         168           1084         4499         3         35481         6138         5890         376           1363         6145         3         54904         9498         9114         582

### In River (no mitigation)

Allowable Exceedances/year
No. of exceedances/worst year
No. of exceedances/worst year
No. of exceedances/summer
No. of exceedances/worst summer

Allowable Exceedances/year

No. of exceedances/year

No. of exceedances/worst year

No. of exceedances/summer

No. of exceedances/worst summer Annual average concentration (ug/l)

Thresholds Thresholds

Event Statistics Mean 90%ile 95%ile

Step 2		
	Copper	Zinc
	RS'	Γ24
	2	2
	0	0.1
	0	1

RST6				
1	1			
0	0			
0	0			
0	0			
0	0			
0.06	0.39			

	(ug/l)	(ug/l)
RST24	21	92
RST6	42	184
	0.27	1.55
	0.70	3.25
	1.19	6.38
	3.41	16.75

Velocity DI

Return To Interface

Tier 1 is used for the calculation

RST6				
1	1			
0	0			
0	0			
0	0			
0	0			
0.06	0.39			

_	(ug/1)	(ug/i)
RST24	21	92
RST6	42	184
i	0.27	1.55
	0.70	3.25
	1.19	6.38
	3.41	16.75
	•	-

#### In River (with mitigation)

Allowable Exceedances/year
No. of exceedances/year
No. of exceedances/worst year
No. of exceedances/summer No. of exceedances/worst summer

Allowable Exceedances/year No. of exceedances/year No. of exceedances/worst year No. of exceedances/summer No. of exceedances/worst summer Annual average concentration (ug/l)

> Thresholds Mean 90%ile 95%ile 99%ile Event Statistics

Thresholds hresholds

	Copper RS	Zinc
-	R3	124
ı	2	2
ı	-	-
ſ		-
ſ	-	-
ſ	-	-

RST6					
1	1				
-	-				
-	-				
-					
-	-				
-	-				

	(ug/l)	(ug/l)
ST24 RST6	21	92
RST6	42	184
	<del> </del>	

Details of the chosen rainfall site SAAR (mm) 680 Altitude (m) 75 Easting 4248 Northing 5648 Coastal distance (km) 18

# Step 2 Whole Scheme: Q95 Sensitivity Test

HIGHWAYS	Highways Agency Water Risk Assessment Tool version 1.0 November 2009											
			oluble - Acute Impact		-			Sedime	nt - Chron	ic Impact		
Anr	Copper	verage Concentration Copper Copper			Zinc			Sedim	diment deposition for this site is judged as:			
Sto	ep 2 0.11	0.65 ug/l	Pass		Pass	Pass Pass						Low flow Vel m/s
Sto	ер 3 -	- ug/l						Exten	sive?	No	89	Deposition Index
Location Details												
Road number		A1			HA Area / DBFO num	ber						
Assessment type			e assessment (single o	outfall)								*
OS grid reference of assessment poir		Easting	424935				Northing		558620			
OS grid reference of outfall structure (	m)	Easting	424935				Northing		558620			
Outfall number		Whole scheme			List of outfalls in cumulative assessm	ont						
Receiving watercourse		River Team			Cultivative assessifi	ent						
EA receiving water Detailed River Ne	twork ID				Assessor and affiliation	n			Beth wool	lley WSP		
Date of assessment		20/04/2018			Version of assessmer	nt			V1			
Notes		Sum of all outfa	ll impermeable areas	contrib	uting.							
Step 1 Runoff Quality AADT	>=100,000	•	Climatic region	Colder	Dry ▼	Rair	nfall site	Newcastle	upon tyne (S/	AAR 680mm)		•
Step 2 River Impacts Annua	l 95%ile river	flow (m <sup>3</sup> /s)	0.222 (	Enter z	zero in Annual 95%ile ı	river	flow box	to assess St	ep 1 runoff	quality on	ly)	
Imperr	neable road a	rea drained (ha)	ea drained (ha)  21.4  Permeable area draining to outfall (ha)  0									
Base	Flow Index (BI	FI)	Is the discharge in or within 1 km upstream of a protected site for conservation?				No ▼ □					
For dissolved zinc only Water	hardness	Medium = 50-200 (	CaCO3/I ▼									
For sediment impact only Is ther	e a downstrea	m structure, lak	e, pond or canal that i	reduces	s the velocity within 10	00m	of the poin	nt of discharg	e?	No	·	D
	1 Estimate	d river width (m)	6.5									
○ Tier	2 Bed widtl	h (m)	3 N	Manning	g's n 0.07		Side slope	e (m/m)	0.5	Long slo	pe (m/m	0.0001
Step 3 Mitigation	Step 3 Mitigation Estimated effectiveness											
<u> </u>		Brief description	on				nuation for		ement of		Predic	t Impact
			solubles ( %)		solubles (%) so	solubles - restricted sediments ( %)						
							rge rate ( l/			She	ow <b>D</b> et	ailed Results
Existing measures				0	D Unl	imite	d 🕇	0	D			
Proposed measures				0	D Unl	imite	d 🔽	0	D		Exi	t Tool

#### **Summary of predictions**

In Runoff

Prediction of impact	Step1
	Step2
	Step3

#### Soluble - Acute Impact

Zinc

#### Sediment - Chronic Impact

Total PAH

Copper	Zinc	Cadmium	Total PAH	Pyrene	Fluoranthene	Anthracene	Phenanthrene

#### **DETAILED RESULTS**

Allowable Exceedances/year
No. of exceedances/year
No. of exceedances/worst year

Allowable Exceedances/year
No. of exceedances/year
No. of exceedances/worst year

Thresholds
Thresholds
Event Statistics Mean
90%ile
95%ile
99%ile

Step 1		
	Copper RS	Zinc
	1	1
	76.50	99.20
	86	107

KOIO			
1	1		
28.80	63.00		
43	75		

	(ug/l)	(ug/l)
RST24	21	92
RST6	42	184
	31.55	173.85
	60.39	356.07
	73.53	485.30
	136.52	922.50

97.40	117.50	6.10	41.50	96.30	41.50	19.20	78,90
109	138	12	51	104	51	28	88

Pyrene

Fluoranthene

Anthracene

Phenanthrene

_	(mg/kg)	(mg/kg)	(mg/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
oxicity	ity 197 315		3.5	3.5 16770		2355	245	515
Г	526	2036	1	15858	2743	2632	168	742
	1084	4499	3	35481	6138	5890	376	1661
	1363	6145	3	54904	9498	9114	582	2569
	2130	8873	5	89125	15419	14795	945	4171

### In River (no mitigation)

Allowable Exceedances/year
No. of exceedances/worst year
No. of exceedances/worst year
No. of exceedances/summer
No. of exceedances/worst summer

Allowable Exceedances/year
No. of exceedances/year
No. of exceedances/worst year
No. of exceedances/summer
No. of exceedances/worst summer
Annual average concentration (ug/l)

Thresholds Thresholds

Event Statistics Mean 90%ile 95%ile 99%ile

Olop 2		
	Copper RS1	Zinc T24
	2	2
	0	0.2
	0	1
	0	0.2
	0	1

RST6									
1	1								
0	0								
0	0								
0	0								
0	0								
0.11	0.65								

	(ug/l)	(ug/l)
RST24	21	92
RST6	42	184
ſ	0.45	2.56
Ī	1.18	5.53
	1.98	10.61
ſ	5.60	27.89

#### Step 2

Velocity 0.08 n

Return To Interface

Copper

Zinc

Cadmium

% settlement needed 0

Tier 1	is used for the calculation

In River	(with	mitigation)

Allowable Exceedances/year

No. of exceedances/worst year

No. of exceedances/summer

No. of exceedances/worst summer

Allowable Exceedances/year
No. of exceedances/year
No. of exceedances/worst year
No. of exceedances/summer
No. of exceedances/worst summer

Thresholds
Event Statistics Mean
90%ile
95%ile
99%ile

Thresholds hresholds

Copper	Ziı
RST24	

Step 3

RST24								
2	2							
-								
-	-							
-								
-	-							

RS	ST6
1	1
-	-
-	-
-	-

	(ug/l)	(ug/l)
ST24 RST6	21	92
RST6	42	184
	-	-
	-	-
	-	-

DI

Details of the chosen rainfall site

 SAAR (mm)
 680

 Altitude (m)
 75

 Easting
 4248

 Northing
 5648

 Coastal distance (km)
 18

# Step 2 Whole Scheme: Permeable areas

HIGHWAYS AGENCY	Highways Agency Water Risk Assessment Tool version 1.0 November 2009													
AGENCY	Soluble - Acute Impact Annual Average Concentration Copper Zinc							Sediment - Chronic Impact						
		Copper Zinc								Sedin	ent deposition for this site is judged as:			
	Step 2	0.06	0.39	ug/l	Pass		Pass		Pass		nulating?	No	0.15	Low flow Vel m/s
	Step 3	-		ug/l						Exten	sive?	No		Deposition Index
Location Details			• •				110 0 0 0 0 1	DDEO	_		T			
Road number			A1					DBFO numbe	[					
Assessment type					e assessment (sin	gle outfall	)		N. 0.		I			
OS grid reference of assessm			Easting		424935				Northing		558620			
OS grid reference of outfall str	ructure (m)		Easting		424935				Northing		558620			
Outfall number			Whole s					f outfalls in e assessmen	,					
Receiving watercourse			River Te	eam			Currulativ	assessmen						
EA receiving water Detailed F	River Network I	D					Assessor	and affiliation			Beth woo	lley WSP		
Date of assessment			20/04/2018			Version of	assessment			V1				
Notes			Sum of	all outfa	ll impermeable are	eas contri	buting.							
Step 1 Runoff Quality	AADT >=	100,000		•	Climatic region	Colde	er Dry	▼ Ra	infall site	Newcastle	upon tyne (S	AAR 680mm	)	•
Step 2 River Impacts	Annual 95%	le river f	low (m³/	s)	0.382	(Enter	zero in Ann	ual 95%ile rive	er flow box	to assess St	ep 1 runoff	quality on	ly)	
	Impermeable	road a	rea drair	ned (ha)	21.4	Perme	eable area d	raining to outfa	ıll (ha)	4.27				
	Base Flow Ir	dex (BF	FI)		0.67	Is the	discharge in	or within 1 km	n upstream	of a protecte	d site for c	onservation	1?	No 🔻 🗅
For dissolved zinc only	Water hardn	ess	Medium =	50-200	CaCO3/I ▼									
For sediment impact only	Is there a do	wnstrea	m struct	ure, lak	e, pond or canal t	hat reduc	es the veloc	ty within 100r	n of the poi	nt of discharg	ge?	No	-	D
		stimated						•						
		ed width		(11)	3	Monni	ng's n 0.0	7 D	Side slop	no (m/m)	0.5	Long old	ope (m/m	) [2,0004
	VIIICIZ D	eu wiuii	(111)			IVIAIIIII	ilg's ii		Side Side	be (III/III)	0.5	Luily Si	ope (III/II	0.0001
Step 3 Mitigation						Г		Estimat	ed effective	eness				
Otep 5 imagadon			Brief d	escription	on.		Treatmen		tenuation fo		lement of		Predic	t Impact
			Direi u	Cochpa			solubles (	%) solub	les - restric	ted sedin	nents (%)			
								disch	arge rate (	l/s )		Sh	ow Det	ailed Results
Existing measures							0	Unlimi	ted 🗸 🛚	D 0	D			
Proposed measures							0	Unlimi	ted 🗸	0	D		Exi	t Tool

**Summary of predictions** 

rediction of impact	Step1
	Step2
	Step3

#### Soluble - Acute Impact

Zinc

## Return To Interface

Copper	Zinc	Cadmium	Total PAH	Pyrene	Fluoranthene	Anthracene	Phenanthrene

Sediment - Chronic Impact

#### **DETAILED RESULTS**

Allowable Exceedances/yea No. of exceedances/year No. of exceedances/worst year

In Runoff

Allowable Exceedances/year No. of exceedances/year No. of exceedances/worst year

> Thresholds Thresholds Mean 90%ile 95%ile 99%ile Event Statistics

Step 1		
	Copper RS	Zinc T24
	1	1
	76.50	99.20
	86	107

RST6				
1	1			
28.80	63.00			
43	75			

	(ug/l)	(ug/l)
RST24	21	92
RST6	42	184
	31.55	173.85
	60.39	356.07
	73.53	485.30
	136.52	922.50

	Copper	Zinc	Cadmium	Total PAH	Pyrene city Threshold	Fluoranthene	Anthracene	Phenanthrene
_				TUX	city Threshold			
ĺ	1	1	1	1	1	1	1	1
	97.40	117.50	6.10	41.50	96.30	41.50	19.20	78.90
ſ	109	138	12	51	104	51	28	88

_	(mg/kg)	(mg/kg)	(mg/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
Toxicity	197	315	3.5	16770	875	2355	245	515
-								=
L	526	2036	1	15858	2743	2632	168	742
	1084	4499	3	35481	6138	5890	376	1661
	1363	6145	3	54904	9498	9114	582	2569
	2130	8873	5	89125	15419	14795	945	4171

#### In River (no mitigation)

Allowable Exceedances/year
No. of exceedances/worst year
No. of exceedances/worst year
No. of exceedances/summer
No. of exceedances/worst summer

Allowable Exceedances/year

No. of exceedances/year

No. of exceedances/worst year

No. of exceedances/summer

No. of exceedances/worst summer Annual average concentration (ug/l)

Event Statistics

Step 2		
	Copper	Zinc
	RS"	Γ24
	2	2
	0	0.1
	0	1

RST6					
1	1				
0	0				
0	0				
0	0				
0	0				
0.06	0.39				

	(ug/l)	(ug/l)
RST24	21	92
RST6	42	184
ſ	0.27	1.55
ŀ	0.70	3.25
ľ	1.19	6.37
	2.40	16.60

Velocity DI

Tier 1 is used for the calculation

T	hr	es	sh	ol	ds	3
т	hr	es	sh	ol	ds	6
						Thresholds Thresholds

Mean 90%ile 95%ile

#### In River (with mitigation)

Allowable Exceedances/year
No. of exceedances/year
No. of exceedances/worst year
No. of exceedances/summer No. of exceedances/worst summer

Allowable Exceedances/year No. of exceedances/year No. of exceedances/worst year No. of exceedances/summer No. of exceedances/worst summer Annual average concentration (ug/l)

> Thresholds hresholds Thresholds Mean 90%ile 95%ile 99%ile Event Statistics

Copper RS	Zinc
no.	124
2	2
-	-
-	
-	
-	
-	-

RST6						
1	1					
-	-					
-	-					
-	-					
-	-					

	(ug/l)	(ug/l)
RST24 RST6	21	92
RST6	42	184
		-
	-	-
	-	-

Details of the chosen rainfall site SAAR (mm) 680 Altitude (m) 75 Easting 4248 Northing 5648 Coastal distance (km) 18

# Step 2 Whole Scheme: Permeable areas Q95 Sensitivity Test

HIGHWAYS Highways Agency Water Risk Assessment Tool version 1.0 November 2009																
AGENCY	Soluble - Acute Impact Annual Average Concentration Copper					Zinc		Sediment - Chronic Impact								
	Step 2 Step 3	Copper 0.11	2inc 0.65	ugil ugil	Pass		Pass			Pass		Accu	nent dep mulating sive?		0.08 94	e is judged as: Low flow Vel m/s Deposition Index
Location Details																
Road number			A1				HA Area	DBFOr	num ber							
Assessment type			Non-cu	mulative a	ssessment (single	outfall	)									
OS grid reference of assessme	nt point (m)		Easting		424935					Northin	g		558620			
OS grid reference of outfall struc	cture (m)		Easting		424935					Northin	g		558620			
Outfall number			Whole S	cheme				foutfalls								
Receiving watercourse			RiverT	eam			cumulativ	e asse	ssment							
EA receiving water Detailed Riv	verNetwork l	D					Assessor	and a ffil	iation				Beth Wo	olley WSF	p	
Date of assessment			20/04/2	018			Version o	fassess	ment				V1			
Notes																
0. 45 %0 %																
Step 1 Runoff Quality	AADT >=1	000,000		<b>-</b>	Climatic region	Colde	er Dry	•	Rai	nfall site	N	lewcastle (	upon tyne (S	SAAR 680m	nm)	•
Step 2 River Impacts	Annual 95%i	le river f	low (m³/	(s)	0.22	(Enter	zero in Ann	ual 95%	ile river	flow bo	x to as	sess Ste	p 1 runof	f quality o	only)	
	Impermeable	road ar	ea drair	ned (ha)	21.4	Perme	eable area d	raining t	o outfall	(ha)	4.27	11				
	Base Flow In						No ▼									
For dissolved zinc only	Water hardn	ess	Medium =	50-200 Ca	003/1											
For sediment impact only	ls there a do	wnstrea	m struct	ure, lake,	pond or canal that	reduc	es the veloci	ty within	100m	of the po	oint of d	ischarge	?		No ▼	D
	Tier1 E	stimated	river wi	dth (m)	6.5									_		·
	Tier2 B	ed width	(m)		3	Manni	ing's n 0.	07	D	Side sl	lope (m.	/m) [	0.5	Long	slope (m/n	n) 0.0001
Step 3 Mitigation								E	stimate	d effect	ive ne ss				Prodle	ct Impact
			Briefd	escription			Treatmen	The state of the s		nua tio n	The second second		ement of		rieur	or impact
							so lub les	(%)		s - restr rge rate		sedim	Show Detailed Results			
Existing measures							0	D	Unlimite		Б	0	D		now Det	aneu Results
Proposed measures							0		Unlimite	d		0				
1 Toposcu ilicusules							-	D			D		D		Ex	lt Tool

**Summary of predictions** 

In Runoff

Prediction of impact	Step1
	Step2
	Step3

#### Soluble - Acute Impact

Copper	Zinc

## Sediment - Chronic Impact

Copper	Zinc	Cadmium	Total PAH	Pyrene	Fluoranthene	Anthracene	Phenanthrene

#### **DETAILED RESULTS**

Allowable Exceedances/year
No. of exceedances/year
No. of exceedances/worst year

Allowable Exceedances/year No. of exceedances/year No. of exceedances/worst year

> Thresholds Thresholds Mean 90%ile 95%ile 99%ile Event Statistics

Step 1			Ste
	Copper	Zinc	
	RS <sup>*</sup>	T24 1	
	76.50	99.20	
	86	107	

	28.80	63.00
	43	75
	(ug/l)	(ug/l)
24 T6	21	92
T6	42	184

	(ug/l)	(ug/l)
RST24	21	92
RST6	42	184
	31.55	173.85
	60.39	356.07
	73.53	485.30
	136.52	922.50

ep 1									
	Copper	Zinc	Cadmium	Total PAH	Pyrene	Fluoranthene	Anthracene	Phenanthrene	
				Tox	icity Threshold				
	1	1	1	1	1	1	1	1	
	97.40	117.50	6.10	41.50	96.30	41.50	19.20	78.90	ľ
	109	138	12	51	104	51	28	88	

	(mg/kg)	(mg/kg)	(mg/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
Toxicity	197	315	3.5	16770	875	2355	245	515
-								
ĺ	526	2036	1	15858	2743	2632	168	742
	1084	4499	3	35481	6138	5890	376	1661
	1363	6145	3	54904	9498	9114	582	2569
	2130	8873	5	89125	15419	14795	945	4171

## In River (no mitigation)

Allowable Exceedances/year
No. of exceedances/year
No. of exceedances/worst year
No. of exceedances/summer
No. of exceedances/worst summer

Allowable Exceedances/year

No. of exceedances/year

No. of exceedances/worst year

No. of exceedances/summer

No. of exceedances/worst summer Annual average concentration (ug/l)

Thresholds Thresholds

Event Statistics Mean 90%ile 95%ile

s	te	p	2

Copper	Zinc
RS'	Γ24
2	2
0	0.2
0	1
0	0.2
0	1

KOID					
1	1				
0	0				
0	0				
0	0				
0	0				
0.11	0.65				
(100)					

	(ug/l)	(ug/l)
RST24	21	92
RST6	42	184
	0.46	2.58
	1.19	5.58
	1.99	10.68
	5.62	28.04

Velocity	0.08	m/s
DI	93.57	
% settlemen		

Return To Interface

Tier 1 is used for the calculation

RS16				
1	1			
0	0			
0	0			
0	0			
0	0			
0.11	0.65			

RST24	21	92
RST6	42	184
	0.46	2.58
	1.19	5.58
	1.99	10.68
	5.62	28.04

#### In River (with mitigation)

Allowable Exceedances/year
No. of exceedances/year
No. of exceedances/worst year
No. of exceedances/summer
No. of exceedances/worst summer

Allowable Exceedances/year
No. of exceedances/worst year
No. of exceedances/worst year
No. of exceedances/summer
No. of exceedances/worst summer

Annual average concentration (ug/l)

Thresholds hresholds Thresholds

Mean 90%ile 95%ile 99%ile Event Statistics

. 5	ŝŧ	e	O	3

Zinc
Γ24
2
-
-

RST6				
1	1			
-				
-				
-				
-	-			
-				

	(ug/l)	(ug/l)
ST24 RST6	21	92
RST6	42	184
		_
	-	-

Details of the chosen rainfall site SAAR (mm) 680 75 Altitude (m) Easting 4248 Northing 5648 Coastal distance (km) 18

# **Appendix B**

Method D Results (Spillage Risk)



## Method D - Spillage Risk

<b>OUTFALI</b>	.1					
		J65 NB ON	NB (J65-66) and SB (Between Slips) (within 100m of slip road)	1		
01	Water body type	Surface Watercourse	Surface Watercourse	1		
D2	Length of road draining to outfall (m)	1030	59	1		
D3	Road Type (A-road or Motorway)	M	M	1		
D4	If A road, is site urban or rural?	N/A	N/A			
D5	Junction type	Slip	No Junction			
D6		<20 minutes	<20 minutes			
D7	Traffic flow (AADT two way)	9,154	131,626			
D8	%HGV	1.60	6.70			
	Spillage factor (no/109 HGVkm/year)	0.43	0.43			
D10	Risk of accidental spillage	0.00	0.00			
	Probability factor	0.45	0.4			
	Risk of pollution incident	0.0000106224	0.0000367444			
	Is risk greater than 0.01?		NO		Totals for Outfall 1	Return period (years)
	Return period without pollution reducing measures	0.0000106224	0.0000367444	D14	0.0000473667	
	Exisiting measures factor	1	•	D16	0.0000473667	
	Return period with pollution reducing measures	0.0000106224	0.0000367444	D18	0.0000473667	7
	Proposed measures factor	1	•			
D18	Residual with proposed pollution reduction measures	0.0000106224	0.0000367444			
OUTFALI	. 2					

OUTFALL	4
---------	---

OUTTALL	· <del>-</del>						
		J65-J66		NB (J65-66) and SB (Between Slips)			J65-J66 (100m within slip)
D1	Water body type	Surface Watercourse	Surface Watercourse	Surface Watercourse	Surface Watercourse	Surface Watercourse	Surface Watercourse
D2	Length of road draining to outfall (m)	606	88	430	40	100	100
D3	Road Type (A-road or Motorway)	M	M	M	M	M	M
D4	If A road, is site urban or rural?	N/A	N/A	N/A	N/A	N/A	N/A
D5	Junction type	No Junction			No junction		No Junction
D6		<20 minutes	<20 minutes	<20 minutes	<20 minutes	<20 minutes	<20 minutes
	Traffic flow (AADT two way)	139,214	7,588	131,626	131,626	139,214	139,214
	%HGV	6.49	2.84	6.70	6.70	6.49	6.49
D9	Spillage factor (no/109 HGVkm/year)	0.36	0.43	0.36	0.43	0.43	0.43
D10	Risk of accidental spillage	0.0007192970	0.0000029734	0.0004982285	0.0000553587	0.0001417756	0.0001417756
D11	Probability factor	0.45	0.45	0.45	0.45	0.45	0.45
D12	Risk of pollution incident	0.0003236837	0.0000013380	0.0002242028	0.0000249114	0.0000637990	0.0000637990
D13	Is risk greater than 0.01?	NO	NO	NO	NO	NO	NO
D14	Return period without pollution reducing measures	0.0003236837	0.0000013380	0.0002242028	0.0000249114	0.0000637990	0.0000637990
D15	Exisiting measures factor	1	1	1	1	1	1
	Return period with pollution reducing measures	0.0003236837	0.0000013380	0.0002242028	0.0000249114	0.0000637990	0.0000637990
	Proposed measures factor	1	1	1	1	1	1
D18	Residual with proposed pollution reduction measures	0.0003236837	0.0000013380	0.0002242028	0.0000249114	0.0000637990	0.0000637990

	Totals for Outfall 2	Return period (years)
D14	0.00070173	1425
D16	0.00070173	1425
D18	0.00070173	1425

# OUTFALL 3

OUTFA	LL 3			
		J65 SB Slip OFF	J65 SB Slip OFF (100m within Roundabout)	
D1	Water body type	Surface Watercourse	Surface Watercourse	
D2	Length of road draining to outfall (m)	300	)	70
D3	Road Type (A-road or Motorway)	M	M	
D4	If A road, is site urban or rural?	N/A	N/A	
D5	Junction type	Slip	Slip	
D6	Location	<20 minutes	<20 minutes	
D7	Traffic flow (AADT two way)	7,588		7,588
D8	%HGV	2.84		2.84
D9	Spillage factor (no/109 HGVkm/year)	0.43	1	5.35
D10	Risk of accidental spillage	0.0000101364		0.0000294271
D11	Probability factor	0.45		0.45
D12	Risk of pollution incident	0.0000045614		0.0000132422
D13	Is risk greater than 0.01?	NO	NO	
D14	Return period without pollution reducing measures	0.0000045614		0.0000132422
D15	Exisiting measures factor	1		1
D16	Return period with pollution reducing measures	0.0000045614		0.0000132422
D17	Proposed measures factor	1		1
D18	Residual with proposed pollution reduction measures	0.0000045614		0.0000132422

## OUTFALL 4

OUTFAL	LL 4						
		J65 SB Slip OFF	J65-J66	J65-J66 (100m within Sliproad)			
D1	Water body type	Surface Watercourse	Surface Watercourse	Surface Watercourse			
D2	Length of road draining to outfall (m)	36	591	200			
D3	Road Type (A-road or Motorway)	M	M	M			
D4	If A road, is site urban or rural?	N/A	N/A	N/A			
D5	Junction type		No Junction	No Junction			
D6		<20 minutes	<20 minutes	<20 minutes			
D7	Traffic flow (AADT two way)	7,588	139,214	139,214			
D8	%HGV	2.84	6.49	6.49			
D9	Spillage factor (no/109 HGVkm/year)	0.43	0.36	0.43			
D10	Risk of accidental spillage	0.0000012164	0.0007014926	0.0002835513			
D11	Probability factor	0.45	0.45	0.45			
D12	Risk of pollution incident	0.000005474	0.0003156717	0.0001275981			
D13	Is risk greater than 0.01?					Totals for Outfall 4	Return period (years)
D14	Return period without pollution reducing measures	0.000005474	0.0003156717	0.0001275981	D14	0.000443817	1 2253
D15	Exisiting measures factor	1	1	1	D16	0.000443817	1 2253
D16	Return period with pollution reducing measures	0.000005474	0.0003156717	0.0001275981	D18	0.000443817	1 2253
D17	Proposed measures factor	1	1	1			
D18	Residual with proposed pollution reduction measures	0.000005474	0.0003156717	0.0001275981			

						i e e e e e e e e e e e e e e e e e e e	
ALL 5				Slip roads adjace	ent to Roundabout		Roundabout sensitivity test
	J66 Between Slips	J66 SB Slip ON	J66 NB Slip OFF	J66 SB Slip ON	J66 NB Slip OFF	J66 Between Slips (100m near slip road)	J66 Roundabout
Water body type	Surface Watercourse	Surface Watercourse	Surface Watercourse	Surface Watercourse	Surface Watercourse	Surface Watercourse	Surface Watercourse
Length of road draining to outfall (m)	399	320	250	100	100	100	360
Road Type (A-road or Motorway)	M	M	M	TR	TR	M	M
If A road, is site urban or rural?	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Junction type	No Junction	Slip	Slip	Roundabout	Roundabout	No Junction	No Junction
Location	<20 minutes	<20 minutes	<20 minutes	<20 minutes	<20 minutes	<20 minutes	<20 minutes
Traffic flow (AADT two way)	128,482	6,679	5,655	6,679	5,655	128,482	10,000
%HGV	6.67	1.33	3.49	1.33	3.49	6.67	5.00
Spillage factor (no/109 HGVkm/year)	0.36	0.43	0.43	5.35	5.35	0.43	5.35
Risk of accidental spillage	0.0004494673	0.0000044517	0.0000077452	0.0000173084	0.0000385459	0.0001345523	0.0003514950
Probability factor	0.45	0.45	0.45	0.45	0.45	0.45	0.45
Risk of pollution incident	0.0002022603	0.0000020032	0.0000034853	0.0000077888	0.0000173457	0.0000605485	0.0001581728
Is risk greater than 0.01?							
Return period without pollution reducing measures	0.0002022603	0.0000020032	0.0000034853	0.0000077888	0.0000173457	0.0000605485	0.0001581728
Exisiting measures factor	1	1	1	1	1	1	1
Return period with pollution reducing measures	0.0002022603	0.0000020032	0.0000034853	0.0000077888	0.0000173457	0.0000605485	0.0001581728
Proposed measures factor	1	1	1	1	1	1	1
Residual with proposed pollution reduction measures	0.0002022603	0.0000020032	0.0000034853	0.0000077888	0.0000173457	0.0000605485	0.0001581728
	Water body type  Length of road draining to outfall (m)  Road Type (A-road or Motorway)  If A road, is site urban or rural?  Junction type Location  Traffic flow (AADT two way)  %HGV  Spillage factor (no/109 HGVkm/year)  Risk of accidental spillage  Probability factor  Risk of pollution incident  Is risk greater than 0.01?  Return period without pollution reducing measures  Exisiting measures factor  Return period with pollution reducing measures  Proposed measures factor	J66 Between Slips   Surface Watercourse	J66 Between Slips	J66 Between Slips   J66 SB Slip ON   J66 NB Slip OFF	Water body type	Water body type	Mater body type

	Totals for Outfall 5		Return period (years)	
D14		0.0004516046	2	2214
D16		0.0004516046	2	2214
D18		0.0004516046	9	2214

### OUTFALL 7A

OUTFALL	- /A						
		J66-67	J66 Between Slips	J66 NB Slip ON	J66 SB Slip OFF	J66-67 (adjacent to slip roads)	J66 Between Slips
D1	Water body type	Surface Watercourse	Surface Watercourse				
D2	Length of road draining to outfall (m)	140.00	401	505	590	100.00	100
D3	Road Type (A-road or Motorway)	M	M	M	M	M	M
D4	If A road, is site urban or rural?	N/a	N/A	N/A	N/A	N/a	N/A
D5	Junction type	No junction	No Junction	Slip	Slip	No junction	No Junction
D6	Location	<20 minutes	<20 minutes				
D7	Traffic flow (AADT two way)	135,812	128,482	6,584	2,573	135,812	128,482
	%HGV	6.71	6.67	0.87	0.31	6.71	6.67
	Spillage factor (no/109 HGVkm/year)	0.36	0.36	0.43	0.43	0.43	0.43
D10	Risk of accidental spillage	0.0001675429	0.0004517203	0.0000045544	0.0000007466	0.0001429434	0.0001345523
	Probability factor	0.45	0.45	0.45	0.45	0.45	0.45
D12	Risk of pollution incident	0.0000753943	0.0002032741	0.0000020495	0.0000003360	0.0000643245	0.0000605485
	Is risk greater than 0.01?						
D14	Return period without pollution reducing measures	0.0000753943	0.0002032741	0.0000020495	0.0000003360	0.0000643245	0.0000605485
D15	Exisiting measures factor	1	1	1	1	1	1
D16	Return period with pollution reducing measures	0.0000753943	0.0002032741	0.0000020495	0.0000003360	0.0000643245	0.0000605485
D17	Proposed measures factor	1	1	1	1	1	1
D18	Residual with proposed pollution reduction measures	0.0000753943	0.0002032741	0.0000020495	0.0000003360	0.0000643245	0.0000605485

	Totals for Outfall 7A	Return period (years)	
D14	0.0004059270	24	463
D16	0.0004059270	2	463
D18	0.0004059270	2	463

#### OUTFALL 6

OUTFA	ALL 6				
		J66-67			
D1	Water body type	Surface Watercourse			
D2	Length of road draining to outfall (m)	371.00	0		
D3	Road Type (A-road or Motorway)	M			
D4	If A road, is site urban or rural?	N/A			
D5	Junction type	No junction			
D6	Location	<20 minutes			
D7	Traffic flow (AADT two way)	135,812			
08	%HGV	6.71	Ī		
D9	Spillage factor (no/109 HGVkm/year)	0.36	6		
010	Risk of accidental spillage	0.0004439887	7		
011	Probability factor	0.45	5		
012	Risk of pollution incident	0.0001997949			
013	Is risk greater than 0.01?	NO			
D14	Return period without pollution reducing measures	0.0001997949		Totals for Outfall 6	Return period (years)
D15	Exisiting measures factor	1	D14	0.0001997949	)
016	Return period with pollution reducing measures	0.0001997949	D16	0.0001997949	9
D17	Proposed measures factor	1	D18	0.0001997949	3
D18	Residual with proposed pollution reduction measures	0.0001997949			

# OUTFALL 7

		300-07			
D1	Water body type	Surface Watercourse			
D2	Length of road draining to outfall (m)	251.00			
D3	Road Type (A-road or Motorway)	M			
D4	If A road, is site urban or rural?	N/a			
D5	Junction type	No junction			
D6	Location	<20 minutes			
D7	Traffic flow (AADT two way)	135,812			
D8	%HGV	6.71			
D9	Spillage factor (no/109 HGVkm/year)	0.36			
D10	Risk of accidental spillage	0.0003003805			
D11	Probability factor	0.45			
D12	Risk of pollution incident	0.0001351712			
D13	Is risk greater than 0.01?				
D14	Return period without pollution reducing measures	0.0001351712		Totals for Outfall 7	Return period (years)
D15	Exisiting measures factor	1	D14	0.0001351712	7398
D16	Return period with pollution reducing measures	0.0001351712	D16	0.0001351712	7398
D17	Proposed measures factor	1	D18	0.0001351712	7398
D18	Residual with proposed pollution reduction measures	0.0001351712		•	_

OUTFALL
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OUTFA	ALL 8		_		
		J66-67	]		
01	Water body type	Surface Watercourse			
D2	Length of road draining to outfall (m)	404.00	ī		
D3	Road Type (A-road or Motorway)	M	1		
04	If A road, is site urban or rural?	N/a			
D5	Junction type	No junction			
D6	Location	<20 minutes			
07	Traffic flow (AADT two way)	135,812			
D8	%HGV	6.71			
D9	Spillage factor (no/109 HGVkm/year)	0.36	5		
D10	Risk of accidental spillage	0.0004834810			
D11	Probability factor	0.45			
D12	Risk of pollution incident	0.0002175664			
D13	Is risk greater than 0.01?				
D14	Return period without pollution reducing measures	0.0002175664		Totals for Outfall 8	Return period (years)
D15	Exisiting measures factor	1	D14	0.0002175664	1
D16	Return period with pollution reducing measures	0.0002175664	D16	0.0002175664	1
D17	Proposed measures factor	1	D18	0.0002175664	1
D18	Residual with proposed pollution reduction measures	0.0002175664		•	

#### OUTFALL 9

-L J							
	J67-68	J67 Between Slips	J67 SB Slip OFF	J67 SB Slip OFF - within 100m of Roundabout	J67-68 (within 100m of slip)	J67 Between Slips (within 100m of slip)  J	67 Roundabout
Water body type	Surface Watercourse	Surface Watercourse	Surface Watercourse	Surface Watercourse	Surface Watercourse	Surface Watercourse S	urface Watercourse
Length of road draining to outfall (m)	83.00	317.00	238.00	100.00	100.00	100.00	36
Road Type (A-road or Motorway)	M	M	M	TR	M	M N	1
If A road, is site urban or rural?	N/A	N/A	N/A	N/A	N/A	N/A	/A
Junction type	No junction	No junction	No junction	Roundabout	No junction	No junction N	o Junction
Location	<20 minutes	<20 minutes	<20 minutes	<20 minutes	<20 minutes	<20 minutes <	20 minutes
Traffic flow (AADT two way)	131,035	110,063	10,067	10,067	131,035	110,063	15,000
%HGV	6.36	7.41	2.27	2.27	6.36	7.41	8.00
Spillage factor (no/109 HGVkm/year)	0.36	0.36	0.43	5.35	0.43	0.43	5.35
Risk of accidental spillage	0.0000909205	0.0003398886	0.0000085424	0.0000446568	0.0001308427	0.0001280688	0.0000843588
Probability factor	0.45	0.45	0.45	0.45	0.45	0.45	0.45
Risk of pollution incident	0.0000409142	0.0001529499	0.0000038441	0.0000200956	0.0000588792	0.0000576310	0.0000379615
Is risk greater than 0.01?							
Return period without pollution reducing measures	0.0000409142	0.0001529499	0.0000038441	0.0000200956	0.0000588792	0.0000576310	0.0000379615
Exisiting measures factor	1	1	1	1	1	1	1
Return period with pollution reducing measures	0.0000409142	0.0001529499	0.0000038441	0.0000200956	0.0000588792	0.0000576310	0.0000379615
Proposed measures factor	1	1	1	1	1	1	1
Residual with proposed pollution reduction measures	0.0000409142	0.0001529499	0.0000038441	0.0000200956	0.0000588792	0.0000576310	0.0000379615
	Water body type  Length of road draining to outfall (m)  Road Type (A-road or Motorway)  If A road, is site urban or rural?  Junction type  Location  Traffic flow (AADT two way)  %HGV  Spillage factor (no/109 HGVkm/year)  Risk of accidental spillage  Probability factor  Risk of pollution incident  Is risk greater than 0.01?  Return period without pollution reducing measures  Exisiting measures factor  Return period with pollution reducing measures  Proposed measures factor	Water body type	J67-68   J67 Between Slips   Surface Watercourse   Surface Water	Mater body type   Surface Watercourse   Su	Mater body type	Mater body type	Mater body type

	Totals for Outfall 9	Return period (years)	
D14	0.0003722754		268
D16	0.0003722754		268
D18	0.0003722754		268

## OUTFALL 11

		J66-67	J67 Between Slips	J67 SB Slip ON	J67 SB Slip ON - Roundabout	J66-67 (100m near slip)	J67 Between Slips (100m near slip)
D1	Water body type	Surface Watercourse	Surface Watercourse	Surface Watercourse	Surface Watercourse	Surface Watercourse	Surface Watercourse
D2	Length of road draining to outfall (m)	70.00	157.00	179.00	100.00	100.00	100.00
D3	Road Type (A-road or Motorway)	M	M	M	TR	M	M
D4	If A road, is site urban or rural?	N/a	N/A	N/A	N/A	N/a	N/A
D5	Junction type	No junction	No junction	Slip	Roundabout	No junction	No junction
D6	Location	<20 minutes	<20 minutes	<20 minutes	<20 minutes	<20 minutes	<20 minutes
D7	Traffic flow (AADT two way)	135,812	110,063	7,872	7,872	135,812	110,063
D8	%HGV	6.71	7.41	2.85	2.85	6.71	7.41
D9	Spillage factor (no/109 HGVkm/year)	0.36	0.36		5.35	0.43	0.43
D10	Risk of accidental spillage	0.0000837715	0.0001683360	0.0000062990	0.0000437827	0.0000015011	0.0000017748
D11	Probability factor	0.45	0.45			0.45	0.45
D12	Risk of pollution incident	0.0000376972	0.0000757512	0.0000028345	0.0000197022	0.0000006755	0.000007987
D13	Is risk greater than 0.01?						
D14	Return period without pollution reducing measures	0.0000376972	0.0000757512	0.0000028345	0.0000197022	0.0000006755	0.0000007987
D15	Exisiting measures factor	1	1	1	1	1	1
D16	Return period with pollution reducing measures	0.0000376972	0.0000757512	0.0000028345	0.0000197022	0.0000006755	0.0000007987
D17	Proposed measures factor	1	1	1	1	1	1
D18	Residual with proposed pollution reduction measures	0.0000376972	0.0000757512	0.0000028345	0.0000197022	0.0000006755	0.000007987

	Totals for Outfall 11	Return period (years)
D14	0.0001374593	7275
D16	0.0001374593	7275
D18	0.0001374593	7275

# OUTFALL 12

OUTFA	LL 12						
		J67-68	J67 Between Slips	J67 NB Slip ON	J67 NB Slip ON - within 100m of roundabout	J67-68 (within 100m of slip)	J67 Between Slips (within 100m of slip)
D1	Water body type	Surface Watercourse	Surface Watercourse	Surface Watercourse	Surface Watercourse	Surface Watercourse	Surface Watercourse
D2	Length of road draining to outfall (m)	68.00	343.00	245.00	87.00	100.00	100.00
D3	Road Type (A-road or Motorway)	M	M	M	TR	M	M
D4	If A road, is site urban or rural?	N/A	N/A	N/A	N/A	N/A	N/A
D5	Junction type	No junction	No junction	No junction	Roundabout	No junction	No junction
D6	Location	<20 minutes	<20 minutes	<20 minutes	<20 minutes	<20 minutes	<20 minutes
D7	Traffic flow (AADT two way)	131,035	110,063	3,880	3,880	131,035	110,063
D8	%HGV	6.36	7.41	2.79	2.79	6.36	7.41
D9	Spillage factor (no/109 HGVkm/year)	0.36	0.36	0.43	5.35	0.43	0.43
D10	Risk of accidental spillage	0.0000744891	0.0003677660	0.0000041598	0.0000183787	0.0001308427	0.0001280688
D11	Probability factor	0.45	0.45	0.45	0.45	0.45	0.45
D12	Risk of pollution incident	0.0000335201	0.0001654947	0.0000018719	0.0000082704	0.0000588792	0.0000576310
D13	Is risk greater than 0.01?						
D14	Return period without pollution reducing measures	0.0000335201	0.0001654947	0.0000018719	0.0000082704	0.0000588792	0.0000576310
D15	Exisiting measures factor	1	1	1	1	1	1
D16	Return period with pollution reducing measures	0.0000335201	0.0001654947	0.0000018719	0.0000082704	0.0000588792	0.0000576310
D17	Proposed measures factor	1	1	1	1	1	1
D18	Residual with proposed pollution reduction measures	0.0000335201	0.0001654947	0.0000018719	0.0000082704	0.0000588792	0.0000576310

	Totals for Outfall 12		Return period (years)
D14		0.0003256673	307
D16		0.0003256673	307
D18		0.0003256673	307

## OUTFALL 13

COTTALL	FALL 13								
		J66-67	J67 Between Slips	J67 SB Slip OFF	J67 SB Slip OFF - Adjacent to the Roundabout		J67 Between Slips (100m near slip)		
D1	Water body type	Surface Watercourse	Surface Watercourse	Surface Watercourse	Surface Watercourse	Surface Watercourse	Surface Watercourse		
D2	Length of road draining to outfall (m)	170.00	172.00	186.00	100.00	100.00	100.00		
D3	Road Type (A-road or Motorway)	M	M	M	TR	M	M		
D4	If A road, is site urban or rural?	N/A	N/A	N/A	N/A	N/a	N/A		
D5	Junction type			No junction	Roundabout	No junction	No junction		
D6		<20 minutes	<20 minutes	<20 minutes	<20 minutes	<20 minutes	<20 minutes		
D7	Traffic flow (AADT two way)	135,812	110,063	10,067	10,067	135,812	110,063		
	%HGV	6.71	7.41	2.27	2.27	6.71	7.41		
D9	Spillage factor (no/109 HGVkm/year)	0.36	0.36	0.43	5.35	0.43	0.43		
D10	Risk of accidental spillage	0.0002034450	0.0001844191	0.0000066760	0.0000446568	0.0000015011	0.0000017748		
D11	Probability factor	0.45	0.45	0.45	0.45	0.45	0.45		
D12	Risk of pollution incident	0.0000915502	0.0000829886	0.0000030042	0.0000200956	0.0000006755	0.0000007987		
D13	Is risk greater than 0.01?								
D14	Return period without pollution reducing measures	0.0000915502	0.0000829886	0.0000030042	0.0000200956	0.0000006755	0.0000007987		
D15	Exisiting measures factor	1	1	1	1	1	1		
D16	Return period with pollution reducing measures	0.0000915502	0.0000829886	0.0000030042	0.0000200956	0.0000006755	0.0000007987		
	Proposed measures factor	1	1	1	1	1	1		
D18	Residual with proposed pollution reduction measures	0.0000915502	0.0000829886	0.0000030042	0.0000200956	0.0000006755	0.0000007987		

	Totals for Outfall 13		Return period (years)	
D14		0.0001991127	5	022
D16		0.0001991127	5	022
D18		0.0001991127	5	022

#### Sum of risk for entire scheme

	Totals for the scheme		Return period (years)
D14		0.0036553003	274
D16		0.0036553003	274
D18		0.0036553003	274

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