

A38 Derby Junctions
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6.3 Environmental Statement
Appendices
Appendix 13.1: HAWRAT Methods A &
D Data and Results

Regulation 5(2)(a)

Planning Act 2008

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

**April 2019** 



### Infrastructure Planning

Planning Act 2008

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

### A38 Derby Junctions Development Consent Order 202[]

# 6.3 Environmental Statement Appendices Appendix 13.1: HAWRAT Methods A & D Data and Results

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# APPENDIX 13.1: HAWRAT METHODS A & D DATA AND RESULTS

- 1.1.1 The following technical notes provides a summary of the results of the water quality risk assessment of routine highway runoff and spillage risk from the A38 Derby Junctions scheme: Kingsway, Markeaton and Little Eaton junctions.
- 1.1.2 A full description of the drainage design and the drainage catchments for the three junctions are shown in Figures 2.2, 2.3 and 2.4 within the A38 Road Drainage Strategy (refer to Appendix 13.4 [TR010022/APP/6.3]).

#### HAWRAT Method A

- 1.1.3 Method A assesses the impact of routine road runoff on receiving waterbodies by considering the copper and zinc content of the runoff (as a proxy for a range of metals typically found in highway runoff), together with the potential for chronic sediment impact on the receiving watercourse (and associated sediment-bound pollutants such as hydrocarbons which tend to be predominantly associated with sediments).
- 1.1.4 Should the assessment indicate that discharges from the outfalls are failing to meet standards, then treatment measures can be considered. The effectivity of various treatment systems in terms of sediment removal, treatment of dissolved metals and hydrocarbons is described in DMRB HD33/16 and HA103/06, and is based on research carried out by the then named Highways Agency.
- 1.1.5 Data used in the assessment is presented in Tables 1, 3 and 5 for the three junctions, with the results are presented in Tables 2, 4 and 6. Screen prints from the assessment are also included herein.



#### Kingsway junction

## Table 1: Data used within the HAWRAT Method A routine runoff assessment: Kingsway junction

Parameter	Value	Source
Annual Average Daily Traffic (AADT)	Outfall 1: >50,000 - <100,000 (highest trafficked part of catchment area)  Outfall 2: >=10,000 and <50,000 (highest trafficked part of catchment area)  Outfall 3: >=10,000 and <50,000 (highest trafficked part of catchment area)  Outfall 4: >=10,000 and <50,000 (highest trafficked part of catchment area)  Outfall 5: >50,000 - <100,000 (highest trafficked part of catchment area)	AECOM engineers, email rcvd 10/10/2018 – design traffic flow in 2039
Climatic Region	Cold-Dry	HAWRAT embedded data
Rainfall Site	Lincoln (Standard Annual Average Rainfall 600 mm)	HAWRAT embedded data
Annual 95%ile river flow	Bramble Brook Calculated Q95: 0.002 m <sup>3</sup> /s	Calculated using Wallingford Hydrosolutions Ltd LowFlow software
Estimated River Width	2.5 m	Measured from MAGIC map
Catchments	Catchment 1: eastern dumbbell and south (to outfall 1) Catchment 2: northern dumbbell and slip roads (to outfall 2) Catchment 3: south off slip (to outfall 3) Catchment 4: eastern access road (outfall to 4) Catchment 5: mainline through junction	Figure 2.2 within the Road Drainage Strategy (refer to Appendix 13.4 [TR010022/APP/6.3])
Impermeable road area drained (ha)	C1: 1.943 C2: 1.338 C3: 0.589 C4: 0.476 C5: 0.850 Cumulative: C1+C2+C3+C4+C5= 5.196 ha C2+C1= 3.281 ha C1+C5= 2.793 ha C5+C3+C4= 1.915 ha	Figure 2.2 within the Road Drainage Strategy (refer to Appendix 13.4 [TR010022/APP/6.3])
Permeable area drained (ha)	C1: 0.2626 C2: 0.1318 C3: 0.0876 C4: 0.0506 C5: 0.2392 Cumulative: C1+C2+C3+C4+C5= 0.7718 ha C2+C1= 0.3944 ha C1+C5= 0.5018 ha C5+C3+C4= 0.5018 ha	Figure 2.2 within the Road Drainage Strategy (refer to Appendix 13.4 [TR010022/APP/6.3])
Base Flow Index	0.5	Adopted value of 0.5 is a default as suggested by the HAWRAT manual. No gauging stations are on the impacted watercourses on National River Flow Archive to provide data.



Parameter	Value	Source
Hardness	High=> 200 mg/L CaCO <sub>3</sub>	Environment Agency Data, for Mackworth Brook at Markeaton used as a proxy for watercourses in this area.
Protected Sites in or within 1km downstream	None	Magic Map

### Table 2: HAWRAT Method A assessment results without mitigation: Kingsway junction

Outfall	Soluble Soluble Acute Acute		Sediment Chronic Impact			Annual Average Cu	Annual Average Soluble Zn
	Impact Copper	Impact Zinc	Accumulating ?	Extensive ?	Deposition Index (% treatment required)	EQS: 10 μg/l	EQS: 7.8 μg/l
C1	PASS	PASS	Yes	Yes	141 (30% settlement required)	0.32	1.43
C2	PASS	PASS	Yes	No	97 (no required treatment)	0.20	0.85
C3	PASS	PASS	Yes	No	43 (no required treatment)	0.10	0.42
C4	PASS	PASS	Yes	No	35 (no required treatment)	0.08	0.35
C5	PASS	PASS	Yes	No	62 (no required treatment)	0.16	0.73
Cumulative for outfalls within 1km, C1, C2, C3, C4 and C5	PASS	PASS	n/a	n/a	n/a	0.64	2.79

#### With existing drainage design mitigation

Outfall	Soluble Acute	Soluble Acute	Sediment Chronic Impact		Annual Average Cu	Annual Average Soluble Zn	
Canan	Impact Copper	Impact Zinc	Accumulating ?	Extensive ?	Deposition Index (% treatment required)	EQS: 10 μg/l	EQS: 7.8 μg/l
C1 (with Attenuation Pond)	PASS	PASS	Yes	No	56 (no other treatment required)	0.19	0.86



#### Summary of Results: Kingsway junction

- 1.1.6 The initial results without mitigation show that all outfalls, even considering cumulative assessment, pass all the criteria for acute and long term metal pollution. However, for sediment impact, without mitigation, Catchment C1 fails for sediment impact (30% settlement required).
- 1.1.7 Within the drainage design there is a pond included the system for outfall C1. A wet attenuation pond results in a decrease of 60% of suspended solids (HD 33/16 Table 8.1 Indicative Treatment Efficiencies of Drainage Systems). With the mitigation already included within the drainage design outfall C1 passes the HAWRAT assessment.



#### Markeaton junction

### Table 3: Data used within the HAWRAT Method A routine runoff assessment: Markeaton junction

Parameter	Value	Source
	Outfall 6: local traffic to park Outfall 7: >50,000 - <100,000 (highest trafficked part of catchment area)	
	Outfall 8: assess on highest contributing traffic, mainline >50,000 - <100,000	150014
Annual Average Daily Traffic (AADT)	Outfall 9: assess on highest contributing traffic, mainline >50,000 - <100,000	AECOM engineers, email rcvd 10/10/2018 - design traffic flow in 2039
	Outfall 10: >50,000 - <100,000 (highest trafficked part of catchment area)	
	Outfall 11: >=10,000 and <50,000 (highest trafficked part of catchment area)	
Climatic Region	Cold-Dry	HAWRAT embedded data
Rainfall Site Lincoln (Standard Annual Average Rainfall 600 mm)		HAWRAT embedded data
Width of watercourse	Outfall 7:13m wide lake at location of discharge north of A38  Outfall 8: downstream of Markeaton Lake outflow 2.5m  Outfall 9: downstream of A38, 2.5m  Outfall 10: 7m wide lake at location of discharge south of A38	Measured from MAGIC map
Annual 95%ile river flow	Kedleston Road Junction assumed a conservative 0.001 m³/s to be conservative. Difficult to calculate using LowFlow software due to modified flow regime with weirs/lakes and sluices upstream  Markeaton Lake flow assumed to be 0.001m³/s	No flow
Catchments	Catchment 6: to Markeaton park* Catchment 7: to Markeaton Lake Catchment 8: Kedleston Road, Northbound off slip, and some mainline Catchment 9: Kedleston Road, Southbound on slip and mainline Catchment 10: to Mill Pond, south of A38 Catchment 11: to Ashbourne Road*	Figure 2.3 within the Road Drainage Strategy (refer to Appendix 13.4 [TR010022/APP/6.3])
Impermeable road area drained (ha)	C6: 0.152 ha C7: 1.513 ha C8: 0.388 ha C9: 0.833 ha C10: 3.391 ha C11: 0.184 ha Cumulative: C10+ C7 = 4.904 ha C8 + C9 = 1.221 ha	Figure 2.3 within the Road Drainage Strategy (refer to Appendix 13.4 [TR010022/APP/6.3])



Parameter	Value	Source
Permeable area drained (ha)	C7: 0.1086 ha C8: 0.0526 ha C9: 0.0388 ha C10: 0.0872 ha Cumulative: C10+ C7 = 0.1958 ha C8 + C9 = 0.0914 ha	Figure 2.3 within the Road Drainage Strategy (refer to Appendix 13.4 [TR010022/APP/6.3])
Base Flow Index	0.5	Adopted value of 0.5 is a default as suggested by the HAWRAT manual. No gauging stations are on the impacted watercourses on National River Flow Archive to provide data.
Hardness	High=> 200 mg/L CaCO₃	Environment Agency Data for Markeaton Brook
Protected Sites in or within 1km downstream	None	Magic Map

<sup>\*</sup>Catchments 11 and 6 cannot be assessed using HAWRAT due to outfalling to combined sewer, and small area outfalling to Markeaton Park drainage respectively.

Table 4: HAWRAT Method A assessment results without mitigation: Markeaton junction

Outfall	Acute Acute		Sediment Chronic Impact			Annual Average Cu	Annual Average Soluble Zn
Impact Copper	Impact Zinc	Accumulati ng?	Extensive?	Deposition Index (% treatment required)	EQS: 10 µg/l	EQS: 7.8 μg/l	
C7	PASS	PASS	Yes	No, but alert downstream structure	22 (no required treatment)	0.45	1.98
C8	PASS	PASS	Yes	No	29 (no treatment required)	0.15	0.68
C9	PASS	PASS	Yes	No	62 (no treatment required)	0.24	1.02
C10	PASS	PASS	Yes	No, but alert downstream structure	90 (no required treatment)	0.76	3.29
C8 +C9 (within 100m)	PASS	PASS	Yes	No	90 (no treatment required)	0.39	1.70
C7 +C10 (within 100 m)	FAIL (2 exceedances allowed – result is 2.7 exceedances per year)	PASS	Yes	Yes – and alert downstream structure	130 (24% settlement needed)	0.92	3.99
	Addi	tion of mitiga	ation on C1, reca	alculation of C1+	-C4 cumulative assessmen	ıt	
C7 +C10 (within 100 m	PASS	PASS	Yes	No, but alert d/s structure	96 (sedimentation pond with 24 hr retention period, and ditches)	0.75	3.23



#### Summary of Results: Markeaton junction

- 1.1.8 The low flow conditions have been assumed to be 1l/s for a conservative assessment. This is due to the difficulties of calculating the volume of the Q95 low flow measurement using the LowFlow software in this area. The software is based on catchment area and rainfall/runoff. In this area the flow regime is highly modified due to the presence of weirs, diverted watercourses, lakes and man-operated sluice gates.
- 1.1.9 The initial results without mitigation show that the outfalls for catchments 7 and 10 pass all the criteria for acute and long term metal pollution, and for sediment impact. However, for both outfalls, there is an 'alert downstream structure' due to the presence of a still water body/lake system downstream of the A38.
- 1.1.10 Initial results without mitigation show that outfalls C8, and C9 pass all the criteria for acute and long term metal pollution, and for sediment impact. Also the cumulative assessment for C8 and C9 pass all the criteria for acute and long term metal pollution and sediment impact.
- 1.1.11 The outfalls for catchments 7 and 10 are also assessed using the cumulative assessment procedure for outfalls under 100m apart. Without mitigation, the combined outfalls C7 and C10 failed for soluble copper in addition to a failure for sediments, and there being the 'alert downstream structure', indicating a need for mitigation. The drainage design was subsequently developed to include a forebay/sedimentation wet pond to provide some mitigation to reduce levels of soluble copper and suspended sediments in part of the road drainage prior to discharge. The wet pond has been sized to accept the first flush for a 1 in 10 year rainfall event, with at least a 24 hour retention time. In addition, there are lined ditches conveying the water to the lined forebay and will drain through to the attenuation tank via a filter drain. The retention time of the lined forebay would be greater than 24 hours. There is then a short length of ditch to the discharge location.
- 1.1.12 From Table 8.1 within HD 33/16, a wet retention pond has a potential maximum suspended solids removal of 60%, and a dissolved copper removal of 40%, and ditches have a potential maximum suspended solids removal of 25%, and a dissolved metals removal of 15%. However, as the drainage strategy allows for the retention of first flush only, the maximum percentage removal cannot be applied to the calculations. As most of the pollutants/sediments would be within the first flush, it is reasonable to apply an efficiency of half of the above percentage removal figures i.e.:
  - (60 + 25)/2 = 43% removal for suspended solids
  - (40 + 15)/2 = 28% removal for dissolved metals



1.1.13 The mitigation provided by the wet pond applies to only part of the cumulative area (i.e. C10 and not C7). The ratio of C10 to the whole area is 0.69, and therefore the above treatment efficiencies have been decreased again to correspond to the fact that not 100% of the impermeable area is being treated, i.e.:

• Suspended solids: 43 X 0.69 = 30%

• Dissolved metals: 28 X 0.69 = 19%

- 1.1.14 Using the above treatment efficiencies within the HAWRAT assessment results, the cumulative assessment for C7 + C10 results in a Pass.
- 1.1.15 This assessment does not take into any organic carbon content in the lake which may also reduce the bioavailability of certain dissolved metals.



#### Little Eaton junction

### Table 5: Data used within the HAWRAT Method A routine runoff assessment: Little Eaton junction

Parameter	Value	Source
Annual Average Daily Traffic (AADT)	Outfall 12: >50,000 - <100,000  Outfall 13: >50,000 - <100,000  Outfall 14: >10,000 - <50,000  Outfall 15: >50,000 - <100,000	AECOM engineers, email rcvd 10/10/2018  – design traffic flow in 2039
Climatic Region	Cold-Dry	HAWRAT embedded data
Rainfall Site	Lincoln (Standard Annual Average Rainfall 600 mm)	HAWRAT embedded data
Width of Watercourse Dam Brook : 4 m River Derwent : 32 m (outfall 4)		Measured from MAGIC map
Annual 95%ile river flow	Dam Brook : 0.009 m³/s River Derwent : 4.609 m³/s	Calculated using Wallingford Hydrosolutions Ltd LowFlow software for Dam Brook, National River Flow Archive Data, Station 28085 Derwent at St Marys Bridge
Catchments	Catchment 12: to Dam Brook Catchment 13: to Dam Brook Catchment 14: to Dam Brook Catchment 15: to River Derwent	Figure 2.4 within the Road Drainage Strategy (refer to Appendix 13.4 [TR010022/APP/6.3])
Impermeable road area drained (ha)	C12: 2.625 C13: 1.837 C14: 0.332 C15: 0.953 C12 + C13 = 4.462 ha	Figure 2.4 within the Road Drainage Strategy (refer to Appendix 13.4 [TR010022/APP/6.3])
Permeable area drained (ha)	C12: 0.3112 C13: 0.2608 C14: 0.1782 C15: 0.1194 C12 + C13 =0.572	Figure 2.4 within the Road Drainage Strategy (refer to Appendix 13.4 [TR010022/APP/6.3])
Base Flow Index	0.5	Adopted value of 0.5 is a default as suggested by the HAWRAT manual. No gauging stations are on the impacted watercourses on National River Flow Archive to provide data.
Hardness	High=> 200 mg/L CaCO₃	Environment Agency Data
Protected Sites in or within 1km downstream	None	Magic Map



Table 6: HAWRAT Method A assessment results without mitigation: Little Eaton junction

Outfall	Soluble Acute	Soluble Acute	,	Sediment Chronic Impact			Annual Average Soluble Zn
	Impact Copper	Impact Zinc	Accumulati ng?	Extensive?	Deposition Index (% treatment required)	EQS: 10 μg/l	EQS: 7.8 μg/l
C12	PASS	PASS	Yes	Yes	109 (9% settlement required)	0.12	0.53
C13	PASS	PASS	Yes	No	76 (no required treatment)	0.09	0.38
C14	PASS	PASS	Yes	No	14 (no required treatment)	0.01	0.06
C15	PASS	PASS	No	No	n/a	0.00	0.00
C12 +C13 (within 100m)	PASS	PASS	Yes	Yes	185 (46% settlement needed)	0.19	0.84

#### With mitigation already in the drainage design

Outfall	Soluble Acute	Soluble Acute	,	Sediment Chro	nic Impact	Annual Average Cu	Annual Average Soluble Zn
	Impact Copper	Impact Zinc	Accumulati ng?	Fytensive? /0/ tractment		EQS: 10 µg/l	EQS: 7.8 μg/l
C12 (with attenuatio n pond)	PASS	PASS	Yes	NO	43 (no further treatment required)	0.07	0.32
C12 +C13 (within 100m)	PASS	PASS	Yes	NO	74 (no further treatment required)	0.11	0.50

#### Summary of Results: Little Eaton junction

- 1.1.16 The initial results without mitigation show that outfalls C13, C14 and C15 pass all the criteria for acute and long term metal pollution, and for sediment impact. However, for outfall C12, there is a failure for sediment impact, without mitigation (9% settlement required), and the cumulative assessment for C12+C13 (46% settlement required).
- 1.1.17 With the proposed attenuation ponds included as mitigation, the HAWRAT assessment passes for all parameters.



#### Method D Assessment: Spillage Risk

- 1.1.18 Method D in DMRB HD45/09 provides a method that gives an indication of an accidental spillage resulting in a serious pollution incident on a receiving water body, and guides the need for spillage containment measures. Watercourses should be protected so that the risk of a serious pollution incident has an annual probability of less than 1% (equivalent to a return period of 1 in 100 years), unless they are considered to be sensitive (e.g. covered by a SSSI designation), in which case a more stringent annual probability of 0.5% is applied (i.e. 1 in 200 years). Where the risk is greater than the allowable standard, spillage containment measures can be built into the drainage designs to reduce the risk.
- 1.1.19 For the Scheme, the probability that a spillage would cause a pollution incident has been calculated for the outfalls. Data used includes road lengths draining to each outfall, and modelled traffic data. Results have been provided in Tables 7, 8 and 9.
- 1.1.20 Based on the analysis carried out no significant spillage risk is anticipated from any of the remodelled road junctions.

Table 7: Method D assessment results: Kingsway junction

Outfall (s)	Annual Probability of Spillage (%)	Predicted Return Period (years)
C1	0.0003	3441
C2	0.0001	9726
C3	0.0000	22013
C4	0.0000	32949
C5	0.0001	9273
C1+C2+C3+C4+c5	0.0005	1734

Table 8: Method D assessment results: Markeaton junction

Outfall (s)	Annual Probability of Spillage (%)	Predicted Return Period (years)
C7	0.0002	4622
C8	0.0000	32506
C9	0.0001	7922
C10	0.0005	2135
C8+C9	0.0001	6369
C7+C10	0.0006	1460

C11 not assessed as small catchment outfalling to sewer

C6 not assessed as park access road



Table 9: Method D assessment results: Little Eaton junction

Outfall (s)	Annual Probability of Spillage (%)	Predicted Return Period (years)
C12	0.0003	3093
C13	0.0003	3443
C14	0.0000	43652
C15	0.0001	8753
C12,C13,C14	0.0006	1570

C3 – assumed higher traffic at north end of mainline carries through junction to be a more conservative estimate of spillage risk



#### Screen prints from HAWRAT for all assessments

### Kingsway junction:

HIGHWAY	S Highways A	gency Water I	Risk Assessmer	nt versio	n 1.0 Novemb	er 2009					
AGENCY	Annual Average Co		uble - Acute Impa	950007			Sedime	nt - Chro	nic Impa	ct	
	Copper Step 2 0.32		Pass	Pas		Fail. Try Tier 2 for Velocity		ent deposit	ion for this	site is judg	ed as:
	Step 3 -	- ug/l		8		velocity	Exten	sive?	Yes	141 D	eposition Inde
oad number	_	A38 Kingsway J	unction	HAAR	ea / DBFO nur	mber					
ssessment type			essment including se	ediments (outfa	ls within 100m	The second secon					
S grid reference of asses S grid reference of outfall		Easting Easting	432546			Northing Northing		432546			
utfall number	Sudctale (III)	Lasurig	432546		st of outfalls in			432546		X	
eceiving watercourse		Bramble Brook			ative assessi					-	
A receiving water Detaile	d River Network ID			Asses	sor and affiliat	tion		DSH			
ate of assessment		22/02/2019		Versio	n of assessm	ent		2			
otes											
tep 1 Runoff Qualit	Y AADT >=50,000 a	nd <100,000 -	Climatic region	Colder Dry		Rainfall site	Lincoln (SA	AR 600mm)			
ep 2 River Impacts	Annual 95%ile river Impermeable road a Base Flow Index (B	area drained (ha)		Permeable are	ea draining to	e river flow box to a outfall (ha) 0.2	626			0.00	No -
or dissolved zinc only	Water hardness	High = >200mg CaC	03/1		66		30				
or sediment impact or	N.S. VIII.	am structure, lake ed river width (m)	e, pond or canal tha	t reduces the v	elocity within	100m of the point o	f dischar	ge?	N	0 -	D
	↑ Tier 2 Bed widt	th (m)	3	Manning's n	0.07	Side slope (r	n/m)	0.5	Longs	lope (m/m)	0.000
tep 3 Mitigation				1		timated effectivenes				Predict	Impact
		Brief descriptio	n			Attenuation for solubles - restricted lischarge rate ( l/s )		ement of nents (%)	-	ow Detai	
xisting measures				0		Inlimited 🖵 🖸	0	D	-   31	low Detai	neu nes
roposed measures				50 E					-		
HIGHWAY	'S Highways A		Risk Assessmer		n 1.0 Novemb	Inlimited - D	Sedime	ent - Chro	nic Impa		Tool
	Annual Average Co Copper Step 2 0.20	Sol poncentration r Zinc 0.85 ug/l	A CONTRACTOR OF THE CONTRACTOR	nt versio	n 1.0 Novemb	NORTH THE PROPERTY OF THE PROP	Sedime Sedim	ent - Chro ent deposit nulating?	ion for this	ct s site is judg	ed as:
AGENCY	Annual Average Co	Sol poncentration r Zinc 0.85 ug/l - ug/l	uble - Acute Impa Copper Pass	nt versio act Zinc	n 1.0 Novemb	eer 2009	Sedime Sedim	ent - Chro ent deposit nulating?	ion for this	ct s site is judg	ed as:
AGENCY pad number	Annual Average Co Copper Step 2 0.20	Soloncentration r Zinc ug/l ug/l ug/l A38 Kingsway J	uble - Acute Impa Copper Pass	nt versio act Zinc Pas:	n 1.0 Novemb	eer 2009	Sedime Sedim	ent - Chro ent deposit nulating?	ion for this	ct s site is judg	ed as:
ad number sessment type	Annual Average Co Copper Step 2 0.20 Step 3 -	Soloncentration r Zinc ug/l ug/l ug/l A38 Kingsway J	uble - Acute Impa Copper Pass	nt versio act Zinc Pas:	n 1.0 Novemb	eer 2009	Sedime Sedim	ent - Chro ent deposit nulating?	ion for this	ct s site is judg	ed as:
ad number sessment type grid reference of asses	Annual Average Co Copper Step 2 0.20 Step 3 -	Soloncentration r Zinc ug/l ug/l ug/l A38 Kingsway J Non-cumulative	uble - Acute Impa Copper Pass unction assessment (single	ret versio act Zino Pasi HA Are outfall)	n 1.0 Novemb	Pass  Morthing  Northing	Sedime Sedim	ent - Chro ent deposit rulating? sive?	ion for this	ct s site is judg	ed as:
add number sessment type 6 grid reference of asses 6 grid reference of outfall tfall number	Annual Average Co Copper Step 2 0.20 Step 3 -	ncentration r Zinc ug/l 0.85 ug/l yg/l A38 Kingsway J Non-cumulative Easting	uble - Acute Impa Copper Pass unction assessment (single 432546	nt versio  Zinc  Pass  HA A R  outfall)	n1.0 Novemb	Pass  Morthing  Northing  C2	Sedime Sedim	ent - Chro ent deposit nulating? sive?	ion for this	ct s site is judg	ed as:
add number ssessment type 6 grid reference of asses 6 grid reference of outfall ffall number sceiving watercourse	Annual Average Cc Copper Step 2 0.20 Step 3 -	Soloncentration r Zinc 0.85 ug/l A38 Kingsway J Non-cumulative E asting	uble - Acute Impa Copper Pass unction assessment (single 432546	nt versio Zinc Pasi HAAR outfall)	ea / DBFO nur	Pass  Morthing  Northing  Northing  C2	Sedime Sedim	ent - Chro ent deposit nulating? sive? 432546 432546	ion for this	ct s site is judg	ed as:
ad number sessment type grid reference of asses grid reference of outfall tfall number ceiving water Detaille	Annual Average Cc Copper Step 2 0.20 Step 3 -	oncentration r Zinc 0.85 ug/l ug/l A38 Kingsway J Non-cumulative Easting Easting Bramble Brook	uble - Acute Impa Copper Pass unction assessment (single 432546	nt versio act Zinc Pass HAAR outfall)	ea / DBFO nur	Pass  Morthing Northing C2  dion	Sedime Sedim	ent - Chro ent deposit nulating? sive?  432546  432546	ion for this	ct s site is judg	ed as:
ad number sessment type grid reference of asses grid reference of outfall tfall number ceiving water course a receiving water Detaile te of assessment	Annual Average Cc Copper Step 2 0.20 Step 3 -	ncentration r Zinc ug/l 0.85 ug/l yg/l A38 Kingsway J Non-cumulative Easting	uble - Acute Impa Copper Pass unction assessment (single 432546	nt versio act Zinc Pass HAAR outfall)	ea / DBFO nur	Pass  Morthing Northing C2  dion	Sedime Sedim	ent - Chro ent deposit nulating? sive? 432546 432546	ion for this	ct s site is judg	ed as:
and number ssessment type S grid reference of asses S grid reference of outfall utfal number eceiving water course A receiving water Detaile ate of assessment otes	Annual Average CC Copper Step 2 0.20 Step 3 - Sep 3 -	oncentration r Zinc 0.85 ug/l 438 Kingsway J Non-cumulative Easting Easting Bramble Brook	uble - Acute Impa Copper Pass unction assessment (single  432546  432546	nt versio act Zinc Pass HAAR outfall)	ea / DBFO nur	Pass mber  Northing Northing C2  dion ent	Sedime Sedime Accum Extens	ent - Chro ent deposit nulating? sive?  432546  432546	ion for this	ct s site is judg	ed as:
add number ssessment type S grid reference of asses S grid reference of outfall utfall number sceiving water course A receiving water Detaile ate of assessment otes tep 1 Runoff Qualit	Annual Average CC Copper Step 2 0.20 Step 3 - Smert point (m) Structure (m)  d River Network ID	A38 Kingsway J Non-cumulative Easting Bramble Brook	uble - Acute Impa Copper Pass unction assessment (single 432546	Pass  HA Are outfall)  Cumula  Asses Versio	at to outfalls in of assessment	Pass  mber  Northing Northing C2  tion ent  Rainfall site	Sedime Sedime Accum Extens	ent - Chro ent deposit ulating? sive?  432546  432546  DSH 2	yes No	ct site is judg 0.00 97 D	ed as:
add number ssessment type S grid reference of asses S grid reference of outfall uffall number sceiving water course A receiving water Detaile ate of assessment oles	Annual Average CC Copper Step 2 0.20 Step 3 - Smert point (m) Structure (m)  d River Network ID	Soloncentration  T Zinc 0.85 ug/l 0.85 lug/l A38 Kingsway J Non-cumulative Easting Easting Bramble Brook  22/02/2019	uble - Acute Impa Copper Pass unction assessment (single 432546 432546  Climatic region	Pass  HA Are outfall)  Cumula  Asses Versio	and DBFO number of outfalls in of assessment	Pass  mber  Northing Northing C2  tion ent  Rainfall site	Sedime Sedime Accum Extens	ent - Chro ent deposit ulating? sive?  432546  432546  DSH 2	yes No	ct site is judg 0.00 97 D	ed as:
add number ssessment type S grid reference of asses S grid reference of outfall Ifall number sceiving water course A receiving water Detaile ate of assessment stes Tep 1 Runoff Qualit	Annual Average C.    Copper	Soloncentration  T Zinc 0.85 ug/l 0.85 ug/l 4.38 Kingsway.J Non-cumulative Easting Easting Bramble Brook 22/02/2019  14-50,000 v  160w (m³/s) area drained (ha)	unction assessment (single 432546 432546 Climatic region  0.002 1.338	Passion Line Colder Dry  (Enter zero in A Permeable are	and DBFO number of outfalls in of assessment	Pass  mber  Northing Northing C2  tion ent  Rainfall site	Sedime Sedime Accurrent Extensi	ent - Chro ent deposit ulating? sive?  432546  432546  DSH 2  AR 600mm)	Yes No	ct site is judg 0.00 97 D	ed as: ow flow Ve eposition In
add number ssessment type S grid reference of asses S grid reference of outfall ufall number sceiving water course A receiving water Detaile ate of assessment otes tep 1 Runoff Qualit tep 2 River Impacts	Annual Average CC Step 2 0.20 Step 3 -  Sement point (m)  structure (m)   X AADT >10,000 and Annual 95%ile river impermeable road a Base Flow Index (B	Solomonentration  T Zinc  0.85  ug/l  - ug/l  A38 Kingsway J  Non-cumulative  Easting  Bramble Brook  22/02/2019  flow (m³/s)  area drained (ha)  Fl)  High = >200mg CaC	unction assessment (single   432546     432546     Climatic region   0.002     1.338     0.5	Asses  Colder Dry  (Enter zero in Apermeable are is the discharge)	and DBFO nurses of outfalls in a seessman of assessman affiliation of a sees affiliation of a see affiliation of	mber    Northing     Northing	Sedime Accun Extens	ent - Chro ent deposit ulating?  432546  432546  DSH 2  AR 600mm)  ed site for c	Yes No  f quality o	ct site is judg 0.00 L 97 D	ed as: ow flow Ve eposition Ind
add number ssessment type S grid reference of asses S grid reference of outfall utfall number aceiving water course A receiving water Detaile ate of assessment otes tep 1 Runoff Qualit tep 2 River Impacts	Annual Average CC Step 2 0.20 Step 3 -  Smert point (m)  structure (m)   X AADT >10,000 and  Annual 95%ile river Impermeable road a Base Flow Index (B  Water hardness [  Wate	oncentration r Zinc 0.85 ug/l 0.85 ug/l A38 Kingsway J Non-cumulative Easting	unction assessment (single 432546 432546  Climatic region  0.002 1.338 0.5  0.03/1  p, pond or canal tha 2.5	Pasi  HA Are outfall)  Line cumula Asses Versio  Colder Dry  (Enter zero in A Permeable are is the discharge)	n1.0 Novemb sea / DBFO num set of outfalls in stative assessing sor and affiliat an of assessment an analysis of the properties of the pro	Pass  Morthing Northing Northing C2  ment C2  Bion ent  Rainfall site e river flow box to a outfall (ha) 1 km upstream of a	Sedime Sedime Extension (SA Session Sedime Extension (SA Sedime Extension SA Sedime Extension SA Sedime Sed	ent - Chro ent deposit ulating? sive?  432546  432546  DSH 2  AR 600mm) ep 1 runofi	on for this Yes No  f quality of	ct site is judg 0.00 97 D	ed as:  w flow Ve flow Ve flow No  No  No  No  No  No  No  No  No  No
oad number ssessment type S grid reference of asses S grid reference of outfall ufal number eceiving watercourse A receiving water Detaile ate of assessment otes  tep 1 Runoff Qualit  tep 2 River Impacts  For dissolved zinc only or sediment impact or	Annual Average CC Step 2 0.20 Step 3 -  Sement point (m)  Structure (m)   AADT 10,000 and Annual 95%ile river impermeable road a Base Flow Index (B Water hardness [Material of the structure]  Water hardness [Material of the structure]  National Average CC  Step 2 0.20  Step 2 0.20  Step 3 -  Structure (m)	oncentration r Zinc 0.85 ug/l 0.85 ug/l A38 Kingsway J Non-cumulative Easting	unction assessment (single 432546 432546  Climatic region  0.002 1.338 0.5  0.03/1  p, pond or canal tha 2.5	Asses  Colder Dry  (Enter zero in Apermeable are is the discharge)	and DBFO number of the state of outfalls in of assessment	Pass  mber  Northing Northing Northing C2  ment  Rainfall site e river flow box to a outfall (ha) 1 km upstream of a	Sedime Sedime Accune Extension (SA Sedime Income SA Sedim	ent - Chro ent deposit ulating?  432546  432546  DSH 2  AR 600mm)  ed site for c	on for this Yes No  f quality of	ct site is judg 0.00 L 97 D	ed as: ow flow Ve eposition Ind
add number sessment type 8 grid reference of asses 8 grid reference of outfall ffall number serving water course A receiving water Detaile ate of assessment ottes tep 1 Runoff Qualit tep 2 River Impacts or dissolved zinc only or sediment impact or	Annual Average CC Step 2 0.20 Step 3 -  Smert point (m)  structure (m)   X AADT >10,000 and  Annual 95%ile river Impermeable road a Base Flow Index (B  Water hardness [  Wate	oncentration r Zinc 0.85 ug/l 0.85 ug/l A38 Kingsway J Non-cumulative Easting	unction assessment (single   432546   432546    Climatic region   0.002   1.338   0.5   0.	Passion Line Colder Dry  (Enter zero in Apermeable are is the discharge treduces the volume in the colder Dry Manning's n	and a liovember of the second	Pass  Morthing Northing Northing C2  Bion ent  Rainfall site e river flow box to a outfall (ha) 1 km upstream of at  100m of the point of Side slope (nameted effectiveness  Attenuation for	Sedime Sedime Extens	ent - Chro ent deposit ulating? sive?  432546  432546  DSH 2  AR 600mm) ep 1 runofi	on for this Yes No  f quality of	ct site is judg 0.00 97 D	No •
add number sessment type 8 grid reference of asses 8 grid reference of outfall ffall number serving water course A receiving water Detaile ate of assessment ottes tep 1 Runoff Qualit tep 2 River Impacts or dissolved zinc only or sediment impact or	Annual Average CC Step 2 0.20 Step 3 -  Smert point (m)  structure (m)   X AADT >10,000 and  Annual 95%ile river Impermeable road a Base Flow Index (B  Water hardness [  Wate	Soloncentration r Zinc 0.85 ug/l ug/l A38 Kingsway J A38 Kingsway J Bramble Brook 22/02/2019  22/02/2019  Flow (m³/s) area drained (ha) FI) High = >200mg CaC am structure, lake driver width (m) h (m)	unction assessment (single   432546   432546    Climatic region   0.002   1.338   0.5   0.	Passion Line Colder Dry  (Enter zero in Apermeable are is the discharge treduces the volume in the colder Dry Manning's n	and DBFO nur  at JOBFO nur  at	Pass  mber  Northing Northing Northing C2  ment  Rainfall site e river flow box to a outfall (ha) 1 km upstream of a	Sedime Sedime Extens	ent - Chro ent deposit uulating? 432546 432546 DSH 2 AR 600mm) ep 1 runoft	on for this Yes No  T quality of onservati	ct site is judg 0.00 97 p	ed as:  No   0.0000
	Annual Average CC Step 2 0.20 Step 3 -  Smert point (m)  structure (m)   X AADT >10,000 and  Annual 95%ile river Impermeable road a Base Flow Index (B  Water hardness [  Wate	Soloncentration r Zinc 0.85 ug/l ug/l A38 Kingsway J A38 Kingsway J Bramble Brook 22/02/2019  22/02/2019  Flow (m³/s) area drained (ha) FI) High = >200mg CaC am structure, lake driver width (m) h (m)	unction assessment (single   432546   432546    Climatic region   0.002   1.338   0.5   0.	Passion Line Colder Dry  (Enter zero in Apermeable are is the discharge treduces the volume in the colder Dry Manning's n	and DBFO nur  at / DB	Pass  Morthing Northing Northing Northing C2 ment  Rainfall site e river flow box to a outfall (ha) 1 km upstream of a  100m of the point o  Side slope (nameted effectiveness Attenuation for colubles – restricted	Sedime Sedime Extens	ent - Chro ent deposit ulating? sive?  432546  432546  DSH 2  AR 600mm) ep 1 runofi	on for this Yes No  T quality of onservati	nly)  Predict	ed as: ow flow Vel eposition Ind  No  0.0001



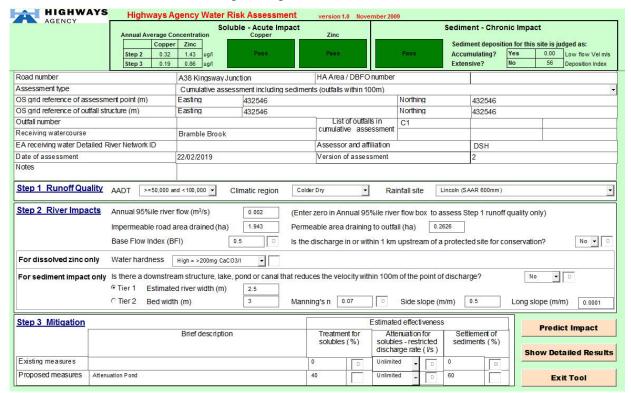
HIGHWAY	Highways A	gency Water	Risk Assessmen	t	version 1.0	Nover	nber 200	9 3						
AGENCY		Sc	oluble - Acute Impa	ct					Sedim	ent - Ch	ronic	Impa	et	
	Annual Average Co		Copper		Zinc				Sodi	ment deno	eition f	or this	site is judge	od ac.
	Step 2 0.10	0.42 ug/l	Pass		Pass			Pass	20.00	imulating?				w flow Vel m/s
	Step 3 -	- ug/l		22						nsive?	No			position Index
Road number		A38 Kingsway	Junction		HA Area / D	BFO	number			T				
Assessment type		4	e assessment (single o	outfall)						1				
OS grid reference of asses	sment point (m)	Easting	432546	- diadiny				Northing		432546				100
OS grid reference of outfall	structure (m)	Easting	432546				$\neg$	Northing		432546	_			
Outfall number	A CAN AND AND AND AND AND AND AND AND AND A		No. of the Association of the		List of o			C3					Î	
Receiving watercourse		Bramble Brook	(3		cumulative	asses	ssment			1			1	
EA receiving water Detaile	d River Network ID	2			Assessor ar	nd affil	iation	1		DSH			-21	
Date of assessment		22/02/2019			Version of a	ssess	ment			2				
Notes							60.00(2M/20 to			77				
Step 1 Runoff Qualit	¥ AADT ≥10,000 an	d <50,000 +	Climatic region	Colder I	Dry		Rair	nfall site	Lincoln (S	AAR 600mi	n)			•
Step 2 River Impacts	Annual 95%ile river	flow (m3/s)	0.002 (	Enterz	ero in Annu	al 959	6ile rive	r flow box t	assess s	Step 1 run	off qua	ality or	nly)	
	Impermeable road	area drained/ha	0.589 F	Dormos	ble area dra	ainina	to outfa	II (ha)	0.0876			6	6.67	
						renim To							VI. 10. A.	
	Base Flow Index (B	FI)	0.5 D	s the di	scharge in o	or with	in 1 km	upstream o	f a protec	ted site fo	rconse	ervatio	n?	No ▼ □
For dissolved zinc only	Water hardness	High = >200mg Ca	CO3/I -											
	A STATE OF THE STA			50-00-00-00 N POR	70 MARK BAR SERVICE BOOK BAR SERVICE B	ros perendentes		THE SPECIAL CONTROL OF						_
For sediment impact or		am structure, la	ke, pond or canal that	reduce	s the velocit	y withi	in 100m	of the poin	t of discha	arge?		No	· • D	
	Tier 1 Estimate	ed river width (m	2.5											
	© Tier 2 Bed widt	h (m)	3 N	Manning	g's n 0.07		D	Side slope	(m/m)	0.5	Lo	ong sl	ope (m/m)	0.0001
		1,000,000									=	- C(1)		
Step 3 Mitigation						E	stimate	d effectiven	ess				Predict	Impact
		Brief descripti	on		Treatment for			nuation for s - restricte		ttlement of		\ <u></u>		
					solubles (%	"		rge rate (Vs		iments (%	"	eh.	ow Dotail	ed Results
Existing measures				0	Г	D	Unlimite				D	311	ow betail	eu Resuits
Proposed measures				0			Unlimite							
r roposed measures				U	- 1	D	Oliminie	° -	U		2]		Exit	rool
AGENCY	Annual Average C Coppe Step 2 0.08	oncentration	Oluble - Acute Impa Copper	ict	Zinc Pass			Pass	Sed	ment - Cl liment dep cumulating	osition	for this	s site is judg	ged as: .ow flow Vel m/s
	Step 3 -	- ug/l		- 6					Ext	ensive?	No	)	35	Deposition Index
Road number		A38 Kingsway	Junction		HA Area / [	BFO	number			Т		_		
Assessment type		1	e assessment (single	outfall)						-1				
OS grid reference of asses	ssment point (m)	Easting	432546					Northing		43254	6			100
OS grid reference of outfal	structure (m)	Easting	432546					Northing		43254	6			
Outfall number			-		List of			C4		1				
Receiving watercourse		Bramble Broo	k	5	cumulative	asse	ssment							
EA receiving water Detaile	d River Network ID				Assessor a	nd affi	iliation			DSH				
Date of assessment	-	22/02/2019			Version of a	asses:	sment			2				
Notes														
Step 1 Runoff Qualit	Y AADT >10,000 an	d <50,000	Climatic region	Colder	Dry	_	Ra	infall site	Lincoln	SAAR 600n	nm)			¥
Step 2 River Impact					zero in Annu			100	to assess	Step 1 ru	noff qu	ality o	only)	
	Base Flow Index (E	Note that the second se			able area dr ischarge in				**************************************	ded site f	or cons	servat	ion?	No ▼ □
For dissolved zinc only	Water hardness	High = >200mg C	aCO3/I ▼					00	200					
For sediment impact of	AND	am structure, la	ke, pond or canal that	t reduce	es the veloci	ty with	nin 100n	n of the poi	nt of disch	arge?		N	lo 🕶	D
	↑ Tier 2 Bed wid	- A		Mannin	ıg's n 0.07		D	Side slop	e (m/m)	0.5		ong s	slope (m/m)	0.0001
Step 3 Mitigation		B					-	ed effectiver					Predict	Impact
	Brief description				Treatment for Solubles (%) Show Det:  Steeman of Settlement of Settlemen				2 7 444 775					
Existing managers				4			The second division in the second				1 '			
Existing measures				0		D	Unlimite	ed 🗸 🗆	0	Г	D		low beta	neu nesuns
Proposed measures				0		D D	Unlimite		0 0		D D			Tool



HIGHWAY	Highways	Agency Wate	r Risk Assessmer	nt version 1.0 Novem	nber 2009			
AGENCY	1000		oluble - Acute Impa	act	3	Sedimen	- Chronic	Impact
		e Concentration	Copper	Zinc		Codimon	t deposition fo	or this site is judged as:
	Step 2 0.		Pass	Pass	Pass	Accumul		
	Step 3	- ug/l	4,000,000			Extensiv	2 S C C C C C C C C C C C C C C C C C C	
Road number		A38 Kingsway	/Junction	HA Area / DBFO n	umber	1		
Assessment type			ve assessment (single	outfall)				-
OS grid reference of asse	ssment point (m)	Easting	432546		Northing	4	32546	
OS grid reference of outfa	Il structure (m)	Easting	432546		Northing	4	32546	
Outfall number			•	List of outfalls				
Receiving watercourse		Bramble Broo	k	cumulative asses	SILICIL			
EA receiving water Detaile	ed River Network ID			Assessor and affili	ation		SH	· · · · · · · · · · · · · · · · · · ·
Date of assessment		22/02/2019		Version of assessi	ment	2		
Notes								
Step 1 Runoff Quali	<u>ty</u> AADT >=50,00	0 and <100,000	Climatic region	Colder Dry	Rainfall site L	incoln (SAAF	t 600mm)	
Step 2 River Impact	S Annual 95%ile ri	ver flow (m <sup>3</sup> /s)	0.002	(Enter zero in Annual 95%	ile river flow box to a	ssess Ster	1 runoff qua	ality only)
		nd area drained (h		Permeable area draining t		an and the same of the same		,
	CONTRACTOR OF THE CONTRACTOR O	5.00071557		NAMES OF TAXABLE PARTY.	,	10 10 10		
	Base Flow Index	(BFI)	0.5	Is the discharge in or withi	n 1 km upstream of a	protected	site for cons	ervation?
For dissolved zinc onl	water hardness	High = >200mg C	aCO3/I +					
	-ty le there a dewne			at radius as the valority within	n 100m of the point of	f disabaras	2	Two of the
For sediment impact o	The second secon			t reduces the velocity withi	ii room or the point of	uistriarge	•	No 🕶 🖪
		ated river width (n	100		[			
	↑Tier 2 Bed w	ridth (m)	3	Manning's n 0.07	Side slope (n	n/m) 0.5	Lo	ong slope (m/m) 0.0001
Step 3 Mitigation				E	stimated effectiveness	;		
		Brief descript	tion	Treatment for	Attenuation for	Settlen	nent of	Predict Impact
				solubles (%)	solubles - restricted	sedime	nts (%)	1
Existing measures				0	Unlimited Unlimited	0		Show Detailed Results
						300	D	
Proposed measures				0	Unlimited _	0	D	Exit Tool
AGENCY	Annual Average C	oncentration	luble - Acute Impac Copper	ct Zinc		Sedimen	t - Chronic	Impact
	Step 2 0.64	200	Pass	Pass				for this site is judged as:
	Coppe   Step 2	2.79 ug/l	Pass			Sedimer Accumu Extensiv	lating?	for this site is judged as:  Low flow Vel m/s  Deposition Index
oad number	Step 2 0.64	2.79 ug/l - ug/l			umber	Accumu	lating?	Low flow Vel m/s
	Step 2 0.64	2.79 ug/l - ug/l A38 Kingsway J	unction	Pass HA A rea / DBFO no		Accumu	lating?	Low flow Vel m/s
ssessment type	Step 2 0.64 Step 3 -	2.79 ug/l - ug/l A38 Kingsway J	unction	Pass		Accumu Extensiv	lating?	Low flow Vel m/s Deposition Index
ssessment type S grid reference of assessr	Step 2 0.64 Step 3 -	2.79 ug/l - ug/l A38 Kingsway J Cumulative ass	unction essment excluding se	Pass HA A rea / DBFO no	100m and 1km apart)	Accumu Extensiv	lating?	Low flow Vel m/s Deposition Index
ssessment type IS grid reference of assessi IS grid reference of outfall s	Step 2 0.64 Step 3 -	2.79 ug/l ug/l A38 Kingsway J Cumulative ass Easting	unction essment excluding se	HA Area / DBFO nodiments (outfalls between	Northing Northing C1 to C5	Accumu Extensiv	lating?	Low flow Vel m/s Deposition Index
ssessment type IS grid reference of assessr IS grid reference of outfall si ruffall number	Step 2 0.64 Step 3 -	2.79 ug/l ug/l A38 Kingsway J Cumulative ass Easting	unction essment excluding se	HA A rea / DBFO nodiments (outfalls between	Northing Northing C1 to C5	Accumu Extensiv	lating?	Low flow Vel m/s Deposition Index
ssessment type S grid reference of assessi S grid reference of outfall si utfall number eceiving watercourse	Step 2 0.84 Step 3 -	2.79 ug/l - ug/l A38 Kingsway J Cumulative ass Easting Easting	unction essment excluding se	HA Area / DBFO nodiments (outfalls between	Northing Northing Northing  in Sment	Accumu Extensiv	lating?	Low flow Vel m/s Deposition Index
ssessment type S grid reference of assessr S grid reference of outfall si utfall number eceiving watercourse A receiving water Detailed ate of assessment	Step 2 0.84 Step 3 -	2.79 ug/l - ug/l A38 Kingsway J Cumulative ass Easting Easting	unction essment excluding se	HA Area / DBFO no ediments (outfalls between during the cumulative assess	Northing Northing Northing C1 to C5 Sment	Accumu Extensiv	alating? e?	Low flow Vel m/s Deposition Index
ssessment type S grid reference of assessr S grid reference of outfall si utfall number eceiving watercourse A receiving water Detailed ate of assessment	Step 2 0.84 Step 3 -	2.79 ug/l - ug/l A38 Kingsway J Cumulative ass Easting Easting Bramble Brook	unction essment excluding se	HA Area / DBFO no ediments (outfalls between during the cumulative assession and affilia	Northing Northing Northing C1 to C5 Sment	Accumu Extensiv	alating? e?	Low flow Vel m/s Deposition Index
ssessment type S grid reference of assessi S grid reference of outfall si utfall number eceiving watercourse A receiving water Detailed ate of assessment otes	Step 2 0.64 Step 3 -  ment point (m) fructure (m)  River Network ID	2.79 ug/l - ug/l A38 Kingsway J Cumulative ass Easting Easting Bramble Brook	unction essment excluding se	HA Area / DBFO no ediments (outfalls between during the cumulative assession and affilia	Northing Northing Northing Northing C1 to C5 sment ation	Accumu Extensiv	alating? e? 36169	Low flow Vel m/s Deposition Index
ssessment type S grid reference of assessi S grid reference of outfall si utfall number eceiving watercourse A receiving water Detailed ate of assessment otes  tep 1 Runoff Quality	Step 2 0.64 Step 3 -  ment point (m) fructure (m)  River Network ID  AADT >=50,000	2.79 ug/l yg/l A38 Kingsway J Cumulative ass Easting Easting Bramble Brook	unction essment excluding se 432824  Climatic region	HA Area / DBFO modiments (outfalls between a cumulative assess)  Assessor and affilia  Version of assessor	100m and 1km apart) Northing Northing Northing C1 to C5 sment attor nent  Rainfall site L	Accumu Extensiv	ating? e? 36169	Low flow Vel m/s Deposition Index
ssessment type S grid reference of assessi S grid reference of outfall si utfall number eceiving watercourse A receiving water Detailed ate of assessment otes  tep 1 Runoff Quality	Step 2 0.64 Step 3 -  ment point (m) fructure (m)  AADT >=50,000  Annual 95%ile rive	2.79 ug/l yg/l A38 Kingsway J Cumulative ass Easting Easting Bramble Brook 19/11/2018	unction essment excluding se 432824  Climatic region [	HA Area / DBFO no diments (outfalls between a cumulative assess Assessor and affilia Version of assessor and affilia version o	Northing Northing Northing Northing Northing In C1 to C5 station nent  Rainfall site  Le river flow box to a	Accumu Extensiv	ating? e? 36169	Low flow Vel m/s Deposition Index
ssessment type S grid reference of assessi S grid reference of outfall si utfall number eceiving watercourse A receiving water Detailed ate of assessment otes  tep 1 Runoff Quality	Step 2 0.64 Step 3 -  ment point (m) fructure (m)  AADT >=50,000  Annual 95%ile rive Impermeable road	A38 Kingsway J Cumulative ass Easting Easting Bramble Brook 19/11/2018  r flow (m³/s) area drained (ha)	unction essment excluding se 432824  Climatic region  0.002 (5.196 F	HA Area / DBFO no diments (outfalls between a cumulative assess Assessor and affilia Version of assessor are colder Dry  Enter zero in Annual 95% Permeable area draining to	Northing Northing Northing Northing Northing In C1 to C5 Section need Rainfall site L lile river flow box to a coutfall (ha) 0.7	Accumu Extensiv	ating? e? 36169 36169 3 1 runoff qu	Low flow Vel m/s Deposition Index
ssessment type S grid reference of assessi S grid reference of outfall si utfall number eceiving watercourse A receiving water Detailed ate of assessment otes  tep 1 Runoff Quality	Step 2 0.64 Step 3 -  ment point (m) fructure (m)  AADT >=50,000  Annual 95%ile rive	2.79 ug/l ug/l A38 Kingsway J Cumulative ass Easting Easting Bramble Brook 19/11/2018  r flow (m³/s) area drained (ha)	unction essment excluding se 432824  Climatic region  0.002 (5.196 F	HA Area / DBFO no diments (outfalls between a cumulative assess Assessor and affilia Version of assessor and affilia version o	Northing Northing Northing Northing Northing In C1 to C5 Section need Rainfall site L lile river flow box to a coutfall (ha) 0.7	Accumu Extensiv	ating? e? 36169 36169 3 1 runoff qu	Low flow Vel m/s Deposition Index
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ssessment type Signid reference of assessi Signid reference of outfall si utfall number ceiving watercourse A receiving water Detailed ate of assessment otes  Step 1 Runoff Quality Step 2 River Impacts  For dissolved zinc only	Step 2 0.64 Step 3 -  ment point (m) Inucture (m)  AADT >=50,000  Annual 95%ile rive Impermeable road Base Flow Index (E) Water hardness	2.79 ug/l - ug/l - ug/l - A38 Kingsway J Cumulative ass Easting Easting Bramble Brook 19/11/2018  and <100,000  r flow (m <sup>3</sup> /s) area drained (ha) BFI)  High = >200mg Cac	Climatic region  0.002  0.5.196  0.5	HA Area / DBFO m diments (outfalls between diments (outfalls between diments)  List of outfalls cumulative assess  Assessor and affilia  Version of assessor  Colder Dry  Enter zero in Annual 95% Permeable area draining to set the discharge in or withing	Northing Northing Northing Northing C1 to C5 Sment Rainfall site L Le river flow box to a o outfall (ha) 0.7 n 1 km upstream of a	Accumu Extensiv  3  3  L  1  1  1  1  1  1  1  1  1  1  1  1	alating? e? 36169 36169 36169 1 runoff qu site for cons	Low flow Vel m/s Deposition Index     Vel
ssessment type Signid reference of assessi Signid reference of outfall si utfall number ceiving watercourse A receiving water Detailed ate of assessment otes  Step 1 Runoff Quality Step 2 River Impacts  For dissolved zinc only	Step 2 0.64 Step 3 -  ment point (m) Inucture (m)  AADT >=50,000  Annual 95%le rive Impermeable road Base Flow Index (E Water hardness r is there a downstree	2.79 ug/l - ug/l - ug/l - A38 Kingsway J Cumulative ass Easting Easting Bramble Brook 19/11/2018  and <100,000  ar flow (m³/s) area drained (ha) BFI) High = >200mg Cac am structure, lake	Climatic region  0.002  0.5.196  0.5  0.901	HA Area / DBFO m diments (outfalls between diments (outfalls between diments)  List of outfalls cumulative assess  Assessor and affilia  Version of assessor  Colder Dry  Enter zero in Annual 95% Permeable area draining to set the discharge in or withing	Northing Northing Northing Northing C1 to C5 Sment Rainfall site L Le river flow box to a o outfall (ha) 0.7 n 1 km upstream of a	Accumu Extensiv  3  3  L  1  1  1  1  1  1  1  1  1  1  1  1	alating? e? 36169 36169 36169 1 runoff qu site for cons	Low flow Vel m/s Deposition Index
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ssessment type S grid reference of assessi S grid reference of outfall si utfall number eceiving water Detailed ate of assessment otes  Step 1 Runoff Quality  Step 2 River Impacts  For dissolved zinc only	Step 2 0.64 Step 3 -  ment point (m) Inucture (m)  AADT >=50,000  Annual 95%lle rive Impermeable road Base Flow Index (E Water hardness I is there a downstre	2.79 ug/l - ug/l	Climatic region  0.002  0.5.196  0.5  0.9  0.9  0.5.196  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0	HA Area / DBFO no diments (outfalls between a cumulative assess Assessor and affilial Version of assessor are discountied by the control of t	Northing Northing Northing Northing Northing In C1 to C5 In C2 In C1 to C5 In C2 In C2 In C3 In C1 to C5 In C4 In	Accumu Extensiv  3  3  1  1  1  1  1  1  1  1  1  1  1	ating? e? 36169 36169 1 runoff qu site for cons	ality only)
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ssessment type S grid reference of assessi S grid reference of outfall si utfall number eceiving water Detailed ate of assessment otes  Step 1 Runoff Quality  Step 2 River Impacts  For dissolved zinc only  For sediment impact only  Step 3 Mitigation	Step 2 0.64 Step 3 -  ment point (m) Inucture (m)  AADT >=50,000  Annual 95%lle rive Impermeable road Base Flow Index (E Water hardness I is there a downstre	2.79 ug/l yg/l A38 Kingsway J Cumulative ass Easting Easting Bramble Brook 19/11/2018  19/11/2018  r flow (m³/s) area drained (ha) 3FI)  High = >200mg Ca( am structure, laked river width (m) th (m)	Climatic region  0.002  0.5.196  F  0.5  D  18  Cooling to the property of the	HA Area / DBFO no diments (outfalls between a cumulative assess Assessor and affilia Version of assessor and affilia version o	Northing Northing Northing Northing Northing In C1 to C5 In C5 In C1 to C5 In C1 to C5 In C2 In C1 to C5 In C2 In C1 to C5 In C2 In C1 to C5 In C1 to	Accumu Extensiv  3  3  1  1  1  1  1  1  1  1  1  1  1	asing?  asing a single	ality only)  Servation?  No   Deposition index
oad number ssessment type S grid reference of assessi S grid reference of outfall si utfall number eceiving watercourse A receiving water Detailed ate of assessment otes  tep 1 Runoff Quality  tep 2 River Impacts  or dissolved zinc only  or sediment impact only  tep 3 Mitigation	Step 2 0.64 Step 3 -  ment point (m) Inucture (m)  AADT >=50,000  Annual 95%lle rive Impermeable road Base Flow Index (E Water hardness I is there a downstre	2.79 ug/l yg/l A38 Kingsway J Cumulative ass Easting Easting Bramble Brook 19/11/2018  19/11/2018  r flow (m³/s) area drained (ha) 3FI)  High = >200mg Ca( am structure, laked river width (m) th (m)	Climatic region  0.002  0.5.196  F  0.5  D  18  Cooling to the property of the	HA Area / DBFO no diments (outfalls between a cumulative assess Assessor and affilia Version of assessor and affilia version o	Northing Northing Northing Northing Northing C1 to C5 In C1 to C5 In C2 Iterity of the point of the point of the point of the point of the stimated effectiveness Atteruation for solubles - restricted	Accumu Extensiv  3  3  Incoln (SAAF  1  1  Incoln (SAAF  1  1  Incoln (SAAF  Incoln (	asing?  asing a single	ality only)  Servation?  No   Predict Impact

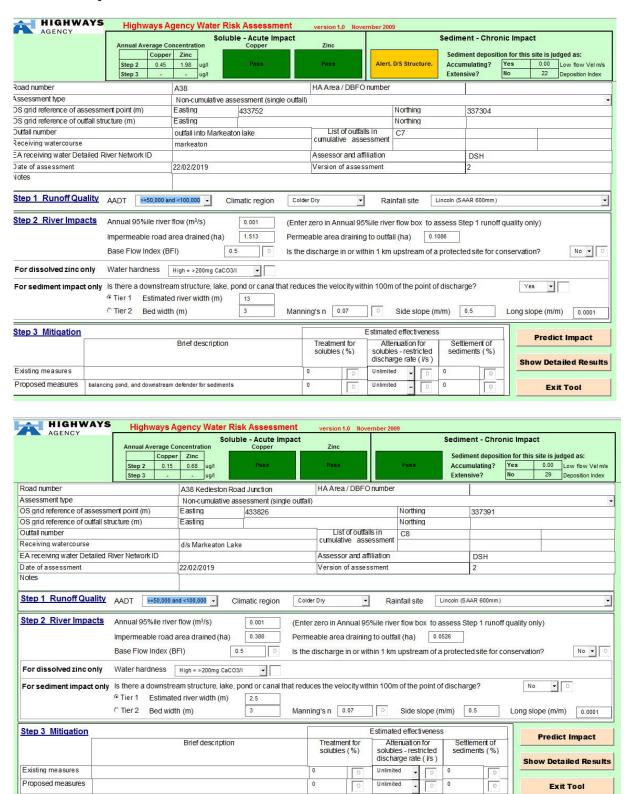


#### Outfall Catchment C1 with design mitigation included:





#### Markeaton junction:





HIGHW	AYS Highways A	gency Water	Risk Assessment	version 1.0 No	vember 200	0					
AGENCY	riigiiirayeri		luble - Acute Impac		verniber 200		Sedime	nt - Chro	nic Impa	ct	
	Annual Average Co	oncentration	Copper	Zinc					750		
	Copper		Pass	Pass	Ш	Dane		ent deposit		0.00	7
	Step 2 0.24 Step 3 -	1.02 ug/l - ug/l	rass	Pass	Ш	Pass	Extens	nulating?	Yes	62	Low flow Vel m/s Deposition Index
Road number	Stop 0		Doed Limiter	HA Area / DBF	Onumber		Laton	I			_ верескоп пласх
		A38 Kedleston		731000 miles miles miles (1900)	Offulfiber						120
Assessment type OS grid reference of as	occement point (m)		assessment (single ou	uttali)		Northing		007004			in the second
OS grid reference of ou		Easting Easting	433826			Northing		337391			
Outfall number	uair suuciule (III)	Lasting		List of out	falle in					7/	
Receiving watercourse		d/s Marales store I	-L-		List of outfalls in C9 Cumulative assessment				-		
EA receiving water Deta	ailed Diver Network ID	d/s Marke aton L	ake	Assessor and	filiation			DOLL			
	alled River Network ID	00.00.000						DSH			
Date of assessment Notes		22/02/2019		Version of ass	essment			2			
Notes											
Step 1 Runoff Quality AADT >10,000 and <50,000 • Climatic region Colder Dry • Rainf						nfall site	incoln (S.A	AR 600mm)			•
Step 2 River Impa	cts Annual 95%ile river	flow (m <sup>3</sup> /s)	0.001 (F	enter zero in Annual i	059/ ilo rivo	r flow boy to a	ecocc St	on 1 rupof	f quality o	nh()	
				Enter zero in Annual				ep i fulloli	quality u	illy)	
	Impermeable road a	area drained (ha)	0.833 Pe	ermeable area drain	ng to outfa	II (ha) 0.0	388				
	Base Flow Index (B	FI)	0.5 D Is	the discharge in or v	vithin 1 km	upstream of a	protecte	ed site for c	onservati	on?	No ► □
20 0 0 0 0	21 20 1 2 U. A					70	200				
For dissolved zinc o	nly Water hardness	High = >200mg Ca0	03/1								
For sediment impact	only is there a downstrea	am structure, lak	e, pond or canal that r	educes the velocity v	ithin 100m	of the point of	dischar	ge?	N	0 -	D
	THE PERSON OF TH	ed river width (m)	2.5	ā.				A.C.		-	
	↑ Tier 2 Bed widt	8.5		anning's n 0.07	D	Side slope (n	n/m)	0.5	Longs	lope (m/i	n) 0.0001
	TIOL 2 BCd widt	()	141	diffing 5 ft _ t-t-		Olde Slope (II	<i></i>		Long 3	iope (iii)	11) 0.0001
Step 3 Mitigation				1	Estimate	d effectiveness	3				
		Brief description	n	Treatment for	Atte	nuation for	Setti	ement of	1	Predi	et Impact
		•		solubles (%)		s - restricted	sedin	nents (%)	N.		
					20000000000	rge rate (Vs)			Sh	ow Det	ailed Results
Existing measures				0	Unlimite	d 🕶 🗖	0	D	-		
Proposed measures				0	Unlimite	d _ D	0	D		Ex	it Tool
TATUICUW.	AVC			0-	200			(1)			
HIGHWA	AYS Highways A	gency Water	Risk Assessment	version 1.0 No	vember 200	9:					
	riigiiwaysA	So	luble - Acute Impac	t	vember 200	9	Sedime	ent - Chro	nic Impa	ıct	
	Annual Average Co	So	AND THE PERSON NAMED IN COLUMN TWO	M. The state of th	vember 200	9		ent - Chro	PEN Personanan		dged as:
	Annual Average Co	So	luble - Acute Impac	t		9 D/S Structure.	Sedim		ion for this	s site is ju	dged as:
	Annual Average Co	So oncentration r Zinc	luble - Acute Impac Copper	žinc Zinc			Sedim	ent deposit	ion for this	s site is ju	
	Annual Average Co Copper Step 2 0.76	oncentration r Zinc 3.29 ug/l	luble - Acute Impac Copper Pass	žinc Zinc	Alert.		Sedim Accur	ent deposit	ion for this	s site is ju	Low flow Vel m/s
AGENCY	Annual Average Co Copper Step 2 0.76	So oncentration r Zinc 3.29 ug/l - ug/l	luble - Acute Impac Copper Pass	Zinc Pass HA Area / DBF	Alert.		Sedim Accur	ent deposit	ion for this	s site is ju	Low flow Vel m/s
AGENCY  Road number	Annual Average Co Copper Step 2 0.76 Step 3 -	So oncentration r Zinc 3.29 ug/l - ug/l	luble - Acute Impac Copper Pass	Zinc Pass HA Area / DBF	Alert.		Sedim Accur	ent deposit	ion for this	s site is ju	Low flow Vel m/s
Road number Assessment type	Annual Average Co Copper Step 2 0.76 Step 3 -	So oncentration r Zinc 3.29 ug/l - ug/l A38 Little Eator Non-cumulative	Iuble - Acute Impac Copper Pass Junction assessment (single or	Zinc Pass HA Area / DBF	Alert.	D/S Structure.	Sedim Accur	ent deposit nulating? sive?	ion for this	s site is ju	Low flow Vel m/s
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Road number Assessment type OS grid reference of as OS grid reference of ou Outfall number Receiving water Det Date of assessment Notes  Step 1 Runoff Qua	Annual Average Co Step 2 0.76 Step 3 -  sessment point (m)  Iffall structure (m)  allied River Network ID  allied AADT >=50,000 ar  Cts Annual 95%ile river Impermeable road a	Soncentration  Tine 3.29 ug/l - ug/l A38 Little Eator Non-cumulative Easting Easting Easting Easting  Easting  Easting  Iake d/s of A38  22/02/2019	Luble - Acute Impac Copper Pass  IJunction assessment (single of 433796)  Climatic region  0.001 (E) 3.391 Periodopara	HA Area / DBR  HA Area / DBR  List of out cumulative a: Assessor and Version of ass  Colder Dry  Enter zero in Annual:	Alert.  Alert.	Northing Northing C10  Infall site I  I flow box to a  II (ha) 0.0	Sedim Accur Exten:	pent deposition ulating? sive?  337233  DSH 2	Yes No	s site is ju 0.00 90	Low flow Vel m's Deposition Index
Road number Assessment type OS grid reference of as OS grid reference of ou Outfall number Receiving water Det Date of assessment Notes  Step 1 Runoff Qua	Annual Average Co Step 2 0.76 Step 3 -  sessment point (m)  Iffall structure (m)  alied River Network ID  aliety AADT >=50,000 ar  Cts Annual 95%ile river	Soncentration  Tine 3.29 ug/l - ug/l A38 Little Eator Non-cumulative Easting Easting Easting Easting  Easting  Easting  Iake d/s of A38  22/02/2019	Luble - Acute Impac Copper Pass  IJunction assessment (single of 433796)  Climatic region  0.001 (E) 3.391 Periodopara	HA Area / DBR  HA Area / DBR  List of out cumulative a: Assessor and Version of ass  Colder Dry  Enter zero in Annual (	Alert.  Alert.	Northing Northing C10  Infall site I  I flow box to a  II (ha) 0.0	Sedim Accur Exten:	pent deposition ulating? sive?  337233  DSH 2	Yes No	s site is ju 0.00 90	Low flow Vel m's Deposition Index
Road number Assessment type OS grid reference of as OS grid reference of ou Outfall number Receiving water Det Date of assessment Notes  Step 1 Runoff Qua	Annual Average Co Copper Step 2 0.76 Step 3 -  Sessment point (m) Ifall structure (m)  ality AADT >=50,000 ar  Cts Annual 95%ile river Impermeable road a Base Flow Index (B	Soncentration  Tine 3.29 ug/l - ug/l A38 Little Eator Non-cumulative Easting Easting Easting Easting  Easting  Easting  Iake d/s of A38  22/02/2019	Iuble - Acute Impac Copper Pass  IJunction assessment (single ou 433796  Climatic region  0.001 (E) 3.391 Pc 0.5	HA Area / DBR  HA Area / DBR  List of out cumulative a: Assessor and Version of ass  Colder Dry  Enter zero in Annual:	Alert.  Alert.	Northing Northing C10  Infall site I  I flow box to a  II (ha) 0.0	Sedim Accur Exten:	pent deposition ulating? sive?  337233  DSH 2	Yes No	s site is ju 0.00 90	Low flow Vel m's Deposition Index
Road number Assessment type OS grid reference of as OS grid reference of ou Outfall number Receiving water Det Date of assessment Notes  Step 1 Runoff Qual Step 2 River Impa	Annual Average Co Copper Step 2 0.76 Step 3 -  Sessment point (m) Ifall structure (m)  ality AADT >=50,000 as  Cts Annual 95%ile river Impermeable road a Base Flow Index (B  nly Water hardness	Soncentration    Zine   3.29   ug/l     3.29   ug/l     -   ug/l     A38 Little Eator     Non-cumulative     Easting     Easting     lake d/s of A38     22/02/2019     of   100,000   ug/l     flow (m³/s)     area drained (ha)     Fl)     High = >200mg Caf	Luble - Acute Impac Copper Pass  AJunction assessment (single or 433796  Climatic region  0.001 (E 3.391 Pc 0.5 Is	Pass  HA Area / DBF  utfall)  List of out cumulative as: Assessor and Version of ass  Colder Dry  Enter zero in Annuals ermeable area drain the discharge in or or	Alert.  O number  falls in ssessment affiliation essment  Rai 25%ile rive ng to outfavithin 1 km	Northing Northing C10  Infall site  If flow box to a all (ha)  upstream of a	Sedim Accur Extens	pent deposition ulating? sive?  337233  DSH 2  Lep 1 runof ded site for control of the control o	yes No	s site is ju 0.00 90 90 only)	Low flow Vel m's Deposition Index
Road number Assessment type OS grid reference of as OS grid reference of ou Outfall number Receiving water course EA receiving water Det Date of assessment Notes  Step 1 Runoff Qua  Step 2 River Impa	Annual Average Co Copper Step 2 0.76 Step 3 -  Sessment point (m)  If all structure (m)  ADT ==50,000 all  Cts Annual 95%ile river Impermeable road a Base Flow Index (B  Inly Water hardness [ Londy Is there a downstre.	Soncentration  Tine 3.29 ugh - ugh  A38 Little Eator Non-cumulative Easting Easting Easting Easting Easting  Ind <100,000 v  Flow (m³/s)  area drained (ha)  Fl)  High = >200mg Cad am structure, lak	Iuble - Acute Impac Copper Pass  IJunction assessment (single ou 433796  Climatic region  0.001 (E) 3.391 Pc 0.5	Pass  HA Area / DBF  utfall)  List of out cumulative as: Assessor and Version of ass  Colder Dry  Enter zero in Annuals ermeable area drain the discharge in or or	Alert.  O number  falls in ssessment affiliation essment  Rai 25%ile rive ng to outfavithin 1 km	Northing Northing C10  Infall site  If flow box to a all (ha)  upstream of a	Sedim Accur Extens	pent deposition ulating? sive?  337233  DSH 2  Lep 1 runof ded site for control of the control o	yes No	s site is ju 0.00 90	Low flow Vel m's Deposition Index
Road number Assessment type OS grid reference of as OS grid reference of ou Outfall number Receiving water Det Date of assessment Notes  Step 1 Runoff Qual Step 2 River Impa	Annual Average Co Copper Step 2 0.76 Step 3 -  Sessment point (m)  If all structure (m)  AADT >=50,000 all  Cts Annual 95%ile river Impermeable road a Base Flow Index (B  Inly Water hardness [ It only Is there a downstre	Soncentration  Tine 3.29 ugh A38 Little Eator Non-cumulative Easting Easting Easting Easting Easting Easting Finow (m³/s)	Climatic region  0.5	HA Area / DBF  List of out cumulative as  Assessor and Version of ass  Colder Dry  Enter zero in Annuals  ermeable area drain the discharge in or an o	Alert.  Fo number  Falls in sessesment affiliation essment  Rail  Solid rive ing to outfautithin 1 km	Northing Northing C10  Infall site  I flow box to a Il (ha)  of the point o	Sedim Accur Extension (SA)	pent deposition ulating? sive?  337233  DSH 2  AR 600mm)  dep 1 runof ed site for conge?	f quality conservat	s site is ju 0.00 90 90 90 90 90 90 90 90	Low flow Vel m's Deposition Index
Road number Assessment type OS grid reference of as OS grid reference of ou Outfall number Receiving water Det Date of assessment Notes  Step 1 Runoff Qual Step 2 River Impa	Annual Average Co Copper Step 2 0.76 Step 3 -  Sessment point (m)  If all structure (m)  ADT ==50,000 all  Cts Annual 95%ile river Impermeable road a Base Flow Index (B  Inly Water hardness [ Londy Is there a downstre.	Soncentration  Tine 3.29 ugh A38 Little Eator Non-cumulative Easting Easting Easting Easting Easting Easting Finow (m³/s)	Climatic region  0.5	Pass  HA Area / DBF  utfall)  List of out cumulative as: Assessor and Version of ass  Colder Dry  Enter zero in Annuals ermeable area drain the discharge in or or	Alert.  O number  falls in ssessment affiliation essment  Rai 25%ile rive ng to outfavithin 1 km	Northing Northing C10  Infall site  If flow box to a all (ha)  upstream of a	Sedim Accur Extension (SA)	pent deposition ulating? sive?  337233  DSH 2  Lep 1 runof ded site for control of the control o	on for this Yes No  f quality of onservat	s site is ju 0.00 90 90 only)	Low flow Vel m's Deposition Index
Road number Assessment type OS grid reference of as OS grid reference of ou Outfall number Receiving water Det Date of assessment Notes  Step 1 Runoff Qui Step 2 River Impa  For dissolved zinc o For sediment impact	Annual Average Co Copper Step 2 0.76 Step 3 -  Sessment point (m)  If all structure (m)  AADT >=50,000 all  Cts Annual 95%ile river Impermeable road a Base Flow Index (B  Inly Water hardness [ It only Is there a downstre	Soncentration  Tine 3.29 ugh A38 Little Eator Non-cumulative Easting Easting Easting Easting Easting Easting Finow (m³/s)	Climatic region  0.5	HA Area / DBF  List of out cumulative as  Assessor and Version of ass  Colder Dry  Enter zero in Annuals  ermeable area drain the discharge in or an o	Alert. O number  Talls in sessment affiliation essment  Rai affiliation essment used to outfar a sesment affiliation of the sesment affiliation and the sesment used to outfar a session used to out	Northing Northing C10  Infall site  Infall s	Sedim Accur Extension (SEAS SSSESS SI SSSESSI SI SSSESSI SI SSSESSI SI SSSESSI SI SSSESSI SI SSSESSI SI SS	pent deposition ulating? sive?  337233  DSH 2  AR 600mm)  dep 1 runof ed site for conge?	on for this Yes No  f quality of onservat	s site is ju 0.00 90  binly)  con?	No O.0001
Road number Assessment type OS grid reference of as OS grid reference of ou Outfall number Receiving water Det Date of assessment Notes  Step 1 Runoff Qual Step 2 River Impa	Annual Average Co Copper Step 2 0.76 Step 3 -  Sessment point (m)  If all structure (m)  AADT >=50,000 all  Cts Annual 95%ile river Impermeable road a Base Flow Index (B  Inly Water hardness [ It only Is there a downstre	Soncentration    Zinc   3.29   ug/l     3.29   ug/l     4.38 Little Eator     Non-cumulative     Easting     Easti	Copper Pass  Junction assessment (single or 433796  Climatic region  0.001 0.5 Is cosn e, pond or canal that ref.	HA Area / DBF  HA Area / DBF  utfall)  List of out cumulative as Assessor and Version of ass  Colder Dry  Enter zero in Annual sermeable area drain the discharge in or service duces the velocity services.	Alert. O number  falls in sessment affiliation essment  Rail 25%ile rive ng to outfavithin 1 km within 100m	Northing Northing C10  Infall site  If flow box to a all (ha)  upstream of a side slope (in deflectiveness	Sedim Accur Extension (SA)	pent deposition ulating? sive?  337233  DSH 2  LAR 600mm)  Lep 1 runof ded site for company co	on for this Yes No  f quality of onservat	s site is ju 0.00 90 90  binly)	Low flow Vel m's Deposition Index
Road number Assessment type OS grid reference of as OS grid reference of ou Outfall number Receiving water Det Date of assessment Notes  Step 1 Runoff Qui Step 2 River Impa  For dissolved zinc o For sediment impact	Annual Average Co Copper Step 2 0.76 Step 3 -  Sessment point (m)  If all structure (m)  AADT >=50,000 all  Cts Annual 95%ile river Impermeable road a Base Flow Index (B  Inly Water hardness [ It only Is there a downstre	Soncentration  Tine 3.29 ugh A38 Little Eator Non-cumulative Easting Easting Easting Easting Easting Easting Finow (m³/s)	Copper Pass  Junction assessment (single or 433796  Climatic region  0.001 0.5 Is cosn e, pond or canal that ref.	HA Area / DBF  List of out cumulative as  Assessor and Version of ass  Colder Dry  Enter zero in Annuals  ermeable area drain the discharge in or an o	Alert.  Alert.  O number  Talls in sessment affiliation essment  Rai 25%ille rive ng to outfavithin 1 km  Estimate Alert.  Alert.	Northing Northing C10  Infall site  Infall s	Sedim Accur Extension (SASSESS SI discharge)  f discharge f discha	pent deposition ulating? sive?  337233  DSH 2  AR 600mm)  dep 1 runof ed site for conge?	on for this Yes No  f quality of onservat	s site is ju 0.00 90 90  binly)	No O.0001
Road number Assessment type OS grid reference of as OS grid reference of ou Outfall number Receiving water Det Date of assessment Notes  Step 1 Runoff Qua  Step 2 River Impa  For dissolved zinc of For sediment impact	Annual Average Co Copper Step 2 0.76 Step 3 -  Sessment point (m)  If all structure (m)  AADT >=50,000 all  Cts Annual 95%ile river Impermeable road a Base Flow Index (B  Inly Water hardness [ It only Is there a downstre	Soncentration    Zinc   3.29   ug/l     3.29   ug/l     4.38 Little Eator     Non-cumulative     Easting     Easti	Copper Pass  Junction assessment (single or 433796  Climatic region  0.001 0.5 Is cosn e, pond or canal that ref.	Enter zero in Annual:  Termination or a service duces the velocity of the service	Alert.  Alert.  O number  Talls in sessment affiliation essment  Rai 25%ille rive ng to outfavithin 1 km  Estimate Alert.  Alert.	Northing Northing C10  Infall site  I flow box to a II (ha)  of the point o Side slope (n  d effectivenessen	Sedim Accur Extension (SASSESS SI discharge)  f discharge f discha	uent deposite unulating? sive?  337233  DSH 2  DSH 2  dep 1 runof ded site for compared to si	on for this Yes No	s site is ju  0.00  90  90  polyphology  polyphology  predi	No O.0001
Road number Assessment type OS grid reference of as OS grid reference of ou Outfall number Receiving water Det Date of assessment Notes  Step 1 Runoff Qui Step 2 River Impa  For dissolved zinc o For sediment impact	Annual Average Co Copper Step 2 0.76 Step 3 -  Sessment point (m)  If all structure (m)  AADT >=50,000 all  Cts Annual 95%ile river Impermeable road a Base Flow Index (B  Inly Water hardness [ It only Is there a downstre	Soncentration    Zinc   3.29   ug/l     3.29   ug/l     4.38 Little Eator     Non-cumulative     Easting     Easti	Copper Pass  Junction assessment (single or 433796  Climatic region  0.001 0.5 Is cosn e, pond or canal that ref.	Enter zero in Annual:  Termination or a service duces the velocity of the service	Alert.  Alert.  O number  Talls in sessment affiliation essment  Rai 25%ille rive ng to outfavithin 1 km  Estimate Alert.  Alert.	Northing Northing C10  Infall site  If flow box to a a li (ha)  of the point of the point of the point of deflectivenesses rusation for se - restricted rige rate ( Vs )	Sedim Accur Extension (SASSESS SI discharge)  f discharge f discha	uent deposite unulating? sive?  337233  DSH 2  DSH 2  dep 1 runof ded site for compared to si	on for this Yes No	s site is ju  0.00  90  90  polyphology  polyphology  predi	No Deposition Index
Road number Assessment type OS grid reference of as OS grid reference of ou Outfall number Receiving water Det Date of assessment Notes  Step 1 Runoff Qua  Step 2 River Impa  For dissolved zinc of For sediment impact	Annual Average Co Copper Step 2 0.76 Step 3 -  Sessment point (m)  If all structure (m)  AADT >=50,000 all  Cts Annual 95%ile river Impermeable road a Base Flow Index (B  Inly Water hardness [ It only Is there a downstre	Soncentration    Zinc   3.29   ug/l     3.29   ug/l     4.38 Little Eator     Non-cumulative     Easting     Easti	Copper Pass  Junction assessment (single or 433796  Climatic region  0.001 0.5 Is cosn e, pond or canal that ref.	HAArea / DBR  HAArea / DBR  Utfall)  List of out cumulative a: Assessor and Version of ass  Colder Dry  Enter zero in Annual: ermeable area drain the discharge in or or educes the velocity with the discharge in or or Treatment for solubles (%)	Alert.  O number  Talls in seessment affiliation essment  Rail 25%ille rive ing to outfavithin 1 km within 100m  Estimate  Atte soluble dischar	Northing Northing C10  Infall site  If flow box to a a li (ha)  upstream of a li (ha)  of the point of the po	Sedim Accur Extension (SAS SSESS SI SSESSI	DSH 2	on for this Yes No	s site is ju  0.00  90  90  90  Predictor (m/n	No Deposition Index



	22872-2											
HIGHWA AGENCY	YS Highways A	gency Wate	r Risk Assessm	ent	version 1.0 Nove	mber 200	09					
AGENCI	100 100 100 100 100 100 100 100 100 100		Soluble - Acute Im	pact				Sedime	ent - Chro	nic Imp	act	
	Annual Average Co		Copper	-	Zinc			Codim	ont donocit	ion for th	ie eito ie iud	god ac:
	Step 2 0.92	3.99 ug/l	River Fails Toxici		Pass	Fail.	Try Tier 2 for		ient deposit nulating?	Yes	0.00	ged as: Low flow Vel m/s
	Step 3 -	- ug/l	Test. Try mitigati	on			Velocity	Exten		Yes	-	Deposition Index
Road number		A38			HA Area / DBFO	number						
Assessment type		7	ssessment including	codimon								12
OS grid reference of ass	essment noint (m)	Easting	433752	seumen	its (Outlails Willill II	JUIII)	Northing		337304			
OS grid reference of outf		Easting	433732				Northing		337304			
Outfall number	un obucture (III)	outfall into Ma	ukoaton lako		List of outfal	ls in	C4				2/	
Receiving watercourse		markeaton	ineatoriane		cumulative asse		04				-	
EA receiving water Detail	iled Diver Network ID	markeaton			Assessor and aff	iliation			DOLL			
	neu River Network ID	40.44.0040			1				DSH			
Date of assessment Notes		19/11/2018			Version of asses	sment			1			
Notes												
Step 1 Runoff Qual	lity	1 400 000	Or Paris	0.14	5	-			4 D 000	,		100
OLCD T INGHIOTI QUAL	>=50,000 a	nd <100,000 🕶	Climatic region	Colde	r Dry 💌	Ка	infall site	Lincoln (SA	AR 600mm)			<u>*</u>
Step 2 River Impac	ts Annual 95%ile river	flow (m3/s)	0.001	/Entor	zoro in Annual OF	0/ ilo rive	or flow boy to	200000 0	on 1 runof	fauglity	only	
	Allindar 50 /olic river	now (m /3)		(Enter	zero in Annual 95	7011ETIVE	-		ep i fulloi	quality	Offiy)	
	Impermeable road a	area drained (h	1a) 4.904	Perme	eable area draining	to outfa	all (ha) 0	.1958				
	Base Flow Index (B	FI)	0.5 D	Is the	discharge in or wit	hin 1 km	upstream of	a protecte	ed site for c	onserva	tion?	No - D
525 42 25 28 90	20.7 2000 to 05 201 to 25							8				
For dissolved zinc on	ly Water hardness	High = >200mg (	CaC 03/I									
For sediment impact	only is there a downstre	am structure la	ake pond or canal t	hat reduc	es the velocity with	nin 100n	n of the point	of dischar	ne?	1	Yes 🕶	-
Tor seament impact	STATE OF THE PROPERTY OF THE PROPERTY OF THE PARTY OF THE	d river width (r	COLUMN TO THE PARTY OF THE PART	riat rodac	too tric velocity with		n or the point	or discridi	go.			
		A. (100 and 100 and 10								12		
	↑ Tier 2 Bed widt	n (m)	3	Manni	ng's n 0.07	D	Side slope	(m/m)	0.5	Long	slope (m/m	0.0001
Step 3 Mitigation						Fetimate	ed effectivene	ee		T W		
Step 5 Militigation		Brief descrip	tion	-	Treatment for		enuation for		lement of	4	Predic	t Impact
		Direct descrip	don		solubles (%)		les - restricted		nents (%)	-		
La constant de la con						discha	arge rate ( Vs )	)		s	how Deta	iled Results
Existing measures				T	0 D	Unlimit	ted 🖵 🖸	0	D			
Proposed measures	balancing pond, and downstrear	n defender for sed	iments		0 ID	Unlimit	ted _ D	0	D		Evit	Tool
10 NO 00 DESCRIPTION OF STATE		St. App. 16 Commercial Commercial St. Commercial St	お37年37人。 -			SACREMONS		100			EAI	. 1001
AGENCY	Annual Average Co	S	r Risk Assessm Soluble - Acute Im Copper	NAME OF TAXABLE PARTY.	version 1.0 Nove	mber 200	09	Sedime	nt - Chro	nic Imp	act	
	Copper							Sedim	ent depositi	on for thi	s site is jud	jed as:
	Step 2 0.39	1.70 ug/l	Pass		Pass		Pass		nulating?	Yes	_	ow flow Vel m/s
-01	Step 3 -	- ug/l		- 4				Extens	sive?	No	90	Deposition Index
Road number		A38 Kedlesto	n Road Junction		HA Area / DBFO	number						
Assessment type		Cumulative a	ssessment including	sedimen	ts (outfalls within 10	Om)						-
OS grid reference of ass	essment point (m)	Easting	433774				Northing		337419			
OS grid reference of outfa	all structure (m)	Easting					Northing					
Outfall number					List of outfall		c8		c9			
Receiving watercourse		d/s Marke ator	ı Lake		cumulative asse	ssment						
EA receiving water Detail	iled River Network ID				Assessor and affi	liation			DSH			
Date of assessment		22/02/2019			Version of assess	sment			2			
Notes						- conservation to		,				
Step 1 Runoff Qual	lity AADT >=50,000 a	nd <100,000 🕶	Climatic region	Colder	r Dry 💌	Ra	infall site	Lincoln (SA	AR 600mm)			•
		0/- 6/-		17	37-31							
Step 2 River Impac	Annual 95%ile river	flow (m <sup>3</sup> /s)	0.001	(Enter	zero in Annual 95	%ile rive	er flow box to	assess St	ep 1 runoff	quality	only)	
	Impermeable road a	area drained (h	a) 1.221	Perme	able area draining	to outfa	all (ha) 0	.0914				
	Base Flow Index (B		0.5 D				Account of the contract of the	a protosto	daita fara		Onei	No ▼ □
	base Flow lindex (b)	F1)	0.5	is the c	discharge in or with	IIII I KIII	upstreamor	a protecte	d site for c	onserva	IOTT	140
For dissolved zinc on	ly Water hardness	High = >200mg (	CaC 03/I +									
W. 100 (200 (200 (200 (200 (200 (200 (200	S. L					I- 400		aran .	0	-		_
For sediment impact	only is there a downstrea		1000	nat reduc	es the velocity with	iin 100n	n of the point	or dischar	ge?		10 -	D
	Tier 1 Estimate	d river width (n	n) 2.5		99	300		24	100			
	© Tier 2 Bed widt	h (m)	3	Mannii	ng's n 0.07	D	Side slope	(m/m)	0.5	Long:	slope (m/m	0.0001
		0079785			60.775 SB	7070 - 1		- 10 A		_		
Step 3 Mitigation					- A		ed effectivene				Predict	Impact
		Date Colonia de la colonia de						Coffi	ement of			
		Brief descrip	tion		Treatment for		enuation for				TANAPE IN THE IN	
		впегаезспр	tion		Treatment for solubles (%)	soluble	es - restricted	sedin	nents (%)		haw Dat-	iled Deau
Existing measures		Brief descrip	tion		solubles (%)	soluble	es - restricted arge rate ( Vs )	sedin	nents (%)	Si	now Deta	iled Results
Existing measures Proposed measures		впег descrip	tion		solubles (%)	soluble	es - restricted arge rate (Vs)	sedim		s	how Deta	iled Results

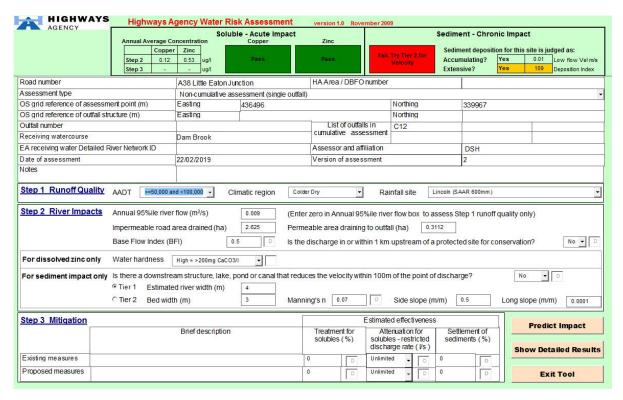


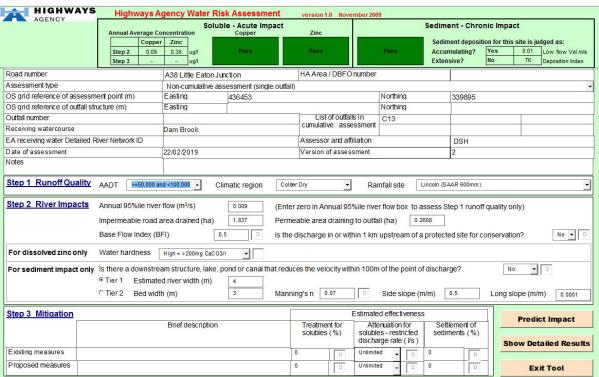
#### With mitigation:

HIGHWA	Highways Agency Water Risk Assessment version 1.0 November 2009									
AGENCY	Annual Average Co	ncentration	le - Acute Impact Copper	Zinc					nic Impac	MA STATE OF STATE
	Copper   Step 2   0.92   Step 3   0.75	3.99 ug/l 3.23 ug/l	Pass	Pass	Alert.	D/S Structure.		nulating?	Yes No	0.00 Low flow Vel m/s 91 Deposition Index
load number		A38		HA Area / DBFO nu	ımber					
ssessment type		Cumulative assessi	ment including sedimer	nts (outfalls within 100r	n)					-
OS grid reference of ass	sessment point (m)	Easting	433752			Northing		337304		
)S grid reference of out	tfall structure (m)	Easting		-78		Northing				
Outfall number		outfall into Markeato	on lake	List of outfalls i		C7		C10		
leceiving watercourse		markeaton		cumulative assess	sment					
:A receiving water Deta	ailed River Network ID			Assessor and affilia	ition			DSH		
) ate of assessment		22/02/2019		Version of assessm	nent			2		
lotes										
Step 1 Runoff Qua	7761	flow (m³/s) area drained (ha)	4.904 Perme	r zero in Annual 95%il eable area draining to discharge in or within	le rive	r flow box to as	sess St			
For dissolved zinc o	nly Water hardness	High = >200mg CaCO3/	1 -							
For sediment impact	For it is there a downstream of the first and the first an	d river width (m)	ond or canal that reduced a manner of the canal tha		100m	of the point of o	_	ge?	Yes	ppe (m/m) 0.0001
Step 3 Mitigation		Brief description		Treatment for solubles (%)	Atte	d effectiveness enuation for es - restricted rge rate ( Vs )		ement of nents (%)		Predict Impact
Existing measures					Unlimite		0	D	Sno	w Detailed Results
Proposed measures	ditches, and sediment retention	forebay to hold first flush	over 24hrs	19	Unlimite	d - D	30			Exit Tool



#### Little Eaton junction:

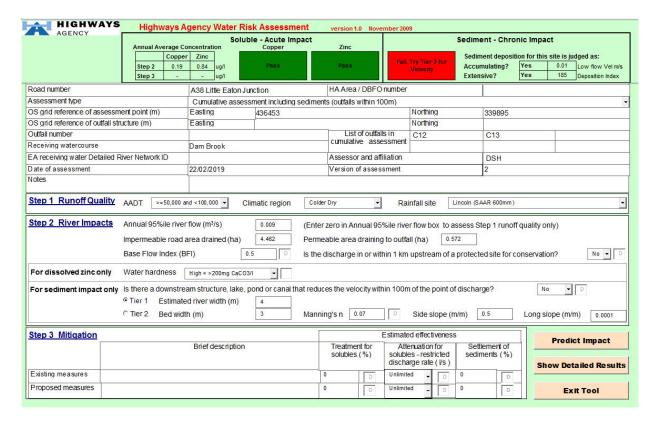




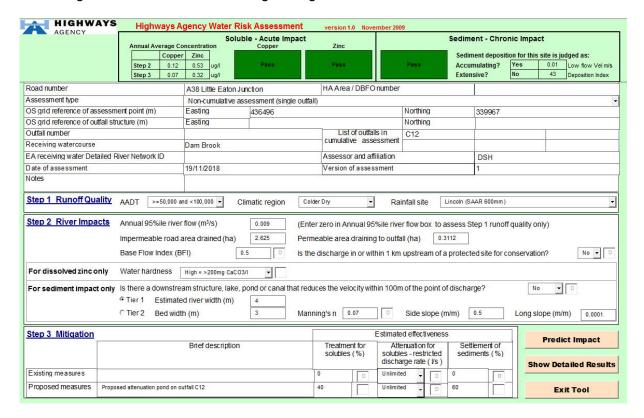


HIGHW	AYS Highways	Agency Water F	Risk Assessment	version 1.0 Noven	nher 200	o -					
AGENCY	riigiiwayay		uble - Acute Impact	version 1.0 Novem	iibei 200		edime	nt - Chro	nic Imp	act	
	Annual Average 0	Concentration	Copper	Zinc	100						
	Coppe	1,000 (1,000) (1,000)	Pass	Pass		Pass		ent deposit	Yes	0.01	
	Step 2 0.01 Step 3 -	0.06 ug/l - ug/l	rass	Pass		rass	Extens	nulating? sive?	No	14	Low flow Vel m/s Deposition Index
Road number		A38 Little Eaton	lunction	HA Area / DBFO r	number	<u>%</u>		<u> </u>			
Assessment type			assessment (single outfal	A COMPANY AND A SECOND CO.	Idilibei						
OS grid reference of as	ssessment point (m)	Easting	436416	1)		Northing		340135			
OS grid reference of ou		Easting	430410			Northing	-	340 133			
Outfall number	addi da da da (117)	Labaria	76.	List of outfalls	in	C14	-				
Receiving watercourse		Dam Brook		cumulative asses		014				-	
EA receiving water Det	tailed River Network ID			Assessor and affili	iation			DSH		10	
Date of assessment		22/02/2019		Version of assess	7.01.00.00			2			
Notes		LEIGEIEGIG		1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0				-			
Step 1 Runoff Qua	ality AADT >10,000 ar	nd <50,000 +	Climatic region Colo	der Dry -	Rai	nfall site Lin	coln (SA	AR 600mm)			•
Step 2 River Impa	acts Annual 95%ile rive	er flow (m³/s)	0.009 (Ente	er zero in Annual 95%	6ile rive	r flow box to ass	sess St	ep 1 runof	fquality	only)	
0.20						0.12			-	,/	
	Impermeable road	2. 2.		eable area draining	to outla	II (IIa)	2				
	Base Flow Index (	BFI)	0.5 D Is the	discharge in or with	in 1 km	upstream of a p	rotecte	ed site for c	onserva	tion?	No - D
For dissolved zinc o	only Water hardness	High = >200mg CaC	03/1								
1 of dissolved zinte	vacer naraness	mgn - >200mg Cac	03/1								
For sediment impact	t only is there a downstre	eam structure, lake	e, pond or canal that redu	ices the velocity withi	in 100m	of the point of c	lischar	ge?	[3	Vo →	D
	<ul> <li>Tier 1 Estimat</li> </ul>	ed river width (m)	4		NAME OF TAXABLE PARTY.		120	***			
	C Tier 2 Bed wid	Ith (m)	3 Manr	ning's n 0.07	D	Side slope (m/r	m)	0.5	Long	slope (m/r	n) 0.0001
			1								
Step 3 Mitigation						d effectiveness	-			Predic	et Impact
		Brief description	1	Treatment for solubles (%)		enuation for es - restricted		ement of nents (%)	-		
				Solubles ( 70)		rge rate (Vs)	Sculli	ichis (70)		how Dot	ailed Results
Existing measures				0 🗖	Unlimite	d 🗸 🗖	0	D	_	now bet	anea nesans
Proposed measures				0 D	Unlimite		0	D	- 1	0-20	
1850						1 1 0	_	10		EX	it Tool
HIGHWAYS AGENCY Highways Agency Water Risk Assessment Soluble - Acute Impact Soluble - Movember 2009 Soluble - Acute Impact											
	Annual Average (	Soli Concentration	Risk Assessment uble - Acute Impact Copper	version 1.0 Nover	mber 200						iduad ac.
	Annual Average C Coppe Step 2 0.00	Soli Concentration er Zinc 0.00 ug/l	uble - Acute Impact		nber 200		Sedim	nent deposit nulating?			idged as: Low flow Vel m/s Deposition index
AGENCY	Annual Average C	Solution er Zinc ug/l ug/l	uble - Acute Impact Copper Pass	Zinc Pass		S	Sedim	nent deposit nulating?	ion for th	is site is ju	Low flow Vel m/s
AGENCY Road number	Annual Average C Coppe Step 2 0.00	Concentration or Zinc 0.00 ug/l ug/l ug/l A38 Little Eaton.	uble - Acute Impact Copper Pass	Zinc Pass HA Area / DBFO		S	Sedim	nent deposit nulating?	ion for th	is site is ju	Low flow Vel m/s
Road number Assessment type	Annual Average ( Coppe Step 2 0.00 Step 3 -	Concentration er Zinc 0.00 ug/l ug/l A38 Little Eaton Non-cumulative	uble - Acute Impact Copper Pass  Junction assessment (single outfa	Zinc Pass HA Area / DBFO		Pass	Sedim	nent deposit nulating? sive?	ion for th	is site is ju	Low flow Vel m/s
Road number Assessment type OS grid reference of as	Annual Average ( Coppy Step 2 0.00 Step 3 -	Concentration or Zinc 0.00 ug/l ug/l ug/l A38 Little Eaton.	uble - Acute Impact Copper Pass	Zinc Pass HA Area / DBFO		Pass Northing	Sedim	nent deposit nulating?	ion for th	is site is ju	Low flow Vel m/s
Road number Assessment type	Annual Average ( Coppy Step 2 0.00 Step 3 -	Concentration er Zinc 0.00 ug/l - ug/l A38 Little Eaton. Non-cumulative a	uble - Acute Impact Copper Pass  Junction assessment (single outfa	Zinc Pass HA Area / DBFO III)	number	Pass	Sedim	nent deposit nulating? sive?	ion for th	is site is ju	Low flow Vel m/s
Road number Assessment type OS grid reference of as OS grid reference of ou	Annual Average ( Coppy Step 2 0.00 Step 3 -	Concentration er Zinc 0.00 ug/l - ug/l A38 Little Eaton. Non-cumulative a	uble - Acute Impact Copper Pass  Junction assessment (single outfa	Zinc Pass  HA Area / DBFO r	number	Pass Northing Northing	Sedim	nent deposit nulating? sive?	ion for th	is site is ju	Low flow Vel m/s
Road number Assessment type OS grid reference of as OS grid reference of ou Outfall number	Annual Average ( Coppi Step 2 0.00 Step 3 -	Solution and the state of the s	uble - Acute Impact Copper Pass  Junction assessment (single outfa	Zinc Pass HA Area / DBFO III)	number	Pass Northing Northing	Sedim	nent deposit nulating? sive?	ion for th	is site is ju	Low flow Vel m/s
Road number Assessment type OS grid reference of as OS grid reference of ou Outfall number Receiving watercourse	Annual Average ( Coppi Step 2 0.00 Step 3 -	Solution and the state of the s	uble - Acute Impact Copper Pass  Junction assessment (single outfa	Zinc  Pass  HA Area / DBFO r  I)  List of outfalls cumulative asset	number	Pass Northing Northing	Sedim	nent deposit nulating? sive?	ion for th	is site is ju	Low flow Vel m/s
Road number Assessment type OS grid reference of as OS grid reference of ou Outfall number Receiving watercourse EA receiving water Det	Annual Average ( Coppi Step 2 0.00 Step 3 -	Concentration  To Zinc  O.00  Ug/I  A38 Little Eaton.  Non-cumulative : Easting  Easting  River Derwent	uble - Acute Impact Copper Pass  Junction assessment (single outfa	Zinc  Pass  HA Area / DBFO r  II)  List of outfalls cumulative assessor and affili	number	Pass Northing Northing	Sedim	nent deposit nulating? sive?	ion for th	is site is ju	Low flow Vel m/s
Road number Assessment type OS grid reference of os OS grid reference of ou Outfall number Receiving water course EA receiving water Det Date of assessment	Annual Average ( Coppi Step 2 0.00 Step 3 -  Sesessment point (m)  Itfall structure (m)	A38 Little Easton Non-cumulative Easting Easting River Derwent	uble - Acute Impact Copper Pass  Junction assessment (single outfal 435883	Zinc  Pass  HA Area / DBFO r  II)  List of outfalls cumulative assessor and affili	number s in ssment liation	Northing Northing C15	Sedim Accur Extens	nent deposit nulating? sive?	ion for th	is site is ju	Low flow Vel m/s
Road number Assessment type OS grid reference of as OS grid reference of ou Outfall number Receiving watercourse EA receiving water Det Date of assessment Notes	Annual Average ( Copper Step 2 0.00 Step 3 - Seessment point (m) Affall structure (m)  Allied River Network ID	Concentration  Triping and state and	Junction  435883  Climatic region  Colimatic region	List of outfalls cumulative assessor and affili Version of assess	number s in ssment liation ment Rai	Pass  Northing Northing C15  Infall site  Lin	Sedim Accur Extens	and depositional deposition of the community of the commu	No No	is site is ju	Low flow Vel m/s Deposition index
Road number Assessment type OS grid reference of as OS grid reference of ou Outfall number Receiving water Det Date of assessment Notes  Step 1 Runoff Qua	Annual Average (	Concentration  Fr Zinc ug/l  0.00 ug/l  - ug/l  A38 Little Eaton.  Non-cumulative : Easting  Easting  River Derwent  22/02/2019	Junction assessment (single outla 435883  Climatic region Columnatic region	Zinc  Pass  HA Area / DBFO r  I)  List of outfalls cumulative asset  Assessor and affil Version of assess  der Dry  er zero in Annual 95%	number s in ssment liation sment Rai	Pass  Northing Northing C15  Infall site  Lire Infow box to ass	Sedim Accur Extens	and depositional deposition of the community of the commu	No No	is site is ju	Low flow Vel m/s Deposition index
Road number Assessment type OS grid reference of as OS grid reference of ou Outfall number Receiving water Det Date of assessment Notes  Step 1 Runoff Qua	Annual Average (	Concentration  Fr Zinc	Junction assessment (single outfall 435883  Climatic region Colimatic regi	Zinc  Pass  HA Area / DBFO r  I)  List of outfalls cumulative asset  Assessor and affil Version of assess	number s in ssment liation ment Rai	Northing Northing C15  Infall site Lin flow box to ass Ill (ha) 0.115	Sedim Accurrent Extension (SA Seeses SI	nent deposition ulating? sive?  339938  DSH 2	ion for th	only)	Low flow Vel m/s Deposition index
Road number Assessment type OS grid reference of as OS grid reference of ou Outfall number Receiving water Det Date of assessment Notes  Step 1 Runoff Qua	Annual Average (    Coppristed     Step 2   0.00   Step 3   -   Sesessment point (m)   Idalied River Network ID   AADT   ==50,000   Annual 95%ile river     Impermeable road     Base Flow Index (I	Concentration  Fr Zinc	Uble - Acute Impact Copper  Pass  Junction assessment (single outfal 435883  Climatic region  4.609 (Ente 0.953 Perm 0.5 Is the	Zinc  Pass  HA Area / DBFO r  I)  List of outfalls cumulative asset and affili Version of assess and affili version of assess are Dry  er zero in Annual 95% areable area draining	number s in ssment liation ment Rai	Northing Northing C15  Infall site Lin flow box to ass Ill (ha) 0.115	Sedim Accurrent Extension (SA Seeses SI	nent deposition ulating? sive?  339938  DSH 2	ion for th	only)	Low flow Vel m/s Deposition index
Road number Assessment type OS grid reference of as OS grid reference of ou Outfall number Receiving water Det Date of assessment Notes  Step 1 Runoff Qui  Step 2 River Impa  For dissolved zinc o	Annual Average (    Coppristed 2	A38 Little Eaton. Non-cumulative: Easting Easting River Derwent 22/02/2019  and <100,000 • If the many states are a drained (ha) BFI)  High = >200mg Cac	Junction assessment (single outfal 435883  Climatic region Columatic region (Entel 0.953 Perm 0.5 Is the	List of outfalls cumulative assessor and affili Version of assessor and affiliation of	number is in syment liation Rain Rain Rain Rain Rain Rain Rain Rai	Pass    Northing   Northing   C15	Sedim Accurrence Extension (SASSESS SI)	and deposite mulating? sive?  339938  DSH 2  dep 1 runof	ion for the	only)	Low flow Vel m/s Deposition Index
Road number Assessment type OS grid reference of as OS grid reference of ou Outfall number Receiving water Det Date of assessment Notes  Step 1 Runoff Qui  Step 2 River Impa	Annual Average (    Copprise	A38 Little Eaton. Non-cumulative: Easting River Derwent  22/02/2019  and <100,000 •  First William (m³/s) area drained (ha) BFI)  High = >200mg CaCeam structure, lake	Junction assessment (single outfal 435883  Climatic region Columatic region (Entel 0.953) Perm 0.5 Is the column of the column o	List of outfalls cumulative assessor and affili Version of assessor and affiliation of	number is in syment liation Rain Rain Rain Rain Rain Rain Rain Rai	Pass    Northing   Northing   C15	Sedim Accurrence Extension (SASSESS SI)	and deposite mulating? sive?  339938  DSH 2  dep 1 runof	ion for the	only)	Low flow Vel m/s Deposition index
Road number Assessment type OS grid reference of as OS grid reference of ou Outfall number Receiving water Det Date of assessment Notes  Step 1 Runoff Qui  Step 2 River Impa  For dissolved zinc o	Annual Average (    Copprise	A38 Little Eaton. Non-cumulative: Easting East	Uble - Acute Impact Copper Pass  Junction assessment (single outfa 435883  Climatic region Colo  4.609 (Ente 0.953 Perm 0.5 Is the 0.03/1 Perm 0.pond or canal that reduced	List of outfalls cumulative assets  Assessor and affill Version of assess  ar Dry  er zero in Annual 95% eable area draining e discharge in or with a ces the velocity with	number sin ssment liation Rai Rai liation to outfal in 1 km	Northing Northing Northing Control Infall site	Sedim Accurate Extension   Sedim Accurate   Sedim Accurat	and deposite mulating? sive?  339938  DSH 2  AAR 600mm)  dep 1 runof ed site for co	ion for the No.	only)	Low flow Vel m/s Deposition index  No  Deposition index
Road number Assessment type OS grid reference of as OS grid reference of ou Outfall number Receiving water Det Date of assessment Notes  Step 1 Runoff Qui  Step 2 River Impa  For dissolved zinc o	Annual Average (    Copprise	A38 Little Eaton. Non-cumulative: Easting East	Uble - Acute Impact Copper Pass  Junction assessment (single outfa 435883  Climatic region Colo  4.609 (Ente 0.953 Perm 0.5 Is the 0.03/1 Perm 0.pond or canal that reduced	List of outfalls cumulative assessor and affili Version of assessor and affiliation of	number is in syment liation Rain Rain Rain Rain Rain Rain Rain Rai	Pass    Northing   Northing   C15	Sedim Accurate Extension   Sedim Accurate   Sedim Accurat	and deposite mulating? sive?  339938  DSH 2  dep 1 runof	ion for the No.	only)	Low flow Vel m/s Deposition index  No  Deposition index
Road number Assessment type OS grid reference of ou Outfall number Receiving water Det Date of assessment Notes  Step 1 Runoff Qui Step 2 River Impa  For dissolved zinc of For sediment impace	Annual Average (    Copprise	A38 Little Eaton. Non-cumulative: Easting East	Uble - Acute Impact Copper Pass  Junction assessment (single outfa 435883  Climatic region Colo  4.609 (Ente 0.953 Perm 0.5 Is the 0.03/1 Perm 0.pond or canal that reduced	Zinc  Pass  HA Area / DBFO r  List of outfalls cumulative asset  Assessor and affil Version of assess  der Dry  er zero in Annual 95% eable area draining e discharge in or with acces the velocity with thing's n  0.07	Rain 100m	Northing Northing Northing Control Infall site	Sedim Accurate Extension   Sedim Accurate   Sedim Accurat	and deposite mulating? sive?  339938  DSH 2  AAR 600mm)  dep 1 runof ed site for co	ion for the No.	only) slope (m/	Low flow Vel m/s Deposition index  No D  D  D  D  D  D  D  D  D  D  D  D  D
Road number Assessment type OS grid reference of as OS grid reference of ou Outfall number Receiving water Det Date of assessment Notes  Step 1 Runoff Qui  Step 2 River Impa  For dissolved zinc o	Annual Average (    Copprise	A38 Little Eaton. Non-cumulative: Easting East	Uble - Acute Impact Copper Pass  Junction assessment (single outla 435883  Climatic region Coli  4.609 (Ente 0.953 Perm 0.5 Is the 03/1 Separate that reduces a pond or canal that reduces a p	Zinc  Pass  HA Area / DBFO r  List of outfalls cumulative asset  Assessor and affil Version of assess  der Dry  er zero in Annual 95% eable area draining e discharge in or with acces the velocity with thing's n  0.07	Rail Rail Rail Rail Rail Rail Rail Rail	Northing Northing Northing C15  Infall site Lim Infall site assume the site of the point of the side slope (m/l)	Sedim Accurate Accura	and deposition mulating? sive?  339938  DSH 2  DSH 2  dep 1 runof ded site for committee of site for committee	ion for the No.	only) slope (m/	Low flow Vel m/s Deposition index  No  Deposition index
Road number Assessment type OS grid reference of ou Outfall number Receiving water Det Date of assessment Notes  Step 1 Runoff Qui Step 2 River Impa  For dissolved zinc of For sediment impace	Annual Average (    Copprise	Concentration  Fr Zinc  0.00  ug/l  - ug/l  A38 Little Eaton.  Non-cumulative : Easting  Easting  River Derwent  22/02/2019  er flow (m³/s) area drained (ha) BFI)  High = >200mg Cac eam structure, lake ed river width (m)  tith (m)	Uble - Acute Impact Copper Pass  Junction assessment (single outla 435883  Climatic region Coli  4.609 (Ente 0.953 Perm 0.5 Is the 03/1 Separate that reduces a pond or canal that reduces a p	Assessor and affil Version of assess der Dry  er zero in Annual 95% eable area draining e discharge in or with ling's n 0.07	number  Sin Ssment  Rain  Rain  Rain  Rain  Rain  Attach  Soluble	Northing Northing Northing C15  Infall site Lin Infall site Li	Sedim Accurate Accura	pent deposite mulating? sive?	onserva	only)  slope (m/	Low flow Vel m/s Deposition index  No D  D  O 0.0001
Road number Assessment type OS grid reference of as OS grid reference of ou Outfall number Receiving water Det Date of assessment Notes  Step 1 Runoff Qui Step 2 River Impa  For dissolved zinc of For sediment impact	Annual Average (    Copprise	Concentration  Fr Zinc  0.00  ug/l  - ug/l  A38 Little Eaton.  Non-cumulative : Easting  Easting  River Derwent  22/02/2019  er flow (m³/s) area drained (ha) BFI)  High = >200mg Cac eam structure, lake ed river width (m)  tith (m)	Uble - Acute Impact Copper Pass  Junction assessment (single outla 435883  Climatic region Coli  4.609 (Ente 0.953 Perm 0.5 Is the 03/1 Separate that reduces a pond or canal that reduces a p	Zinc  Pass  HA Area / DBFO r  List of outfalls cumulative asset  Assessor and affil Version of assess  der Dry  er zero in Annual 959 aeable area draining adischarge in or with  cices the velocity with  hing's n  Treatment for solubles (%)	Rail In Siment Rail In 100m In	Northing Northing C15  Infall site Lin Infall	Sedim Accur Extension (SAS See See See See See See See See See	DSH 2	onserva	only)  slope (m/	Low flow Vel m/s Deposition index  No D  D  D  D  D  D  D  D  D  D  D  D  D
Road number Assessment type OS grid reference of as OS grid reference of ou Outfall number Receiving water Det Date of assessment Notes  Step 1 Runoff Qui Step 2 River Impa  For dissolved zinc o For sediment impace	Annual Average (    Copprise	Concentration  Fr Zinc  0.00  ug/l  - ug/l  A38 Little Eaton.  Non-cumulative : Easting  Easting  River Derwent  22/02/2019  er flow (m³/s) area drained (ha) BFI)  High = >200mg Cac eam structure, lake ed river width (m)  tith (m)	Uble - Acute Impact Copper Pass  Junction assessment (single outla 435883  Climatic region Coli  4.609 (Ente 0.953 Perm 0.5 Is the 03/1 Separate that reduces a pond or canal that reduces a p	List of outfalls cumulative assets  Assessor and affill Version of assess  der Dry  er zero in Annual 95% eable area draining e discharge in or with a ces the velocity withing's n   Treatment for	number  Sin Ssment  Rain  Rain  Rain  Rain  Rain  Attach  Soluble	Northing Northing Northing C15  Infall site  Linfall site  Linfall site  Infall sit	Sedim Accurate Accura	and deposition mulating? sive?  339938  DSH 2  DSH 2  dep 1 runof ded site for committee of site for committee	onserva	only)  slope (m/	Low flow Vel m/s Deposition index  No D  D  O 0.0001





#### With mitigation included within drainage design:





HIGHWAYS	Highways A	gency Water Ris	k Assessment	version 1.0 November 200	9		
AGENCY	Copper	ncentration	e - Acute Impact Copper Pass	Zinc Pass	Sedim	ent - Chronic Impaction for this nulating? Sive?  Yes No	
Road number		A38 Little Eaton Jur	nction	HA Area / DBFO number			
Assessment type		Cumulative assessi	ment including sedimen	ts (outfalls within 100m)			•
OS grid reference of assessme	ent point (m)	Easting	436453		Northing	339895	
OS grid reference of outfall stru	cture (m)	Easting			Northing		
Outfall number			-	List of outfalls in	C12	C13	
Receiving watercourse		Dam Brook		cumulative assessment			
EA receiving water Detailed Ri	ver Network ID			Assessor and affiliation		DSH	
Date of assessment		22/02/2019		Version of assessment		2	
Notes							
Step 2 River Impacts	AADT >=50,000 ar  Annual 95%ile river Impermeable road a Base Flow Index (Bi	flow (m³/s) area drained (ha)	4.4624 Perme	zero in Annual 95%ile rive able area draining to outfa discharge in or within 1 km	er flow box to assess Si		
For sediment impact only		d river width (m)		es the velocity within 100m		741	ope (m/m) 0.0001
Step 3 Mitigation		Brief description		Treatment for Atte		ement of nents (%)	Predict Impact
Existing measures				0 Unlimite	ed 🖵 0	D	
Proposed measures attenua	tion pond			40 Unlimite	ed 💶 🖸 60		Exit Tool