# Appendix 15.1 Water Quality Calculations

## Outfall to Clyde - Combined discharge from all road sections associated with the option D proposals for the Raith Junction

As various outfall options were initially considered, contaminant concentration and risk of spillage were calculated for individual road sections. When a single outfall to the river Clyde was determined to provide the optimum solution, figures from the road sections were combined to produce an indication of the impact of runoff from the amended junction on the watercourse.

## Risk of Spillage:

P <sub>acc total</sub> =	0.01088	(Sum of probability of spillage for individual road sections. <i>Method D,</i>
Risk of Pollution P <sub>pol</sub> =	0.004896	(Probability of spillage with risk reduction factor applied: 0.45,
Annual probability of serious pollution incident $P_{INC}$ =	0.49 %	emergency response. Table D2, Annex I, HA 216/06)
Concentration of contaminants:		
Total Runoff Volume (V) Q <sub>95</sub>	793.665 m <sup>3</sup> /day 668736 m <sup>3</sup> /day	(Sum of runoff volume for individual road sections) (Blairston GS, <i>Hydrometric Register and Statistics 1996 - 2000, CEH Wallingford</i> )
Total Dissolved Copper 5 day Build-up Rate (M <sub>cu</sub> )	0.087376 kg	(Sum of copper build-up for individual road sections)
U/S Dissolved Copper (C <sub>b</sub> )	0.00162 mg/l	(For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data)
$C_r = [(C_b * Q_{95}) + (1000 * M)] / (Q_{95} + V)$		(Method B, Annex I, HA 216/06)
Dissolved Copper Concentration, Crcu	0.001749 mg/l	
	= 1.75 μg/L	
Total Zinc 5 day Build-up	0.380629 kg	(Sum of zinc build-up for individual road sections)
U/S Zinc	0.01045 mg/l	(For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data)
C <sub>r Zn</sub>	0.011006 mg/l	
•	= 11.01 μg/L	

# Outfall 500 into Clyde - Raith Junction

RISK OF Spillage:				
NB Road Length > 100m from slip inc M003	95	m		
NB Road Length < 100m from slip inc M003	100	m		
NB RL < 100m from slip ex M003	100	m		
NB RL > 100m from slip ex M003	205	m		
SB Road Length > 100m from slip inc M006	10	m		
SB Road Length < 100m from slip inc M006	100	m		
SB RL < 100m from slip ex M006	100	m		
SB RL > 100m from slip ex M006	290	m		
Serious spillage rate > 100m from slip	0.31		(Figures assume an all purpose urban road.	
Serious spillage rate < 100m from slip	0.36		Table D1, Annex I, HA 216/06)	
AADT (NB inc. M003)	42179			
AADT (NB ex. M003)	28361			
AADT (SB inc. M006)	50480			
AADT (SB ex. M006)	25471			
HGV traffic (NB inc M003)	5.5	%		
HGV traffic (SB inc M006)	7.5			
HGV traffic (all others)	5	%		
Risk Reduction Factor	0.45		(Assuming RE2 - high quality - watercourse	
Risk Reduction Factor	0.45		(Assuming RE2 - high quality - watercourse classification and < 20min emergency response.	
Risk Reduction Factor	0.45		(Assuming RE2 - high quality - watercourse classification and < 20min emergency response. Table D2, Annex I, HA 21606)	
Risk Reduction Factor P <sub>acc</sub> = RL * SS * (AADT * 365 / 10 <sup>9</sup> )	0.45 * (HGV% / 100	)	(Assuming RE2 - high quality - watercourse classification and < 20min emergency response. Table D2, Annex I, HA 216/06) (Method D, Annex I, HA 216/06)	
Risk Reduction Factor $P_{acc} = RL * SS * (AADT * 365 / 10^9)$ Risk of Spillage NB $P_{acc > 100m from slip inc M003} =$	0.45 * (HGV% / 100 0.00002494	)	(Assuming RE2 - high quality - watercourse classification and < 20min emergency response. Table D2, Annex I, HA 216/06) (Method D, Annex I, HA 216/06)	
Risk Reduction Factor P <sub>acc</sub> = RL * SS * (AADT * 365 / 10 <sup>9</sup> ) Risk of Spillage NB P <sub>acc &gt; 100m from slip inc M003</sub> = NB P <sub>acc &lt; 100m from slip inc. M003</sub> =	0.45 * (HGV% / 100 0.00002494 0.00003048	)	(Assuming RE2 - high quality - watercourse classification and < 20min emergency response. <i>Table D2, Annex I, HA</i> 216/06) ( <i>Method D, Annex I, HA</i> 216/06)	
Risk Reduction Factor P <sub>acc</sub> = RL * SS * (AADT * 365 / 10 <sup>9</sup> ) Risk of Spillage NB P <sub>acc &gt; 100m from slip inc. M003</sub> = NB P <sub>acc &lt; 100m from slip inc. M003</sub> = NB P <sub>acc &lt; 100m from slip ex. M003</sub> =	0.45 * (HGV% / 100 0.00002494 0.00003048 0.00001863	)	(Assuming RE2 - high quality - watercourse classification and < 20min emergency response. <i>Table D2, Annex I, HA</i> 216/06) ( <i>Method D, Annex I, HA</i> 216/06)	
Risk Reduction Factor P <sub>acc</sub> = RL * SS * (AADT * 365 / 10 <sup>9</sup> ) Risk of Spillage NB P <sub>acc &gt; 100m from slip inc M003</sub> = NB P <sub>acc &lt; 100m from slip ex. M003</sub> = NB P <sub>acc &gt; 100m from slip ex. M003</sub> =	0.45 * (HGV% / 100 0.00002494 0.00003048 0.00001863 0.00003289	)	(Assuming RE2 - high quality - watercourse classification and < 20min emergency response. <i>Table D2, Annex I, HA</i> 216/06) ( <i>Method D, Annex I, HA</i> 216/06)	
Risk Reduction Factor P <sub>acc</sub> = RL * SS * (AADT * 365 / 10 <sup>9</sup> ) Risk of Spillage NB P <sub>acc &gt; 100m</sub> from slip inc M003 = NB P <sub>acc &lt; 100m</sub> from slip ex. M003 = NB P <sub>acc &lt; 100m</sub> from slip ex. M003 = NB P <sub>acc &gt; 100m</sub> from slip ex. M003 = Risk of Spillage SB P <sub>acc &gt; 100m</sub> from slip inc M006 =	0.45 * (HGV% / 100 0.00002494 0.00003048 0.00001863 0.00003289 0.00000428	)	(Assuming RE2 - high quality - watercourse classification and < 20min emergency response. <i>Table D2, Annex I, HA</i> 216/06) ( <i>Method D, Annex I, HA</i> 216/06)	
Risk Reduction Factor $P_{acc} = RL * SS * (AADT * 365 / 109)$ Risk of Spillage NB P <sub>acc &gt; 100m</sub> from slip inc M003 = NB P <sub>acc &lt; 100m</sub> from slip inc. M003 = NB P <sub>acc &lt; 100m</sub> from slip ex. M003 = NB P <sub>acc &gt; 100m</sub> from slip ex. M003 = Risk of Spillage SB P <sub>acc &gt; 100m</sub> from slip inc M006 = SB P <sub>acc &lt; 100m</sub> from slip inc. M006 =	0.45 * (HGV% / 100 0.00002494 0.00003048 0.00001863 0.00003289 0.00000428 0.00004975	)	(Assuming RE2 - high quality - watercourse classification and < 20min emergency response. Table D2, Annex I, HA 216/06) (Method D, Annex I, HA 216/06)	
Risk Reduction Factor $P_{acc} = RL * SS * (AADT * 365 / 109)$ Risk of Spillage NB P <sub>acc &gt; 100m</sub> from slip inc M003 = NB P <sub>acc &lt; 100m</sub> from slip inc. M003 = NB P <sub>acc &gt; 100m</sub> from slip ex. M003 = Risk of Spillage SB P <sub>acc &gt; 100m</sub> from slip inc M006 = SB P <sub>acc &lt; 100m</sub> from slip inc. M006 = SB P <sub>acc &lt; 100m</sub> from slip ex. M008 =	0.45  • (HGV% / 100  0.00002494 0.00003048 0.00001863 0.00003289 0.00000428 0.00000428 0.00004975 0.00001673	)	(Assuming RE2 - high quality - watercourse classification and < 20min emergency response. Table D2, Annex I, HA 216/06) (Method D, Annex I, HA 216/06)	
Risk Reduction Factor $P_{acc} = RL * SS * (AADT * 365 / 109)$ Risk of Spillage NB P <sub>acc &gt; 100m</sub> from slip inc M003 = NB P <sub>acc &lt; 100m</sub> from slip ex. M003 = NB P <sub>acc &gt; 100m</sub> from slip ex. M003 = Risk of Spillage SB P <sub>acc &gt; 100m</sub> from slip inc M006 = SB P <sub>acc &lt; 100m</sub> from slip ex. M006 = SB P <sub>acc &gt; 100m</sub> from slip ex. M006 = SB P <sub>acc &gt; 100m</sub> from slip ex. M006 =	0.45 * (HGV% / 100 0.00002494 0.00003048 0.00001863 0.00003289 0.00000428 0.0000428 0.00004975 0.00001673 0.00004179	)	(Assuming RE2 - high quality - watercourse classification and < 20min emergency response. Table D2, Annex I, HA 216/06) (Method D, Annex I, HA 216/06)	
Pacc = RL * SS * (AADT * 365 / 10 <sup>9</sup> )           Risk of Spillage NB Pacc > 100m from slip inc M003 =           NB Pacc < 100m from slip inc. M003 =	0.45 * (HGV% / 100 0.00002494 0.00003048 0.00001863 0.00003289 0.00000428 0.00004975 0.00001673 0.00001673 0.00004179 0.00021950		(Assuming RE2 - high quality - watercourse classification and < 20min emergency response. Table D2, Annex I, HA 216/06) (Method D, Annex I, HA 216/06)	
Risk Reduction Factor $P_{acc} = RL * SS * (AADT * 365 / 10^9)$ Risk of Spillage NB P <sub>acc &gt; 100m</sub> from slip inc M003 = NB P <sub>acc &lt; 100m</sub> from slip ex. M003 = NB P <sub>acc &gt; 100m</sub> from slip ex. M003 = Risk of Spillage SB P <sub>acc &gt; 100m</sub> from slip inc M006 = SB P <sub>acc &lt; 100m</sub> from slip ex. M006 = SB P <sub>acc &gt; 100m</sub> from slip ex. M006 = SB P <sub>acc &gt; 100m</sub> from slip ex. M006 = P <sub>acc total</sub> = Risk of Pollution P <sub>pol</sub> =	0.45 • (HGV% / 100 0.00002494 0.00003048 0.00001863 0.0000428 0.0000428 0.00004275 0.00001673 0.0000179 0.00021950 0.0001	)	(Assuming RE2 - high quality - watercourse classification and < 20min emergency response. Table D2, Annex I, HA 216/06) (Method D, Annex I, HA 216/06)	

Water Quality:		
Copper Concentration		
Total Road Length (>30000)	305	
Total Road Length (<30000)	695 m	
Road Width	11 m	
Total Impervious Area (>30000)	3355 m <sup>2</sup>	
Total Impervious Area (<30000)	7645 m <sup>2</sup>	
Runoff Coefficient	0.75	(see justification Environmental Statement Chapter 15)
Rainfall Depth	12 mm/day	(Flood Estimation Handbook CD Rom, Institute of
Runoff Volume	99 m³/day	Hydrology, 1999)
Q <sub>95</sub>	668736 m <sup>3</sup> /day	(Blairston Gauging Station)
Dissolved Copper Build-up Rate (>30000)	1.2 kg/ha/a	(Table B1, Annex I, HA 216/06)
Dissolved Copper Build-up Rate (<30000)	0.4 kg/ha/a	
Dissolved Copper 5 day Build-up Rate (>3)	0.005515068 kg	
Dissolved Copper 5 day Build-up Rate (<3)	0.004189041 kg	
Total dissolved copper 5 day build-up	0.00970411 kg	
U/S Dissolved Copper	0.00162 mg/l	(For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data)
$C_r = [(C_b * Q_{95}) + (1000 * M_{cu})]$	] / (Q <sub>95</sub> + V)	(Method B, Annex I, HA 216/06)
Dissolved Copper Concentration, Crou	0.001634269 ma/l	
=	1.634269184 ug/l	
_	100 1200 10 1 pg/ 2	
Zinc Concentration		
Total Zinc Build-up Rate (>30000)	5 kg/ha/a	(Table B1, Annex I, HA 216/06)
Total Zinc Build-up Rate (<30000)	2 kg/ha/a	
Total Zinc 5 day Build-up Rate (>3)	0.022979452 kg	
Total Zinc 5 day Build-up Rate (<3)	0.020945205 kg	
Total total zinc 5 day build-up rate	0.043924658 kg	
U/S Total Zinc	0.01045 mg/l	(For the river Clyde @ Bothwell Bridge,
		SEPA Water Quality Data)
C <sub>r Zn</sub>	0.010514127 mg/l	
	10.51412659 µg/L	

## Outfall 580 into Clyde - Raith Junction

Risk of Spillage:		
Road Length > 100m away from slip rd	200	m
Road Length < 100m away from slip rd	0	m
Serious spillage rate > 100m from slip	0.31	(Figures assume an all purpose urban road.
Serious spillage rate < 100m from slip	0.36	Table D1, Annex I, HA 216/06)
AADT	53832	
HGV traffic	5	%
Risk Reduction Factor	0.45	(Assuming RE2 - high quality - watercourse
		classification and $< 20$ min emergency response.
		Table D2, Alliex I, HA 2 10/00 $)$
P <sub>acc</sub> = RL * SS * (AADT * 365 / 10°) *	(HGV% / <sup>/</sup>	( <i>internod D, Annex I, HA 2 16/06</i> )
Risk of Spillage P <sub>acc road</sub> =	0.0001	
P <sub>acc &lt; 100m from slip</sub> =	0.0000	
P <sub>acc total</sub> =	0.0001	
Risk of Pollution P <sub>pol</sub> =	0.0000	
Return Period 1:	0.0027	%

Water Quality:		
Copper Concentration		
Total Road Length	200 m	
Road Wildth	22  m	
Runoff Coefficient	0.75	(See justification Environmental Statement Chapter 15)
Rainfall Depth	12 mm/day	(Flood Estimation Handbook CD Rom. Institute of
Runoff Volume	39.6 m°/day	Hydrology, 1999)
Q <sub>95</sub>	668736 m <sup>3</sup> /dav	(Blairston Gauging Station)
Dissolved Copper Build-up Rate	1.2 kg/ha/a	(Table B1, Annex I, HA 216/06)
Dissolved Copper 5 day Build-up Rate	0.00723 kg	
U/S Dissolved Copper	0.00162 mg/l	(For the river Clyde @ Bothwell Bridge,
$C_r =  (C_b * Q_{95}) + (1000 * M_{cll}) $	/ (Q <sub>95</sub> + V)	(Method B. Apper I. HA 216/06)
	( 00 ,	
Dissolved Copper Concentration, Cr cu	0.00163 mg/l	
	= 1.63072 µg/L	
Zinc Concentration		
Total Zinc Build-up Rate	5 kg/ha/a	(Table B1, Annex I, HA 216/06)
Total Zinc 5 day Build-up Rate	0.03014 kg	
U/S Total Zinc	0.01045 mg/l	(For the river Clyde @ Bothwell Bridge,
		SEPA Water Quality Data )
C <sub>r Zn</sub>	0.01049 mg/l	
	10.4944 µg/L	

## M74 Junction 5, Raith Water Quality Calculations

## Outfall 860 into Clyde - Raith Junction

Risk of Spillage:			
NB Road Length > 100m from slip ex slip	455	m	
NB Road Length < 100m from slip ex slip	100	m	
NB RL < 100m from slip inc. slip	100	m	
NB RL > 100m from slip inc.slip	395		
SB Road Length > 100m from slip ex slip	510		
SB Road Length < 100m from slip ex slip	100		
SB RL < 100m from slip inc slip	100		
SB RL > 100m from slip inc. slip	340	m	
Serious spillage rate > 100m from slip	0.31		(Figures assume an all purpose urban road.
Serious spillage rate < 100m from slip	0.36		Table D1, Annex I, HA 216/06)
AADT (NB ex slip)	28361		
AADT (NB inc. slip)	49137		
AADT (SB ex. slip)	25471		
AADT (SB inc. slip)	49884		
HGV traffic (NB inc. Slip)	8	%	
HGV traffic (SB inc. Slip)	7	%	
HGV traffic others	5	%	
Risk Reduction Factor	0.45		(Assuming RE2 - high quality - watercourse
			classification and < 20min emergency response. Table D2, Annex I, HA 216/06)
P <sub>acc</sub> = RL * SS * (AADT * 365 / 10 <sup>9</sup> ) * (HG	V% / 100)	)	(Method D, Annex I, HA 216/06)
			-
Risk of Spillage NB P <sub>acc &gt; 100m from slip ex slip</sub> =	0.0001		
NB P <sub>acc &lt; 100m from slip ex slip</sub> =	0.0000		
NB P <sub>acc &lt; 100m from slip inc. slip</sub> =	0.0001		
NB P <sub>acc &gt; 100m from slip inc. slip</sub> =	0.0002		
Risk of Spillage SB P <sub>acc &gt; 100m from slip ex slip</sub> =	0.0001		
SB P <sub>acc &lt; 100m from slip ex slip</sub> =	0.0000		
SB P <sub>acc &lt; 100m from slip inc slip</sub> =	0.0000		
SB P <sub>acc &gt; 100m from slip inc slip</sub> =	0.0001		
P <sub>acc total</sub> =	0.0006		
Rick of Dollution D	0.0003		
	0.0003		
Return Period 1:	0.03	%	

#### Water Quality: Copper Concentration Total Road Length (<30000) 1165 m Total Road Length (>30000) 935 m Road Width 11 m Total Impervious Area (<30000) 12815 m<sup>2</sup> Total Impervious Area (>30000) 10285 m<sup>2</sup> Runoff Coefficient 0.75 (see justification Environmental Statement Chapter 15) (Flood Estimation Handbook CD Rom, Institute of 12 mm/day Rainfall Depth 207.9 m3/day Runoff Volume Hydrology, 1999) Q<sub>95</sub> 668736 m<sup>3</sup>/day (Blairston Gauging Station) Dissolved Copper Build-up Rate (<30000) 1.2 kg/ha/a (Table B1, Annex I, HA 216/06) Dissolved Copper Build-up Rate (>30000) 0.4 Dissolved Copper 5 day Build-up Rate (<3...) 0.02107 kg Dissolved Copper 5 day Build-up Rate (>3...) 0.00564 kg Total Dissolved Copper 5 day Build-up Rate 0.0267 kg U/S Dissolved Copper 0.00162 mg/l (For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data) $C_r = [(C_b * Q_{95}) + (1000 * M_{cu})] / (Q_{95} + V)$ (Method B, Annex I, HA 216/06) 0.00166 mg/l Dissolved Copper Concentration, Cr cu = 1.65941 µg/L Zinc Concentration Total Zinc Build-up Rate (<30000) 5 kg/ha/a (Table B1, Annex I, HA 216/06) Total Zinc Build-up Rate (>30000) 2 kg/ha/a Total Zinc 5 day Build-up Rate (<3...) 0.08777 kg Total Zinc 5 day Build-up Rate (>3...) 0.02818 kg Total total zinc 5 day build-up rate 0.11595 kg U/S Total Zinc 0.01045 mg/l (For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data) 0.01062 mg/l C<sub>r Zn</sub> 10.6201 µg/L

## Outfall M003 into Clyde - Raith Junction

Risk of Spillage:		
Road Length < 100m away from side road	100 m	
Road Length < 100m away from slip rd	200 m	
Serious spillage rate < 100m from side road	1.81	(Figures assume an all purpose urban road.
Serious spillage rate < 100m from slip rd	0.36	Table D1, Annex I, HA 216/06)
AADT	13818	
HGV traffic	6 %	
Risk Reduction Factor	0.45	(Assuming RE2 - high quality - watercourse
		classification and < 20min emergency response. Table D2, Annex I, HA 216/06)
P <sub>acc</sub> = RL * SS * (AADT * 365 / 10 <sup>9</sup> ) * (HG	V% / 100)	(Method D, Annex I, HA 216/06)
Pick of Spillage		
	0.0001	
Facc side road =	0.0001	
P <sub>acc slip</sub> =	0.0000	
P <sub>acc total</sub> =	0.0001	
Risk of Pollution P=	0.000	
	0.0000	
Return Period 1:	0.0034 %	
Water Quality:		
Copper Concentration		
Total Road Length	300 m	
Road Width	10 m	
Total Impervious Area	3000 m <sup>2</sup>	
Runoff Coefficient	0.75	(see justification Environmental Statement Chapter 15)
Rainfall Depth	12 mm/day	(Flood Estimation Handbook CD Rom, Institute of
Runoff Volume	27 m <sup>3</sup> /day	Hydrology, 1999)
Q <sub>95</sub>	668736 m <sup>3</sup> /day	(Blairston Gauging Station)
Dissolved Copper Build-up Rate	0.3 kg/ha/a	(Table B1, Annex I, HA 216/06)
Dissolved Copper 5 day Build-up Rate	0.001233 kg	
U/S Dissolved Copper	0.00162 mg/l	(For the river Clyde @ Bothwell Bridge,
$C_r = [(C_b * Q_{95}) + (1000 * M_{cu})] / (Q_{95})$	+ V)	(Method B, Annex I, HA 216/06)
		-
Dissolved Copper Concentration, C <sub>r cu</sub>	0.001622 mg/l	
=	1.021778 µg/L	
Zinc Concentration		
Total Zina Build up Bata	1 ka/ha/-	(Table B1 Appay I HA 216/06)
Total Zine 5 day Ruild up Poto	1 kg/na/a	( Table DT, ATTILEX I, TA 2 10/00 )
10/2 Total Zinc	0.00411  kg	(For the river Clude @ Bothwall Bridge
	0.01045 mg/i	SEPA Water Quality Data)
C <sub>r Zn</sub>	0.010456 mg/l	
	10.45572 µg/L	

## Outfall M004 into Clyde - Raith Junction

Read Length - 100m sawy from size read NAADT       100 m         Read Length - 100m sawy from junctions NAADT       100 m         Read Length - 100m sawy from junctions NAADT       100 m         Serious spillage rate + 100m from roundabout       5.35         Serious spillage rate + 100m from roundabout       5.35         Serious spillage rate + 100m from roundabout       5.35         Northern AADT       6 %         Ostimus ADT       47916         Risk Reduction Factor       0.31         Nethern AADT       6 %         Ostimus ADT       0.45         Risk Reduction Factor       0.45         Risk Reduction Factor       0.0002         Pause and F       0.00006         Pause and F       <	Risk of Spillage:		
Road Langh - 100m away from undobust (NAADT)       300 m         Road Langh - 100m away from undobust (NAADT)       20 m         Road Langh - 100m away from undobust (NAADT)       20 m         Serious spillage rate < 100m from rondobust (NAADT)	Road Length < 100m away from side road NAADT	100 m	
Road Length - 100m away from incurdabout (NADT)       100 m         Road Length - 100m away from incurdabout SAADT       100 m         Serious spillage rate < 100m from roundabout SADT	Road Length $< 100$ m away from side road NAADT	300 m	
Road Length - 100m away from junctions NADT       20 m         Serious spillage rate < 100m from roundabout SADT	Road Length $< 100m$ away from roundabout (NAADT)	100 m	
Riad Length - 100m away from isourdabout SAADT       100 m         Serious spillage rate < 100m from roundabout	Road Length > 100m away from junctions NAADT	20 m	
Serious spillage rate < 100m from side road	Road Length < 100m away from roundabout SAADT	100 m	
Serious spillage rate < 100m from roundabout	Serious spillage rate < 100m from side road	1.81	(Figures assume an all purpose urban road.
Serious spillage rate > 100m junctions         0.31           Southern AADT         47916           HeV traffic         6 %           Risk Reduction Factor         0.45           Risk Reduction Factor         0.45           Risk Reduction Factor         0.45           Risk of Spillage         0.0002           Pace RL * SS * (AADT * 385 / 10 <sup>0</sup> ) * (HGV% / 100)         (Merbed D. Annex.I. HA 21006)           Risk of Spillage         0.0000           Pace transmit =         0.0000           Return Petriod         1:         0.0016           Pace transmit =	Serious spillage rate < 100m from roundabout	5.35	Table D1, Annex I, HA 216/06)
Northern AADT         55370           HGV Taffic         6 %           NGK Reduction Factor         47976           Risk Reduction Factor         0.45           Passe Ret "SS" (AADT ' 365 / 10") ' (HGV% / 100)         (Assuming RE2 - high quality - watercourse classification and - 20min emergency response. Table OL Annex I, HA 27608)           Risk Reduction Factor         0.0002           Pass de molt =         0.0002           Pass de molt =         0.0000           Pass de molt (NADT)         220 m           Total Road Length (NAADT)         220 m           Gopper Concentration         17 m           Total Road Length (NAADT)         3740 m <sup>2</sup> Road Widh         17 m           Impervious Area (NADT)         688 m <sup>2</sup> /           Cold Estinstation Handbook CD Ronn	Serious spillage rate > 100m junctions	0.31	
Southern AADT         47916           HeV trafic         0.45           Risk Reduction Factor         0.45           Risk Reduction Factor         0.45           Risk Reduction Factor         0.45           Risk of Spillage         0.0002           Pace RL*SS*(AADT*365/10 <sup>3</sup> )*(HGV%/100)         (Memod D. Annex I. HA 21606)           Risk of Spillage         0.0002           Pace and staff         0.0006           Pace and staff         0.0000           Risk of Pollution Pace         0.00000           Return Petrid         1:         0.009           Ket or Quality:         Coper Concentration         10540 m²           Total Road Length (NAADT	Northern AADT	55370	
HGV traffic       6 %         Risk Reduction Factor       0.45         Risk Reduction Factor       0.45         Pass = RL * SS * (AADT * 365 / 10 <sup>°</sup> ) * (HGV% / 100)       (Assuming RE2 - high quality - watercourse classification and < 20min emergency response. Table (2, Answ. K) # 27608)	Southern AADT	47916	
Risk Reduction Factor         0.45         (Assuming RE2 - high quilty - watercourse dissification and - 20min emergency response. Table D2. Annex I. M 21606)           Pass = RL * SS * (AADT * 365 / 10 <sup>°</sup> ) * (HGV% / 100)         (Method D. Annex I. M 21606)           Risk of Spillage Pace start and a = excense	HGV traffic	6 %	
Classification and < 20min mergency response.	Risk Reduction Factor	0.45	(Assuming RE2 - high quality - watercourse
$P_{avc} = RL + SS + (AADT + 365 / 10)^{+} (HeV% / 100)$ (Method D, Annex I, PA 21608)         Risk of Spillage       0.0002         Pace terms and S =       0.0006         Pace constance N =       0.0000         Return Period       1:       0.09         Water Quality:       220 m         Copper Concentration       12 mm/day         Total Road Length (SAADT)       240 m²         Rundf Coefficiant       0.75         Rundf Coefficiant       0.75         Rundf Volume (AAADT)       33.66 m²/day         Disolved Copper S day Build-up Rate       1.2 kytha/a         Disolved Copper S day Build-up Rate <td></td> <td></td> <td>classification and &lt; 20min emergency response.</td>			classification and < 20min emergency response.
$P_{wc} = RC - SS (AAUT - 365 / 10) (ProV% / 100) (ProV% $		( ( 100)	(Method D. Annex I, HA 216/06)
Risk of Spillage       0.0002         Pace state Name =       0.0006         Pace transmittance M =       0.0006         Pace number M =       0.0009         Risk of Pollution P <sub>pol</sub> =       0.0009         Return Period       1:       0.09         Verter Quality:       Verter Quality:         Copper Concentration         Total Road Length (NAADT)       220 m <sup>2</sup> / <sub>1</sub> Gaad Width       17 m <sup>2</sup> / <sub>17</sub> Impervious Area (NAADT)       3740 m <sup>2</sup> / <sub>1</sub> Group Concentration       0.75         Total Road Length (NAADT)       3740 m <sup>2</sup> / <sub>1</sub> Group Concentration       0.75         State (NAADT)       3740 m <sup>2</sup> / <sub>1</sub> Numoff Volume (NAADT)       12 mm/day         Rainfall Depth       12 mm/day         Runoff Volume (NAADT)       682 m <sup>2</sup> / <sub>1</sub> /day         Runoff Volume (SAADT)       0.017326 kg         Dissolved Copper Suid-up Rate       0.00162 mg/1         Dissolved Copper Solved Long Rate       0.001646 mg/1         U/S Dissolved Copper Concentratio	$P_{acc} = RL^{-1}SS^{-1}(AADT^{-1}365710^{-1})^{-1}(HGV)^{-1}$	% / 100)	(Method D, Alliex I, HA 2 10:00)
Part atter waits =         0.0000           Part atter waits =         0.0006           Part atter waits =         0.0006           Part atter waits =         0.0006           Part atter waits =         0.0000           Return Period         1:         0.000           Water Quality:         Copper Concentration           Total Road Length (NAADT)         220 m           Marker Gaud Length (SAADT)         400 m           Marker Gaud Length (SAADT)         3740 m <sup>2</sup> Impervious Area (SAADT)         10540 m <sup>2</sup> Runoff Coefficient         0.75           Runoff Volume (NAADT)         12 mm/day           Runoff Volume (SAADT)         33.66 m <sup>2</sup> /day           Q <sub>6</sub> Generative (SAADT)           Dissolved Copper Build-up Rate         0.00162 m <sup>2</sup> /day           (JS Dissolved Copper Suil-up Rate         0.00162 m <sup>2</sup> /day           (JS Dissolved Copper Concentration)         1.454675 m <sup>2</sup> /day           C = [C_k^- Q_{ab}] + (1000^+ M_{ab}] / (Q_{ab} + V)         (Method B, Annex I, HA 21606)           Diss	Risk of Spillage		
Description         0.0006           Pace task and 8 =         0.0007           Risk of Pollution P <sub>pol</sub> =         0.0009           Return Period         1:         0.09           Water Quality:         0.0000           Copper Concentration         220 m           Total Road Length (NAADT)         220 m           Total Road Length (SAADT)         400 m           Road Width         17 m           Impervious Area (SAADT)         3740 m <sup>2</sup> Road Midth         17 m           Impervious Area (SAADT)         3660 m <sup>2</sup> Road Midth         17 m           Bace Add Midth         17 m           Road Midth         17 m           Dissolved Copper Suid-up Rate         0.75           Obsolved Copper Suid-up Rate	$P_{acc side road N} =$	0.0002	
• Act Bit and S =		0.0006	
The comparison is a constrained in the constraint of	acc side road S =	0.0000	
$P_{act running interval is} = 0.0000$ $P_{act total is} = 0.00000$ $P_{act total is} = 0.000000$ $P_{act total is} = 0.000000$ $P_{act total is} = 0.0000000$ $P_{act total is} = 0.0000000000000000000000000000000000$	r acc roundabout N =	0.0006	
$P_{acc tunit} = 0.0006$ $P_{acc tunit} = 0.0006$ Risk of Pollution P <sub>pol</sub> = 0.0009 Return Period 1: 0.009 % Water Quality: Copper Concentration Total Road Length (NAADT) Total Road Length (NAADT) Total Road Length (NAADT) Total Road Length (NAADT) Total Road Length (SAADT) Road Width 17 m Impervious Area (SAADT) Total Road Length (SAADT) Total Road Length (SAADT) Total Road Length (SAADT) Second 10540 m <sup>2</sup> (Flood Estimation Handbook CD Rom, Instance of Hydrokay, 1999) Road Width 17 m Total Road Length (SAADT) Second 10540 m <sup>2</sup> (Flood Estimation Handbook CD Rom, Instance of Hydrokay, 1999) Road Width 17 m Total Road Length (SAADT) Second 10540 m <sup>2</sup> (Flood Estimation Handbook CD Rom, Instance of Hydrokay, 1999) Road Width 19 Road Widt	Pacc no junction N =	0.0000	
Processes Processes Risk of Pollution P <sub>por</sub> = 0.0000 Return Period 1: 0.009 % Water Quality: Copper Concentration Total Road Length (NAADT) 220 m Total Road Length (NAADT) 4400 m Road Width 17 m Impervious Area (NAADT) 4400 m <sup>2</sup> Impervious Area (NAADT) 6800 m <sup>2</sup> Total Impervious Area (NAADT) 6800 m <sup>2</sup> Intervious Area (NAADT) 6800 m <sup>2</sup> Total Impervious Area (SAADT) 6800 m <sup>2</sup> Total Inpervious Area (SAADT) 6800 m <sup>2</sup> Total Inpervious Area (SAADT) 6800 m <sup>2</sup> Total Road Length (NAADT) 6800 m <sup>2</sup> US olsolved Copper S day Build-up Rate 0.075226 kg U/S Dissolved Copper S day Build-up Rate 0.001628 mg/l C <sub>r</sub> = [(C <sub>b</sub> * Q <sub>bb</sub> ) + (1000 * M <sub>col</sub> )] / (Q <sub>bb</sub> + V) (Method B, Annex I, HA 21606) Dissolved Copper Concentration, C <sub>r ou</sub> (NAADT) 0.001646 mg/l = 1.645675 µg/L Zinc Concentration Total Zinc Build-up Rate 0.0072192 kg 0.01045 mg/l (For the river Clyde @ Bothwell Bridge, SEPA Water Quality Date) (For the river Clyde @ Bothwell Bridge, SEPA Water Quality Date) (For the river Clyde @ Bothwell Bridge, SEPA Water Quality Date) (For the river Clyde @ Bothwell Bridge, SEPA Water Quality Date) (For the river Clyde @ Bothwell Bridge, SEPA Water Quality Date) (For the river Clyde @ Bothwell Bridge, SEPA Water Quality Date) (For the river Clyde @ Bothwell Bridge, SEPA Water Quality Date) (For the river Clyde @ Bothwell Bridge, SEPA Water Quality Date) (For the river Clyde @ Bothwell Bridge, SEPA Water Quality Date) (For the river Clyde @ Bothwell Bridge, SEPA Water Quality Date) (For the river Clyde @ Bothwell Bridge, SEPA Water Quality Date) (For the river Clyde @ Bothwell Bridge,	P <sub>acc roundabout S</sub> =	0.0006	
Risk of Pollution $P_{pol} =$ 0.0009         Return Period       1:       0.09         Water Quality:       Copper Concentration         Total Road Length (NAADT)       220 m         Total Road Length (SAADT)       400 m         Read Width       17 m         Impervious Area (SAADT)       6800 m <sup>2</sup> Total Road Length (SAADT)       6800 m <sup>2</sup> Road Width       17 m         Impervious Area (SAADT)       6800 m <sup>2</sup> Road Width       17 m         Impervious Area (SAADT)       6800 m <sup>2</sup> Runoff Coefficient       0.75 (see justification Environmental Statement Chapter 15)         Rainfall Depth       12 mm/day         Runoff Volume (SAADT)       612 m <sup>3</sup> /day         Ogs       0.00162 mg/l         Dissolved Copper Build-up Rate       0.017322 kg         U/S Dissolved Copper Concentration, $C_{rou (NAADT)}$ 0.00162 mg/l $C_r = [(C_p * Q_{qb}) + (1000 * M_{qb})] / (Q_{qb} + V)       (Method B, Annex I, HA 21606)         Dissolved Copper Concentration, C_{rou (NAADT)}       0.001646 mg/l         C_r = [(C_p * Q_{qb}) + (1000 * M_{qb})] / (Q_{qb} + V)       (Method B, Annex I, HA 21606)         Dissolved Copper Concentration, C_{rou (NAADT)}       0.001646 mg/l         C_r = [$	P <sub>acc total</sub> =	0.0020	
Risk of Pollution $P_{pol} =$ 0.0009         Return Period       1:       0.09       %         Water Quality:         Copper Concentration         Total Road Length (NAADT)       220 m         Mater Quality:       400 m         Recent Concentration         Total Road Length (SAADT)       400 m         Road Width       17 m         Impervious Area (SAADT)       3740 m <sup>2</sup> Impervious Area (SAADT)       6800 m <sup>2</sup> Total Road Length (NAADT)       3740 m <sup>2</sup> Runoff Coefficient       0.75 (See justification Environmental Statement Chapter 15)         Runoff Volume (NAADT)       33.66 m <sup>2</sup> (day         Runoff Volume (NAADT)       61.2 m <sup>2</sup> (day         Qs       (Flood Estimation Handbook CD Rom, Institute of Handbook CD Rom (Table B1,			
Return Period         1:         0.09         %           Water Quality:         Copper Concentration           Total Road Length (NAADT)         220 m         400 m           Total Road Length (NAADT)         400 m         17 m           Road Width         17 m         400 m           Impervious Area (SAADT)         6800 m <sup>2</sup> Total Road Length (SAADT)         6800 m <sup>2</sup> Rundf Coefficient         0.75 (See justification Environmental Statement Chapter 15)           Rundf Volume (NAADT)         33.66 m <sup>3</sup> /day           Rundf Volume (NAADT)         33.66 m <sup>3</sup> /day           Rundf Volume (NAADT)         12 mm/day           Rundf Volume (NAADT)         12 mm/day           Stat Rundf Volume (SAADT)         12 mm/day           Ge8736 m <sup>3</sup> /day         (Blairston Gauging Station)           1.2 kg/ha/a         (Table B1, Annex I, HA 21606)           Dissolved Copper S day Build-up Rate         0.001646 mg/l           Dissolved Copper Concentration, C <sub>r ou (MADT)</sub> 0.001646 mg/l           ctal Zinc S day Build-up Rate         0.007232 kg           OLOTES         go.001646 mg/l           ctal Zinc S day Build-up Rate         0.0072192 kg           OLOTES         (Table B1, Annex I, HA 21606)           Disstowe	Risk of Pollution P <sub>pol</sub> =	0.0009	
Keturn Period       1.       0.09 $\%$ Water Quality:       Copper Concentration         Total Road Length (NAADT)       220 m         Total Road Length (SAADT)       400 m         Road Width       17 m         Impervious Area (NAADT)       3740 m <sup>2</sup> Runoff Coefficient       0.75         Runoff Coefficient       0.75         Runoff Volume (NAADT)       33.66 m <sup>3</sup> /day         Painfall Depth       12 mm/day         Runoff Volume (SAADT)       33.66 m <sup>3</sup> /day         Bisolved Copper Build-up Rate       0.017328 kg         Dissolved Copper       0.00162 mg/l         U/S Dissolved Copper       0.00162 mg/l         Copper Concentration       0.001646 mg/l         Total Zinc Build-up Rate       0.001646 mg/l         Dissolved Copper Concentration, Cr ou (NAADT)       0.001646 mg/l         Cr = [(Cb, * Qab) + (1000 * Max)] / (Qab + V)       (Metrod B, Annex I, HA 21606)         Dissolved Copper Concentration, Cr ou (NAADT)       0.001646 mg/l         Total Zinc S day Build-up Rate       0.0072192 kg         Outrasize kg flav/a       (Table B1, Annex I, HA 21606)         Colorentration       (Fabre B1, Annex I, HA 21606)         Total Zinc S day Build-up Rate       0.072192 kg     <	Deture Deried	0.00 %	
Water Quality:         Copper Concentration         Total Road Length (NAADT)       220 m         Total Road Length (SAADT)       400 m         Road Width       17 m         Impervious Area (NAADT)       3740 m <sup>2</sup> Impervious Area (NAADT)       3740 m <sup>2</sup> Ito all Impervious Area (NAADT)       3740 m <sup>2</sup> Runoff Coefficient       0.75 (see justification Environmental Statement Chapter 15)         Runoff Volume (NAADT)       33.66 m <sup>3</sup> /day         Runoff Volume (NAADT)       94.88 m <sup>3</sup> /day         Ogs       668736 m <sup>3</sup> /day         Dissolved Copper Build-up Rate       0.017328 kg         Dissolved Copper S day Build-up Rate       0.017328 kg         U/S Dissolved Copper       0.001642 mg/l         Dissolved Copper Concentration, Cr ou (NAADT)       0.001642 mg/l         Cr_= [(Cs * Q <sub>60</sub> ) + (1000 * M <sub>60</sub> )] / (Q <sub>65</sub> + V)       (Method B, Annex I, HA 216/06)         Dissolved Copper Concentration, Cr ou (NAADT)       0.001646 mg/l         Total Zinc S day Build-up Rate       5 kg/ha/a         (Table B1, Annex I, HA 216/06)       (Table B1, Annex I, HA 216/06)         Cr_e [(Cs * Qay Dild-up Rate       0.00122 kg         (VS Total Zinc S day Build-up Rate       0.001646 mg/l         Cr_an (NAADT)       0.010455 mg/l <td>Return Period 1.</td> <td>0.09 %</td> <td></td>	Return Period 1.	0.09 %	
Water Quality:         Copper Concentration         Total Road Length (NAADT)       220 m         Road Width       17 m         Impervious Area (NAADT)       3740 m <sup>2</sup> Runoff Coefficient       6800 m <sup>2</sup> Runoff Coefficient       12 mm/day         Runoff Volume (NAADT)       12 mm/day         Runoff Volume (NAADT)       33.66 m <sup>2</sup> /day         Runoff Volume (SAADT)       6800 m <sup>2</sup> Nunoff Volume (SAADT)       12 mm/day         Runoff Volume (SAADT)       13.86 m <sup>2</sup> /day         Runoff Volume (SAADT)       12 mm/day         G88736 m <sup>2</sup> /day       (Flood Estimation Handbook CD Rom, Institute of Hydrology, 1999)         Runoff Volume (SAADT)       12 kg/ha/a         Qa5       0017326 kg         Dissolved Copper S day Build-up Rate       0.017326 kg         U/S Dissolved Copper Concentration, Cr ou (NAADT)       0.00162 mg/l         Cr = [(Cb * Qa6) + (1000 * Mo.)] / (Qa5 + V)       (Method B, Annex I, HA 21606)         Dissolved Copper Concentration, Cr ou (NAADT)       0.001646 mg/l         Total Zinc Build-up Rate       0.001645 mg/l         U/S Total Zinc Concentration       5 kg/ha/a         Cr = [(Cb * Qa6) + (1000 * Ma0)] / (Qa5 + V)       (Table B1, Annex I, HA 21606)         Dissolved			
Copper Concentration         Total Road Length (NAADT)       220 m         Total Road Length (SAADT)       400 m         Road Width       17 m         Impervious Area (NAADT)       3740 m <sup>2</sup> Impervious Area (SAADT)       6800 m <sup>2</sup> Total Impervious Area (SAADT)       6800 m <sup>2</sup> Runoff Coefficient       0.75 (see justification Environmental Statement Chapter 15)         Rainfall Depth       12 mm/day         Runoff Volume (NAADT)       33.66 m <sup>3</sup> /day         Runoff Volume (SAADT)       668736 m <sup>3</sup> /day         Qa5       668736 m <sup>3</sup> /day         Dissolved Copper Build-up Rate       0.017326 kg         U/S Dissolved Copper 1       0.00162 mg/l         U/S Dissolved Copper Concentration, C <sub>r ou (NAADT)</sub> 0.001646 mg/l         LiseSolved Copper Concentration, C <sub>r ou (NAADT)</sub> 0.001646 mg/l         Total Zinc Build-up Rate       0.001646 mg/l         Dissolved Copper Concentration, C <sub>r ou (NAADT)</sub> 0.001646 mg/l         Concentration       5 kg/ha/a         Cr_= [(C_b * Qa6) + (1000 * M <sub>ou</sub> )] / (Qa6 + V)       (Method B, Annex I, HA 21606)         Dissolved Copper Concentration, C <sub>r ou (NAADT)</sub> 0.001646 mg/l         Cr_= (C_b * Qa6) + (1000 * M <sub>ou</sub> ) / See M       (Table B1, Annex I, HA 21606) <t< td=""><td>Water Quality:</td><td></td><td></td></t<>	Water Quality:		
Corplet ConcentrationTotal Road Length (NAADT)220 mTotal Road Length (SAADT)400 mRoad Width17 mImpervious Area (NAADT)3740 m²Impervious Area (NAADT)6800 m²Total Impervious Area (NAADT)6800 m²Runoff Coefficient0.75Runoff Coefficient0.75Runoff Volume (NAADT)12 mm/dayRunoff Volume (NAADT)61.2 m³/dayRunoff Volume (NAADT)61.2 m³/dayRunoff Volume (SAADT)61.2 m³/dayRunoff Volume (SAADT)1.2 kg/ha/aTotal Runoff Volume (SAADT)1.2 kg/ha/aDissolved Copper Build-up Rate0.017326 kgU/S Dissolved Copper0.00162 mg/l(For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data)C <sub>r</sub> = [(C <sub>b</sub> * Q <sub>60</sub> ) + (1000 * M <sub>cul</sub> )] / (Q <sub>60</sub> + V)Dissolved Copper Concentration, C <sub>r cu (NAADT)</sub> Total Zinc S day Build-up RateU/S Total Zinc S day Build-up Rate(Jourd Same)(Jourd Copper Concentration, C <sub>r cu (NAADT)</sub> )(Jourd Same)(Jourd Same) <td>Coppor Concontration</td> <td></td> <td></td>	Coppor Concontration		
Total Road Length (NAADT)220 mTotal Road Length (SAADT)400 mRoad Width17 mImpervious Area (NAADT)3740 m²Impervious Area (SAADT)6800 m²Total Impervious Area (SAADT)6800 m²Runoff Coefficient0.75 (see justification Environmental Statement Chapter 15)Rainfall Depth12 mm/dayRunoff Volume (NAADT)33.66 m³/dayRunoff Volume (SAADT)61.2 m²/dayTotal Runoff Volume (SAADT)688736 m³/dayQas668736 m³/dayDissolved Copper Build-up Rate0.017328 kgU/S Dissolved Copper0.00162 mg/lCr = [(Cb * Qas) + (1000 * Mcw)] / (Qas + V)(Hotod B, Annex I, HA 21606)Dissolved Copper Concentration, Cr cu (NAADT)0.001646 mg/lTotal Zinc S day Build-up Rate0.0012192 kgU/S Total Zinc Concentration, Cr cu (NAADT)0.010556 mg/l(For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data)Cr = [(Cb * Qas) + (1000 * Mcw)] / (Qas + V)(Method B, Annex I, HA 21606)Dissolved Copper Concentration, Cr cu (NAADT)0.001646 mg/l10.45675 µg/L0.072192 kg(VS Total Zinc Concentration, Cr cu (NAADT)0.010556 mg/l(VS Total Zinc Concentration)0.010556 mg/l(VS Total Zinc Concentration)0.010556 mg/l(VS Total Zinc Concentration)0.010556 mg/l <t< td=""><td>copper concentration</td><td></td><td></td></t<>	copper concentration		
Total Road Length (SAADT)400 mRoad Width17 mImpervious Area (NAADT)3740 m²Impervious Area (SAADT)6800 m²Runoff Coefficient0.75Runoff Volume (NAADT)12 mm/dayRunoff Volume (SAADT)33.66 m³/dayQas94.86 m³/dayQas94.86 m³/dayDissolved Copper S day Build-up Rate0.017328 kg $C_r = [(C_b * Qas) + (1000 * M_{cu})] / (Qas + V)(For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data)Cral Zinc S day Build-up Rate0.001646 mg/lTotal Zinc S day Build-up Rate0.001646 mg/lUS Total Zinc S day Build-up Rate0.001646 mg/lUS Total Zinc S day Build-up Rate0.001646 mg/lUS Total Zinc S day Build-up Rate0.001646 mg/lStatic S and Build-up Rate0.001646 mg/lCr_ata (NAADT)0.01045 mg/lOuting S and Set Set Set Set Set Set Set Set Set Set$	Total Road Length (NAADT)	220 m	
Road Width17mImpervious Area (NAADT)3740m²Impervious Area (SAADT)6800m²Total Impervious Area10540m²Runoff Coefficient0.75(see justification Environmental Statement Chapter 15)Rainfall Depth12mm/dayRunoff Volume (NAADT)33.66m³/dayRunoff Volume (SAADT)61.2m³/dayQs668736m³/dayQs668736m³/dayQs0.017326kgU/S Dissolved Copper Build-up Rate0.017326kgU/S Dissolved Copper 5 day Build-up Rate0.017326kgU/S Dissolved Copper Concentration, $C_{r cu}$ (NAADT)0.001646mg/lDissolved Copper Concentration, $C_{r cu}$ (NAADT)0.001646mg/lTotal Zinc Build-up Rate0.0072192kgU/S Total Zinc G Jay Build-up Rate0.01025mg/l(For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data)0.01045Cr_= [(Cb * Qab) + (1000 * Mbu)] / (Qab + V)(Method B, Annex I, HA 216/06)Dissolved Copper Concentration, Cr cu (NAADT)0.001646Total Zinc Build-up Rate0.072192V/S Total Zinc0.010556Multic 5 day Build-up Rate0.010556Oral Zinc S day Build-up Rate0.010556Total Zinc S day Build-up Rate0.010556U/S Total Zinc0.010556Multic 5 day Build-up Rate0.010556Multic 5 day Build-up Rate0.010556Multic 5 day Build-up Rate0.010556Multic	Total Road Length (SAADT)	400 m	
Impervious Area (NAADT) $3740 \text{ m}^2$ Impervious Area (SAADT)6800 m^2Total Impervious Area10540 m^2Runoff Coefficient0.75 (see justification Environmental Statement Chapter 15)Rainfall Depth12 mm/dayRunoff Volume (NAADT)33.66 m³/dayRunoff Volume (SAADT)612 m³/dayTotal Runoff Volume (SAADT)94.86 m³/dayQa5668736 m³/dayDissolved Copper Build-up Rate0.017326 kgU/S Dissolved Copper0.00162 mg/l(For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data)C <sub>r</sub> = [(C <sub>b</sub> * Q <sub>80</sub> ) + (1000 * M <sub>cu</sub> )] / (Q <sub>95</sub> + V)(Method B, Annex I, HA 216/06)Dissolved Copper Concentration, C <sub>r ou (NAADT)</sub> 0.001646 mg/l 1.645675 µg/LTotal Zinc Build-up Rate0.072192 kg 0.0110556 mg/l 1.65564 b un/l.	Road Width	17 m	
Impervious Area (SAADT)6800 m²Total Impervious Area10540 m²Runoff Coefficient0.75Rainfall Depth12 mm/dayRunoff Volume (NAADT)33.66 m³/dayRunoff Volume (SAADT)61.2 m³/dayRunoff Volume (SAADT)61.2 m³/dayRunoff Volume (SAADT)94.86 m³/dayGas668736 m³/dayDissolved Copper Build-up Rate0.017326 kgDissolved Copper 5 day Build-up Rate0.017326 kgU/S Dissolved Copper0.00162 mg/l(For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data)C <sub>r</sub> = [(C <sub>b</sub> * Q <sub>35</sub> ) + (1000 * M <sub>cu</sub> )] / (Q <sub>35</sub> + V)(Method B, Annex I, HA 216/06)Dissolved Copper Concentration, C <sub>r ou</sub> (NAADT)0.001646 mg/lTotal Zinc Suild-up Rate0.072192 kgU/S Total Zinc0.01745 mg/l(For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data)C <sub>r 2h</sub> (NAADT)0.010556 mg/l0.01045 mg/l0.01045 mg/l10,5564 fd un/l.	Impervious Area (NAADT)	3740 m <sup>2</sup>	
Total Impervious Area10540 m²Runoff Coefficient0.75(see justification Environmental Statement Chapter 15)Rainfall Depth12 mm/day(Flood Estimation Handbook CD Rom, Institute ofRunoff Volume (NAADT)33.66 m³/day $Hydrology, 1999$ )Runoff Volume (SAADT)61.2 m³/day(Blairston Gauging Station)Dissolved Copper Build-up Rate0.017326 kg(Table B1, Annex I, HA 216/06)Dissolved Copper 5 day Build-up Rate0.017326 kg(For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data) $C_r = [(C_b * Q_{95}) + (1000 * M_{cu})] / (Q_{95} + V)$ (Method B, Annex I, HA 216/06)Dissolved Copper Concentration, $C_{rou}$ (NAADT)0.001646 mg/lTotal Zinc Build-up Rate0.0072192 kgU/S Total Zinc0.001455 mg/l(For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data)Cr 2n (NAADT)0.010456 mg/l10 S50646 un/l.0.010556 mg/l	Impervious Area (SAADT)	6800 m <sup>2</sup>	
Runoff Coefficient0.75(see justification Environmental Statement Chapter 15)Rainfall Depth12 mm/day(Flood Estimation Handbook CD Rom, Institute of Hydrology, 1999)Runoff Volume (NAADT)33.66 m³/dayHydrology, 1999)Total Runoff Volume94.86 M³/daym³/dayQas668736 m³/day(Blairston Gauging Station)Dissolved Copper Build-up Rate1.2 kg/ha/a(Table B1, Annex I, HA 216/06)Dissolved Copper0.00162 mg/l(For the river Clyde @ Bothwell Bridge, SEPA Water Cuality Data) $C_r = [(C_b * Qas) + (1000 * M_{cu})] / (Qas + V)(Method B, Annex I, HA 216/06)Dissolved Copper Concentration, C_{r ou (NAADT)}0.001646 mg/l1.645675 µg/LTotal Zinc Suild-up Rate0.072192 kgTotal Zinc S day Build-up Rate0.072192 kgV/S Total Zinc0.010455 mg/l(For the river Clyde @ Bothwell Bridge,SEPA Water Cuality Data)Cr 2n (NAADT)0.010556 mg/lU/S Total Zinc0.010455 mg/l(For the river Clyde @ Bothwell Bridge,SEPA Water Quality Data)Cr 2n (NAADT)0.010556 mg/l$	Total Impervious Area	10540 m <sup>2</sup>	
Rainfall Depth12 mm/day(Flood Estimation Handbook CD Rom, Institute of Hydrology, 1999)Runoff Volume (NAADT)33.66 m <sup>3</sup> /dayHydrology, 1999)Runoff Volume (SAADT)94.86 m <sup>3</sup> /dayHydrology, 1999)Total Runoff Volume94.86 m <sup>3</sup> /day(Blairston Gauging Station)Dissolved Copper Build-up Rate0.017326 kg(Table B1, Annex I, HA 216/06)Dissolved Copper0.00162 mg/l(For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data) $C_r = [(C_b * Q_{95}) + (1000 * M_{cu})] / (Q_{95} + V)$ (Method B, Annex I, HA 216/06)Dissolved Copper Concentration, $C_{r cu}$ (NAADT)0.001646 mg/l = 1.645675 µg/L(Table B1, Annex I, HA 216/06)Zinc Concentration $C_{r cu}$ (NAADT)0.001646 mg/l = 1.645675 µg/L(Table B1, Annex I, HA 216/06)VS Total Zinc0.072192 kg 0.01045 mg/l(Table B1, Annex I, HA 216/06)C <sub>r Zn</sub> (NAADT)0.010556 mg/l 10,55646 µg/l(For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data)	Runoff Coefficient	0.75	(see justification Environmental Statement Chapter 15)
Runoff Volume (NAADT)33.66 m³/dayHydrology, 1999)Runoff Volume (SAADT)61.2 m³/dayTotal Runoff Volume94.86 m³/day $Q_{95}$ 668736 m³/dayDissolved Copper Build-up Rate1.2 kg/ha/aDissolved Copper 5 day Build-up Rate0.017326 kgU/S Dissolved Copper0.00162 mg/l(For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data) $C_r = [(C_b * Q_{95}) + (1000 * M_{cu})] / (Q_{95} + V)$ (Method B, Annex I, HA 216/06)Dissolved Copper Concentration, $C_{r cu}$ (NAADT)Total Zinc Build-up RateTotal Zinc S day Build-up Rate0.072192 kgV/S Total Zinc $C_{r_{2n}}$ (NAADT)0.010556 mg/l10.55646 ug/l	Rainfall Depth	12 mm/d	ay (Flood Estimation Handbook CD Rom, Institute of
Runoff Volume (SAADT)61.2 m³/dayTotal Runoff Volume94.86 m³/day $Q_{95}$ 668736 m³/dayDissolved Copper Build-up Rate1.2 kg/ha/aDissolved Copper 5 day Build-up Rate0.017326 kgU/S Dissolved Copper0.00162 mg/l(For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data) $C_r = [(C_b * Q_{95}) + (1000 * M_{cu})] / (Q_{95} + V)$ (Method B, Annex I, HA 216/06)Dissolved Copper Concentration, $C_{r cu}$ (NAADT)Total Zinc Build-up Rate $Total Zinc S day Build-up Rate$ $0.01045$ mg/l $0.01045$ mg/l $0.01045$ mg/l $0.01045$ mg/l $0.01045$ mg/l $0.01045$ mg/l $0.010556$ mg/l $0.010556$ mg/l $10.55646$ ug/l	Runoff Volume (NAADT)	33.66 m <sup>3</sup> /da	Y Hydrology, 1999)
Total Runoff Volume $94.86 \text{ m}^3/day$ $Q_{95}$ $668736 \text{ m}^3/day$ (Blairston Gauging Station)Dissolved Copper Build-up Rate $1.2 \text{ kg/ha/a}$ (Table B1, Annex I, HA 216/06)Dissolved Copper 5 day Build-up Rate $0.017326 \text{ kg}$ (For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data) $C_r = [(C_b * Q_{95}) + (1000 * M_{ou})] / (Q_{95} + V)$ (Method B, Annex I, HA 216/06)Dissolved Copper Concentration, $C_{r ou (NAADT)}$ $0.001646 \text{ mg/l}$ $1.645675 \mu g/L$ $0.0072192 \text{ kg}$ Zinc Concentration $0.0072192 \text{ kg}$ Total Zinc Suild-up Rate $0.0072192 \text{ kg}$ $V/S$ Total Zinc $0.01045 \text{ mg/l}$ $C_{r Zn}(NAADT)$ $0.010556 \text{ mg/l}$ $C_{r Zn}(NAADT)$ $0.010556 \text{ mg/l}$	Runoff Volume (SAADT)	61.2 m³/da	у
$Q_{95}$ 668736 m <sup>3</sup> /day       (Blairston Gauging Station)         Dissolved Copper Build-up Rate       1.2 kg/ha/a       (Table B1, Annex I, HA 216/06)         Dissolved Copper       0.00162 mg/l       (For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data) $C_r = [(C_b * Q_{95}) + (1000 * M_{cu})] / (Q_{95} + V)$ (Method B, Annex I, HA 216/06)         Dissolved Copper Concentration, $C_{r cu (NAADT)}$ 0.001646 mg/l         Total Zinc Build-up Rate       0.072192 kg         U/S Total Zinc       0.01045 mg/l $C_{r Zn}$ (NAADT)       0.010556 mg/l	Total Runoff Volume	94.86 m <sup>3</sup> /da	у
Dissolved Copper Build-up Rate Dissolved Copper 5 day Build-up Rate U/S Dissolved Copper $U(S Dissolved Copper$ $U(S Dissolved Copper$ $C_r = [(C_b * Q_{95}) + (1000 * M_{cu})] / (Q_{95} + V)$ (Method B, Annex I, HA 216/06) Dissolved Copper Concentration, $C_{r ou} (NAADT)$ $= 0.001646 mg/l = 1.645675 \mug/L$ Zinc Concentration Total Zinc Build-up Rate Total Zinc 5 day Build-up Rate U/S Total Zinc $C_{r Zn} (NAADT)$ $U(S Total Zinc Concentration)$ $C_{r Zn} (NAADT)$ $U(S Total Zinc Concentration)$ $C_{r Zn} (NAADT)$ $U(S Total Zinc Concentration)$ $U(S Total Zi$	Q <sub>95</sub>	668736 m <sup>3</sup> /da	y (Blairston Gauging Station)
Dissolved Copper 5 day Build-up Rate U/S Dissolved Copper $U_{(S Dissolved Copper}$ $U_{(S Dissolved Copper}$ $U_{(S Dissolved Copper}$ $U_{(S Total Zinc Concentration)}$ $U_{(Rathod B, Annex I, HA 216/06)}$ $U_{(Rathod B, Annex I, HA 216/06)}$ $U_{(R$	Dissolved Copper Build-up Rate	1.2 kg/ha/	a (Table B1, Annex I, HA 216/06)
U/S Dissolved Copper $0.00162 \text{ mg/l}$ (For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data) $C_r = [(C_b * Q_{95}) + (1000 * M_{cu})] / (Q_{95} + V)$ (Method B, Annex I, HA 216/06)Dissolved Copper Concentration, $C_{r cu}$ (NAADT) $0.001646 \text{ mg/l}$ $1.645675 \mug/LZinc Concentration0.001646 \text{ mg/l}1.645675 \mug/LTotal Zinc Build-up RateTotal Zinc 5 day Build-up RateU/S Total Zinc5 \text{ kg/ha/a}0.01045 \text{ mg/l}0.01045 \text{ mg/l}0.01045 \text{ mg/l}0.010556 \text{ mg/l}C_{r Zn} (NAADT)0.010556 \text{ mg/l}10.55646 \mug/L$	Dissolved Copper 5 day Build-up Rate	0.017326 kg	
SEPA Water Quality Data) $C_r = [(C_b * Q_{95}) + (1000 * M_{cu})] / (Q_{95} + V)$ (Method B, Annex I, HA 216/06)         Dissolved Copper Concentration, $C_{r cu}$ (NAADT)         =       0.001646 mg/l         1.645675 µg/L         Zinc Concentration         Total Zinc Build-up Rate         Total Zinc 5 day Build-up Rate         U/S Total Zinc         C <sub>r Zn</sub> (NAADT)         0.010556 mg/l         10.55646 µg/L	U/S Dissolved Copper	0.00162 mg/l	(For the river Clyde @ Bothwell Bridge,
$C_{r} = [(C_{b} * Q_{95}) + (1000 * M_{cu})] / (Q_{95} + V) $ (Method B, Annex I, HA 216/06) Dissolved Copper Concentration, $C_{r cu}$ (NAADT) $= \begin{array}{c} 0.001646 \text{ mg/l} \\ 1.645675 \text{ µg/L} \end{array}$ Zinc Concentration Total Zinc Build-up Rate Total Zinc 5 day Build-up Rate U/S Total Zinc $0.072192 \text{ kg} \\ 0.01045 \text{ mg/l} \\ 0.01045 \text{ mg/l} \end{aligned}$ (For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data) $C_{r Zn} (NAADT) \qquad 0.0105566 \text{ mg/l} \\ 10.55646 \text{ µg/L} \end{aligned}$			SEPA Water Quality Data)
Dissolved Copper Concentration, $C_{r cu (NAADT)}$ = 0.001646 mg/l = 1.645675 µg/L Zinc Concentration Total Zinc Build-up Rate Total Zinc 5 day Build-up Rate U/S Total Zinc 0.00105 mg/l (For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data) $C_{r Zn} (NAADT)$ 0.010556 mg/l 10.55646 µg/L	$C_r = [(C_b * Q_{95}) + (1000 * M_{cu})] / (Q_{95} +$	V)	(Method B, Annex I, HA 216/06)
Dissolved Copper Concentration, Crou (NAADT)       0.001646 Hig/l         =       1.645675 µg/L         Zinc Concentration       5 kg/ha/a       (Table B1, Annex I, HA 216/06)         Total Zinc S day Build-up Rate       0.072192 kg       0.01045 mg/l         U/S Total Zinc       0.01045 mg/l       (For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data)         Cr Zn (NAADT)       0.010556 mg/l       10.55646 µg/L	Dissolved Conner Concentration	0.001646 mg/	
Zinc Concentration         Total Zinc Build-up Rate       5 kg/ha/a       (Table B1, Annex I, HA 216/06)         Total Zinc 5 day Build-up Rate       0.072192 kg         U/S Total Zinc       0.01045 mg/l       (For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data)         Cr Zn (NAADT)       0.010556 mg/l	Dissolved Copper Concentration, Cr cu (NAADT)	0.001646 mg/l	
Zinc Concentration         Total Zinc Build-up Rate       5 kg/ha/a       (Table B1, Annex I, HA 216/06)         Total Zinc 5 day Build-up Rate       0.072192 kg         U/S Total Zinc       0.01045 mg/l       (For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data)         Cr <sub>zn</sub> (NAADT)       0.010556 mg/l	=	1.045075 µg/L	
Zinc Concentration         Total Zinc Build-up Rate       5 kg/ha/a       (Table B1, Annex I, HA 216/06)         Total Zinc 5 day Build-up Rate       0.072192 kg         U/S Total Zinc       0.01045 mg/l       (For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data)         Cr Zn (NAADT)       0.010556 mg/l			
Total Zinc Build-up Rate     5 kg/ha/a     (Table B1, Annex I, HA 216/06)       Total Zinc 5 day Build-up Rate     0.072192 kg     (For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data)       Cr Zn (NAADT)     0.0105566     mg/l	Zinc Concentration		
Total Zinc 5 day Build-up Rate     0.072192 kg       U/S Total Zinc     0.01045 mg/l       (For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data)       Cr <sub>zn</sub> (NAADT)     0.0105566 mg/l	Total Zinc Build-up Rate	5 kg/ba	(Table B1, Annex I, HA 216/06)
U/S Total Zinc     0.01045 mg/l     (For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data )       Cr Zn (NAADT)     0.010556 mg/l       10.55646 ug/l	Total Zinc 5 day Build-up Rate	0.072192 kg	
Cr <sub>Zn</sub> (NAADT)         0.010556         mg/l         separate         separat         separate         separate	U/S Total Zinc	0.01045 mg/	(For the river Clyde @ Bothwell Bridge
Cr <sub>zn</sub> (NAADT) 0.010556 mg/l 10,55646 µg/L		0.01040 mg/l	SEPA Water Quality Data )
10.55646 ug/L	C <sub>e 76</sub> (NAADT)	0.010556 mg/	ce maior security balay
		10.55646 ug/l	

## Outfall M006 into Clyde - Raith Junction

Risk of Spillage:			
	000		
Road Length < 100m away from slip road NAAD1	230	m	
Road Length < 100m from slip CAADT	200	m	
Road Length < 100m from roundabout NBRB1	100	m	
Road Length < 100m from roundabout SBRB1	70	m	
Road Length < 100m from roundabout SAAD I	30	m	
Road Length < 100m from slip road SAADT (12m)	250	m	
Road Length < 100m from slip road SAADT (6m)	280	m	
Serious spillage rate < 100m from slip road	0.36		(Figures assume an all purpose urban road.
Serious spillage rate < 100m from roundabout	5.35		Table D1, Annex I, HA 216/06 )
Northern AADT	23400		
Central AADT	10880		
North Bound to Roundabout	12532		
South Bound from Roundabout	14121		
	25009	a <i>1</i>	
HGV traffic (NAADT/SAADT)	11	%	
HGV traffic (CAADT)	8	%	
HGV traffic (NBRBT)	13	%	
HGV traffic (SBRBT)	12	%	
Risk Reduction Factor	0.45		(Assuming RE2 - high quality - watercourse
			Classification and < 20min emergency response.
P <sub>acc</sub> = RL * SS * (AADT * 365 / 10 <sup>9</sup> ) * (HC	GV% / 100)		(Method D, Annex I, HA 216/06)
Risk of Spillage			
P <sub>acc slip road N</sub> =	0.000078		
P <sub>acc slip</sub> road <sub>C</sub> =	0.000023		
P <sub>acc roundabout NB</sub> =	0.000318		
P <sub>acc roundabout SB</sub> =	0.000232		
P <sub>acc roundabout S</sub> =	0.000161		
P <sub>acc slip road S</sub> =	0.000192		
P <sub>acc total</sub> =	0.001003		
Risk of Pollution P <sub>pol</sub> =	0.0005		
Return Period 1:	0.05	%	

Water Quality:		
Copper Concentration		
Total Road Length (NAADT)	230 m	
Total Road Length (CAADT)	200 m	
Total Road Length (NBRBT)	100 m	
Total Road Length (SBRBT)	70 m	
Total Road Length (SAADT 12m)	280 m	
Total Road Length (SAADT 6m)	280 m	
Road Width (NAADT)	13 m	
Road Width (CAADT/NBRBT)	7.3 m	
Road Width (SBRBT)	4.5 m	
Road Width (SAADT 12m)	12 m	
Road Width (SAAD1 6m)	6 m	
Impervious Area (NAADT)	2990 m <sup>2</sup>	
Impervious Area (CAADT)	1460 m <sup>2</sup>	
Impervious Area (NBRBT)	730 m <sup>2</sup>	
Impervious Area (SBRBT)	315 m <sup>2</sup>	
Impervious Area (SAADT 12m)	3360 m <sup>2</sup>	
Impervious Area (SAADT 6m)	1680 m <sup>2</sup>	
Total Impervious Area	10535 m <sup>2</sup>	
Runoff Coefficient	0.75	(see justification Environmental Statement Chapter 15)
Rainfall Depth	12 mm/day	(Flood Estimation Handbook CD Rom, Institute of
Runoff Volume (NAADT/SAADT)	72.27 m <sup>3</sup> /day	Hydrology, 1999)
Runoff Volume (CAADT/NBRBT/SBRBT)	22.545 m <sup>3</sup> /day	
Total Runoff Volume	94.815 m <sup>3</sup> /day	
Qos	668736 m <sup>3</sup> /day	(Blairston Gauging Station)
Dissolved Copper Build-up Rate (NAADT/SAADT)	0.4  kg/ha/a	(Table B1 Apper / HA 216/06)
Dissolved Copper Build-up Rate (constant approximation	0.3 kg/ha/a	
Dissolved Copper E day Duild up Rate (	0.0014 km	
Dissolved Copper 5 day Build-up Rate (NAADT/SAADT)	0.0044 kg	
Dissolved Copper 5 day Build-up Rate (CAADT/NBRBT/SBRBT)	0.0010295 kg	
l otal Dissolved Copper 5 day build-up	0.0054295 kg	
U/S Dissolved Copper	0.00162 mg/l	(For the river Clyde @ Bothwell Bridge,
	10	
$C_r = [(C_b * Q_{95}) + (1000 * M_{cu})] / (Q_9)$	<sub>5</sub> + V)	(Method B, Annex I, HA 216/06 )
Dissolved Copper Concentration, Cr cu (NAADT)	0.0016279 mg/l	
=	1.6278882 µg/L	
	13	
Zinc Concentration		
Total Zinc Build-up Rate (NAADT/SAADT)	2 kg/ha/a	(Table B1, Annex I, HA 216/06)
Total Zinc Build-up Rate (CAADT/NBRBT/SBRBT)	1 kg/ha/a	
Total Zinc 5 day Build-up Rate (NAADT/SAADT)	0.022 kg	
Total Zinc 5 day Build-up Rate (CAADT/NBRBT/SBRBT)	0.0034315 kg	
Total Zinc 5 day build-up	0.0254315 kg	
U/S Total Zinc	0.01045 mg/l	(For the river Clyde @ Bothwell Bridge,
		SEPA Water Quality Data )
C <sub>r Zn</sub> (NAADT)	0.0104865 mg/l	
	10.486542 ug/L	

## Outfall M009 into Clyde - Raith Junction

Road Length < 100m away f	rom roundabout	110	m	
Serious spillage rate < 100m	n from roundabout	5.35		(Figures assume an all purpose urban road.
AADT		21317		Table D1, Annex I, HA 216/06)
Assume 10% HGV traffic		11	%	
Risk Reduction Factor		0.45		(Assuming RE2 - high quality - watercourse
				classification and < 20min emergency response.
				Table D2, Annex I, HA 216/06)
$P_{acc} = RL * SS * (A)$	AADT * 365 / 10 <sup>9</sup> ) * (	(HGV% / 100	))	(Method D, Annex I, HA 216/06)
Risk of Spillage				
Risk of Spillage P <sub>acc roundabout</sub> =		0.0005		
Risk of Spillage P <sub>acc roundabout</sub> = P <sub>acc total</sub> =		0.0005	1	
Risk of Spillage P <sub>acc roundabout</sub> = P <sub>acc total</sub> =		0.0005	]	
Risk of Spillage P <sub>acc roundabout</sub> = P <sub>acc total</sub> = Risk of Pollution P <sub>pol</sub> =		0.0005 0.0005 0.0002	]	

Copper Concentration		
Total Road Length	110 m	
Road Width	7 m	
Total Impervious Area	770 m <sup>2</sup>	
Runoff Coefficient Rainfall Depth	0.75 12 mm/day	(see justification Environmental Statement Chapter 15) (Flood Estimation Handbook CD Rom, Institute of
Runoff Volume	6.93 m <sup>3</sup> /day	Hydrology, 1999)
Q <sub>95</sub>	668736 m <sup>3</sup> /day	(Blairston Gauging Station)
Dissolved Copper Build-up Rate	0.4 kg/ha/a	(Table B1, Annex I, HA 216/06)
Dissolved Copper 5 day Build-up Rate	0.000422 kg	
U/S Dissolved Copper	0.00162 mg/l	(For the river Clyde @ Bothwell Bridge,
		SEPA Water Quality Data )
$C_r = [(C_b * Q_{95}) + (1000 * M_c)]$	<sub>u</sub> )] / (Q <sub>95</sub> + V)	(Method B, Annex I, HA 216/06)
Dissolved Copper Concentration, Craw	0.001621 mg/l	
	= 1.620614 µg/L	
	P.5	
Zinc Concentration		
Total Zinc Build-up Rate	2 kg/ha/a	(Table B1, Annex I, HA 216/06)
Total Zinc 5 day Build-up Rate	0.00211 kg	
U/S Total Zinc	0.01045 mg/l	(For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data)
C <sub>r Zn</sub>	0.010453 mg/l	
	10.45305 µg/L	

## Outfall M011 into Clyde - Raith Junction

Risk of Spillage:			
Road Length < 100m away from slip road	220	m	
Road Length $> 100m$ away from junctions	190	m	
Serious spillage rate < 100m from slip rd	0.36		(Figures assume an all purpose urban road.
Serious spillage rate > 100m from junctions	0.31		Table D1. Annex I. HA 216/06)
AADT	22245		····,
HGV traffic	9	%	
Risk Reduction Factor	0.45		(Assuming RE2 - high quality - watercourse
			classification and < 20min emergency response.
			Table D2, Annex I, HA 216/06)
P <sub>acc</sub> = RL * SS * (AADT * 365 / 10 <sup>9</sup> ) * (H	IGV% / 100)		(Method D, Annex I, HA 216/06)
			-
Risk of Spillage			
P <sub>acc slip</sub> =	0.000058		
P <sub>acc no junc.</sub> =	0.000043		
P <sub>acc total</sub> =	0.000101		
Risk of Pollution P	0 0000		
	0.0000		
Return Period 1:	0.00	%	

Water Quality:		
Copper Concentration		
Total Road Length	410 m	
Road Width	7 m	
Total Impervious Area	2870 m <sup>2</sup>	
Runoff Coefficient	0.75	(see justification Environmental Statement Chapter 15)
Rainfall Depth	12 mm/day	(Flood Estimation Handbook CD Rom, Institute of
Runoff Volume	25.83 m³/day	Hydrology, 1999)
Q <sub>95</sub>	668736 m <sup>3</sup> /day	(Blairston Gauging Station)
Dissolved Copper Build-up Rate	0.4 kg/ha/a	(Table B1, Annex I, HA 216/06)
Dissolved Copper 5 day Build-up Rate	0.0015726 kg	
U/S Dissolved Copper	0.00162 mg/l	(For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data)
$C_r = [(C_b * Q_{95}) + (1000 * M_{cu})] / (C_b + (1000 * M_{cu}))] / (C_b + (1000 * M_{cu}))]$	Q <sub>95</sub> + V)	(Method B, Annex I, HA 216/06)
Dissolved Copper Concentration, C <sub>r cu</sub> =	0.0016223 mg/l 1.6222889 μg/L	
Zinc Concentration		
Total Zinc Build-up Rate	2 kg/ha/a	(Table B1, Annex I, HA 216/06)
Total Zinc 5 day Build-up Rate	0.007863 kg	
U/S Total Zinc	0.01045 mg/l	(For the river Clyde @ Bothwell Bridge,
		SEPA Water Quality Data)
C <sub>r Zn</sub>	0.0104614 mg/l	
	10.461354 µg/L	

## Outfall M014 into Clyde - Raith Junction

Risk of Spillage:		
Pood Longth < 100m away from roundabout	80 m	
Road Length < 100m away from slip rd	290 m	
Road Length > 100m away from junctions	50 m	
Serious spillage rate < 100m from roundabout	5 35	(Figures assume an all purpose urban road
Serious spillage rate < 100m from slip rd	0.36	Table D1 Anney I HA 216/06
Serious spillage rate > 100m junctions	0.31	
AADT (M74)	5444	
AADT (Rbt)	15332	
HGV traffic (M74)	17 %	
HGV traffic (Rbt)	11 %	
Risk Reduction Factor	0.45	(Assuming RE2 - high quality - watercourse
		classification and < 20min emergency response.
		Table D2, Annex I, HA 216/06 )
P <sub>acc</sub> = RL * SS * (AADT * 365 / 10 <sup>9</sup> ) * (H	IGV% / 100)	(Method D, Annex I, HA 216/06 )
Risk of Spillage		
Page roundabout =	0.0003	
	0.0000	
Face slip =	0.0000	
Pacc no junction =	0.0000	
P <sub>acc total</sub> =	0.0003	
Risk of Pollution P <sub>pol</sub> =	0.0001	
Return Period 1	0.014 %	
	0.014 /0	
Water Quality:		
Copper Concentration		
Total Road Length	420 m	
Road Width	7 m	
Total Impervious Area	$2940 \text{ m}^2$	
Runoff Coefficient	0.75	(see justification Environmental Statement Chapter 15)
Rainfall Depth	12 mm/day	(Flood Estimation Handbook CD Rom, Institute of
Runoff Volume	26.46 m <sup>3</sup> /day	Hydrology, 1999)
Q <sub>er</sub>	668736 m <sup>3</sup> /dov	(Blairston Gauging Station)
Supervised Copper Build up Rate (AADT M74)		
Dissolved Copper Build-up Rate (AADT M/4)	0.3 kg/na/a	(Table B1, Annex I, HA 216/06)
Dissolved Copper 5 day Build up Pate	0.4 kg/ha/a	
LI/S Dissolved Copper 5 day Build-up Rate	0.002619 kg	(For the river Clude @ Pethwell Pridge
0/3 Dissolved Copper	0.00162 mg/i	SEPA Water Quality Data )
$C_r = [(C_b * Q_{95}) + (1000 * M_{cu})] / (Q_{10})$	9 <sub>95</sub> + V)	(Method B, Annex I, HA 216/06 )
$C_r = [(C_b * Q_{95}) + (1000 * M_{cu})] / (Q_b + (Q_{95}) + (Q_$	9 <sub>95</sub> + V)	(Method B, Annex I, HA 216/06 )
$C_r = [(C_b * Q_{95}) + (1000 * M_{cu})] / (Q$ Dissolved Copper Concentration, C <sub>r cu</sub>	9 <sub>95</sub> + V) 0.001624 mg/l	(Method B, Annex I, HA 216/06 )

Zinc Concentration

Total Zinc Build-up Rate (AADT M74)	1 kg/ha/a	(Table B1, Annex I, HA 216/06 )
Total Zinc Build-up Rate (AADT Rbt)	2 kg/ha/a	
Total Zinc 5 day Build-up Rate	0.012082 kg	
U/S Total Zinc	0.01045 mg/l	(For the river Clyde @ Bothwell Bridge,
		SEPA Water Quality Data )
C <sub>r Zn</sub>	0.010468 mg/l	
	10.46765 µg/L	

### M74 Junction 5, Raith Water Quality Calculations

Outfall MR0I\_210 into Clyde - Raith Junction

Risk of Spillage:			
Road Length Roundabout A	50	m	
Road Length Roundabout B	30	m	
Road Length Roundabout C	40	m	
Road Length Roundabout D	140	m	
Road Length Roundabout E	60	m	
Road Length Roundabout F	60	m	
Serious spillage rate < 100m from roundabout	5.35		(Figures assume an all purpose urban road.
AADT A	52243		Table D1, Annex I, HA 216/06 )
AADT B	49699		
AADT C	51678		
AADT D	30360		
AADT E	42871		
AADT F	28750		
HGV traffic (A/C/E/F)	9	%	
HGV traffic (B)	10	%	
HGV traffic (D)	8	%	
Risk Reduction Factor	0.45		(Assuming RE2 - high quality - watercourse
			classification and < 20min emergency response.
			Table D2, Annex I, HA 216/06 )
P <sub>acc</sub> = RL * SS * (AADT * 365 / 10 <sup>9</sup> ) * (HGV%	o / 100)		(Method D, Annex I, HA 216/06)
			_
Risk of Spillage			
P <sub>acc A</sub> =	0.000459		
P <sub>acc B</sub> =	0.000291		
P <sub>acc C</sub> =	0.000363		
P <sub>acc D</sub> =	0.000664		
P <sub>acc E</sub> =	0.000452		
P <sub>acc F</sub> =	0.000303		
P <sub>acc total</sub> =	0.002533		
Risk of Pollution P <sub>pol</sub> =	0.0011		
Return Period 1:	0.11	%	

Water Quality:		
Copper Concentration		
Total Road Length A	50 m	
Total Road Length B	30 m	
Total Road Length C	40 m	
Total Road Length D	140 m	
Total Road Length E	60 m	
Total Road Length F	60 m	
Road Width (A/B/C/E/F)	11 m	
	7.5 m	
Impervious Area A	550 m <sup>-</sup>	
Impervious Area B	330 m <sup>-</sup>	
Impervious Area C	440 m <sup>-</sup>	
Impervious Area D	1050 m <sup>2</sup>	
Impervious Area E	660 m <sup>2</sup>	
Impervious Area F	660 m <sup>-</sup>	
Total Impervious Area	3690 m <sup>2</sup>	<i>i</i>
Runoff Coefficient	0.75	(see justification Environmental Statement Chapter 15)
Rainfail Depth	12 mm/day	(Flood Estimation Handbook CD Rom, Institute of
	4.95 m /day	Hydrology, 1999)
Runoli volume B	2.97 m /day	
	3.96 m <sup>-</sup> /day	
	9.45 m <sup>-</sup> /day	
Runoff Volume E	5.94 m <sup>-</sup> /day	
	5.94 m /day	
I otal Runoff Volume	33.21 m /day	
$Q_{95}$	668736 m³/day	(Blairston Gauging Station)
Dissolved Copper Build-up Rate A	1.2 kg/ha/a	(Table B1, Annex I, HA 216/06)
Dissolved Copper Build-up Rate B	1.2 kg/ha/a	
Dissolved Copper Build up Rate C	1.2 kg/na/a	
Dissolved Copper Build-up Rate D	1.2 kg/ha/a	
Dissolved Copper Build-up Rate F	0.4 kg/ha/a	
Dissolved Copper 5 day Build-up Rate A	0.000904 kg	
Dissolved Copper 5 day Build-up Rate B	0.000542 kg	
Dissolved Copper 5 day Build-up Rate C	0.000723 kg	
Dissolved Copper 5 day Build-up Rate D	0.001726 kg	
Dissolved Copper 5 day Build-up Rate E	0.001085 kg	
Dissolved Copper 5 day Build-up Rate F	0.000362 kg	
I otal Dissolved Copper 5 day Build-up	0.005342 kg	(For the river Clude @ Bothwall Bridge
U/S Dissolved Copper	0.00162 mg/i	(For the river Ciyde @ Bothwell Bridge, SEPA Water Quality Data)
C = [(C * O) + (1000 * M)]/(O + )	Λ	
$C_r = [(C_b \ Q_{95}) + (1000 \ M_{cu})] / (Q_{95} + C_b)$	')	(Method B, Annex I, HA 216/06)
Dissolved Copper Concentration, C	0.001628 mg/l	
–	1 627908 ug/l	
=		
Zinc Concentration		
Total Zine Duild up Date A	<b>e</b> 1 - 8 - 7	
Total Zinc Build-up Rate A	5 kg/na/a	(Table B1, Annex I, HA 216/06)
Total Zinc Build-up Rate B	5 kg/ha/a	
Total Zinc Build-up Rate D	5 kg/ha/a	
Total Zinc Build-up Rate E	5 kg/ha/a	
Total Zinc Build-up Rate F	2 kg/ha/a	
Total Zinc 5 day Build-up Rate A	0.003767 kg	
Total Zinc 5 day Build-up Rate B	0.00226 kg	
Total Zinc 5 day Build-up Rate C	0.003014 kg	
Total ∠inc 5 day Build-up Rate D	0.007192 kg	
I otal Zinc 5 day Build-up Rate E	0.004521 kg	
Total Zinc 5 day build-up Kate F	0.001000 kg	
U/S Total Zinc	0.022302 kg	(For the river Clude @ Bothwell Bridge
	0.01040 mg/l	SEPA Water Quality Data )
Cr Zn (A)	0.010483 mg/l	
12009	10.48322 µg/L	

## Outfall MROI 580 into Clyde - Raith Junction

Risk of Spillage:			
Road Length Roundabout V	30	m	
Road Length Roundabout W	90	m	
Road Length Roundabout X	140	m	
Road Length Roundabout Y	50	m	
Road Length Roundabout Z	90	m	
Serious spillage rate < 100m from roundabout	5.35		(Figures assume an all purpose urban road.
AADT V	14290		Table D1, Annex I, HA 216/06)
AADT W	32953		
AADT X	27969		
AADT Y	43162		
AADT Z	27830		
HGV traffic (V)	21	%	
HGV traffic (W/X/Z)	9	%	
HGV traffic (Y)	10	%	
Risk Reduction Factor	0.45		(Assuming RE2 - high quality - watercourse
			classification and < 20min emergency response. Table D2, Annex I, HA 216/06)
P <sub>acc</sub> = RL * SS * (AADT * 365 / 10 <sup>9</sup> ) * (HGV% / 100)			(Method D, Annex I, HA 216/06)
Risk of Spillage			
P <sub>acc V</sub> =	0.000176		
P <sub>acc W</sub> =	0.000521		
P <sub>acc X</sub> =	0.000688		
P <sub>acc Y</sub> =	0.000421		
P <sub>acc Z</sub> =	0.000440		
P <sub>acc total</sub> =	0.002247	]	
Risk of Pollution P <sub>pol</sub> =	0.0010		
Return Period 1:	0.10	%	

Water Quality:		
Copper Concentration		
Total Road Length V	30 m	
Total Road Length W	90 m	
Total Road Length X	140 m	
Total Road Length Y	50 m	
Total Road Length Z	90 m	
Road Width	11 m	
Impervious Area V	330 m <sup>2</sup>	
Impervious Area W	990 m <sup>2</sup>	
Impervious Area X	1540 m <sup>2</sup>	
	550 m <sup>2</sup>	
	$000 \text{ m}^2$	
	990 m <sup>2</sup>	
Total Impervious Area	4400 m	
Runon Coemcient	0.75 12 mm/day	(See Justilication Environmental Statement Chapter 15)
	12 mm/uay	(FIGOU ESUMATION HANDBOOK CD ROM, Institute of
	2.97 m /day	Hydrology, 1999)
Runoff Volume W	8.91 m°/day	
Runoff Volume X	13.86 m <sup>°</sup> /day	
Runoff Volume Y	4.95 m <sup>3</sup> /day	
Runoff Volume Z	8.91 m³/day	
Total Runoff Volume	39.6 m <sup>3</sup> /day	
Q <sub>95</sub>	668736 m <sup>3</sup> /day	(Blairston Gauging Station)
Dissolved Copper Build-up Rate V	0.3 kg/ha/a	(Table B1, Annex I, HA 216/06)
Dissolved Copper Build-up Rate W	1.2 kg/ha/a	
Dissolved Copper Build-up Rate X	0.4 kg/ha/a	
Dissolved Copper Build-up Rate Y	1.2 kg/ha/a	
Dissolved Copper Build-up Rate Z	0.4 kg/ha/a	
Dissolved Copper 5 day Build-up Rate V	0.0001356 kg	
Dissolved Copper 5 day Build-up Rate W	0.0016274 kg	
Dissolved Copper 5 day Build-up Rate X	0.0008438 kg	
Dissolved Copper 5 day Build-up Rate Y	0.0009041 kg	
Dissolved Copper 5 day Build-up Rate Z	0.0005425 kg	
Total Dissolved Copper 5 Day Build-up	0.0040534 kg	
U/S Dissolved Copper	0.00162 mg/l	(For the river Clyde @ Bothwell Bridge,
$C_r = [(C_b * Q_{95}) + (1000 * M_{cu})] / (Q_{95})$	<sub>5</sub> + V)	(Method B, Annex I, HA 216/06)
		-
Dissolved Copper Concentration, Cr cu (V)	0.001626 mg/l	
=	1.625965 µg/L	
	1.	
Zine Concentration		
Total Zinc Build-up Rate V	1 kg/ha/a	(Table B1, Annex I, HA 216/06)
Total Zinc Build-up Rate W	5 kg/ha/a	
Total Zinc Build-up Rate X	2 kg/ha/a	
Total Zinc Build-up Rate Y	5 kg/ha/a	
Total Zinc Build-up Rate Z	2 kg/ha/a	
Total Zinc 5 day Build-up Rate V	0.0004521 kg	
Total Zinc 5 day Build-up Rate W	0.0067808 kg	
Total Zinc 5 day Build-up Rate X	0.0042192 kg	
Total Zinc 5 day Build-up Rate Y	0.0037671 kg	
Total Zinc 5 day Build-up Rate Z	0.0027123 kg	
Total Zinc 5 Day Build-up	0.0179315 kg	
U/S Total Zinc	0.01045 mg/l	(For the river Clyde @ Bothwell Bridge,
		SEPA Water Quality Data )
C <sub>r Zn (V)</sub>	0.0104762 mg/l	
	10.476194 µg/L	

# Entrance and Exit Strathclyde Country Park To Clyde - Raith Junction

Risk of Spillage:		
Road Length < 100m away from slip rd Serious spillage rate < 100m from slip rd AADT HGV traffic	70 m 0.36 4522 2 %	(Figures assume an all purpose urban road. Table D1, Annex I, HA 216/06)
Risk Reduction Factor	0.45	(Assuming RE2 - high quality - watercourse classification and < 20min emergency response. <i>Table D2, Annex I, HA 216/06</i> )
$P_{acc} = RL * SS * (AADT * 365 / 10^9) * ($	(HGV% / 100)	(Method D, Annex I, HA 216/06)
Risk of Spillage P <sub>acc slip</sub> =	0.0000	
P <sub>acc total</sub> =	0.0000	
Risk of Pollution P <sub>pol</sub> =	0.0000	
Return Period 1:	0.00 %	
Water Quality:		
Copper Concentration		
Total Road Length Road Width	70 m 10 m	
Total Impervious Area Runoff Coefficient Rainfall Depth	700 m <sup>-</sup> 0.75 12 mm/day	(see justification Environmental Statement Chapter 15) (Flood Estimation Handbook CD Rom, Institute of
Runoff Volume	6.3 m <sup>°</sup> /day	Hydrology, 1999) (Blairston Gauging Station)
Dissolved Copper Build-up Rate	0.2 kg/ha/a	(Table B1, Annex I, HA 216/06)
Dissolved Copper 5 day Build-up Rate U/S Dissolved Copper	0.000192 kg 0.00162 mg/l	(For the river Clyde @ Bothwell Bridge, 
$C_r = [(C_b * Q_{95}) + (1000 * M_{cu})] / ($	(Q <sub>95</sub> + V)	(Method B, Annex I, HA 216/06)
Dissolved Copper Concentration, C <sub>r cu</sub>	0.00162 mg/l = 1.620272 μg/L	
Zinc Concentration		
Total Zinc Build-up Rate Total Zinc 5 day Build-up Rate U/S Total Zinc	0.4 kg/ha/a 0.000384 kg 0.01045 mg/l	(Table B1, Annex I, HA 216/06) (For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data)

0.01045 mg/l 10.45048 μg/L

# M74 North Bound On Slip from Roundabout into Clyde - Raith Junction

Risk of Spillage:		
Road Length < 100m away from roundabout Road Length < 100m away from slip rd	100 60	m m
Serious spillage rate < 100m from roundabout	5.35	(Figures assume an all purpose urban road.
AADT	0.36 4984	Table D1, Annex I, HA 216/06 )
HGV traffic	9	%
Risk Reduction Factor	0.45	(Assuming RE2 - high quality - watercourse
		classification and < 20min emergency response. Table D2, Annex I, HA 216/06)
P <sub>acc</sub> = RL * SS * (AADT * 365 / 10 <sup>9</sup> ) *	(HGV% / 100	(Method D, Annex I, HA 216/06)
Risk of Spillage		
P <sub>acc roundabout</sub> =	0.000088	
P <sub>acc slip</sub> =	0.000004	
P <sub>acc total</sub> =	0.000091	
Risk of Pollution P <sub>pol</sub> =	0.0000	
Return Period 1:	0.00	yrs

Water Quality:		
Copper Concentration		
Total Road Length	160 m	
Road Width	6 m	
Total Impervious Area	960 m <sup>2</sup>	
Runoff Coefficient	0.75	(see justification Environmental Statement Chapter 15)
Rainfall Depth	12 mm/day	(Flood Estimation Handbook CD Rom, Institute of
Runoff Volume	8.64 m³/day	Hydrology, 1999)
Q <sub>95</sub>	668736 m <sup>3</sup> /day	(Blairston Gauging Station)
Dissolved Copper Build-up Rate	0.2 kg/ha/a	(Table B1, Annex I, HA 216/06)
Dissolved Copper 5 day Build-up Rate	0.000263 kg	
U/S Dissolved Copper	0.00162 mg/l	(For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data)
$C_r = [(C_b * Q_{95}) + (1000 * M_{cu})]$	/ (Q <sub>95</sub> + V)	(Method B, Annex I, HA 216/06)
Dissolved Copper Concentration, $C_{r cu}$	0.0016204 mg/l = 1.6203724 μg/L	
Zinc Concentration		
Dissolved Zinc Build-up Rate	0.4 kg/ha/a	(Table B1, Annex I, HA 216/06)
Dissolved Zinc 5 day Build-up Rate	0.000526 kg	
U/S Dissolved Zinc	0.01045 mg/l	(For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data)
C <sub>r Zn</sub>	0.0104507 mg/l	
	10.450652 µg/L	

# A725 Southbound Off-slip into Clyde - Raith Junction

Risk of Spillage:		
Road Length < 100m away from slip rd Road Length < 100m away from junctions Road Length > 100m away from roundabout Serious spillage rate < 100m from slip rd Serious spillage rate < 100m from junctions Serious spillage rate > 100m roundabout AADT Assume 10% HGV traffic Risk Reduction Factor	270 m 140 m 100 m 0.36 0.31 5.35 24413 9 % 0.45	(Figures assume an all purpose urban road. <i>Table D1, Annex I, HA 216/06</i> ) (Assuming RE2 - high quality - watercourse classification and < 20min emergency response. <i>Table D2, Annex I, HA 216/06</i> )
P <sub>acc</sub> = RL * SS * (AADT * 365 / 10 <sup>9</sup> )	* (HGV% / 100)	(Method D, Annex I, HA 216/06)
Risk of Spillage $P_{acc slip rd} =$ $P_{acc no junctions} =$ $P_{acc roundabout} =$ $P_{acc total} =$ Risk of Pollution $P_{pol} =$ Return Period1:	0.000078 0.000035 0.000429 0.000542 0.0002	
Water Quality:		
Copper Concentration		
Total Road Length Road Width Total Impervious Area Runoff Coefficient Rainfall Depth Runoff Volume $Q_{95}$ Dissolved Copper Build-up Rate Dissolved Copper 5 day Build-up Rate U/S Dissolved Copper	$510 \text{ m} \\ 8 \text{ m} \\ 4080 \text{ m}^2 \\ 0.75 \\ 12 \text{ mm/day} \\ 36.72 \text{ m}^3/\text{day} \\ 668736 \text{ m}^3/\text{day} \\ 0.4 \text{ kg/ha/a} \\ 0.0022356 \text{ kg} \\ 0.00162 \text{ mg/l} \\ 100000000000000000000000000000000000$	(see justification <i>Environmental Statement Chapter</i> 15) (Flood Estimation Handbook CD Rom, <i>Institute of</i> <i>Hydrology</i> , 1999) (Blairston Gauging Station) ( <i>Table B1</i> , <i>Annex I</i> , <i>HA</i> 216/06) (For the river Clyde @ Bothwell Bridge, <i>SEPA Water Quality Data</i> )
$C_r = [(C_b \ Q_{95}) + (1000 \ M_{cu})]$	$7 (Q_{95} + V)$	(Method B, Annex I, HA 216/06)
Dissolved Copper Concentration, $C_{r cu}$	0.0016233 mg/l = 1.6232539 μg/L	
Zinc Concentration		

Dissolved Zinc Build-up Rate	2	kg/ha/a	(Table B1, Annex I, HA 216/06)
Dissolved Zinc 5 day Build-up Rate	0.0111781	٨g	
U/S Dissolved Zinc	0.01045 r	mg/l	(For the river Clyde @ Bothwell Bridge,
			SEPA Water Quality Data )
C <sub>rZn</sub>	0.0104661 r	mg/l	
	10.466141 µ	ug/L	

# M74 Southbound to Roundabout into Clyde - Raith Junction

Risk of Spillage:		
Road Length < 100m away from slip rd (combined)	30 m	
Road Length < 100m away from slip rd (combined)	120 m	
Road Length < 100m away from sup to (spiit)	100 m	
Serious spillage rate < 100m from slip rd	0.36	(Figures assume an all purpose urban road.
Serious spillage rate < 100m from roundabout	5.35	Table D1. Annex I. HA 216/06 )
AADT (combined)	20638	,
AADT (split)	15194	
HGV traffic	11 %	
Risk Reduction Factor	0.45	(Assuming RE2 - high quality - watercourse
		classification and < 20min emergency response. Table D2_Appex I_HA 216/06)
P <sub>acc</sub> = RL * SS * (AADT * 365 / 10 <sup>9</sup> ) * (HG	V% / 100)	(Method D, Annex I, HA 216/06)
Risk of Spillage		
P <sub>acc slip combined</sub> =	0.0000	
Pace slip split =	0.0000	
Page roundehout =	0.0003	
	0.0003	
racc total =	0.0004	
Risk of Pollution P <sub>pol</sub> =	0.0002	
Return Period 1:	0.02 %	
Water Quality:		
Copper Concentration		
Total Road Length	250 m	
Road Width	8 m	
Total Impervious Area	2000 m <sup>2</sup>	
Runoff Coefficient	0.75	(see justification Environmental Statement Chapter 15)
Rainfall Depth	12 mm/day	(Flood Estimation Handbook CD Rom, Institute of
Runoff Volume	18 m <sup>3</sup> /day	Hydrology, 1999)
Q <sub>95</sub>	668736 m <sup>3</sup> /day	(Blairston Gauging Station)
Dissolved Copper Build-up Rate	0.4  kg/ha/a	(Table B1, Annex I, HA 216/06)
Dissolved Copper 5 day Build-up Rate	0.001096 kg	
U/S Dissolved Copper	0.00162 mg/l	(For the river Clyde @ Bothwell Bridge
	0.00102 mg/1	SEPA Water Quality Data)
$C_r = [(C_b * Q_{95}) + (1000 * M_{cu})] / (Q_{95})$	+ V)	(Method B, Annex I, HA 216/06)
Dissolved Copper Concentration, $C_{r  ou}$	0.001622 mg/l	
=	= 1.621595 μg/L	
Zinc Concentration		
Dissolved Zinc Build-up Rate	2 kg/ha/a	(Table B1, Annex I, HA 216/06)
Dissolved Zinc 5 day Build-up Rate	0.005479 kg	·
U/S Dissolved Zinc	0.01045 mg/l	(For the river Clyde @ Bothwell Bridge,
C	0.010458 mg/	SEFA Water Quality Data j
⊂r ∠n	10 45791 ug/l	
	10.45751 µy/L	

# Combined A725 North Bound On-slip into Clyde - Raith Junction

Risk of Spillage:		
Road Length < 100m away from slip rd Road Length < 100m away from roundabout Serious spillage rate < 100m from slip rd Serious spillage rate < 100m from roundabout	380 m 20 m 0.36 5.35 20776	(Figures assume an all purpose urban road. Table D1, Annex I, HA 216/06)
HGV traffic	13 %	
Risk Reduction Factor	0.45	(Assuming RE2 - high quality - watercourse classification and < 20min emergency response. <i>Table D2, Annex I, HA 216/06</i> )
P <sub>acc</sub> = RL * SS * (AADT * 365 / 10 <sup>9</sup> ) * (F	IGV% / 100)	(Method D, Annex I, HA 216/06)
Risk of Spillage		
$P_{acc slip rd} =$	0.0001	
$P_{acc roundabout} =$	0.0001	
P <sub>acc total</sub> =	0.0002	
Risk of Pollution P <sub>pol</sub> =	0.0001	
Return Period 1:	0.01 %	
Water Quality:		
Copper Concentration		
Total Road Length Road Width	400 m 8 m	
Total Impervious Area	3200 m <sup>2</sup>	
Runoff Coefficient Rainfall Denth	0.75 12 mm/c	(see justification <i>Environmental Statement Chapter 15</i> ) Hay (Flood Estimation Handbook CD Rom, <i>Institute of</i>
Runoff Volume	28.8 m <sup>3</sup> /d	av Hydrology, 1999)
Q <sub>05</sub>	$668736 \text{ m}^3/\text{d}^3$	(Blairston Gauging Station)
Dissolved Copper Build-up Rate	0.4 kg/ha	a/a (Table B1, Annex I, HA 216/06)
Dissolved Copper 5 day Build-up Rate	0.001753 kg	
U/S Dissolved Copper	0.00162 mg/l	(For the river Clyde @ Bothwell Bridge, SEPA Water Quality Data)
$C_r = [(C_b * Q_{95}) + (1000 * M_{cu})] / (C_b + (1000 * M_{cu}))] / (C_b + (1000 * M_{cu}))]$	Q <sub>95</sub> + V)	(Method B, Annex I, HA 216/06)
Dissolved Copper Concentration, C <sub>r cu</sub>	0.001623 mg/l = 1.622552 µg/L	
Zinc Concentration		

Dissolved Zinc Build-up Rate	2 kg/h	a/a (Table B1, Annex I, HA 216/06)
Dissolved Zinc 5 day Build-up Rate	0.008767 kg	
U/S Dissolved Zinc	0.01045 mg/l	(For the river Clyde @ Bothwell Bridge,
		SEPA Water Quality Data)
C <sub>r Zn</sub>	0.010463 mg/l	
	10.46266 µg/L	

## M74 Junction 5, Raith Water Quality Calculations

#### Summary of Alternative Option D - Clyde / Burn

Outfall	U/S Concn Copper	D/S Concn Copper	Difference	U/S Concn Zinc	D/S Concn Zinc	Difference	EQS Cu*	EQS Zn*
Clyde	1.62 ug/l	1.75 ug/l	0.13 ug/l	10.5 ug/l	11.01 ug/l	0.6 ug/l	28 ug/l	75 ug/l

\*EQS Cu and Zn based on statutory figures for Clyde water hardness 105mg/l

#### Gully/Carrier Pipe System

Outfall	% of Disolved Copper Removed	Removed Concn of Copper**	D/S Concn after Treatment	Difference between U/S and D/S	% of Disolved Zinc Removed	Removed Concn of Zinc	D/S Concn after Treatment	Difference between U/S and D/S
Clyde	0%	0.00 ug/l	1.75 ug/l	0.13 ug/l	0%	0.00 ug/l	11.01 ug/l	0.56 ug/l

#### If oil separation tanks were to be used it may have the following effect

Outfall	% of Disolved Copper Removed	Removed Concn of Copper**	D/S Concn after Treatment	Difference between U/S and D/S	% of Disolved Zinc Removed	Removed Concn of Zinc	D/S Concn after Treatment	Difference between U/S and D/S
Clyde	0%	0.00 ug/l	1.75 ug/l	0.13 ug/l	0%	0.00 ug/l	11.01 ug/l	0.56 ug/l

If an additional treatment system such as a sedimentation lagoon was to be used it may result in the following

Outfall	% of Disolved Copper Removed	Removed Concn of Copper**	D/S Concn after Treatment	Difference between U/S and D/S	% of Disolved Zinc Removed	Removed Concn of Zinc	D/S Concn after Treatment	Difference between U/S and D/S
Clyde	20%	0.03 ug/l	1.72 ug/l	0.10 ug/l	60%	0.33 ug/l	10.67 ug/l	0.22 ug/l

#### Biofiltration Technique

Outfall	% of Disolved Copper Removed	Removed Concn of Copper**	D/S Concn after Treatment	Difference between U/S and D/S	% of Disolved Zinc Removed	Removed Concn of Zinc	D/S Concn after Treatment	Difference between U/S and D/S
Clyde	10%	0.01 ug/l	1.71 ug/l	0.09 ug/l	30%	0.07 ug/l	10.61 ug/l	0.16 ug/l

#### Swales

Outfall	% of Disolved Copper Removed	Removed Concn of Copper**	D/S Concn after Treatment	Difference between U/S and D/S	% of Disolved Zinc Removed	Removed Concn of Zinc	D/S Concn after Treatment	Difference between U/S and D/S
Clyde	0%	0.00 ug/l	1.71 ug/l	0.09 ug/l	0%	0.00 ug/l	10.61 ug/l	0.16 ug/l

#### Pollution Risks

Outfal	Pr (serious accident Spill)	Risk of Serious Polution Incident	Probability of Serious Pollution Incident Per Year	Return Period of Serious Pollution Incident Per Year after Mitigation
Clyde	0.01088	0.0049	0.49 %	0.18 %