# A14.3 Water Quality Calculations

## 1 Introduction

1.1.1 This appendix provides additional information on the calculations used to inform the water quality assessment of the route options, as reported in DMRB Stage 2 Scheme Assessment Report, Part 3: Environmental Assessment, Chapter 14 (Road Drainage and the Water Environment).

1.1.2 As part of the water quality assessment, routine runoff and accidental spillage risk to the surface water features proposed to receive road drainage were assessed using the Highways Agency's (now Highways England) Water Risk Assessment Tool (HAWRAT), in line with * DMRB Volume 11, Section 3, Part 10 (HD45/09): Road Drainage and the Water Environment (The Highways Agency, Transport Scotland, Welsh Assembly Government and The Department for Regional Development Northern Ireland 2009).

1.1.3 The results of the HAWRAT assessments are provided in Section 2. Routine runoff parameters and results can be found in Section 3 (Routine Runoff Assessment – HAWRAT Output Sheets (Location Details, User Parameters and Results)) and the results of the spillage risk assessment can be found in Section 4 (Accidental Spillage Inverness Risk Assessment – Calculation Tables).

## 2 Results of HAWRAT Assessments

**Assessment of Pollution Impacts from Spillages**

2.1.1 The risk of an accidental spillage or vehicle fire, which could lead to a pollution incident, is considered to be proportional to the risk of a collision of heavy goods vehicles. Not all spillages lead to pollution incidents, as action can be taken to control spillages and prevent them from affecting the water environment.

2.1.2 The assessment has been completed for both individual outfalls and for outfalls discharging into the same reach (assessment of cumulative risk), for each route option. The results show that the risk of a serious pollution incident for each outfall (including the cumulative risk where more than one outfall discharges into the same reach) has an annual probability far below the 1% quoted in the DMRB guidance for outfalls that are not within 1km of a protected area (none of the outfalls would be located within 1km of a protected area). Therefore, the assessment has identified that no measures are required to mitigate spillage risk. In addition, the preferred option would be designed to modern highway codes and standards, which would also reduce the likelihood of such an accident.

**Assessment of Pollution Impacts from Routine Runoff to Surface Waters**

2.1.3 HAWRAT routine runoff assessments have been completed for all of the drainage catchments that are proposed to discharge to surface water, by route option. An assessment could not be completed for the proposed lane gain/drop along the A9 because no information was available about the discharge of routine runoff from this section of road.

2.1.4 The results of the HAWRAT routine runoff assessments have been used to help determine the magnitude and significance of the operational effects of each route option on water quality.

2.1.5 Individual (single outfall) routine runoff assessments have been completed for all drainage catchments that would discharge to surface water. In addition, cumulative routine runoff assessments have been undertaken where two or more outfalls discharge into the same reach of a surface water feature. There are two types of cumulative routine runoff assessment, as follows:

- a cumulative assessment for soluble and sediment-bound pollutants is required when two or more outfalls are located within 100m of each other in the same reach of a surface water feature; and
- a cumulative assessment for soluble pollutants is required when two or more outfalls are located over 100m from each other, but within 1km, in the same reach of a surface water feature.

2.1.6 All of the proposed outfalls (for all route options) failed Step 1 of the individual and cumulative assessments, as would normally be expected. Therefore, Step 2 assessments were completed for all of the drainage catchments. The results of these assessments are shown (including their impact magnitude), by route option, in Tables 1 to 9. Resulting impact significance is reported in Chapter 14 (Road Drainage and the Water Environment). Detailed assessment input and output sheets are provided in Section 4 (Routine Runoff Assessment – HAWRAT Input and Output Sheets).

*Option 1A*

2.1.7 Table 1 summarises the results of the Step 2 individual HAWRAT routine runoff assessment for soluble and sediment-bound pollutants. Impact magnitude is determined based on the magnitude criteria provided in Table 14.2 of Chapter 14 (Road Drainage and the Water Environment).

**Table 1: Summary of Step 2 HAWRAT Individual Routine Runoff Assessment**

| Drainage Catchments | Receiving Watercourse | HAWRAT Results | | | Compliance with EQS | | Required Treatment of Solubles[1] | | Required Settlement of Sediments | Impact Magnitude |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Soluble Acute Impacts | | Sediment Chronic Impacts | | | | | | |
| | | Cu | Zn | | Cu | Zn | Cu | Zn | | |
| 1 | SWF 02 | Pass | Fail | Fail | Pass | Pass | 0% | 11% | 59% | **moderate** |
| 2 | SWF 04 | Pass | Pass | Pass | Pass | Pass | 0% | 0% | 0% | **negligible** |
| 3 | SWF 07 | Fail | Fail | Fail | Fail | Fail | 52% | 64% | 93% | **major** |
| 4 | SWF 08 | Pass | Pass | Alert 2 | Pass | Pass | 0% | 0% | Not quantified | **negligible** |
| 5 | SWF 03 | Pass | Pass | Fail | Pass | Pass | 0% | 0% | 22% | **minor** |

2.1.8 None of the drainage catchments included in the preliminary drainage design for Option 1A discharge into the same surface water feature. Therefore, a cumulative assessment was not needed for this option.

*Option 1B*

2.1.9 Table 2 summarises the results of the Step 2 individual HAWRAT routine runoff assessment for soluble and sediment-bound pollutants.

2.1.10 Table 3 summarises the results of the Step 2 cumulative HAWRAT routine runoff assessments for soluble pollutants.

**Table 2: Summary of Step 2 HAWRAT Individual Routine Runoff Assessment**

| Drainage Catchments | Receiving Watercourse | HAWRAT Results | | | Compliance with EQS | | Required Treatment of Solubles[2] | | Required Settlement of Sediments | Impact Magnitude |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Soluble Acute Impacts | | Sediment Chronic Impacts | | | | | | |
| | | Cu | Zn | | Cu | Zn | Cu | Zn | | |
| 1 | SWF 02 | Pass | Fail | Fail | Pass | Pass | 0% | 11% | 59% | **moderate** |
| 2 | SWF 04 | Pass | Pass | Pass | Pass | Pass | 0% | 0% | 0% | **negligible** |
| 3 | SWF 08 | Pass | Pass | Fail | Pass | Pass | 0% | 0% | 19% | **minor** |
| 4 | SWF 08 | Pass | Pass | Alert 2 | Pass | Pass | 0% | 0% | Not quantified | **negligible** |
| 5 | SWF 03 | Pass | Pass | Fail | Pass | Pass | 0% | 0% | 45% | **minor** |

[1] Not specified in detailed results but passes when figure entered for proposed 'treatment for solubles' (HAWRAT Step 3). Figure is not based on a proposed discharge rate as this is not yet known (may change when discharge rate applied).

[2] Not specified in detailed results but passes when figure entered for proposed 'treatment for solubles' (HAWRAT Step 3). Figure is not based on a proposed discharge rate as this is not yet known (may change when discharge rate applied).

**Table 3: Summary of Step 2 HAWRAT Cumulative Routine Runoff Assessment for Soluble Impacts**

| Drainage Catchments | Receiving Watercourse | HAWRAT Results Soluble Acute Impacts | | Compliance with Environmental Quality Standards | | Required Treatment of Solubles | | Impact Magnitude |
|---|---|---|---|---|---|---|---|---|
| | | Cu | Zn | Cu | Zn | Cu | Zn | |
| 3 & 4 | SWF 08 | Pass | Fail | Pass | Pass | 0% | 13% | **minor** |

*Option 2A*

2.1.11 Table 4 summarises the results of the Step 2 individual HAWRAT routine runoff assessment for soluble and sediment-bound pollutants.

**Table 4: Summary of Step 2 HAWRAT Individual Routine Runoff Assessment**

| Drainage Catchments | Receiving Watercourse | HAWRAT Results | | | Compliance with EQS | | Required Treatment of Solubles[3] | | Required Settlement of Sediments | Impact Magnitude |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Soluble Acute Impacts | | Sediment Chronic Impacts | | | | | | |
| | | Cu | Zn | | Cu | Zn | Cu | Zn | | |
| 1 | SWF 02 | Pass | Fail | Fail | Pass | Pass | 0% | 10% | 59% | **moderate** |
| 3 | SWF 04 | Pass | Pass | Pass | Pass | Pass | 0% | 0% | 0% | **negligible** |
| 4 | SWF 07 | Fail | Fail | Fail | Fail | Fail | 52% | 64% | 93% | **major** |
| 5 | SWF 08 | Pass | Pass | Alert 2 | Pass | Pass | 0% | 0% | Not quantified | **negligible** |
| 6 | SWF 03 | Pass | Pass | Fail | Pass | Pass | 0% | 0% | 22% | **minor** |

2.1.12 None of the drainage catchments included in the preliminary drainage design for Option 2A discharge into the same surface water feature. Therefore, a cumulative assessment was not needed for this option.

*Option 2B*

2.1.13 Table 5 summarises the results of the Step 2 individual HAWRAT routine runoff assessment for soluble and sediment-bound pollutants.

2.1.14 Table 6 summarises the results of the Step 2 cumulative HAWRAT routine runoff assessments for soluble pollutants.

[3] Not specified in detailed results but passes when figure entered for proposed 'treatment for solubles' (HAWRAT Step 3). Figure is not based on a proposed discharge rate as this is not yet known (may change when discharge rate applied).

**Table 5: Summary of Step 2 HAWRAT Individual Routine Runoff Assessment**

| Drainage Catchments | Receiving Watercourse | HAWRAT Results | | | Compliance with EQS | | Required Treatment of Solubles[4] | | Required Settlement of Sediments | Impact Magnitude |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Soluble Acute Impacts | | Sediment Chronic Impacts | | | | | | |
| | | Cu | Zn | | Cu | Zn | Cu | Zn | | |
| 1 | SWF 02 | Pass | Fail | Fail | Pass | Pass | 0% | 10% | 59% | **moderate** |
| 3 | SWF 04 | Pass | Pass | Pass | Pass | Pass | 0% | 0% | 0% | **negligible** |
| 4 | SWF 08 | Pass | Pass | Fail | Pass | Pass | 0% | 0% | 19% | **minor** |
| 5 | SWF 08 | Pass | Pass | Alert 2 | Pass | Pass | 0% | 0% | Not quantified | **negligible** |
| 6 | SWF 03 | Pass | Pass | Fail | Pass | Pass | 0% | 0% | 45% | **minor** |

**Table 6: Summary of Step 2 HAWRAT Cumulative Routine Runoff Assessment for Soluble Impacts**

| Drainage Catchments | Receiving Watercourse | HAWRAT Results Soluble Acute Impacts | | Compliance with Environmental Quality Standards | | Required Treatment of Solubles[1] | | Impact Magnitude |
|---|---|---|---|---|---|---|---|---|
| | | Cu | Zn | Cu | Zn | Cu | Zn | |
| 4 & 5 | SWF 08 | Pass | Fail | Pass | Pass | 0% | 13% | **minor** |

*Option 3A*

2.1.15 Table 7 summarises the results of the Step 2 individual HAWRAT routine runoff assessment for soluble and sediment-bound pollutants.

**Table 7: Summary of Step 2 HAWRAT Individual Routine Runoff Assessment**

| Drainage Catchments | Receiving Watercourse | HAWRAT Results | | | Compliance with EQS | | Required Treatment of Solubles[5] | | Required Settlement of Sediments | Impact Magnitude |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Soluble Acute Impacts | | Sediment Chronic Impacts | | | | | | |
| | | Cu | Zn | | Cu | Zn | Cu | Zn | | |
| 1 | SWF 02 | Pass | Pass | Alert 2 | Pass | Pass | 0% | 0% | Not quantified | **negligible** |
| 2 | SWF 04 | Pass | Pass | Pass | Pass | Pass | 0% | 0% | 0% | **negligible** |
| 3 | SWF 07 | Fail | Fail | Fail | Fail | Fail | 52% | 64% | 93% | **major** |
| 4 | SWF 08 | Pass | Pass | Alert 2 | Pass | Pass | 0% | 0% | Not quantified | **negligible** |
| 5 | SWF 03 | Pass | Pass | Fail | Pass | Pass | 0% | 0% | 22% | **minor** |

[4] Not specified in detailed results but passes when figure entered for proposed 'treatment for solubles' (HAWRAT Step 3). Figure is not based on a proposed discharge rate as this is not yet known (may change when discharge rate applied).

[5] Not specified in detailed results but passes when figure entered for proposed 'treatment for solubles' (HAWRAT Step 3). Figure is not based on a proposed discharge rate as this is not yet known (may change when discharge rate applied).

2.1.16 None of the drainage catchments included in the preliminary drainage design for Option 3A discharge into the same surface water feature. Therefore, a cumulative assessment was not needed for this option.

*Option 3B*

2.1.17 Table 8 summarises the results of the Step 2 individual HAWRAT routine runoff assessment for soluble and sediment-bound pollutants.

2.1.18 Table 9 summarises the results of the Step 2 cumulative HAWRAT routine runoff assessments for soluble pollutants.

**Table 8: Summary of Step 2 HAWRAT Individual Routine Runoff Assessment**

| Drainage Catchments | Receiving Watercourse | HAWRAT Results | | | Compliance with EQS | | Required Treatment of Solubles[6] | | Required Settlement of Sediments | Impact Magnitude |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Soluble Acute Impacts | | Sediment Chronic Impacts | | | | | | |
| | | Cu | Zn | | Cu | Zn | Cu | Zn | | |
| 1 | SWF 02 | Pass | Pass | Alert 2 | Pass | Pass | 0% | 0% | Not quantified | **negligible** |
| 2 | SWF 04 | Pass | Pass | Pass | Pass | Pass | 0% | 0% | 0% | **negligible** |
| 3 | SWF 08 | Pass | Pass | Fail | Pass | Pass | 0% | 0% | 19% | **minor** |
| 4 | SWF 08 | Pass | Pass | Alert 2 | Pass | Pass | 0% | 0% | Not quantified | **negligible** |
| 5 | SWF 03 | Pass | Pass | Fail | Pass | Pass | 0% | 0% | 45% | **minor** |

**Table 9: Summary of Step 2 HAWRAT Cumulative Routine Runoff Assessment for Soluble Impacts**

| Drainage Catchments | Receiving Watercourse | HAWRAT Results Soluble Acute Impacts | | Compliance with Environmental Quality Standards | | Required Treatment of Solubles[1] | | Impact Magnitude |
|---|---|---|---|---|---|---|---|---|
| | | Cu | Zn | Cu | Zn | Cu | Zn | |
| 3 & 4 | SWF 08 | Pass | Fail | Pass | Pass | 0% | 13% | **minor** |

[6] Not specified in detailed results but passes when figure entered for proposed 'treatment for solubles' (HAWRAT Step 3). Figure is not based on a proposed discharge rate as this is not yet known (may change when discharge rate applied).

# 3 Routine Runoff Assessment – HAWRAT Input and Output Sheets (Location Details, User Parameters and Results)

3.1.1 The following table shows the details of the rainfall site chosen and used in relation to the HAWARAT assessment for all route options (1A, 1B, 2A, 2B, 3A and 3B).

| Details of the chosen rainfall site | |
|---|---|
| SAAR (mm) | 1343.9 |
| Altitude (m) | 130 |
| Easting | 2704 |
| Northing | 7389 |
| Coastal distance (km) | 58 |

3.1.2 HAWRAT output results each individual drainage catchment for all Route Options are presented below. Routine Runoff results for cumulative assessments, Route 1B drainage catchments 3 & 4, Route 2B drainage catchments 4 & 5 and Route 3B drainage catchments 3 & 4, are also presented.

## Routine Runoff Parameters: Individual Assessments

### Route Option 1A: Drainage Catchment 1

| | | | | |
|---|---|---|---|---|
| Road Number | A9/A96 Inshes to Smithton | | Assessment type | Non-cumulative assessment (single outfall) |
| HA Area/DBFO number | | | | |
| OS grid reference of assessment point (m) | Easting | | Receiving watercourse | SWF02 |
| | Northing | | EA receiving water Detailed River Network ID | |
| OS grid reference of outfall structure (m) | Easting | | Assessor and affiliation | Jane Gooding, Jacobs |
| | Northing | | Date of assessment | 24/01/2017 |
| Outfall number | 1 | | Version of assessment | 1 |
| List of outfalls in cumulative assessment | | | | |
| Notes | DS 2036: Routine Runoff Assessment for Option 1A, Catchment 1 | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| *Runoff Risk Assessments* | | | | |
| AADT | vpd | >10,000 and <50,000 | *>10,000 and <50,000* | |
| Climatic Region | - | Warm Dry | *Colder Wet* | |
| Rainfall Site | - | Ashford (SAAR 710mm) | *Ardtalnaig (SAAR 1343.9mm)* | |
| 95%ile River flow | m3/s | 0 | *0.001* | |
| Baseflow Index | - | 0.5 | *0.763* | |
| Impermeable road area drained | ha | 1 | *0.75* | |
| Permeable area draining to outfall | ha | 1 | *0.18* | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | *No* | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | *No* | |
| Hardness | - | Low = <50mg CaCO3/l | *Low = <50mg CaCO3/l* | |
| Use Tier 1 | - | TRUE | *TRUE* | |
| Use Tier 2 | - | FALSE | *FALSE* | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | *0.5* | |
| Tier2 Bed width | m | 3 | *3* | |
| Tier2 Side slope | m/m | 0.5 | *0.5* | |
| Tier2 Long slope | m/m | 0.0001 | *0.0001* | |
| Tier2 Mannings' n | - | 0.07 | *0.07* | |
| Existing treatment for solubles | % | 0 | *0* | *description for existing measures* |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Existing settlement of sediments | % | 0 | *0* | |
| Proposed treatment for solubles | % | 0 | *0* | *description for proposed measures* |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Proposed settlement of sediments | % | 0 | *0* | |

### Route Option 1A: Drainage Catchment 2

| | | | | |
|---|---|---|---|---|
| Road Number | A9/A96 Inshes to Smithton | | Assessment type | Non-cumulative assessment (single outfall) |
| HA Area/DBFO number | | | | |
| OS grid reference of assessment point (m) | Easting | | Receiving watercourse | SWF 04 |
| | Northing | | EA receiving water Detailed River Network ID | |
| OS grid reference of outfall structure (m) | Easting | | Assessor and affiliation | Jane Gooding, Jacobs |
| | Northing | | Date of assessment | 26/01/2017 |
| Outfall number | 2 | | Version of assessment | 1 |
| List of outfalls in cumulative assessment | | | | |
| Notes | DS 2036: Routine Runoff Assessment for Option 1A, Catchment 2 | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| *Runoff Risk Assessments* | | | | |
| AADT | vpd | >10,000 and <50,000 | *>10,000 and <50,000* | |
| Climatic Region | - | Warm Dry | *Colder Wet* | |
| Rainfall Site | - | Ashford (SAAR 710mm) | *Ardtalnaig (SAAR 1343.9mm)* | |
| 95%ile River flow | m3/s | 0 | *0.005* | |
| Baseflow Index | - | 0.5 | *0.764* | |
| Impermeable road area drained | ha | 1 | *1.93* | |
| Permeable area draining to outfall | ha | 1 | *0.51* | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | *No* | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | *No* | |
| Hardness | - | Low = <50mg CaCO3/l | *Low = <50mg CaCO3/l* | |
| Use Tier 1 | - | TRUE | *TRUE* | |
| Use Tier 2 | - | FALSE | *FALSE* | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | *0.6* | |
| Tier2 Bed width | m | 3 | *3* | |
| Tier2 Side slope | m/m | 0.5 | *0.5* | |
| Tier2 Long slope | m/m | 0.0001 | *0.0001* | |
| Tier2 Mannings' n | - | 0.07 | *0.07* | |
| Existing treatment for solubles | % | 0 | *0* | *description for existing measures* |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Existing settlement of sediments | % | 0 | *0* | |
| Proposed treatment for solubles | % | 0 | *0* | *description for proposed measures* |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Proposed settlement of sediments | % | 0 | *0* | |

## Route Option 1A: Drainage Catchment 3

| | | | | | |
|---|---|---|---|---|---|
| **Road Number** | A9/A96 Inshes to Smithton | | **Assessment type** | Non-cumulative assessment (single outfall) | |
| **HA Area/DBFO number** | | | | | |
| **OS grid reference of assessment point (m)** | **Easting** | | **Receiving watercourse** | SWF07 | |
| | **Northing** | | **EA receiving water Detailed River Network ID** | | |
| **OS grid reference of outfall structure (m)** | **Easting** | | **Assessor and affiliation** | Jane Gooding, Jacobs | |
| | **Northing** | | **Date of assessment** | 24/01/2017 | |
| **Outfall number** | 3 | | **Version of assessment** | 1 | |
| **List of outfalls in cumulative assessment** | | | | | |
| **Notes** | DS 2036: Routine Runoff Assessment for Option 1A, Catchment 3 | | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| ***Runoff Risk Assessments*** | | | | |
| AADT | vpd | >10,000 and <50,000 | ***>10,000 and <50,000*** | |
| Climatic Region | - | Warm Dry | ***Colder Wet*** | |
| Rainfall Site | - | Ashford (SAAR 710mm) | ***Ardtalnaig (SAAR 1343.9mm)*** | |
| 95%ile River flow | m3/s | 0 | ***0.0001*** | |
| Baseflow Index | - | 0.5 | ***0.576*** | |
| Impermeable road area drained | ha | 1 | ***1.23*** | |
| Permeable area draining to outfall | ha | 1 | ***0.33*** | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | ***No*** | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | ***No*** | |
| Hardness | - | Low = <50mg CaCO3/l | ***Low = <50mg CaCO3/l*** | |
| Use Tier 1 | - | TRUE | ***TRUE*** | |
| Use Tier 2 | - | FALSE | ***FALSE*** | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | ***0.3*** | |
| Tier2 Bed width | m | 3 | ***3*** | |
| Tier2 Side slope | m/m | 0.5 | ***0.5*** | |
| Tier2 Long slope | m/m | 0.0001 | ***0.0001*** | |
| Tier2 Mannings' n | - | 0.07 | ***0.07*** | |
| Existing treatment for solubles | % | 0 | ***0*** | ***description for existing measures*** |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Existing settlement of sediments | % | 0 | ***0*** | |
| Proposed treatment for solubles | % | 0 | ***0*** | ***description for proposed measures*** |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Proposed settlement of sediments | % | 0 | ***0*** | |

## Route Option 1A: Drainage Catchment 4

| | | | | | |
|---|---|---|---|---|---|
| **Road Number** | A9/A96 Inshes to Smithton | | **Assessment type** | Non-cumulative assessment (single outfall) | |
| **HA Area/DBFO number** | | | | | |
| **OS grid reference of assessment point (m)** | **Easting** | | **Receiving watercourse** | SWF08 | |
| | **Northing** | | **EA receiving water Detailed River Network ID** | | |
| **OS grid reference of outfall structure (m)** | **Easting** | | **Assessor and affiliation** | Jane Gooding, Jacobs | |
| | **Northing** | | **Date of assessment** | 24/01/2017 | |
| **Outfall number** | 4 | | **Version of assessment** | 1 | |
| **List of outfalls in cumulative assessment** | | | | | |
| **Notes** | DS 2036: Routine Runoff Assessment for Option 1A, Catchment 14 | | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| ***Runoff Risk Assessments*** | | | | |
| AADT | vpd | >10,000 and <50,000 | ***>10,000 and <50,000*** | |
| Climatic Region | - | Warm Dry | ***Colder Wet*** | |
| Rainfall Site | - | Ashford (SAAR 710mm) | ***Ardtalnaig (SAAR 1343.9mm)*** | |
| 95%ile River flow | m3/s | 0 | ***0.002*** | |
| Baseflow Index | - | 0.5 | ***0.584*** | |
| Impermeable road area drained | ha | 1 | ***0.73*** | |
| Permeable area draining to outfall | ha | 1 | ***0.06*** | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | ***No*** | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | ***Yes*** | |
| Hardness | - | Low = <50mg CaCO3/l | ***Low = <50mg CaCO3/l*** | |
| Use Tier 1 | - | TRUE | ***TRUE*** | |
| Use Tier 2 | - | FALSE | ***FALSE*** | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | ***0.5*** | |
| Tier2 Bed width | m | 3 | ***3*** | |
| Tier2 Side slope | m/m | 0.5 | ***0.5*** | |
| Tier2 Long slope | m/m | 0.0001 | ***0.0001*** | |
| Tier2 Mannings' n | - | 0.07 | ***0.07*** | |
| Existing treatment for solubles | % | 0 | ***0*** | ***description for existing measures*** |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Existing settlement of sediments | % | 0 | ***0*** | |
| Proposed treatment for solubles | % | 0 | ***0*** | ***description for proposed measures*** |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Proposed settlement of sediments | % | 0 | ***0*** | |

## Route Option 1A: Drainage Catchment 5

| | | | | |
|---|---|---|---|---|
| **Road Number** | A9/A96 Inshes to Smithton | | **Assessment type** | Non-cumulative assessment (single outfall) |
| **HA Area/DBFO number** | | | | |
| **OS grid reference of assessment point (m)** | **Easting** | | **Receiving watercourse** | SWF03 |
| | **Northing** | | **EA receiving water Detailed River Network ID** | |
| **OS grid reference of outfall structure (m)** | **Easting** | | **Assessor and affiliation** | Jane Gooding, Jacobs |
| | **Northing** | | **Date of assessment** | 24/01/2017 |
| **Outfall number** | 5 | | **Version of assessment** | 1 |
| **List of outfalls in cumulative assessment** | | | | |
| **Notes** | DS 2036: Routine Runoff Assessment for Option 1A, Catchment 5 | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| ***Runoff Risk Assessments*** | | | | |
| AADT | vpd | >10,000 and <50,000 | ***>10,000 and <50,000*** | |
| Climatic Region | - | Warm Dry | ***Colder Wet*** | |
| Rainfall Site | - | Ashford (SAAR 710mm) | ***Ardtalnaig (SAAR 1343.9mm)*** | |
| 95%ile River flow | m3/s | 0 | ***0.002*** | |
| Baseflow Index | - | 0.5 | ***0.712*** | |
| Impermeable road area drained | ha | 1 | ***0.61*** | |
| Permeable area draining to outfall | ha | 1 | ***0.16*** | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | ***No*** | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | ***No*** | |
| Hardness | - | Low = <50mg CaCO3/l | ***Low = <50mg CaCO3/l*** | |
| Use Tier 1 | - | TRUE | ***TRUE*** | |
| Use Tier 2 | - | FALSE | ***FALSE*** | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | ***0.8*** | |
| Tier2 Bed width | m | 3 | ***3*** | |
| Tier2 Side slope | m/m | 0.5 | ***0.5*** | |
| Tier2 Long slope | m/m | 0.0001 | ***0.0001*** | |
| Tier2 Mannings' n | - | 0.07 | ***0.07*** | |
| Existing treatment for solubles | % | 0 | ***0*** | ***description for existing measures*** |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Existing settlement of sediments | % | 0 | ***0*** | |
| Proposed treatment for solubles | % | 0 | ***0*** | ***description for proposed measures*** |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Proposed settlement of sediments | % | 0 | ***0*** | |

## Route Option 1B: Drainage Catchment 1

| | | | | |
|---|---|---|---|---|
| **Road Number** | A9/A96 Inshes to Smithton | | **Assessment type** | Non-cumulative assessment (single outfall) |
| **HA Area/DBFO number** | | | | |
| **OS grid reference of assessment point (m)** | **Easting** | | **Receiving watercourse** | SWF02 |
| | **Northing** | | **EA receiving water Detailed River Network ID** | |
| **OS grid reference of outfall structure (m)** | **Easting** | | **Assessor and affiliation** | Jane Gooding, Jacobs |
| | **Northing** | | **Date of assessment** | 24/01/2017 |
| **Outfall number** | 1 | | **Version of assessment** | 1 |
| **List of outfalls in cumulative assessment** | | | | |
| **Notes** | DS 2036: Routine Runoff Assessment for Option 1B, Catchment 1 | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| ***Runoff Risk Assessments*** | | | | |
| AADT | vpd | >10,000 and <50,000 | ***>10,000 and <50,000*** | |
| Climatic Region | - | Warm Dry | ***Colder Wet*** | |
| Rainfall Site | - | Ashford (SAAR 710mm) | ***Ardtalnaig (SAAR 1343.9mm)*** | |
| 95%ile River flow | m3/s | 0 | ***0.001*** | |
| Baseflow Index | - | 0.5 | ***0.763*** | |
| Impermeable road area drained | ha | 1 | ***0.75*** | |
| Permeable area draining to outfall | ha | 1 | ***0.18*** | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | ***No*** | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | ***No*** | |
| Hardness | - | Low = <50mg CaCO3/l | ***Low = <50mg CaCO3/l*** | |
| Use Tier 1 | - | TRUE | ***TRUE*** | |
| Use Tier 2 | - | FALSE | ***FALSE*** | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | ***0.5*** | |
| Tier2 Bed width | m | 3 | ***3*** | |
| Tier2 Side slope | m/m | 0.5 | ***0.5*** | |
| Tier2 Long slope | m/m | 0.0001 | ***0.0001*** | |
| Tier2 Mannings' n | - | 0.07 | ***0.07*** | |
| Existing treatment for solubles | % | 0 | ***0*** | ***description for existing measures*** |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Existing settlement of sediments | % | 0 | ***0*** | |
| Proposed treatment for solubles | % | 0 | ***0*** | ***description for proposed measures*** |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Proposed settlement of sediments | % | 0 | ***0*** | |

## Route Option 1B: Drainage Catchment 2

| | | | | | |
|---|---|---|---|---|---|
| **Road Number** | A9/A96 Inshes to Smithton | | **Assessment type** | Non-cumulative assessment (single outfall) | |
| **HA Area/DBFO number** | | | | | |
| **OS grid reference of assessment point (m)** | **Easting** | | **Receiving watercourse** | SWF 04 | |
| | **Northing** | | **EA receiving water Detailed River Network ID** | | |
| **OS grid reference of outfall structure (m)** | **Easting** | | **Assessor and affiliation** | Jane Gooding, Jacobs | |
| | **Northing** | | **Date of assessment** | 26/01/2017 | |
| **Outfall number** | 2 | | **Version of assessment** | 1 | |
| **List of outfalls in cumulative assessment** | | | | | |
| **Notes** | DS 2036: Routine Runoff Assessment for Option 1B, Catchment 2 | | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| ***Runoff Risk Assessments*** | | | | |
| AADT | vpd | >10,000 and <50,000 | *>10,000 and <50,000* | |
| Climatic Region | - | Warm Dry | *Colder Wet* | |
| Rainfall Site | - | Ashford (SAAR 710mm) | *Ardtalnaig (SAAR 1343.9mm)* | |
| 95%ile River flow | m3/s | 0 | *0.005* | |
| Baseflow Index | - | 0.5 | *0.764* | |
| Impermeable road area drained | ha | 1 | *1.99* | |
| Permeable area draining to outfall | ha | 1 | *0.53* | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | *No* | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | *No* | |
| Hardness | - | Low = <50mg CaCO3/l | *Low = <50mg CaCO3/l* | |
| Use Tier 1 | - | TRUE | *TRUE* | |
| Use Tier 2 | - | FALSE | *FALSE* | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | *0.6* | |
| Tier2 Bed width | m | 3 | *3* | |
| Tier2 Side slope | m/m | 0.5 | *0.5* | |
| Tier2 Long slope | m/m | 0.0001 | *0.0001* | |
| Tier2 Mannings' n | - | 0.07 | *0.07* | |
| Existing treatment for solubles | % | 0 | *0* | *description for existing measures* |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Existing settlement of sediments | % | 0 | *0* | |
| Proposed treatment for solubles | % | 0 | *0* | *description for proposed measures* |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Proposed settlement of sediments | % | 0 | *0* | |

## Route Option 1B: Drainage Catchment 3

| | | | | | |
|---|---|---|---|---|---|
| **Road Number** | A9/A96 Inshes to Smithton | | **Assessment type** | Non-cumulative assessment (single outfall) | |
| **HA Area/DBFO number** | | | | | |
| **OS grid reference of assessment point (m)** | **Easting** | | **Receiving watercourse** | SWF08 | |
| | **Northing** | | **EA receiving water Detailed River Network ID** | | |
| **OS grid reference of outfall structure (m)** | **Easting** | | **Assessor and affiliation** | Jane Gooding, Jacobs | |
| | **Northing** | | **Date of assessment** | 24/01/2017 | |
| **Outfall number** | 3 | | **Version of assessment** | 1 | |
| **List of outfalls in cumulative assessment** | | | | | |
| **Notes** | DS 2036: Routine Runoff Assessment for Option 1B, Catchment 3 | | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| ***Runoff Risk Assessments*** | | | | |
| AADT | vpd | >10,000 and <50,000 | *>10,000 and <50,000* | |
| Climatic Region | - | Warm Dry | *Colder Wet* | |
| Rainfall Site | - | Ashford (SAAR 710mm) | *Ardtalnaig (SAAR 1343.9mm)* | |
| 95%ile River flow | m3/s | 0 | *0.002* | |
| Baseflow Index | - | 0.5 | *0.584* | |
| Impermeable road area drained | ha | 1 | *1.17* | |
| Permeable area draining to outfall | ha | 1 | *0.45* | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | *No* | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | *No* | |
| Hardness | - | Low = <50mg CaCO3/l | *Low = <50mg CaCO3/l* | |
| Use Tier 1 | - | TRUE | *TRUE* | |
| Use Tier 2 | - | FALSE | *FALSE* | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | *0.5* | |
| Tier2 Bed width | m | 3 | *3* | |
| Tier2 Side slope | m/m | 0.5 | *0.5* | |
| Tier2 Long slope | m/m | 0.0001 | *0.0001* | |
| Tier2 Mannings' n | - | 0.07 | *0.07* | |
| Existing treatment for solubles | % | 0 | *0* | *description for existing measures* |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Existing settlement of sediments | % | 0 | *0* | |
| Proposed treatment for solubles | % | 0 | *0* | *description for proposed measures* |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Proposed settlement of sediments | % | 0 | *0* | |

## Route Option 1B: Drainage Catchment 4

| | | | | | |
|---|---|---|---|---|---|
| **Road Number** | A9/A96 Inshes to Smithton | | **Assessment type** | Non-cumulative assessment (single outfall) | |
| **HA Area/DBFO number** | | | | | |
| **OS grid reference of assessment point (m)** | **Easting** | | **Receiving watercourse** | SWF08 | |
| | **Northing** | | **EA receiving water Detailed River Network ID** | | |
| **OS grid reference of outfall structure (m)** | **Easting** | | **Assessor and affiliation** | Jane Gooding, Jacobs | |
| | **Northing** | | **Date of assessment** | 24/01/2017 | |
| **Outfall number** | 4 | | **Version of assessment** | 1 | |
| **List of outfalls in cumulative assessment** | | | | | |
| **Notes** | DS 2036: Routine Runoff Assessment for Option 1B, Catchment 4 | | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| ***Runoff Risk Assessments*** | | | | |
| AADT | vpd | >10,000 and <50,000 | ***>10,000 and <50,000*** | |
| Climatic Region | - | Warm Dry | ***Colder Wet*** | |
| Rainfall Site | - | Ashford (SAAR 710mm) | ***Ardtalnaig (SAAR 1343.9mm)*** | |
| 95%ile River flow | m3/s | 0 | ***0.002*** | |
| Baseflow Index | - | 0.5 | ***0.584*** | |
| Impermeable road area drained | ha | 1 | ***0.77*** | |
| Permeable area draining to outfall | ha | 1 | ***0.06*** | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | ***No*** | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | ***Yes*** | |
| Hardness | - | Low = <50mg CaCO3/l | ***Low = <50mg CaCO3/l*** | |
| Use Tier 1 | - | TRUE | ***TRUE*** | |
| Use Tier 2 | - | FALSE | ***FALSE*** | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | ***0.5*** | |
| Tier2 Bed width | m | 3 | ***3*** | |
| Tier2 Side slope | m/m | 0.5 | ***0.5*** | |
| Tier2 Long slope | m/m | 0.0001 | ***0.0001*** | |
| Tier2 Mannings' n | - | 0.07 | ***0.07*** | |
| Existing treatment for solubles | % | 0 | ***0*** | ***description for existing measures*** |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Existing settlement of sediments | % | 0 | ***0*** | |
| Proposed treatment for solubles | % | 0 | ***0*** | ***description for proposed measures*** |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Proposed settlement of sediments | % | 0 | ***0*** | |

## Route Option 1B: Drainage Catchment 5

| | | | | | |
|---|---|---|---|---|---|
| **Road Number** | A9/A96 Inshes to Smithton | | **Assessment type** | Non-cumulative assessment (single outfall) | |
| **HA Area/DBFO number** | | | | | |
| **OS grid reference of assessment point (m)** | **Easting** | | **Receiving watercourse** | SWF03 | |
| | **Northing** | | **EA receiving water Detailed River Network ID** | | |
| **OS grid reference of outfall structure (m)** | **Easting** | | **Assessor and affiliation** | Jane Gooding, Jacobs | |
| | **Northing** | | **Date of assessment** | 24/01/2017 | |
| **Outfall number** | 5 | | **Version of assessment** | 1 | |
| **List of outfalls in cumulative assessment** | | | | | |
| **Notes** | DS 2036: Routine Runoff Assessment for Option 1B, Catchment 5 | | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| ***Runoff Risk Assessments*** | | | | |
| AADT | vpd | >10,000 and <50,000 | ***>10,000 and <50,000*** | |
| Climatic Region | - | Warm Dry | ***Colder Wet*** | |
| Rainfall Site | - | Ashford (SAAR 710mm) | ***Ardtalnaig (SAAR 1343.9mm)*** | |
| 95%ile River flow | m3/s | 0 | ***0.002*** | |
| Baseflow Index | - | 0.5 | ***0.712*** | |
| Impermeable road area drained | ha | 1 | ***0.86*** | |
| Permeable area draining to outfall | ha | 1 | ***0.2*** | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | ***No*** | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | ***No*** | |
| Hardness | - | Low = <50mg CaCO3/l | ***Low = <50mg CaCO3/l*** | |
| Use Tier 1 | - | TRUE | ***TRUE*** | |
| Use Tier 2 | - | FALSE | ***FALSE*** | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | ***0.8*** | |
| Tier2 Bed width | m | 3 | ***3*** | |
| Tier2 Side slope | m/m | 0.5 | ***0.5*** | |
| Tier2 Long slope | m/m | 0.0001 | ***0.0001*** | |
| Tier2 Mannings' n | - | 0.07 | ***0.07*** | |
| Existing treatment for solubles | % | 0 | ***0*** | ***description for existing measures*** |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Existing settlement of sediments | % | 0 | ***0*** | |
| Proposed treatment for solubles | % | 0 | ***0*** | ***description for proposed measures*** |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Proposed settlement of sediments | % | 0 | ***0*** | |

## Route Option 2A: Drainage Catchment 1

| | | | | | |
|---|---|---|---|---|---|
| Road Number | A9/A96 Inshes to Smithton | | Assessment type | | Non-cumulative assessment (single outfall) |
| HA Area/DBFO number | | | | | |
| OS grid reference of assessment point (m) | Easting | | Receiving watercourse | | SWF02 |
| | Northing | | EA receiving water Detailed River Network ID | | |
| OS grid reference of outfall structure (m) | Easting | | Assessor and affiliation | | Jane Gooding, Jacobs |
| | Northing | | Date of assessment | | 24/01/2017 |
| Outfall number | 1 | | Version of assessment | | 1 |
| List of outfalls in cumulative assessment | | | | | |
| Notes | DS 2036: Routine Runoff Assessment for Option 2A, Catchment 1 | | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| *Runoff Risk Assessments* | | | | |
| AADT | vpd | >10,000 and <50,000 | *>10,000 and <50,000* | |
| Climatic Region | - | Warm Dry | *Colder Wet* | |
| Rainfall Site | - | Ashford (SAAR 710mm) | *Ardtalnaig (SAAR 1343.9mm)* | |
| 95%ile River flow | m3/s | 0 | *0.001* | |
| Baseflow Index | - | 0.5 | *0.763* | |
| Impermeable road area drained | ha | 1 | *0.74* | |
| Permeable area draining to outfall | ha | 1 | *0.18* | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | *No* | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | *Yes* | |
| Hardness | - | Low = <50mg CaCO3/l | *Low = <50mg CaCO3/l* | |
| Use Tier 1 | - | TRUE | *TRUE* | |
| Use Tier 2 | - | FALSE | *FALSE* | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | *0.5* | |
| Tier2 Bed width | m | 3 | *3* | |
| Tier2 Side slope | m/m | 0.5 | *0.5* | |
| Tier2 Long slope | m/m | 0.0001 | *0.0001* | |
| Tier2 Mannings' n | - | 0.07 | *0.07* | |
| Existing treatment for solubles | % | 0 | *0* | *description for existing measures* |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Existing settlement of sediments | % | 0 | *0* | |
| Proposed treatment for solubles | % | 0 | *0* | *description for proposed measures* |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Proposed settlement of sediments | % | 0 | *0* | |

## Route Option 2A: Drainage Catchment 3

| | | | | | |
|---|---|---|---|---|---|
| Road Number | A9/A96 Inshes to Smithton | | Assessment type | | Non-cumulative assessment (single outfall) |
| HA Area/DBFO number | | | | | |
| OS grid reference of assessment point (m) | Easting | | Receiving watercourse | | SWF 04 |
| | Northing | | EA receiving water Detailed River Network ID | | |
| OS grid reference of outfall structure (m) | Easting | | Assessor and affiliation | | Jane Gooding, Jacobs |
| | Northing | | Date of assessment | | 26/01/2017 |
| Outfall number | 3 | | Version of assessment | | 1 |
| List of outfalls in cumulative assessment | | | | | |
| Notes | DS 2036: Routine Runoff Assessment for Option 2A, Catchment 3 | | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| *Runoff Risk Assessments* | | | | |
| AADT | vpd | >10,000 and <50,000 | *>10,000 and <50,000* | |
| Climatic Region | - | Warm Dry | *Colder Wet* | |
| Rainfall Site | - | Ashford (SAAR 710mm) | *Ardtalnaig (SAAR 1343.9mm)* | |
| 95%ile River flow | m3/s | 0 | *0.005* | |
| Baseflow Index | - | 0.5 | *0.764* | |
| Impermeable road area drained | ha | 1 | *1.93* | |
| Permeable area draining to outfall | ha | 1 | *0.51* | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | *No* | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | *No* | |
| Hardness | - | Low = <50mg CaCO3/l | *Low = <50mg CaCO3/l* | |
| Use Tier 1 | - | TRUE | *TRUE* | |
| Use Tier 2 | - | FALSE | *FALSE* | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | *0.6* | |
| Tier2 Bed width | m | 3 | *3* | |
| Tier2 Side slope | m/m | 0.5 | *0.5* | |
| Tier2 Long slope | m/m | 0.0001 | *0.0001* | |
| Tier2 Mannings' n | - | 0.07 | *0.07* | |
| Existing treatment for solubles | % | 0 | *0* | *description for existing measures* |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Existing settlement of sediments | % | 0 | *0* | |
| Proposed treatment for solubles | % | 0 | *0* | *description for proposed measures* |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Proposed settlement of sediments | % | 0 | *0* | |

## Route Option 2A: Drainage Catchment 4

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Road Number** | A9/A96 Inshes to Smithton | | **Assessment type** | | Non-cumulative assessment (single outfall) | | |
| **HA Area/DBFO number** | | | | | | | |
| **OS grid reference of assessment point (m)** | **Easting** | | **Receiving watercourse** | | SWF07 | | |
| | **Northing** | | **EA receiving water Detailed River Network ID** | | | | |
| **OS grid reference of outfall structure (m)** | **Easting** | | **Assessor and affiliation** | | Jane Gooding, Jacobs | | |
| | **Northing** | | **Date of assessment** | | 24/01/2017 | | |
| **Outfall number** | 4 | | **Version of assessment** | | 1 | | |
| **List of outfalls in cumulative assessment** | | | | | | | |
| **Notes** | DS 2036: Routine Runoff Assessment for Option 2A, Catchment 4 | | | | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| *Runoff Risk Assessments* | | | | |
| AADT | vpd | >10,000 and <50,000 | *>10,000 and <50,000* | |
| Climatic Region | - | Warm Dry | *Colder Wet* | |
| Rainfall Site | - | Ashford (SAAR 710mm) | *Ardtalnaig (SAAR 1343.9mm)* | |
| 95%ile River flow | m3/s | 0 | *0.0001* | |
| Baseflow Index | - | 0.5 | *0.576* | |
| Impermeable road area drained | ha | 1 | *1.23* | |
| Permeable area draining to outfall | ha | 1 | *0.33* | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | *No* | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | *No* | |
| Hardness | - | Low = <50mg CaCO3/l | *Low = <50mg CaCO3/l* | |
| Use Tier 1 | - | TRUE | *TRUE* | |
| Use Tier 2 | - | FALSE | *FALSE* | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | *0.3* | |
| Tier2 Bed width | m | 3 | *3* | |
| Tier2 Side slope | m/m | 0.5 | *0.5* | |
| Tier2 Long slope | m/m | 0.0001 | *0.0001* | |
| Tier2 Mannings' n | - | 0.07 | *0.07* | |
| Existing treatment for solubles | % | 0 | *0* | *description for existing measures* |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Existing settlement of sediments | % | 0 | *0* | |
| Proposed treatment for solubles | % | 0 | *0* | *description for proposed measures* |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Proposed settlement of sediments | % | 0 | *0* | |

## Route Option 2A: Drainage Catchment 5

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Road Number** | A9/A96 Inshes to Smithton | | **Assessment type** | | Non-cumulative assessment (single outfall) | | |
| **HA Area/DBFO number** | | | | | | | |
| **OS grid reference of assessment point (m)** | **Easting** | | **Receiving watercourse** | | SWF08 | | |
| | **Northing** | | **EA receiving water Detailed River Network ID** | | | | |
| **OS grid reference of outfall structure (m)** | **Easting** | | **Assessor and affiliation** | | Jane Gooding, Jacobs | | |
| | **Northing** | | **Date of assessment** | | 24/01/2017 | | |
| **Outfall number** | 5 | | **Version of assessment** | | 1 | | |
| **List of outfalls in cumulative assessment** | | | | | | | |
| **Notes** | DS 2036: Routine Runoff Assessment for Option 2A, Catchment 5 | | | | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| *Runoff Risk Assessments* | | | | |
| AADT | vpd | >10,000 and <50,000 | *>10,000 and <50,000* | |
| Climatic Region | - | Warm Dry | *Colder Wet* | |
| Rainfall Site | - | Ashford (SAAR 710mm) | *Ardtalnaig (SAAR 1343.9mm)* | |
| 95%ile River flow | m3/s | 0 | *0.002* | |
| Baseflow Index | - | 0.5 | *0.584* | |
| Impermeable road area drained | ha | 1 | *0.73* | |
| Permeable area draining to outfall | ha | 1 | *0.06* | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | *No* | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | *Yes* | |
| Hardness | - | Low = <50mg CaCO3/l | *Low = <50mg CaCO3/l* | |
| Use Tier 1 | - | TRUE | *TRUE* | |
| Use Tier 2 | - | FALSE | *FALSE* | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | *0.5* | |
| Tier2 Bed width | m | 3 | *3* | |
| Tier2 Side slope | m/m | 0.5 | *0.5* | |
| Tier2 Long slope | m/m | 0.0001 | *0.0001* | |
| Tier2 Mannings' n | - | 0.07 | *0.07* | |
| Existing treatment for solubles | % | 0 | *0* | *description for existing measures* |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Existing settlement of sediments | % | 0 | *0* | |
| Proposed treatment for solubles | % | 0 | *0* | *description for proposed measures* |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Proposed settlement of sediments | % | 0 | *0* | |

## Route Option 2A: Drainage Catchment 6

| | | | | | |
|---|---|---|---|---|---|
| Road Number | A9/A96 Inshes to Smithton | | Assessment type | Non-cumulative assessment (single outfall) | |
| HA Area/DBFO number | | | | | |
| OS grid reference of assessment point (m) | Easting | | Receiving watercourse | SWF03 | |
| | Northing | | EA receiving water Detailed River Network ID | | |
| OS grid reference of outfall structure (m) | Easting | | Assessor and affiliation | Jane Gooding, Jacobs | |
| | Northing | | Date of assessment | 24/01/2017 | |
| Outfall number | 6 | | Version of assessment | 1 | |
| List of outfalls in cumulative assessment | | | | | |
| Notes | DS 2036: Routine Runoff Assessment for Option 2A, Catchment 6 | | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| *Runoff Risk Assessments* | | | | |
| AADT | vpd | >10,000 and <50,000 | *>10,000 and <50,000* | |
| Climatic Region | - | Warm Dry | *Colder Wet* | |
| Rainfall Site | - | Ashford (SAAR 710mm) | *Ardtalnaig (SAAR 1343.9mm)* | |
| 95%ile River Flow | m3/s | 0 | *0.002* | |
| Baseflow Index | - | 0.5 | *0.712* | |
| Impermeable road area drained | ha | 1 | *0.61* | |
| Permeable area draining to outfall | ha | 1 | *0.16* | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | *No* | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | *No* | |
| Hardness | - | Low = <50mg CaCO3/l | *Low = <50mg CaCO3/l* | |
| Use Tier 1 | - | TRUE | *TRUE* | |
| Use Tier 2 | - | FALSE | *FALSE* | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | *0.8* | |
| Tier2 Bed width | m | 3 | *3* | |
| Tier2 Side slope | m/m | 0.5 | *0.5* | |
| Tier2 Long slope | m/m | 0.0001 | *0.0001* | |
| Tier2 Mannings' n | - | 0.07 | *0.07* | |
| Existing treatment for solubles | % | 0 | *0* | *description for existing measures* |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Existing settlement of sediments | % | 0 | *0* | |
| Proposed treatment for solubles | % | 0 | *0* | *description for proposed measures* |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Proposed settlement of sediments | % | 0 | *0* | |

## Route Option 2B: Drainage Catchment 1

| | | | | | |
|---|---|---|---|---|---|
| Road Number | A9/A96 Inshes to Smithton | | Assessment type | Non-cumulative assessment (single outfall) | |
| HA Area/DBFO number | | | | | |
| OS grid reference of assessment point (m) | Easting | | Receiving watercourse | SWF02 | |
| | Northing | | EA receiving water Detailed River Network ID | | |
| OS grid reference of outfall structure (m) | Easting | | Assessor and affiliation | Jane Gooding, Jacobs | |
| | Northing | | Date of assessment | 24/01/2017 | |
| Outfall number | 1 | | Version of assessment | 1 | |
| List of outfalls in cumulative assessment | | | | | |
| Notes | DS 2036: Routine Runoff Assessment for Option 2B, Catchment 1 | | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| *Runoff Risk Assessments* | | | | |
| AADT | vpd | >10,000 and <50,000 | *>10,000 and <50,000* | |
| Climatic Region | - | Warm Dry | *Colder Wet* | |
| Rainfall Site | - | Ashford (SAAR 710mm) | *Ardtalnaig (SAAR 1343.9mm)* | |
| 95%ile River Flow | m3/s | 0 | *0.001* | |
| Baseflow Index | - | 0.5 | *0.763* | |
| Impermeable road area drained | ha | 1 | *0.74* | |
| Permeable area draining to outfall | ha | 1 | *0.18* | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | *No* | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | *Yes* | |
| Hardness | - | Low = <50mg CaCO3/l | *Low = <50mg CaCO3/l* | |
| Use Tier 1 | - | TRUE | *TRUE* | |
| Use Tier 2 | - | FALSE | *FALSE* | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | *0.5* | |
| Tier2 Bed width | m | 3 | *3* | |
| Tier2 Side slope | m/m | 0.5 | *0.5* | |
| Tier2 Long slope | m/m | 0.0001 | *0.0001* | |
| Tier2 Mannings' n | - | 0.07 | *0.07* | |
| Existing treatment for solubles | % | 0 | *0* | *description for existing measures* |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Existing settlement of sediments | % | 0 | *0* | |
| Proposed treatment for solubles | % | 0 | *0* | *description for proposed measures* |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Proposed settlement of sediments | % | 0 | *0* | |

## Route Option 2B: Drainage Catchment 3

| | | | | |
|---|---|---|---|---|
| Road Number | A9/A96 Inshes to Smithton | | Assessment type | Non-cumulative assessment (single outfall) |
| HA Area/DBFO number | | | | |
| OS grid reference of assessment point (m) | Easting | | Receiving watercourse | SWF 04 |
| | Northing | | EA receiving water Detailed River Network ID | |
| OS grid reference of outfall structure (m) | Easting | | Assessor and affiliation | Jane Gooding, Jacobs |
| | Northing | | Date of assessment | 26/01/2017 |
| Outfall number | 3 | | Version of assessment | 1 |
| List of outfalls in cumulative assessment | | | | |
| Notes | DS 2036: Routine Runoff Assessment for Option 2B, Catchment 3 | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| ***Runoff Risk Assessments*** | | | | |
| AADT | vpd | >10,000 and <50,000 | ***>10,000 and <50,000*** | |
| Climatic Region | - | Warm Dry | ***Colder Wet*** | |
| Rainfall Site | - | Ashford (SAAR 710mm) | ***Ardtalnaig (SAAR 1343.9mm)*** | |
| 95%ile River flow | m3/s | 0 | ***0.005*** | |
| Baseflow Index | - | 0.5 | ***0.764*** | |
| Impermeable road area drained | ha | 1 | ***1.99*** | |
| Permeable area draining to outfall | ha | 1 | ***0.53*** | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | ***No*** | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | ***No*** | |
| Hardness | - | Low = <50mg CaCO3/l | ***Low = <50mg CaCO3/l*** | |
| Use Tier 1 | - | TRUE | ***TRUE*** | |
| Use Tier 2 | - | FALSE | ***FALSE*** | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | ***0.6*** | |
| Tier2 Bed width | m | 3 | ***3*** | |
| Tier2 Side slope | m/m | 0.5 | ***0.5*** | |
| Tier2 Long slope | m/m | 0.0001 | ***0.0001*** | |
| Tier2 Mannings' n | - | 0.07 | ***0.07*** | |
| Existing treatment for solubles | % | 0 | ***0*** | ***description for existing measures*** |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Existing settlement of sediments | % | 0 | ***0*** | |
| Proposed treatment for solubles | % | 0 | ***0*** | ***description for proposed measures*** |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Proposed settlement of sediments | % | 0 | ***0*** | |

## Route Option 2B: Drainage Catchment 4

| | | | | |
|---|---|---|---|---|
| Road Number | A9/A96 Inshes to Smithton | | Assessment type | Non-cumulative assessment (single outfall) |
| HA Area/DBFO number | | | | |
| OS grid reference of assessment point (m) | Easting | | Receiving watercourse | SWF08 |
| | Northing | | EA receiving water Detailed River Network ID | |
| OS grid reference of outfall structure (m) | Easting | | Assessor and affiliation | Jane Gooding, Jacobs |
| | Northing | | Date of assessment | 24/01/2017 |
| Outfall number | 4 | | Version of assessment | 1 |
| List of outfalls in cumulative assessment | | | | |
| Notes | DS 2036: Routine Runoff Assessment for Option 2B, Catchment 4 | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| ***Runoff Risk Assessments*** | | | | |
| AADT | vpd | >10,000 and <50,000 | ***>10,000 and <50,000*** | |
| Climatic Region | - | Warm Dry | ***Colder Wet*** | |
| Rainfall Site | - | Ashford (SAAR 710mm) | ***Ardtalnaig (SAAR 1343.9mm)*** | |
| 95%ile River flow | m3/s | 0 | ***0.002*** | |
| Baseflow Index | - | 0.5 | ***0.584*** | |
| Impermeable road area drained | ha | 1 | ***1.17*** | |
| Permeable area draining to outfall | ha | 1 | ***0.45*** | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | ***No*** | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | ***No*** | |
| Hardness | - | Low = <50mg CaCO3/l | ***Low = <50mg CaCO3/l*** | |
| Use Tier 1 | - | TRUE | ***TRUE*** | |
| Use Tier 2 | - | FALSE | ***FALSE*** | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | ***0.5*** | |
| Tier2 Bed width | m | 3 | ***3*** | |
| Tier2 Side slope | m/m | 0.5 | ***0.5*** | |
| Tier2 Long slope | m/m | 0.0001 | ***0.0001*** | |
| Tier2 Mannings' n | - | 0.07 | ***0.07*** | |
| Existing treatment for solubles | % | 0 | ***0*** | ***description for existing measures*** |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Existing settlement of sediments | % | 0 | ***0*** | |
| Proposed treatment for solubles | % | 0 | ***0*** | ***description for proposed measures*** |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Proposed settlement of sediments | % | 0 | ***0*** | |

## Route Option 2B: Drainage Catchment 5

| | | | | |
|---|---|---|---|---|
| Road Number | A9/A96 Inshes to Smithton | | Assessment type | Non-cumulative assessment (single outfall) |
| HA Area/DBFO number | | | | |
| OS grid reference of assessment point (m) | Easting | | Receiving watercourse | SWF08 |
| | Northing | | EA receiving water Detailed River Network ID | |
| OS grid reference of outfall structure (m) | Easting | | Assessor and affiliation | Jane Gooding, Jacobs |
| | Northing | | Date of assessment | 24/01/2017 |
| Outfall number | 5 | | Version of assessment | 1 |
| List of outfalls in cumulative assessment | | | | |
| Notes | DS 2036: Routine Runoff Assessment for Option 2B, Catchment 5 | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| *Runoff Risk Assessments* | | | | |
| AADT | vpd | >10,000 and <50,000 | *>10,000 and <50,000* | |
| Climatic Region | - | Warm Dry | *Colder Wet* | |
| Rainfall Site | - | Ashford (SAAR 710mm) | *Ardtalnaig (SAAR 1343.9mm)* | |
| 95%ile River flow | m3/s | 0 | *0.002* | |
| Baseflow Index | - | 0.5 | *0.584* | |
| Impermeable road area drained | ha | 1 | *0.77* | |
| Permeable area draining to outfall | ha | 1 | *0.06* | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | *No* | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | *Yes* | |
| Hardness | - | Low = <50mg CaCO3/l | *Low = <50mg CaCO3/l* | |
| Use Tier 1 | - | TRUE | *TRUE* | |
| Use Tier 2 | - | FALSE | *FALSE* | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | *0.5* | |
| Tier2 Bed width | m | 3 | *3* | |
| Tier2 Side slope | m/m | 0.5 | *0.5* | |
| Tier2 Long slope | m/m | 0.0001 | *0.0001* | |
| Tier2 Mannings' n | - | 0.07 | *0.07* | |
| Existing treatment for solubles | % | 0 | *0* | *description for existing measures* |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Existing settlement of sediments | % | 0 | *0* | |
| Proposed treatment for solubles | % | 0 | *0* | *description for proposed measures* |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Proposed settlement of sediments | % | 0 | *0* | |

## Route Option 2B: Drainage Catchment 6

| | | | | |
|---|---|---|---|---|
| Road Number | A9/A96 Inshes to Smithton | | Assessment type | Non-cumulative assessment (single outfall) |
| HA Area/DBFO number | | | | |
| OS grid reference of assessment point (m) | Easting | | Receiving watercourse | SWF03 |
| | Northing | | EA receiving water Detailed River Network ID | |
| OS grid reference of outfall structure (m) | Easting | | Assessor and affiliation | Jane Gooding, Jacobs |
| | Northing | | Date of assessment | 24/01/2017 |
| Outfall number | 6 | | Version of assessment | 1 |
| List of outfalls in cumulative assessment | | | | |
| Notes | DS 2036: Routine Runoff Assessment for Option 2B, Catchment 6 | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| *Runoff Risk Assessments* | | | | |
| AADT | vpd | >10,000 and <50,000 | *>10,000 and <50,000* | |
| Climatic Region | - | Warm Dry | *Colder Wet* | |
| Rainfall Site | - | Ashford (SAAR 710mm) | *Ardtalnaig (SAAR 1343.9mm)* | |
| 95%ile River flow | m3/s | 0 | *0.002* | |
| Baseflow Index | - | 0.5 | *0.712* | |
| Impermeable road area drained | ha | 1 | *0.86* | |
| Permeable area draining to outfall | ha | 1 | *0.2* | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | *No* | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | *No* | |
| Hardness | - | Low = <50mg CaCO3/l | *Low = <50mg CaCO3/l* | |
| Use Tier 1 | - | TRUE | *TRUE* | |
| Use Tier 2 | - | FALSE | *FALSE* | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | *0.8* | |
| Tier2 Bed width | m | 3 | *3* | |
| Tier2 Side slope | m/m | 0.5 | *0.5* | |
| Tier2 Long slope | m/m | 0.0001 | *0.0001* | |
| Tier2 Mannings' n | - | 0.07 | *0.07* | |
| Existing treatment for solubles | % | 0 | *0* | *description for existing measures* |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Existing settlement of sediments | % | 0 | *0* | |
| Proposed treatment for solubles | % | 0 | *0* | *description for proposed measures* |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Proposed settlement of sediments | % | 0 | *0* | |

## Route Option 3A: Drainage Catchment 1

| | | | | |
|---|---|---|---|---|
| **Road Number** | A9/A96 Inshes to Smithton | **Assessment type** | Non-cumulative assessment (single outfall) | |
| **HA Area/DBFO number** | | | | |
| **OS grid reference of assessment point (m)** | **Easting** | **Receiving watercourse** | SWF02 | |
| | **Northing** | **EA receiving water Detailed River Network ID** | | |
| **OS grid reference of outfall structure (m)** | **Easting** | **Assessor and affiliation** | Jane Gooding, Jacobs | |
| | **Northing** | **Date of assessment** | 24/01/2017 | |
| **Outfall number** | 1 | **Version of assessment** | 1 | |
| **List of outfalls in cumulative assessment** | | | | |
| **Notes** | DS 2036: Routine Runoff Assessment for Option 3A, Catchment 1 | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| *Runoff Risk Assessments* | | | | |
| AADT | vpd | >10,000 and <50,000 | *>10,000 and <50,000* | |
| Climatic Region | - | Warm Dry | *Colder Wet* | |
| Rainfall Site | - | Ashford (SAAR 710mm) | *Ardtalnaig (SAAR 1343.9mm)* | |
| 95%ile River flow | m3/s | 0 | *0.001* | |
| Baseflow Index | - | 0.5 | *0.763* | |
| Impermeable road area drained | ha | 1 | *0.29* | |
| Permeable area draining to outfall | ha | 1 | *0.02* | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | *No* | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | *Yes* | |
| Hardness | - | Low = <50mg CaCO3/l | *Low = <50mg CaCO3/l* | |
| Use Tier 1 | - | TRUE | *TRUE* | |
| Use Tier 2 | - | FALSE | *FALSE* | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | *0.5* | |
| Tier2 Bed width | m | 3 | *3* | |
| Tier2 Side slope | m/m | 0.5 | *0.5* | |
| Tier2 Long slope | m/m | 0.0001 | *0.0001* | |
| Tier2 Mannings' n | - | 0.07 | *0.07* | |
| Existing treatment for solubles | % | 0 | *0* | *description for existing measures* |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Existing settlement of sediments | % | 0 | *0* | |
| Proposed treatment for solubles | % | 0 | *0* | *description for proposed measures* |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Proposed settlement of sediments | % | 0 | *0* | |

## Route Option 3A: Drainage Catchment 2

| | | | | |
|---|---|---|---|---|
| **Road Number** | A9/A96 Inshes to Smithton | **Assessment type** | Non-cumulative assessment (single outfall) | |
| **HA Area/DBFO number** | | | | |
| **OS grid reference of assessment point (m)** | **Easting** | **Receiving watercourse** | SWF 04 | |
| | **Northing** | **EA receiving water Detailed River Network ID** | | |
| **OS grid reference of outfall structure (m)** | **Easting** | **Assessor and affiliation** | Jane Gooding, Jacobs | |
| | **Northing** | **Date of assessment** | 26/01/2017 | |
| **Outfall number** | 2 | **Version of assessment** | 1 | |
| **List of outfalls in cumulative assessment** | | | | |
| **Notes** | DS 2036: Routine Runoff Assessment for Option 3A, Catchment 2 | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| *Runoff Risk Assessments* | | | | |
| AADT | vpd | >10,000 and <50,000 | *>10,000 and <50,000* | |
| Climatic Region | - | Warm Dry | *Colder Wet* | |
| Rainfall Site | - | Ashford (SAAR 710mm) | *Ardtalnaig (SAAR 1343.9mm)* | |
| 95%ile River flow | m3/s | 0 | *0.005* | |
| Baseflow Index | - | 0.5 | *0.764* | |
| Impermeable road area drained | ha | 1 | *1.43* | |
| Permeable area draining to outfall | ha | 1 | *0.37* | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | *No* | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | *No* | |
| Hardness | - | Low = <50mg CaCO3/l | *Low = <50mg CaCO3/l* | |
| Use Tier 1 | - | TRUE | *TRUE* | |
| Use Tier 2 | - | FALSE | *FALSE* | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | *0.6* | |
| Tier2 Bed width | m | 3 | *3* | |
| Tier2 Side slope | m/m | 0.5 | *0.5* | |
| Tier2 Long slope | m/m | 0.0001 | *0.0001* | |
| Tier2 Mannings' n | - | 0.07 | *0.07* | |
| Existing treatment for solubles | % | 0 | *0* | *description for existing measures* |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Existing settlement of sediments | % | 0 | *0* | |
| Proposed treatment for solubles | % | 0 | *0* | *description for proposed measures* |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Proposed settlement of sediments | % | 0 | *0* | |

## Route Option 3A: Drainage Catchment 3

| | | | | | |
|---|---|---|---|---|---|
| Road Number | A9/A96 Inshes to Smithton | | Assessment type | Non-cumulative assessment (single outfall) | |
| HA Area/DBFO number | | | | | |
| OS grid reference of assessment point (m) | Easting | | Receiving watercourse | SWF07 | |
| | Northing | | EA receiving water Detailed River Network ID | | |
| OS grid reference of outfall structure (m) | Easting | | Assessor and affiliation | Jane Gooding, Jacobs | |
| | Northing | | Date of assessment | 24/01/2017 | |
| Outfall number | 3 | | Version of assessment | 1 | |
| List of outfalls in cumulative assessment | | | | | |
| Notes | DS 2036: Routine Runoff Assessment for Option 3A, Catchment 3 | | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) | |
|---|---|---|---|---|---|
| *Runoff Risk Assessments* | | | | | |
| AADT | vpd | >10,000 and <50,000 | *>10,000 and <50,000* | | |
| Climatic Region | - | Warm Dry | *Colder Wet* | | |
| Rainfall Site | - | Ashford (SAAR 710mm) | *Ardtalnaig (SAAR 1343.9mm)* | | |
| 95%ile River flow | m3/s | 0 | *0.0001* | | |
| Baseflow Index | - | 0.5 | *0.576* | | |
| Impermeable road area drained | ha | 1 | *1.23* | | |
| Permeable area draining to outfall | ha | 1 | *0.33* | | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | *No* | | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | *No* | | |
| Hardness | - | Low = <50mg CaCO3/l | *Low = <50mg CaCO3/l* | | |
| Use Tier 1 | - | TRUE | *TRUE* | | |
| Use Tier 2 | - | FALSE | *FALSE* | | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | *0.3* | | |
| Tier2 Bed width | m | 3 | *3* | | |
| Tier2 Side slope | m/m | 0.5 | *0.5* | | |
| Tier2 Long slope | m/m | 0.0001 | *0.0001* | | |
| Tier2 Mannings' n | - | 0.07 | *0.07* | | |
| Existing treatment for solubles | % | 0 | *0* | *description for existing measures* | |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | | |
| Existing settlement of sediments | % | 0 | *0* | | |
| Proposed treatment for solubles | % | 0 | *0* | *description for proposed measures* | |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | | |
| Proposed settlement of sediments | % | 0 | *0* | | |

## Route Option 3A: Drainage Catchment 4

| | | | | | |
|---|---|---|---|---|---|
| Road Number | A9/A96 Inshes to Smithton | | Assessment type | Non-cumulative assessment (single outfall) | |
| HA Area/DBFO number | | | | | |
| OS grid reference of assessment point (m) | Easting | | Receiving watercourse | SWF08 | |
| | Northing | | EA receiving water Detailed River Network ID | | |
| OS grid reference of outfall structure (m) | Easting | | Assessor and affiliation | Jane Gooding, Jacobs | |
| | Northing | | Date of assessment | 24/01/2017 | |
| Outfall number | 4 | | Version of assessment | 1 | |
| List of outfalls in cumulative assessment | | | | | |
| Notes | DS 2036: Routine Runoff Assessment for Option 3A, Catchment 4 | | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) | |
|---|---|---|---|---|---|
| *Runoff Risk Assessments* | | | | | |
| AADT | vpd | >10,000 and <50,000 | *>10,000 and <50,000* | | |
| Climatic Region | - | Warm Dry | *Colder Wet* | | |
| Rainfall Site | - | Ashford (SAAR 710mm) | *Ardtalnaig (SAAR 1343.9mm)* | | |
| 95%ile River flow | m3/s | 0 | *0.002* | | |
| Baseflow Index | - | 0.5 | *0.584* | | |
| Impermeable road area drained | ha | 1 | *0.73* | | |
| Permeable area draining to outfall | ha | 1 | *0.06* | | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | *No* | | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | *Yes* | | |
| Hardness | - | Low = <50mg CaCO3/l | *Low = <50mg CaCO3/l* | | |
| Use Tier 1 | - | TRUE | *TRUE* | | |
| Use Tier 2 | - | FALSE | *FALSE* | | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | *0.5* | | |
| Tier2 Bed width | m | 3 | *3* | | |
| Tier2 Side slope | m/m | 0.5 | *0.5* | | |
| Tier2 Long slope | m/m | 0.0001 | *0.0001* | | |
| Tier2 Mannings' n | - | 0.07 | *0.07* | | |
| Existing treatment for solubles | % | 0 | *0* | *description for existing measures* | |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | | |
| Existing settlement of sediments | % | 0 | *0* | | |
| Proposed treatment for solubles | % | 0 | *0* | *description for proposed measures* | |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | | |
| Proposed settlement of sediments | % | 0 | *0* | | |

## Route Option 3A: Drainage Catchment 5

| | | | | |
|---|---|---|---|---|
| **Road Number** | A9/A96 Inshes to Smithton | | **Assessment type** | Non-cumulative assessment (single outfall) |
| **HA Area/DBFO number** | | | | |
| **OS grid reference of assessment point (m)** | **Easting** | | **Receiving watercourse** | SWF03 |
| | **Northing** | | **EA receiving water Detailed River Network ID** | |
| **OS grid reference of outfall structure (m)** | **Easting** | | **Assessor and affiliation** | Jane Gooding, Jacobs |
| | **Northing** | | **Date of assessment** | 24/01/2017 |
| **Outfall number** | 5 | | **Version of assessment** | 1 |
| **List of outfalls in cumulative assessment** | | | | |
| **Notes** | DS 2036: Routine Runoff Assessment for Option 3A, Catchment 5 | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| ***Runoff Risk Assessments*** | | | | |
| AADT | vpd | >10,000 and <50,000 | ***>10,000 and <50,000*** | |
| Climatic Region | - | Warm Dry | ***Colder Wet*** | |
| Rainfall Site | - | Ashford (SAAR 710mm) | ***Ardtalnaig (SAAR 1343.9mm)*** | |
| 95%ile River flow | m3/s | 0 | ***0.002*** | |
| Baseflow Index | - | 0.5 | ***0.712*** | |
| Impermeable road area drained | ha | 1 | ***0.61*** | |
| Permeable area draining to outfall | ha | 1 | ***0.16*** | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | ***No*** | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | ***No*** | |
| Hardness | - | Low = <50mg CaCO3/l | ***Low = <50mg CaCO3/l*** | |
| Use Tier 1 | - | TRUE | ***TRUE*** | |
| Use Tier 2 | - | FALSE | ***FALSE*** | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | ***0.8*** | |
| Tier2 Bed width | m | 3 | ***3*** | |
| Tier2 Side slope | m/m | 0.5 | ***0.5*** | |
| Tier2 Long slope | m/m | 0.0001 | ***0.0001*** | |
| Tier2 Mannings' n | - | 0.07 | ***0.07*** | |
| Existing treatment for solubles | % | 0 | ***0*** | ***description for existing measures*** |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Existing settlement of sediments | % | 0 | ***0*** | |
| Proposed treatment for solubles | % | 0 | ***0*** | ***description for proposed measures*** |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Proposed settlement of sediments | % | 0 | ***0*** | |

## Route Option 3B: Drainage Catchment 1

| | | | | |
|---|---|---|---|---|
| **Road Number** | A9/A96 Inshes to Smithton | | **Assessment type** | Non-cumulative assessment (single outfall) |
| **HA Area/DBFO number** | | | | |
| **OS grid reference of assessment point (m)** | **Easting** | | **Receiving watercourse** | SWF02 |
| | **Northing** | | **EA receiving water Detailed River Network ID** | |
| **OS grid reference of outfall structure (m)** | **Easting** | | **Assessor and affiliation** | Jane Gooding, Jacobs |
| | **Northing** | | **Date of assessment** | 24/01/2017 |
| **Outfall number** | 1 | | **Version of assessment** | 1 |
| **List of outfalls in cumulative assessment** | | | | |
| **Notes** | DS 2036: Routine Runoff Assessment for Option 3B, Catchment 1 | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| ***Runoff Risk Assessments*** | | | | |
| AADT | vpd | >10,000 and <50,000 | ***>10,000 and <50,000*** | |
| Climatic Region | - | Warm Dry | ***Colder Wet*** | |
| Rainfall Site | - | Ashford (SAAR 710mm) | ***Ardtalnaig (SAAR 1343.9mm)*** | |
| 95%ile River flow | m3/s | 0 | ***0.001*** | |
| Baseflow Index | - | 0.5 | ***0.763*** | |
| Impermeable road area drained | ha | 1 | ***0.29*** | |
| Permeable area draining to outfall | ha | 1 | ***0.02*** | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | ***No*** | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | ***Yes*** | |
| Hardness | - | Low = <50mg CaCO3/l | ***Low = <50mg CaCO3/l*** | |
| Use Tier 1 | - | TRUE | ***TRUE*** | |
| Use Tier 2 | - | FALSE | ***FALSE*** | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | ***0.5*** | |
| Tier2 Bed width | m | 3 | ***3*** | |
| Tier2 Side slope | m/m | 0.5 | ***0.5*** | |
| Tier2 Long slope | m/m | 0.0001 | ***0.0001*** | |
| Tier2 Mannings' n | - | 0.07 | ***0.07*** | |
| Existing treatment for solubles | % | 0 | ***0*** | ***description for existing measures*** |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Existing settlement of sediments | % | 0 | ***0*** | |
| Proposed treatment for solubles | % | 0 | ***0*** | ***description for proposed measures*** |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Proposed settlement of sediments | % | 0 | ***0*** | |

## Route Option 3B: Drainage Catchment 2

| | | | | | |
|---|---|---|---|---|---|
| **Road Number** | A9/A96 Inshes to Smithton | | **Assessment type** | Non-cumulative assessment (single outfall) | |
| **HA Area/DBFO number** | | | | | |
| **OS grid reference of assessment point (m)** | **Easting** | | **Receiving watercourse** | SWF 04 | |
| | **Northing** | | **EA receiving water Detailed River Network ID** | | |
| **OS grid reference of outfall structure (m)** | **Easting** | | **Assessor and affiliation** | Jane Gooding, Jacobs | |
| | **Northing** | | **Date of assessment** | 26/01/2017 | |
| **Outfall number** | 2 | | **Version of assessment** | 1 | |
| **List of outfalls in cumulative assessment** | | | | | |
| **Notes** | DS 2036: Routine Runoff Assessment for Option 3B, Catchment 2 | | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| ***Runoff Risk Assessments*** | | | | |
| AADT | vpd | >10,000 and <50,000 | ***>10,000 and <50,000*** | |
| Climatic Region | - | Warm Dry | ***Colder Wet*** | |
| Rainfall Site | - | Ashford (SAAR 710mm) | ***Ardtalnaig (SAAR 1343.9mm)*** | |
| 95%ile River flow | m3/s | 0 | ***0.005*** | |
| Baseflow Index | - | 0.5 | ***0.764*** | |
| Impermeable road area drained | ha | 1 | ***1.49*** | |
| Permeable area draining to outfall | ha | 1 | ***0.39*** | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | ***No*** | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | ***No*** | |
| Hardness | - | Low = <50mg CaCO3/l | ***Low = <50mg CaCO3/l*** | |
| Use Tier 1 | - | TRUE | ***TRUE*** | |
| Use Tier 2 | - | FALSE | ***FALSE*** | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | ***0.6*** | |
| Tier2 Bed width | m | 3 | ***3*** | |
| Tier2 Side slope | m/m | 0.5 | ***0.5*** | |
| Tier2 Long slope | m/m | 0.0001 | ***0.0001*** | |
| Tier2 Mannings' n | - | 0.07 | ***0.07*** | |
| Existing treatment for solubles | % | 0 | ***0*** | ***description for existing measures*** |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Existing settlement of sediments | % | 0 | ***0*** | |
| Proposed treatment for solubles | % | 0 | ***0*** | ***description for proposed measures*** |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Proposed settlement of sediments | % | 0 | ***0*** | |

## Route Option 3B: Drainage Catchment 3

| | | | | | |
|---|---|---|---|---|---|
| **Road Number** | A9/A96 Inshes to Smithton | | **Assessment type** | Non-cumulative assessment (single outfall) | |
| **HA Area/DBFO number** | | | | | |
| **OS grid reference of assessment point (m)** | **Easting** | | **Receiving watercourse** | SWF08 | |
| | **Northing** | | **EA receiving water Detailed River Network ID** | | |
| **OS grid reference of outfall structure (m)** | **Easting** | | **Assessor and affiliation** | Jane Gooding, Jacobs | |
| | **Northing** | | **Date of assessment** | 24/01/2017 | |
| **Outfall number** | 3 | | **Version of assessment** | 1 | |
| **List of outfalls in cumulative assessment** | | | | | |
| **Notes** | DS 2036: Routine Runoff Assessment for Option 3B, Catchment 3 | | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| ***Runoff Risk Assessments*** | | | | |
| AADT | vpd | >10,000 and <50,000 | ***>10,000 and <50,000*** | |
| Climatic Region | - | Warm Dry | ***Colder Wet*** | |
| Rainfall Site | - | Ashford (SAAR 710mm) | ***Ardtalnaig (SAAR 1343.9mm)*** | |
| 95%ile River flow | m3/s | 0 | ***0.002*** | |
| Baseflow Index | - | 0.5 | ***0.584*** | |
| Impermeable road area drained | ha | 1 | ***1.17*** | |
| Permeable area draining to outfall | ha | 1 | ***0.45*** | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | ***No*** | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | ***No*** | |
| Hardness | - | Low = <50mg CaCO3/l | ***Low = <50mg CaCO3/l*** | |
| Use Tier 1 | - | TRUE | ***TRUE*** | |
| Use Tier 2 | - | FALSE | ***FALSE*** | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | ***0.5*** | |
| Tier2 Bed width | m | 3 | ***3*** | |
| Tier2 Side slope | m/m | 0.5 | ***0.5*** | |
| Tier2 Long slope | m/m | 0.0001 | ***0.0001*** | |
| Tier2 Mannings' n | - | 0.07 | ***0.07*** | |
| Existing treatment for solubles | % | 0 | ***0*** | ***description for existing measures*** |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Existing settlement of sediments | % | 0 | ***0*** | |
| Proposed treatment for solubles | % | 0 | ***0*** | ***description for proposed measures*** |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Proposed settlement of sediments | % | 0 | ***0*** | |

## Route Option 3B: Drainage Catchment 4

| | | | | | |
|---|---|---|---|---|---|
| **Road Number** | A9/A96 Inshes to Smithton | | **Assessment type** | | Non-cumulative assessment (single outfall) |
| **HA Area/DBFO number** | | | | | |
| **OS grid reference of assessment point (m)** | **Easting** | | **Receiving watercourse** | | SWF08 |
| | **Northing** | | **EA receiving water Detailed River Network ID** | | |
| **OS grid reference of outfall structure (m)** | **Easting** | | **Assessor and affiliation** | | Jane Gooding, Jacobs |
| | **Northing** | | **Date of assessment** | | 24/01/2017 |
| **Outfall number** | 4 | | **Version of assessment** | | 1 |
| **List of outfalls in cumulative assessment** | | | | | |
| **Notes** | DS 2036: Routine Runoff Assessment for Option 3B, Catchment 4 | | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| ***Runoff Risk Assessments*** | | | | |
| AADT | vpd | >10,000 and <50,000 | *>10,000 and <50,000* | |
| Climatic Region | - | Warm Dry | *Colder Wet* | |
| Rainfall Site | - | Ashford (SAAR 710mm) | *Ardtalnaig (SAAR 1343.9mm)* | |
| 95%ile River flow | m3/s | 0 | *0.002* | |
| Baseflow Index | - | 0.5 | *0.584* | |
| Impermeable road area drained | ha | 1 | *0.77* | |
| Permeable area draining to outfall | ha | 1 | *0.06* | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | *No* | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | *Yes* | |
| Hardness | - | Low = <50mg CaCO3/l | *Low = <50mg CaCO3/l* | |
| Use Tier 1 | - | TRUE | *TRUE* | |
| Use Tier 2 | - | FALSE | *FALSE* | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | *0.5* | |
| Tier2 Bed width | m | 3 | *3* | |
| Tier2 Side slope | m/m | 0.5 | *0.5* | |
| Tier2 Long slope | m/m | 0.0001 | *0.0001* | |
| Tier2 Mannings' n | - | 0.07 | *0.07* | |
| Existing treatment for solubles | % | 0 | *0* | *description for existing measures* |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Existing settlement of sediments | % | 0 | *0* | |
| Proposed treatment for solubles | % | 0 | *0* | *description for proposed measures* |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Proposed settlement of sediments | % | 0 | *0* | |

## Route Option 3B: Drainage Catchment 5

| | | | | | |
|---|---|---|---|---|---|
| **Road Number** | A9/A96 Inshes to Smithton | | **Assessment type** | | Non-cumulative assessment (single outfall) |
| **HA Area/DBFO number** | | | | | |
| **OS grid reference of assessment point (m)** | **Easting** | | **Receiving watercourse** | | SWF03 |
| | **Northing** | | **EA receiving water Detailed River Network ID** | | |
| **OS grid reference of outfall structure (m)** | **Easting** | | **Assessor and affiliation** | | Jane Gooding, Jacobs |
| | **Northing** | | **Date of assessment** | | 24/01/2017 |
| **Outfall number** | 5 | | **Version of assessment** | | 1 |
| **List of outfalls in cumulative assessment** | | | | | |
| **Notes** | DS 2036: Routine Runoff Assessment for Option 3B, Catchment 5 | | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| ***Runoff Risk Assessments*** | | | | |
| AADT | vpd | >10,000 and <50,000 | *>10,000 and <50,000* | |
| Climatic Region | - | Warm Dry | *Colder Wet* | |
| Rainfall Site | - | Ashford (SAAR 710mm) | *Ardtalnaig (SAAR 1343.9mm)* | |
| 95%ile River flow | m3/s | 0 | *0.002* | |
| Baseflow Index | - | 0.5 | *0.712* | |
| Impermeable road area drained | ha | 1 | *0.86* | |
| Permeable area draining to outfall | ha | 1 | *0.2* | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | *No* | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | *No* | |
| Hardness | - | Low = <50mg CaCO3/l | *Low = <50mg CaCO3/l* | |
| Use Tier 1 | - | TRUE | *TRUE* | |
| Use Tier 2 | - | FALSE | *FALSE* | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | *0.8* | |
| Tier2 Bed width | m | 3 | *3* | |
| Tier2 Side slope | m/m | 0.5 | *0.5* | |
| Tier2 Long slope | m/m | 0.0001 | *0.0001* | |
| Tier2 Mannings' n | - | 0.07 | *0.07* | |
| Existing treatment for solubles | % | 0 | *0* | *description for existing measures* |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Existing settlement of sediments | % | 0 | *0* | |
| Proposed treatment for solubles | % | 0 | *0* | *description for proposed measures* |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | *Unlimited* | |
| Proposed settlement of sediments | % | 0 | *0* | |

## Routine Runoff Parameters: Cumulative Assessments

### Route Option 1B: Drainage Catchments 3 & 4

| | | | | |
|---|---|---|---|---|
| **Road Number** | A9/A96 Inshes to Smithton | | **Assessment type** | Cumulative assessment excluding sediments (outfalls between 100m and 1km apart) |
| **HA Area/DBFO number** | | | | |
| **OS grid reference of assessment point (m)** | **Easting** | | **Receiving watercourse** | SWF08 |
| | **Northing** | | **EA receiving water Detailed River Network ID** | |
| **OS grid reference of outfall structure (m)** | **Easting** | | **Assessor and affiliation** | Jane Gooding, Jacobs |
| | **Northing** | | **Date of assessment** | 24/01/2017 |
| **Outfall number** | 3 & 4 | | **Version of assessment** | 1 |
| **List of outfalls in cumulative assessment** | | | | |
| **Notes** | DS 2036: Cumulative Routine Runoff Assessment for Option 1B, Catchments 3 & 4 | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| ***Runoff Risk Assessments*** | | | | |
| AADT | vpd | >10,000 and <50,000 | ***>10,000 and <50,000*** | |
| Climatic Region | - | Warm Dry | ***Colder Wet*** | |
| Rainfall Site | - | Ashford (SAAR 710mm) | ***Ardtalnaig (SAAR 1343.9mm)*** | |
| 95%ile River flow | m3/s | 0 | ***0.002*** | |
| Baseflow Index | - | 0.5 | ***0.584*** | |
| Impermeable road area drained | ha | 1 | ***1.94*** | |
| Permeable area draining to outfall | ha | 1 | ***0.51*** | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | ***No*** | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | ***No*** | |
| Hardness | - | Low = <50mg CaCO3/l | ***Low = <50mg CaCO3/l*** | |
| Use Tier 1 | - | TRUE | ***TRUE*** | |
| Use Tier 2 | - | FALSE | ***FALSE*** | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | ***0.8*** | |
| Tier2 Bed width | m | 3 | ***3*** | |
| Tier2 Side slope | m/m | 0.5 | ***0.5*** | |
| Tier2 Long slope | m/m | 0.0001 | ***0.0001*** | |
| Tier2 Mannings' n | - | 0.07 | ***0.07*** | |
| Existing treatment for solubles | % | 0 | ***0*** | ***description for existing measures*** |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Existing settlement of sediments | % | 0 | ***0*** | |
| Proposed treatment for solubles | % | 0 | ***0*** | ***description for proposed measures*** |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Proposed settlement of sediments | % | 0 | ***0*** | |

### Route Option 2B: Drainage Catchments 4 & 5

| | | | | |
|---|---|---|---|---|
| **Road Number** | A9/A96 Inshes to Smithton | | **Assessment type** | Cumulative assessment excluding sediments (outfalls between 100m and 1km apart) |
| **HA Area/DBFO number** | | | | |
| **OS grid reference of assessment point (m)** | **Easting** | | **Receiving watercourse** | SWF 08 |
| | **Northing** | | **EA receiving water Detailed River Network ID** | |
| **OS grid reference of outfall structure (m)** | **Easting** | | **Assessor and affiliation** | Jane Gooding, Jacobs |
| | **Northing** | | **Date of assessment** | 24/01/2017 |
| **Outfall number** | 4 & 5 | | **Version of assessment** | 1 |
| **List of outfalls in cumulative assessment** | | | | |
| **Notes** | DS 2036: Cumulative Routine Runoff Assessment for Option 2B, Catchments 4 & 5 | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| ***Runoff Risk Assessments*** | | | | |
| AADT | vpd | >10,000 and <50,000 | ***>10,000 and <50,000*** | |
| Climatic Region | - | Warm Dry | ***Colder Wet*** | |
| Rainfall Site | - | Ashford (SAAR 710mm) | ***Ardtalnaig (SAAR 1343.9mm)*** | |
| 95%ile River flow | m3/s | 0 | ***0.002*** | |
| Baseflow Index | - | 0.5 | ***0.584*** | |
| Impermeable road area drained | ha | 1 | ***1.94*** | |
| Permeable area draining to outfall | ha | 1 | ***0.51*** | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | ***No*** | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | ***No*** | |
| Hardness | - | Low = <50mg CaCO3/l | ***Low = <50mg CaCO3/l*** | |
| Use Tier 1 | - | TRUE | ***TRUE*** | |
| Use Tier 2 | - | FALSE | ***FALSE*** | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | ***5*** | |
| Tier2 Bed width | m | 3 | ***3*** | |
| Tier2 Side slope | m/m | 0.5 | ***0.5*** | |
| Tier2 Long slope | m/m | 0.0001 | ***0.0001*** | |
| Tier2 Mannings' n | - | 0.07 | ***0.07*** | |
| Existing treatment for solubles | % | 0 | ***0*** | ***description for existing measures*** |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Existing settlement of sediments | % | 0 | ***0*** | |
| Proposed treatment for solubles | % | 0 | ***0*** | ***description for proposed measures*** |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Proposed settlement of sediments | % | 0 | ***0*** | |

## Route Option 3B: Drainage Catchments 3 & 4

| | | | | | |
|---|---|---|---|---|---|
| **Road Number** | A9/A96 Inshes to Smithton | | **Assessment type** | Cumulative assessment excluding sediments (outfalls between 100m and 1km apart) | |
| **HA Area/DBFO number** | | | | | |
| **OS grid reference of assessment point (m)** | **Easting** | | **Receiving watercourse** | SWF08 | |
| | **Northing** | | **EA receiving water Detailed River Network ID** | | |
| **OS grid reference of outfall structure (m)** | **Easting** | | **Assessor and affiliation** | Jane Gooding, Jacobs | |
| | **Northing** | | **Date of assessment** | 24/01/2017 | |
| **Outfall number** | 3 & 4 | | **Version of assessment** | 1 | |
| **List of outfalls in cumulative assessment** | | | | | |
| **Notes** | DS 2036: Cumulative Routine Runoff Assessment for Option 3B, Catchments 3 & 4 | | | | |

| Parameter | Units | Default Value | Value used | Notes (Enter notes in the left-hand cells only) |
|---|---|---|---|---|
| ***Runoff Risk Assessments*** | | | | |
| AADT | vpd | >10,000 and <50,000 | ***>10,000 and <50,000*** | |
| Climatic Region | - | Warm Dry | ***Colder Wet*** | |
| Rainfall Site | - | Ashford (SAAR 710mm) | ***Ardtalnaig (SAAR 1343.9mm)*** | |
| 95%ile River flow | m3/s | 0 | ***0.002*** | |
| Baseflow Index | - | 0.5 | ***0.584*** | |
| Impermeable road area drained | ha | 1 | ***1.94*** | |
| Permeable area draining to outfall | ha | 1 | ***0.51*** | |
| Is the discharge in or within 1 km upstream of a protected site for conservation? | - | No | ***No*** | |
| Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? | - | No | ***No*** | |
| Hardness | - | Low = <50mg CaCO3/l | ***Low = <50mg CaCO3/l*** | |
| Use Tier 1 | - | TRUE | ***TRUE*** | |
| Use Tier 2 | - | FALSE | ***FALSE*** | |
| Tier 1 Estimated river width at Q95 | 0 | 5 | ***0.8*** | |
| Tier2 Bed width | m | 3 | ***3*** | |
| Tier2 Side slope | m/m | 0.5 | ***0.5*** | |
| Tier2 Long slope | m/m | 0.0001 | ***0.0001*** | |
| Tier2 Mannings' n | - | 0.07 | ***0.07*** | |
| Existing treatment for solubles | % | 0 | ***0*** | ***description for existing measures*** |
| Existing attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Existing settlement of sediments | % | 0 | ***0*** | |
| Proposed treatment for solubles | % | 0 | ***0*** | ***description for proposed measures*** |
| Proposed attenuation -restricted discharge rate | l/s | Unlimited | ***Unlimited*** | |
| Proposed settlement of sediments | % | 0 | ***0*** | |

## Routine Runoff Results: Individual Assessments

### Route Option 1A: Drainage Catchment 1

Summary of predictions

| Prediction of Impact | Soluble - Acute Impact: Copper | Soluble - Acute Impact: Zinc | Sediment - Chronic Impact: Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|---|---|
| Step1 | | | | | | | | | | |
| Step2 | | | | | | | | | | |
| Step3 | | | | | | | | | | |

DETAILED RESULTS

**In Runoff**

Step 1

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.00 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.00 | 20.60 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 23.36 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.86 | 372.28 |

Step 1

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| | | | | Toxicity Threshold | | | | |
| Allowable Exceedances/year | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | 83.80 | 112.10 | 2.20 | 48.30 | 111.00 | 48.30 | 23.00 | 91.00 |
| No. of exceedances/worst year | 97 | 128 | 7 | 59 | 127 | 59 | 82 | 101 |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| Event Statistics Mean | 331 | 1165 | 1 | 16068 | 2780 | 2667 | 170 | 752 |
| 90%ile | 733 | 2672 | 2 | 35481 | 6158 | 5890 | 376 | 1661 |
| 95%ile | 962 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 3313 |
| 99%ile | 1383 | 5637 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

**In River (no mitigation)**

Step 2

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 0.9 | 2 |
| No. of exceedances/worst year | 2 | 5 |
| No. of exceedances/summer | 0.5 | 1.1 |
| No. of exceedances/worst summer | 2 | 5 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0.4 |
| No. of exceedances/worst year | 0 | 2 |
| No. of exceedances/summer | 0 | 0.1 |
| No. of exceedances/worst summer | 0 | 1 |
| Annual average concentration (ug/l) | 0.58 | 1.79 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 1.63 | 5.00 |
| 90%ile | 5.01 | 12.38 |
| 95%ile | 8.63 | 22.43 |
| 99%ile | 16.16 | 68.67 |

Step 2

Velocity 0.03 m/s — Tier 1 is used for the calculation

DI 242.58

% settlement needed 59 %

**In River (with mitigation)**

Step 2

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI -

## Route Option 1A: Drainage Catchment 2

### Summary of predictions

| Prediction of impact | Soluble - Acute Impact | | Sediment - Chronic Impact | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Copper | Zinc | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| Step1 | | | | | | | | | | |
| Step2 | | | | | | | | | | |
| Step3 | | | | | | | | | | |

### DETAILED RESULTS

#### In Runoff

**Step 1**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.00 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.00 | 20.60 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 23.36 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.36 | 372.28 |

**Step 1**

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| Toxicity Threshold | | | | | | | | |
| Allowable Exceedances/year | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | 83.80 | 112.10 | 2.20 | 48.30 | 111.00 | 48.30 | 23.00 | 91.00 |
| No. of exceedances/worst year | 97 | 128 | 7 | 59 | 127 | 59 | 32 | 101 |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| Event Statistics Mean | 331 | 1165 | 1 | 16068 | 2780 | 2667 | 170 | 752 |
| 90%ile | 733 | 2672 | 2 | 35481 | 6138 | 5890 | 376 | 1661 |
| 95%ile | 962 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 3313 |
| 99%ile | 1383 | 5637 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

#### In River (no mitigation)

**Step 2**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 0.2 | 1.2 |
| No. of exceedances/worst year | 1 | 4 |
| No. of exceedances/summer | 0.1 | 0.8 |
| No. of exceedances/worst summer | 1 | 4 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0.1 |
| No. of exceedances/worst year | 0 | 1 |
| No. of exceedances/summer | 0 | 0 |
| No. of exceedances/worst summer | 0 | 0 |
| Annual average concentration (ug/l) | 0.54 | 1.05 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 1.00 | 3.14 |
| 90%ile | 2.91 | 7.38 |
| 95%ile | 5.38 | 15.60 |
| 99%ile | 11.48 | 50.80 |

**Step 2**

Velocity: 0.10 m/s — Tier 1 is used for the calculation

DI: 59.66

% settlement needed: 0 %

#### In River (with mitigation)

**Step 3**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds hresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI: -

## Route Option 1A: Drainage Catchment 3

### Summary of predictions

| Prediction of impact | Soluble - Acute Impact | | Sediment - Chronic Impact | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Copper | Zinc | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| Step1 | | | | | | | | | | |
| Step2 | | | | | | | | | | |
| Step3 | | | | | | | | | | |

### DETAILED RESULTS

#### In Runoff

**Step 1**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.80 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.80 | 20.60 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 23.36 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.36 | 372.28 |

**Step 1**

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| | | | | Toxicity Threshold | | | | |
| Allowable Exceedances/year | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | 83.80 | 112.10 | 2.20 | 48.30 | 111.00 | 48.30 | 23.00 | 91.00 |
| No. of exceedances/worst year | 97 | 128 | 7 | 59 | 127 | 59 | 32 | 101 |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| Event Statistics Mean | 331 | 1165 | 1 | 16068 | 2780 | 2667 | 170 | 752 |
| 90%ile | 733 | 2672 | 2 | 35481 | 6138 | 5890 | 376 | 1661 |
| 95%ile | 962 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 3313 |
| 99%ile | 1583 | 5657 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

#### In River (no mitigation)

**Step 2**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 11.6 | 12.2 |
| No. of exceedances/worst year | 16 | 17 |
| No. of exceedances/summer | 6.1 | 5.9 |
| No. of exceedances/worst summer | 15 | 16 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 2.1 | 4 |
| No. of exceedances/worst year | 5 | 9 |
| No. of exceedances/summer | 1.2 | 1.8 |
| No. of exceedances/worst summer | 4 | 8 |
| Annual average concentration (ug/l) | 2.95 | 9.41 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 6.82 | 19.95 |
| 90%ile | 17.96 | 54.12 |
| 95%ile | 27.22 | 77.30 |
| 99%ile | 49.28 | 169.32 |

**Step 2**

Velocity: 0.01 m/s — Tier 1 is used for the calculation

DI: 1341.33

% settlement needed: 93 %

#### In River (with mitigation)

**Step 3**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds hresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI: -

## Route Option 1A: Drainage Catchment 4

### Summary of predictions

| Prediction of impact | Soluble - Acute Impact | | Sediment - Chronic Impact | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Copper | Zinc | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| Step1 | | | | | | | | | | |
| Step2 | | | | | | | | | | |
| Step3 | | | | | | | | | | |

### DETAILED RESULTS

#### In Runoff

**Step 1**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.00 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.00 | 20.60 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 23.36 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.36 | 372.28 |

**Step 1**

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| Toxicity Threshold | | | | | | | | |
| Allowable Exceedances/year | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | 83.80 | 112.10 | 2.20 | 48.30 | 111.00 | 48.30 | 23.80 | 91.80 |
| No. of exceedances/worst year | 97 | 128 | 7 | 59 | 127 | 59 | 32 | 101 |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| Event Statistics Mean | 331 | 1165 | 1 | 16068 | 2780 | 2667 | 170 | 752 |
| 90%ile | 733 | 2672 | 2 | 35481 | 6138 | 5890 | 376 | 1661 |
| 95%ile | 962 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 3313 |
| 99%ile | 1383 | 5637 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

#### In River (no mitigation)

**Step 2**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 0.2 | 0.9 |
| No. of exceedances/worst year | 1 | 3 |
| No. of exceedances/summer | 0.1 | 0.6 |
| No. of exceedances/worst summer | 1 | 3 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0.1 |
| No. of exceedances/worst year | 0 | 1 |
| No. of exceedances/summer | 0 | 0 |
| No. of exceedances/worst summer | 0 | 0 |
| Annual average concentration (ug/l) | 0.31 | 0.97 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 0.93 | 2.92 |
| 90%ile | 2.58 | 6.54 |
| 95%ile | 5.21 | 12.63 |
| 99%ile | 11.18 | 50.94 |

**Step 2**

Velocity 0.05 m/s — Tier 1 is used for the calculation

DI 76.96

% settlement needed 0 %

#### In River (with mitigation)

**Step 3**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds freshoids RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI -

JACOBS

## Route Option 1A: Drainage Catchment 5

### Summary of predictions

| Prediction of impact | Soluble - Acute Impact | | Sediment - Chronic Impact | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Copper | Zinc | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| Step1 | | | | | | | | | | |
| Step2 | | | | | | | | | | |
| Step3 | | | | | | | | | | |

### DETAILED RESULTS

#### In Runoff

**Step 1**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.00 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.00 | 20.60 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 23.36 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.36 | 372.28 |

**Step 1**

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| | | | | Toxicity Threshold | | | | |
| Allowable Exceedances/year | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | 83.00 | 112.10 | 2.20 | 48.30 | 111.00 | 48.30 | 23.00 | 91.00 |
| No. of exceedances/worst year | 97 | 128 | 7 | 59 | 127 | 59 | 32 | 101 |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| | 331 | 1165 | 1 | 16068 | 2780 | 2667 | 170 | 752 |
| | 733 | 2672 | 2 | 35481 | 6138 | 5890 | 376 | 1661 |
| | 962 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 3313 |
| | 1383 | 5637 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

#### In River (no mitigation)

**Step 2**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 0.1 | 0.9 |
| No. of exceedances/worst year | 1 | 3 |
| No. of exceedances/summer | 0.1 | 0.6 |
| No. of exceedances/worst summer | 1 | 3 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0 |
| No. of exceedances/worst year | 0 | 0 |
| No. of exceedances/summer | 0 | 0 |
| No. of exceedances/worst summer | 0 | 0 |
| Annual average concentration (ug/l) | 0.27 | 0.85 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 0.82 | 2.60 |
| 90%ile | 2.24 | 5.83 |
| 95%ile | 4.54 | 11.21 |
| 99%ile | 10.05 | 45.32 |

**Step 2**

Velocity 0.02 m/s — Tier 1 is used for the calculation

DI 127.81

% settlement needed 22 %

#### In River (with mitigation)

**Step 3**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds hresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI -

## Route Option 1B: Drainage Catchment 1

### Summary of predictions

| | Soluble - Acute Impact | | Sediment - Chronic Impact | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Copper | Zinc | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| Prediction of impact Step1 | | | | | | | | | | |
| Step2 | | | | | | | | | | |
| Step3 | | | | | | | | | | |

### DETAILED RESULTS

#### In Runoff

Step 1

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.00 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.00 | 20.60 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 23.36 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.36 | 372.28 |

Step 1

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| | | | | Toxicity Threshold | | | | |
| Allowable Exceedances/year | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | 83.80 | 112.10 | 2.20 | 48.30 | 111.00 | 48.30 | 23.00 | 91.00 |
| No. of exceedances/worst year | 97 | 128 | 7 | 59 | 127 | 59 | 32 | 101 |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| Mean | 331 | 1165 | 1 | 16068 | 2780 | 2667 | 170 | 752 |
| 90%ile | 733 | 2672 | 2 | 35481 | 6138 | 5890 | 376 | 1661 |
| 95%ile | 962 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 3313 |
| 99%ile | 1383 | 5637 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

#### In River (no mitigation)

Step 2

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 0.9 | 2 |
| No. of exceedances/worst year | 2 | 5 |
| No. of exceedances/summer | 0.5 | 1.1 |
| No. of exceedances/worst summer | 2 | 5 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0.4 |
| No. of exceedances/worst year | 0 | 2 |
| No. of exceedances/summer | 0 | 0.1 |
| No. of exceedances/worst summer | 0 | 1 |
| Annual average concentration (ug/l) | 0.58 | 1.79 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 1.63 | 5.00 |
| 90%ile | 5.01 | 12.38 |
| 95%ile | 8.63 | 22.43 |
| 99%ile | 16.16 | 68.67 |

Step 2

Velocity 0.03 m/s — Tier 1 is used for the calculation

DI 242.58

% settlement needed 59 %

#### In River (with mitigation)

Step 3

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds hresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI -

## Route Option 1B: Drainage Catchment 2

### Summary of predictions

| Prediction of impact | Soluble - Acute Impact | | Sediment - Chronic Impact | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Copper | Zinc | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| Step1 | | | | | | | | | | |
| Step2 | | | | | | | | | | |
| Step3 | | | | | | | | | | |

### DETAILED RESULTS

#### In Runoff

**Step 1**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.00 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.00 | 20.60 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 23.56 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.86 | 372.28 |

**Step 1**

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| Toxicity Threshold | | | | | | | | |
| Allowable Exceedances/year | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | 83.80 | 112.10 | 2.20 | 48.30 | 111.00 | 48.30 | 23.00 | 91.00 |
| No. of exceedances/worst year | 97 | 128 | 7 | 59 | 127 | 59 | 32 | 101 |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| | 331 | 1165 | 1 | 16068 | 2780 | 2667 | 170 | 752 |
| | 733 | 2672 | 2 | 35481 | 6138 | 5890 | 376 | 1661 |
| | 962 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 3313 |
| | 1383 | 5637 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

#### In River (no mitigation)

**Step 2**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 0.2 | 1.2 |
| No. of exceedances/worst year | 1 | 4 |
| No. of exceedances/summer | 0.1 | 0.8 |
| No. of exceedances/worst summer | 1 | 4 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0.2 |
| No. of exceedances/worst year | 0 | 2 |
| No. of exceedances/summer | 0 | 0 |
| No. of exceedances/worst summer | 0 | 0 |
| Annual average concentration (ug/l) | 0.35 | 1.08 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 1.03 | 3.21 |
| 90%ile | 2.99 | 7.55 |
| 95%ile | 5.50 | 13.93 |
| 99%ile | 11.69 | 51.52 |

**Step 2**

Velocity 0.10 m/s — Tier 1 is used for the calculation

DI 61.51

% settlement needed 0 %

#### In River (with mitigation)

**Step 3**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI -

## Route Option 1B: Drainage Catchment 3

### Summary of predictions

| Prediction of impact | Soluble - Acute Impact | | Sediment - Chronic Impact | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Copper | Zinc | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| Step1 | | | | | | | | | | |
| Step2 | | | | | | | | | | |
| Step3 | | | | | | | | | | |

### DETAILED RESULTS

#### In Runoff

**Step 1**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.00 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.00 | 20.60 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 28.36 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.36 | 372.28 |

**Step 1**

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| | | | | Toxicity Threshold | | | | |
| Allowable Exceedances/year | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | 83.80 | 112.10 | 2.20 | 48.30 | 111.00 | 48.30 | 23.00 | 91.00 |
| No. of exceedances/worst year | 97 | 128 | 7 | 59 | 127 | 59 | 32 | 101 |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| Event Statistics Mean | 331 | 1165 | 1 | 16068 | 2780 | 2667 | 170 | 752 |
| 90%ile | 753 | 2672 | 2 | 35481 | 6138 | 5890 | 376 | 1661 |
| 95%ile | 962 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 3318 |
| 99%ile | 1383 | 5637 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

#### In River (no mitigation)

**Step 2**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 0.5 | 1.6 |
| No. of exceedances/worst year | 1 | 5 |
| No. of exceedances/summer | 0.2 | 1 |
| No. of exceedances/worst summer | 1 | 5 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0.2 |
| No. of exceedances/worst year | 0 | 2 |
| No. of exceedances/summer | 0 | 0 |
| No. of exceedances/worst summer | 0 | 0 |
| Annual average concentration (ug/l) | 0.46 | 1.41 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 1.31 | 4.03 |
| 90%ile | 3.76 | 9.15 |
| 95%ile | 6.87 | 17.96 |
| 99%ile | 14.04 | 62.37 |

**Step 2**

Velocity 0.05 m/s — Tier 1 is used for the calculation

DI 123.35

% settlement needed 19 %

#### In River (with mitigation)

**Step 3**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI -

## Route Option 1B: Drainage Catchment 4

### Summary of predictions

| Prediction of impact | Soluble - Acute Impact | | Sediment - Chronic Impact | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Copper | Zinc | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| Step1 | | | | | | | | | | |
| Step2 | | | | | | | | | | |
| Step3 | | | | | | | | | | |

### DETAILED RESULTS

#### In Runoff

**Step 1**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.80 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.80 | 26.60 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 25.36 | 87.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.36 | 372.28 |

**Step 1**

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| | | | | Toxicity Threshold | | | | |
| Allowable Exceedances/year | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | 63.80 | 112.10 | 2.20 | 48.30 | 111.00 | 48.30 | 23.00 | 91.00 |
| No. of exceedances/worst year | 97 | 128 | 7 | 59 | 127 | 59 | 32 | 101 |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| Event Statistics Mean | 331 | 1185 | 1 | 16068 | 2780 | 2667 | 170 | 752 |
| 90%ile | 733 | 2672 | 2 | 35481 | 6138 | 5890 | 376 | 1661 |
| 95%ile | 982 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 3313 |
| 99%ile | 1383 | 5037 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

#### In River (no mitigation)

**Step 2**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 0.2 | 0.9 |
| No. of exceedances/worst year | 1 | 3 |
| No. of exceedances/summer | 0.1 | 0.6 |
| No. of exceedances/worst summer | 1 | 3 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0.2 |
| No. of exceedances/worst year | 0 | 2 |
| No. of exceedances/summer | 0 | 0 |
| No. of exceedances/worst summer | 0 | 0 |
| Annual average concentration (ug/l) | 0.33 | 1.01 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 0.97 | 3.04 |
| 90%ile | 2.70 | 6.84 |
| 95%ile | 5.46 | 13.19 |
| 99%ile | 11.54 | 52.55 |

**Step 2**

Velocity 0.05 m/s — Tier 1 is used for the calculation

DI 81.18

% settlement needed 0 %

#### In River (with mitigation)

**Step 3**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds hresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI -

## Route Option 1B: Drainage Catchment 5

### Summary of predictions

| Prediction of impact | Soluble - Acute Impact | | Sediment - Chronic Impact | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Copper | Zinc | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| Step1 | | | | | | | | | | |
| Step2 | | | | | | | | | | |
| Step3 | | | | | | | | | | |

### DETAILED RESULTS

#### In Runoff

**Step 1**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.00 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.00 | 20.60 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 23.36 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.36 | 372.28 |

**Step 1**

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| | | | | Toxicity Threshold | | | | |
| Allowable Exceedances/year | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | 63.00 | 112.10 | 2.20 | 48.30 | 111.00 | 48.30 | 23.00 | 91.00 |
| No. of exceedances/worst year | 97 | 128 | 7 | 59 | 127 | 59 | 32 | 101 |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| Event Statistics Mean | 331 | 1165 | 1 | 16068 | 2780 | 2667 | 170 | 752 |
| 90%ile | 733 | 2672 | 2 | 35481 | 6138 | 5890 | 376 | 1661 |
| 95%ile | 962 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 3313 |
| 99%ile | 1383 | 5637 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

#### In River (no mitigation)

**Step 2**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 0.2 | 1.3 |
| No. of exceedances/worst year | 1 | 4 |
| No. of exceedances/summer | 0.1 | 0.8 |
| No. of exceedances/worst summer | 1 | 4 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0.2 |
| No. of exceedances/worst year | 0 | 2 |
| No. of exceedances/summer | 0 | 0 |
| No. of exceedances/worst summer | 0 | 0 |
| Annual average concentration (ug/l) | 0.36 | 1.13 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 1.07 | 3.35 |
| 90%ile | 3.00 | 7.73 |
| 95%ile | 5.89 | 14.63 |
| 99%ile | 12.25 | 54.20 |

**Step 2**

Velocity 0.02 m/s — Tier 1 is used for the calculation

DI 180.19

% settlement needed 45 %

#### In River (with mitigation)

**Step 3**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds hresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI -

## Route Option 2A: Drainage Catchment 1

### Summary of predictions

| Prediction of impact | Soluble - Acute Impact | | Sediment - Chronic Impact | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Copper | Zinc | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| Step1 | | | | | | | | | | |
| Step2 | | | | | | | | | | |
| Step3 | | | | | | | | | | |

### DETAILED RESULTS

#### In Runoff

**Step 1**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.00 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.00 | 20.60 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 23.36 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.36 | 372.28 |

**Step 1**

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| | | | | Toxicity Threshold | | | | |
| Allowable Exceedances/year | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | 83.80 | 112.10 | 2.20 | 48.30 | 111.00 | 48.30 | 23.00 | 91.00 |
| No. of exceedances/worst year | 97 | 128 | 7 | 59 | 127 | 59 | 32 | 101 |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| Event Statistics Mean | 331 | 1165 | 1 | 16068 | 2780 | 2667 | 170 | 752 |
| 90%ile | 733 | 2672 | 2 | 35481 | 6138 | 5890 | 376 | 1661 |
| 95%ile | 962 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 3313 |
| 99%ile | 1383 | 5637 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

#### In River (no mitigation)

**Step 2**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 0.9 | 2 |
| No. of exceedances/worst year | 2 | 5 |
| No. of exceedances/summer | 0.5 | 1.1 |
| No. of exceedances/worst summer | 2 | 5 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0.4 |
| No. of exceedances/worst year | 0 | 2 |
| No. of exceedances/summer | 0 | 0.1 |
| No. of exceedances/worst summer | 0 | 1 |
| Annual average concentration (ug/l) | 0.57 | 1.77 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 1.62 | 4.95 |
| 90%ile | 4.97 | 12.29 |
| 95%ile | 8.54 | 22.19 |
| 99%ile | 16.06 | 68.31 |

**Step 2**

Velocity 0.03 m/s — Tier 1 is used for the calculation

DI 239.34

% settlement needed 59 %

#### In River (with mitigation)

**Step 3**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds hresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI -

## Route Option 2A: Drainage Catchment 3

### Summary of predictions

| Prediction of impact | Soluble - Acute Impact | | Sediment - Chronic Impact | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Copper | Zinc | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| Step1 | | | | | | | | | | |
| Step2 | | | | | | | | | | |
| Step3 | | | | | | | | | | |

### DETAILED RESULTS

#### In Runoff

**Step 1**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.80 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.80 | 20.60 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 25.36 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.36 | 372.28 |

**Step 1**

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| | | | | Toxicity Threshold | | | | |
| Allowable Exceedances/year | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | 63.80 | 112.10 | 2.20 | 48.30 | 111.00 | 48.30 | 23.00 | 91.00 |
| No. of exceedances/worst year | 97 | 128 | 7 | 59 | 127 | 59 | 32 | 101 |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| | 331 | 1165 | 1 | 16068 | 2780 | 2667 | 170 | 752 |
| | 733 | 2672 | 2 | 85481 | 6138 | 5890 | 376 | 1661 |
| | 962 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 3313 |
| | 1383 | 5637 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

#### In River (no mitigation)

**Step 2**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 0.2 | 1.2 |
| No. of exceedances/worst year | 1 | 4 |
| No. of exceedances/summer | 0.1 | 0.8 |
| No. of exceedances/worst summer | 1 | 4 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0.1 |
| No. of exceedances/worst year | 0 | 1 |
| No. of exceedances/summer | 0 | 0 |
| No. of exceedances/worst summer | 0 | 0 |
| Annual average concentration (ug/l) | 0.34 | 1.05 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 1.00 | 3.14 |
| 90%ile | 2.91 | 7.38 |
| 95%ile | 5.38 | 13.60 |
| 99%ile | 11.48 | 50.80 |

**Step 2**

Velocity: 0.10 m/s — Tier 1 is used for the calculation

DI: 59.66

% settlement needed: 0 %

#### In River (with mitigation)

**Step 3**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI: -

## Route Option 2A: Drainage Catchment 4

### Summary of predictions

| | | Soluble - Acute Impact | | Sediment - Chronic Impact | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Copper | Zinc | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| Prediction of impact | Step1 | | | | | | | | | | |
| | Step2 | | | | | | | | | | |
| | Step3 | | | | | | | | | | |

### DETAILED RESULTS

#### In Runoff

**Step 1**

| | | Copper | Zinc |
|---|---|---|---|
| | | RST24 | |
| Allowable Exceedances/year | | 1 | 1 |
| No. of exceedances/year | | 63.00 | 56.70 |
| No. of exceedances/worst year | | 81 | 64 |
| | | RST6 | |
| Allowable Exceedances/year | | 1 | 1 |
| No. of exceedances/year | | 18.00 | 20.60 |
| No. of exceedances/worst year | | 24 | 27 |
| | | (ug/l) | (ug/l) |
| Thresholds | RST24 | 21 | 60 |
| Thresholds | RST6 | 42 | 120 |
| Event Statistics | Mean | 23.36 | 67.70 |
| | 90%ile | 45.65 | 147.58 |
| | 95%ile | 54.99 | 194.62 |
| | 99%ile | 96.36 | 372.28 |

**Step 1**

| | | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Toxicity Threshold | | | | |
| Allowable Exceedances/year | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | | 83.80 | 112.10 | 2.20 | 48.30 | 111.00 | 48.30 | 23.00 | 91.00 |
| No. of exceedances/worst year | | 97 | 128 | 7 | 59 | 127 | 59 | 32 | 101 |
| | | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| Event Statistics | Mean | 331 | 1165 | 1 | 16068 | 2780 | 2667 | 170 | 752 |
| | 90%ile | 733 | 2672 | 2 | 35481 | 6138 | 5890 | 376 | 1661 |
| | 95%ile | 962 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 3313 |
| | 99%ile | 1383 | 5637 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

#### In River (no mitigation)

**Step 2**

| | | Copper | Zinc |
|---|---|---|---|
| | | RST24 | |
| Allowable Exceedances/year | | 2 | 2 |
| No. of exceedances/year | | 11.6 | 12.2 |
| No. of exceedances/worst year | | 16 | 17 |
| No. of exceedances/summer | | 6.1 | 5.9 |
| No. of exceedances/worst summer | | 15 | 16 |
| | | RST6 | |
| Allowable Exceedances/year | | 1 | 1 |
| No. of exceedances/year | | 2.1 | 4 |
| No. of exceedances/worst year | | 5 | 9 |
| No. of exceedances/summer | | 1.2 | 1.8 |
| No. of exceedances/worst summer | | 4 | 8 |
| Annual average concentration (ug/l) | | 2.95 | 9.41 |
| | | (ug/l) | (ug/l) |
| Thresholds | RST24 | 21 | 60 |
| Thresholds | RST6 | 42 | 120 |
| Event Statistics | Mean | 6.82 | 19.95 |
| | 90%ile | 17.96 | 54.12 |
| | 95%ile | 27.22 | 77.30 |
| | 99%ile | 48.23 | 169.32 |

**Step 2**

Velocity 0.01 m/s — Tier 1 is used for the calculation

DI 1341.33

% settlement needed 93 %

#### In River (with mitigation)

**Step 3**

| | | Copper | Zinc |
|---|---|---|---|
| | | RST24 | |
| Allowable Exceedances/year | | 2 | 2 |
| No. of exceedances/year | | - | - |
| No. of exceedances/worst year | | - | - |
| No. of exceedances/summer | | - | - |
| No. of exceedances/worst summer | | - | - |
| | | RST6 | |
| Allowable Exceedances/year | | 1 | 1 |
| No. of exceedances/year | | - | - |
| No. of exceedances/worst year | | - | - |
| No. of exceedances/summer | | - | - |
| No. of exceedances/worst summer | | - | - |
| Annual average concentration (ug/l) | | - | - |
| | | (ug/l) | (ug/l) |
| Thresholds hresholds | RST24 | 21 | 60 |
| Thresholds | RST6 | 42 | 120 |
| Event Statistics | Mean | - | - |
| | 90%ile | - | - |
| | 95%ile | - | - |
| | 99%ile | - | - |

DI -

## Route Option 2A: Drainage Catchment 5

### Summary of predictions

| Prediction of impact | Soluble - Acute Impact | | Sediment - Chronic Impact | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Copper | Zinc | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| Step1 | | | | | | | | | | |
| Step2 | | | | | | | | | | |
| Step3 | | | | | | | | | | |

### DETAILED RESULTS

#### In Runoff

**Step 1**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.00 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.00 | 20.60 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 23.36 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.36 | 372.28 |

**Step 1**

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| Toxicity Threshold | | | | | | | | |
| Allowable Exceedances/year | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | 83.80 | 112.10 | 2.20 | 48.30 | 111.00 | 48.30 | 23.00 | 91.00 |
| No. of exceedances/worst year | 97 | 128 | 7 | 59 | 127 | 59 | 32 | 101 |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| Event Statistics Mean | 331 | 1165 | 1 | 16068 | 2780 | 2667 | 170 | 752 |
| 90%ile | 733 | 2672 | 2 | 35481 | 6138 | 5890 | 376 | 1661 |
| 95%ile | 962 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 8313 |
| 99%ile | 1383 | 5637 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

#### In River (no mitigation)

**Step 2**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 0.2 | 0.9 |
| No. of exceedances/worst year | 1 | 3 |
| No. of exceedances/summer | 0.1 | 0.6 |
| No. of exceedances/worst summer | 1 | 3 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0.1 |
| No. of exceedances/worst year | 0 | 1 |
| No. of exceedances/summer | 0 | 0 |
| No. of exceedances/worst summer | 0 | 0 |
| Annual average concentration (ug/l) | 0.31 | 0.97 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 0.93 | 2.92 |
| 90%ile | 2.58 | 6.54 |
| 95%ile | 5.21 | 12.65 |
| 99%ile | 11.18 | 50.94 |

**Step 2**

Velocity 0.05 m/s — Tier 1 is used for the calculation

DI 76.96

% settlement needed 0 %

#### In River (with mitigation)

**Step 3**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds hresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI -

## Route Option 2A: Drainage Catchment 6

### Summary of predictions

| Prediction of impact | Soluble - Acute Impact | | Sediment - Chronic Impact | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Copper | Zinc | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| Step1 | | | | | | | | | | |
| Step2 | | | | | | | | | | |
| Step3 | | | | | | | | | | |

### DETAILED RESULTS

#### In Runoff

**Step 1**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.00 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.00 | 20.60 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 23.36 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.36 | 372.28 |

**Step 1**

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| | | | | Toxicity Threshold | | | | |
| Allowable Exceedances/year | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | 83.80 | 112.10 | 2.20 | 48.30 | 111.00 | 48.30 | 23.00 | 91.00 |
| No. of exceedances/worst year | 97 | 128 | 7 | 59 | 127 | 59 | 32 | 101 |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| Event Statistics Mean | 331 | 1165 | 1 | 16068 | 2780 | 2667 | 170 | 752 |
| 90%ile | 733 | 2672 | 2 | 35481 | 6138 | 5890 | 376 | 1661 |
| 95%ile | 962 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 3313 |
| 99%ile | 1383 | 5637 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

#### In River (no mitigation)

**Step 2**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 0.1 | 0.9 |
| No. of exceedances/worst year | 1 | 3 |
| No. of exceedances/summer | 0.1 | 0.6 |
| No. of exceedances/worst summer | 1 | 3 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0 |
| No. of exceedances/worst year | 0 | 0 |
| No. of exceedances/summer | 0 | 0 |
| No. of exceedances/worst summer | 0 | 0 |
| Annual average concentration (ug/l) | 0.27 | 0.85 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 0.82 | 2.60 |
| 90%ile | 2.24 | 5.83 |
| 95%ile | 4.54 | 11.21 |
| 99%ile | 10.05 | 45.32 |

**Step 2**

Velocity 0.02 m/s — Tier 1 is used for the calculation

DI 127.81

% settlement needed 22 %

#### In River (with mitigation)

**Step 3**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds hresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI -

## Route Option 2B: Drainage Catchment 1

### Summary of predictions

| Prediction of impact | Soluble - Acute Impact | | Sediment - Chronic Impact | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Copper | Zinc | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| Step1 | | | | | | | | | | |
| Step2 | | | | | | | | | | |
| Step3 | | | | | | | | | | |

### DETAILED RESULTS

#### In Runoff

Step 1

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.00 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.00 | 20.60 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 23.36 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.36 | 372.28 |

Step 1

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| | | | | Toxicity Threshold | | | | |
| Allowable Exceedances/year | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | 83.80 | 112.10 | 2.20 | 48.30 | 111.00 | 48.30 | 23.00 | 91.00 |
| No. of exceedances/worst year | 97 | 128 | 7 | 59 | 127 | 59 | 32 | 101 |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| Event Statistics Mean | 331 | 1165 | 1 | 16068 | 2780 | 2667 | 170 | 752 |
| 90%ile | 733 | 2672 | 2 | 35481 | 6138 | 5890 | 376 | 1661 |
| 95%ile | 962 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 3313 |
| 99%ile | 1383 | 5637 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

#### In River (no mitigation)

Step 2

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 0.9 | 2 |
| No. of exceedances/worst year | 2 | 5 |
| No. of exceedances/summer | 0.5 | 1.1 |
| No. of exceedances/worst summer | 2 | 5 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0.4 |
| No. of exceedances/worst year | 0 | 2 |
| No. of exceedances/summer | 0 | 0.1 |
| No. of exceedances/worst summer | 0 | 1 |
| Annual average concentration (ug/l) | 0.57 | 1.77 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 1.62 | 4.95 |
| 90%ile | 4.97 | 12.29 |
| 95%ile | 8.54 | 22.19 |
| 99%ile | 16.06 | 68.31 |

Step 2

Velocity 0.03 m/s — Tier 1 is used for the calculation

DI 230.34

% settlement needed 59 %

#### In River (with mitigation)

Step 3

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds hresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI -

## Route Option 2B: Drainage Catchment 3

### Summary of predictions

| Prediction of impact | Soluble - Acute Impact | | Sediment - Chronic Impact | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Copper | Zinc | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| Step1 | | | | | | | | | | |
| Step2 | | | | | | | | | | |
| Step3 | | | | | | | | | | |

### DETAILED RESULTS

#### In Runoff

**Step 1**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.00 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.00 | 20.60 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 23.36 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.36 | 372.28 |

**Step 1**

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| | | | | Toxicity Threshold | | | | |
| Allowable Exceedances/year | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | 83.80 | 112.10 | 2.20 | 48.30 | 111.00 | 48.30 | 23.80 | 91.80 |
| No. of exceedances/worst year | 97 | 128 | 7 | 59 | 127 | 59 | 32 | 101 |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| Mean | 331 | 1165 | 1 | 16068 | 2780 | 2667 | 170 | 752 |
| 90%ile | 733 | 2672 | 2 | 35481 | 6138 | 5890 | 376 | 1661 |
| 95%ile | 962 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 3313 |
| 99%ile | 1383 | 5637 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

#### In River (no mitigation)

**Step 2**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 0.2 | 1.2 |
| No. of exceedances/worst year | 1 | 4 |
| No. of exceedances/summer | 0.1 | 0.8 |
| No. of exceedances/worst summer | 1 | 4 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0.2 |
| No. of exceedances/worst year | 0 | 2 |
| No. of exceedances/summer | 0 | 0 |
| No. of exceedances/worst summer | 0 | 0 |
| Annual average concentration (ug/l) | 0.35 | 1.08 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 1.03 | 3.21 |
| 90%ile | 2.99 | 7.55 |
| 95%ile | 5.50 | 13.93 |
| 99%ile | 11.69 | 51.52 |

**Step 2**

Velocity: 0.10 m/s — Tier 1 is used for the calculation

DI: 61.51

% settlement needed: 0 %

#### In River (with mitigation)

**Step 3**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds treshoids RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI: -

## Route Option 2B: Drainage Catchment 4

### Summary of predictions

| Prediction of impact | Soluble - Acute Impact | | Sediment - Chronic Impact | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Copper | Zinc | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| Step1 | | | | | | | | | | |
| Step2 | | | | | | | | | | |
| Step3 | | | | | | | | | | |

### DETAILED RESULTS

#### In Runoff

**Step 1**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 83.00 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.00 | 20.00 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 23.36 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.36 | 372.28 |

**Step 1**

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| | | | | Toxicity Threshold | | | | |
| Allowable Exceedances/year | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | 83.80 | 112.10 | 2.20 | 48.30 | 111.00 | 48.30 | 23.80 | 91.80 |
| No. of exceedances/worst year | 97 | 128 | 7 | 59 | 127 | 59 | 32 | 101 |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| Event Statistics Mean | 331 | 1165 | 1 | 16068 | 2780 | 2667 | 170 | 752 |
| 90%ile | 733 | 2672 | 2 | 35481 | 6138 | 5890 | 376 | 1661 |
| 95%ile | 962 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 3313 |
| 99%ile | 1383 | 5637 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

#### In River (no mitigation)

**Step 2**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 0.5 | 1.6 |
| No. of exceedances/worst year | 1 | 5 |
| No. of exceedances/summer | 0.2 | 1 |
| No. of exceedances/worst summer | 1 | 5 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0.2 |
| No. of exceedances/worst year | 0 | 2 |
| No. of exceedances/summer | 0 | 0 |
| No. of exceedances/worst summer | 0 | 0 |
| Annual average concentration (ug/l) | 0.46 | 1.41 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 1.31 | 4.08 |
| 90%ile | 3.76 | 9.15 |
| 95%ile | 6.87 | 17.96 |
| 99%ile | 14.04 | 62.37 |

**Step 2**

Velocity 0.05 m/s — Tier 1 is used for the calculation

DI 123.35

% settlement needed 19 %

#### In River (with mitigation)

**Step 3**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI -

## Route Option 2B: Drainage Catchment 5

### Summary of predictions

| Prediction of impact | Soluble - Acute Impact | | Sediment - Chronic Impact | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Copper | Zinc | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| Step1 | | | | | | | | | | |
| Step2 | | | | | | | | | | |
| Step3 | | | | | | | | | | |

### DETAILED RESULTS

#### In Runoff

**Step 1**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 83.00 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.00 | 20.60 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 23.36 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.36 | 372.28 |

**Step 1**

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| Toxicity Threshold | | | | | | | | |
| Allowable Exceedances/year | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | 83.80 | 112.10 | 2.20 | 48.30 | 111.00 | 48.30 | 23.00 | 91.00 |
| No. of exceedances/worst year | 97 | 128 | 7 | 59 | 127 | 59 | 32 | 101 |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| Event Statistics Mean | 331 | 1165 | 1 | 16068 | 2780 | 2667 | 170 | 752 |
| 90%ile | 733 | 2672 | 2 | 35481 | 6138 | 5890 | 376 | 1661 |
| 95%ile | 962 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 3313 |
| 99%ile | 1383 | 5637 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

#### In River (no mitigation)

**Step 2**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 0.2 | 0.9 |
| No. of exceedances/worst year | 1 | 3 |
| No. of exceedances/summer | 0.1 | 0.6 |
| No. of exceedances/worst summer | 1 | 3 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0.2 |
| No. of exceedances/worst year | 0 | 2 |
| No. of exceedances/summer | 0 | 0 |
| No. of exceedances/worst summer | 0 | 0 |
| Annual average concentration (ug/l) | 0.33 | 1.01 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 0.97 | 3.04 |
| 90%ile | 2.70 | 6.84 |
| 95%ile | 5.46 | 13.19 |
| 99%ile | 11.54 | 52.53 |

**Step 2**

Velocity: 0.05 m/s — Tier 1 is used for the calculation

DI: 81.18

% settlement needed: 0 %

#### In River (with mitigation)

**Step 3**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI: -

## Route Option 2B: Drainage Catchment 6

### Summary of predictions

| Prediction of impact | Soluble - Acute Impact | | Sediment - Chronic Impact | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Copper | Zinc | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| Step1 | | | | | | | | | | |
| Step2 | | | | | | | | | | |
| Step3 | | | | | | | | | | |

### DETAILED RESULTS

#### In Runoff

**Step 1**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.00 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.00 | 20.00 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 23.36 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.36 | 372.28 |

**Step 1**

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| | | | | Toxicity Threshold | | | | |
| Allowable Exceedances/year | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | 83.60 | 112.10 | 2.20 | 48.30 | 111.00 | 48.30 | 23.00 | 91.00 |
| No. of exceedances/worst year | 97 | 128 | 7 | 59 | 127 | 59 | 32 | 101 |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| Event Statistics Mean | 331 | 1165 | 1 | 16068 | 2780 | 2667 | 170 | 752 |
| 90%ile | 733 | 2672 | 2 | 35481 | 6138 | 5890 | 376 | 1661 |
| 95%ile | 962 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 3313 |
| 99%ile | 1383 | 5637 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

#### In River (no mitigation)

**Step 2**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 0.2 | 1.3 |
| No. of exceedances/worst year | 1 | 4 |
| No. of exceedances/summer | 0.1 | 0.8 |
| No. of exceedances/worst summer | 1 | 4 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0.2 |
| No. of exceedances/worst year | 0 | 2 |
| No. of exceedances/summer | 0 | 0 |
| No. of exceedances/worst summer | 0 | 0 |
| Annual average concentration (ug/l) | 0.36 | 1.13 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 1.07 | 3.35 |
| 90%ile | 3.00 | 7.73 |
| 95%ile | 5.89 | 14.63 |
| 99%ile | 12.25 | 34.20 |

**Step 2**

Velocity 0.02 m/s — Tier 1 is used for the calculation

DI 180.19

% settlement needed 45 %

#### In River (with mitigation)

**Step 3**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI -

## Route Option 3A: Drainage Catchment 1

### Summary of predictions

| Prediction of impact | Soluble - Acute Impact | | Sediment - Chronic Impact | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Copper | Zinc | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| Step1 | | | | | | | | | | |
| Step2 | | | | | | | | | | |
| Step3 | | | | | | | | | | |

### DETAILED RESULTS

#### In Runoff

**Step 1**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.00 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.00 | 20.60 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 23.36 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.36 | 372.28 |

**Step 1**

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| Toxicity Threshold | | | | | | | | |
| Allowable Exceedances/year | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | 83.80 | 112.10 | 2.20 | 48.30 | 111.00 | 48.30 | 23.80 | 91.80 |
| No. of exceedances/worst year | 97 | 128 | 7 | 59 | 127 | 59 | 32 | 101 |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| Event Statistics Mean | 331 | 1165 | 1 | 16068 | 2780 | 2667 | 170 | 752 |
| 90%ile | 733 | 2672 | 2 | 35481 | 6138 | 5890 | 376 | 1661 |
| 95%ile | 962 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 3313 |
| 99%ile | 1383 | 5637 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

#### In River (no mitigation)

**Step 2**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 0.1 | 0.9 |
| No. of exceedances/worst year | 1 | 3 |
| No. of exceedances/summer | 0.1 | 0.6 |
| No. of exceedances/worst summer | 1 | 3 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0 |
| No. of exceedances/worst year | 0 | 0 |
| No. of exceedances/summer | 0 | 0 |
| No. of exceedances/worst summer | 0 | 0 |
| Annual average concentration (ug/l) | 0.26 | 0.83 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 0.81 | 2.56 |
| 90%ile | 2.25 | 5.76 |
| 95%ile | 4.32 | 10.91 |
| 99%ile | 9.84 | 43.82 |

**Step 2**

Velocity: 0.03 m/s — Tier 1 is used for the calculation

DI: 93.80

% settlement needed: 0 %

#### In River (with mitigation)

**Step 3**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI: -

## Route Option 3A: Drainage Catchment 2

### Summary of predictions

| Prediction of impact | Soluble - Acute Impact | | Sediment - Chronic Impact | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Copper | Zinc | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| Step1 | | | | | | | | | | |
| Step2 | | | | | | | | | | |
| Step3 | | | | | | | | | | |

### DETAILED RESULTS

#### In Runoff

**Step 1**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.00 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.00 | 20.60 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 23.86 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.36 | 372.28 |

**Step 1**

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| Toxicity Threshold | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | 83.80 | 112.10 | 2.20 | 48.30 | 111.00 | 48.30 | 23.00 | 91.00 |
| | 97 | 128 | 7 | 59 | 127 | 59 | 32 | 101 |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| | 381 | 1165 | 1 | 16068 | 2780 | 2667 | 170 | 752 |
| | 783 | 2672 | 2 | 35481 | 6138 | 5890 | 376 | 1661 |
| | 962 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 3315 |
| | 1383 | 5637 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

#### In River (no mitigation)

**Step 2**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 0.1 | 0.9 |
| No. of exceedances/worst year | 1 | 3 |
| No. of exceedances/summer | 0.1 | 0.6 |
| No. of exceedances/worst summer | 1 | 3 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0 |
| No. of exceedances/worst year | 0 | 0 |
| No. of exceedances/summer | 0 | 0 |
| No. of exceedances/worst summer | 0 | 0 |
| Annual average concentration (ug/l) | 0.26 | 0.82 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 0.79 | 2.51 |
| 90%ile | 2.21 | 5.67 |
| 95%ile | 4.25 | 10.70 |
| 99%ile | 9.65 | 42.84 |

**Step 2**

Velocity: 0.10 m/s — Tier 1 is used for the calculation

DI: 44.20

% settlement needed: 0 %

#### In River (with mitigation)

**Step 2**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI: -

## Route Option 3A: Drainage Catchment 3

### Summary of predictions

| Prediction of impact | Soluble - Acute Impact | | Sediment - Chronic Impact | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Copper | Zinc | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| Step1 | | | | | | | | | | |
| Step2 | | | | | | | | | | |
| Step3 | | | | | | | | | | |

### DETAILED RESULTS

#### In Runoff

Step 1

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.00 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.00 | 20.00 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 23.86 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.56 | 372.28 |

Step 1

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| | | | | Toxicity Threshold | | | | |
| Allowable Exceedances/year | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | 83.80 | 112.10 | 2.20 | 48.30 | 111.00 | 48.30 | 23.00 | 91.00 |
| No. of exceedances/worst year | 97 | 128 | 7 | 59 | 127 | 59 | 32 | 101 |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| Mean | 331 | 1165 | 1 | 16068 | 2780 | 2667 | 170 | 752 |
| 90%ile | 733 | 2672 | 2 | 35481 | 6158 | 5890 | 376 | 1661 |
| 95%ile | 962 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 3313 |
| 99%ile | 1383 | 5637 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

#### In River (no mitigation)

Step 2

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 11.6 | 12.2 |
| No. of exceedances/worst year | 16 | 17 |
| No. of exceedances/summer | 6.1 | 5.9 |
| No. of exceedances/worst summer | 15 | 16 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 2.1 | 4 |
| No. of exceedances/worst year | 5 | 9 |
| No. of exceedances/summer | 1.2 | 1.8 |
| No. of exceedances/worst summer | 4 | 8 |
| Annual average concentration (ug/l) | 2.95 | 9.41 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 6.82 | 19.95 |
| 90%ile | 17.96 | 54.12 |
| 95%ile | 27.22 | 77.30 |
| 99%ile | 49.23 | 169.32 |

Step 2

Velocity 0.01 m/s — Tier 1 is used for the calculation

DI 1341.33

% settlement needed 93 %

#### In River (with mitigation)

Step 3

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI -

## Route Option 3A: Drainage Catchment 4

### Summary of predictions

| Prediction of Impact | Soluble - Acute Impact | | Sediment - Chronic Impact | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Copper | Zinc | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| Step1 | | | | | | | | | | |
| Step2 | | | | | | | | | | |
| Step3 | | | | | | | | | | |

### DETAILED RESULTS

#### In Runoff

**Step 1**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.00 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.00 | 20.00 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 23.36 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.36 | 372.28 |

**Step 1**

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| | | | | Toxicity Threshold | | | | |
| Allowable Exceedances/year | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | 83.80 | 112.10 | 2.20 | 48.30 | 111.00 | 48.30 | 23.80 | 91.80 |
| No. of exceedances/worst year | 97 | 128 | 7 | 59 | 127 | 59 | 32 | 101 |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| Mean | 331 | 1165 | 1 | 16068 | 2780 | 2667 | 170 | 752 |
| 90%ile | 733 | 2672 | 2 | 35481 | 6138 | 5890 | 376 | 1661 |
| 95%ile | 962 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 3313 |
| 99%ile | 1383 | 5037 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

#### In River (no mitigation)

**Step 2**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 0.2 | 0.9 |
| No. of exceedances/worst year | 1 | 3 |
| No. of exceedances/summer | 0.1 | 0.6 |
| No. of exceedances/worst summer | 1 | 3 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0.1 |
| No. of exceedances/worst year | 0 | 1 |
| No. of exceedances/summer | 0 | 0 |
| No. of exceedances/worst summer | 0 | 0 |
| Annual average concentration (ug/l) | 0.31 | 0.97 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 0.93 | 2.92 |
| 90%ile | 2.58 | 6.54 |
| 95%ile | 5.21 | 12.63 |
| 99%ile | 11.18 | 50.94 |

**Step 2**

Velocity 0.05 m/s — Tier 1 is used for the calculation

DI 76.96

% settlement needed 0 %

#### In River (with mitigation)

**Step 3**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds freshoils RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI -

## Route Option 3A: Drainage Catchment 5

### Summary of predictions

| Prediction of impact | Soluble - Acute Impact | | Sediment - Chronic Impact | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Copper | Zinc | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| Step1 | | | | | | | | | | |
| Step2 | | | | | | | | | | |
| Step3 | | | | | | | | | | |

### DETAILED RESULTS

#### In Runoff

**Step 1**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.00 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.00 | 20.60 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 68 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 23.36 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.36 | 372.28 |

**Step 1**

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| Toxicity Threshold | | | | | | | | |
| Allowable Exceedances/year | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | 83.80 | 112.10 | 2.20 | 48.30 | 111.60 | 48.30 | 23.00 | 91.00 |
| No. of exceedances/worst year | 97 | 128 | 7 | 59 | 127 | 59 | 32 | 101 |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| Event Statistics Mean | 331 | 1165 | 1 | 16068 | 2780 | 2667 | 170 | 752 |
| 90%ile | 733 | 2672 | 2 | 35481 | 6158 | 5890 | 376 | 1661 |
| 95%ile | 962 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 3313 |
| 99%ile | 1383 | 5687 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

#### In River (no mitigation)

**Step 2**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 0.1 | 0.9 |
| No. of exceedances/worst year | 1 | 3 |
| No. of exceedances/summer | 0.1 | 0.6 |
| No. of exceedances/worst summer | 1 | 3 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0 |
| No. of exceedances/worst year | 0 | 0 |
| No. of exceedances/summer | 0 | 0 |
| No. of exceedances/worst summer | 0 | 0 |
| Annual average concentration (ug/l) | 0.27 | 0.85 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 68 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 0.82 | 2.60 |
| 90%ile | 2.24 | 5.85 |
| 95%ile | 4.54 | 11.21 |
| 99%ile | 10.05 | 45.32 |

**Step 2**

Velocity 0.02 m/s — Tier 1 is used for the calculation

DI 127.81

% settlement needed 22 %

#### In River (with mitigation)

**Step 3**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholdshresholds RST24 | 21 | 68 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI -

## Route Option 3B: Drainage Catchment 1

### Summary of predictions

| Prediction of impact | Soluble - Acute Impact | | Sediment - Chronic Impact | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Copper | Zinc | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| Step1 | | | | | | | | | | |
| Step2 | | | | | | | | | | |
| Step3 | | | | | | | | | | |

### DETAILED RESULTS

#### In Runoff

**Step 1**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.00 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.00 | 20.60 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 23.36 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.36 | 872.28 |

**Step 1**

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| | | | | Toxicity Threshold | | | | |
| Allowable Exceedances/year | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | 63.80 | 112.10 | 2.20 | 48.30 | 111.00 | 48.30 | 23.00 | 91.00 |
| No. of exceedances/worst year | 97 | 128 | 7 | 59 | 127 | 59 | 32 | 101 |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| Event Statistics Mean | 331 | 1185 | 1 | 16068 | 2780 | 2687 | 170 | 752 |
| 90%ile | 733 | 2672 | 2 | 35481 | 6138 | 5890 | 376 | 1661 |
| 95%ile | 982 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 3313 |
| 99%ile | 1383 | 5037 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

#### In River (no mitigation)

**Step 2**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 0.1 | 0.9 |
| No. of exceedances/worst year | 1 | 3 |
| No. of exceedances/summer | 0.1 | 0.6 |
| No. of exceedances/worst summer | 1 | 3 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0 |
| No. of exceedances/worst year | 0 | 0 |
| No. of exceedances/summer | 0 | 0 |
| No. of exceedances/worst summer | 0 | 0 |
| Annual average concentration (ug/l) | 0.26 | 0.83 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 0.81 | 2.56 |
| 90%ile | 2.25 | 5.76 |
| 95%ile | 4.32 | 10.91 |
| 99%ile | 9.84 | 43.82 |

**Step 2**

Velocity 0.03 m/s — Tier 1 is used for the calculation

DI 93.80

% settlement needed 0 %

#### In River (with mitigation)

**Step 3**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI -

## Route Option 3B: Drainage Catchment 2

### Summary of predictions

| Prediction of impact | Soluble - Acute Impact | | Sediment - Chronic Impact | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Copper | Zinc | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| Step1 | | | | | | | | | | |
| Step2 | | | | | | | | | | |
| Step3 | | | | | | | | | | |

### DETAILED RESULTS

#### In Runoff

Step 1

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.00 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.00 | 20.60 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 88 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 23.36 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.36 | 372.28 |

Step 1

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| | | | | | Toxicity Threshold | | | |
| Allowable Exceedances/year | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | 63.00 | 112.10 | 2.20 | 48.30 | 111.00 | 48.30 | 23.00 | 91.00 |
| No. of exceedances/worst year | 97 | 128 | 7 | 59 | 127 | 59 | 32 | 101 |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| Event Statistics Mean | 331 | 1165 | 1 | 16068 | 2780 | 2667 | 170 | 752 |
| 90%ile | 733 | 2672 | 2 | 35481 | 6138 | 5890 | 376 | 1661 |
| 95%ile | 962 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 3313 |
| 99%ile | 1383 | 5637 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

#### In River (no mitigation)

Step 2

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 0.1 | 0.9 |
| No. of exceedances/worst year | 1 | 3 |
| No. of exceedances/summer | 0.1 | 0.6 |
| No. of exceedances/worst summer | 1 | 3 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0 |
| No. of exceedances/worst year | 0 | 0 |
| No. of exceedances/summer | 0 | 0 |
| No. of exceedances/worst summer | 0 | 0 |
| Annual average concentration (ug/l) | 0.27 | 0.85 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 88 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 0.82 | 2.59 |
| 90%ile | 2.30 | 5.89 |
| 95%ile | 4.40 | 11.05 |
| 99%ile | 9.94 | 43.93 |

Step 2

Velocity 0.10 m/s — Tier 1 is used for the calculation

DI 46.06

% settlement needed 0 %

#### In River (with mitigation)

Step 3

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds hresholds RST24 | 21 | 88 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI -

## Route Option 3B: Drainage Catchment 3

### Summary of predictions

| Prediction of impact | Soluble - Acute Impact | | Sediment - Chronic Impact | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Copper | Zinc | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| Step1 | | | | | | | | | | |
| Step2 | | | | | | | | | | |
| Step3 | | | | | | | | | | |

### DETAILED RESULTS

#### In Runoff

**Step 1**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.00 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.00 | 20.00 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 23.36 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.36 | 372.28 |

**Step 1**

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| Toxicity Threshold | | | | | | | | |
| Allowable Exceedances/year | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | 83.80 | 112.10 | 2.20 | 48.30 | 111.00 | 48.30 | 23.80 | 91.80 |
| No. of exceedances/worst year | 97 | 128 | 7 | 59 | 127 | 59 | 32 | 101 |
| | (mg/kgl | (mg/kgl | (mg/kgl | (ug/kgl | (ug/kgl | (ug/kgl | (ug/kgl | (ug/kgl |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| Event Statistics Mean | 331 | 1165 | 1 | 16068 | 2780 | 2667 | 170 | 752 |
| 90%ile | 733 | 2672 | 2 | 35481 | 6138 | 5890 | 376 | 1661 |
| 95%ile | 962 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 3313 |
| 99%ile | 1383 | 5037 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

#### In River (no mitigation)

**Step 2**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 0.5 | 1.6 |
| No. of exceedances/worst year | 1 | 5 |
| No. of exceedances/summer | 0.2 | 1 |
| No. of exceedances/worst summer | 1 | 5 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0.2 |
| No. of exceedances/worst year | 0 | 2 |
| No. of exceedances/summer | 0 | 0 |
| No. of exceedances/worst summer | 0 | 0 |
| Annual average concentration (ug/l) | 0.46 | 1.41 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 1.31 | 4.03 |
| 90%ile | 3.76 | 9.15 |
| 95%ile | 6.87 | 17.96 |
| 99%ile | 14.04 | 62.37 |

**Step 2**

Velocity 0.05 m/s — Tier 1 is used for the calculation

DI 123.35

% settlement needed 19 %

#### In River (with mitigation)

**Step 3**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI -

## Route Option 3B: Drainage Catchment 4

### Summary of predictions

Soluble - Acute Impact

| Prediction of impact | Copper | Zinc |
|---|---|---|
| Step1 | | |
| Step2 | | |
| Step3 | | |

Sediment - Chronic Impact

| Prediction of impact | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| Step1 | | | | | | | | |
| Step2 | | | | | | | | |
| Step3 | | | | | | | | |

### DETAILED RESULTS

#### In Runoff

**Step 1**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.80 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.80 | 20.60 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 25.36 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.36 | 372.28 |

**Step 1**

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| | | | | Toxicity Threshold | | | | |
| Allowable Exceedances/year | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | 63.80 | 112.10 | 2.20 | 48.30 | 111.00 | 48.30 | 23.00 | 91.00 |
| No. of exceedances/worst year | 97 | 128 | 7 | 59 | 127 | 59 | 32 | 101 |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| Event Statistics Mean | 331 | 1165 | 1 | 16068 | 2780 | 2667 | 170 | 752 |
| 90%ile | 733 | 2672 | 2 | 35481 | 6138 | 5890 | 376 | 1661 |
| 95%ile | 982 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 3313 |
| 99%ile | 1383 | 5687 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

#### In River (no mitigation)

**Step 2**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 0.2 | 0.9 |
| No. of exceedances/worst year | 1 | 3 |
| No. of exceedances/summer | 0.1 | 0.6 |
| No. of exceedances/worst summer | 1 | 3 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0.2 |
| No. of exceedances/worst year | 0 | 2 |
| No. of exceedances/summer | 0 | 0 |
| No. of exceedances/worst summer | 0 | 0 |
| Annual average concentration (ug/l) | 0.33 | 1.01 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 0.97 | 3.04 |
| 90%ile | 2.70 | 6.84 |
| 95%ile | 5.46 | 13.19 |
| 99%ile | 11.54 | 52.53 |

**Step 2**

Velocity 0.05 m/s — Tier 1 is used for the calculation

DI 81.18

% settlement needed 0 %

#### In River (with mitigation)

**Step 3**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI -

## Route Option 3B: Drainage Catchment 5

### Summary of predictions

| Prediction of impact | Soluble - Acute Impact | | Sediment - Chronic Impact | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Copper | Zinc | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| Step1 | | | | | | | | | | |
| Step2 | | | | | | | | | | |
| Step3 | | | | | | | | | | |

### DETAILED RESULTS

#### In Runoff

Step 1

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.80 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.80 | 20.60 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 23.36 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.36 | 372.28 |

Step 1

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| | | | | Toxicity Threshold | | | | |
| Allowable Exceedances/year | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | 63.80 | 112.10 | 2.20 | 48.30 | 111.00 | 48.30 | 23.00 | 91.00 |
| No. of exceedances/worst year | 97 | 128 | 7 | 59 | 127 | 59 | 32 | 101 |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| Event Statistics Mean | 331 | 1165 | 1 | 16068 | 2780 | 2667 | 170 | 752 |
| 90%ile | 733 | 2672 | 2 | 35481 | 6138 | 5890 | 376 | 1661 |
| 95%ile | 982 | 3572 | 3 | 70795 | 12247 | 11752 | 750 | 3313 |
| 99%ile | 1383 | 5687 | 4 | 89125 | 15419 | 14795 | 945 | 4171 |

#### In River (no mitigation)

Step 2

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 0.2 | 1.3 |
| No. of exceedances/worst year | 1 | 4 |
| No. of exceedances/summer | 0.1 | 0.8 |
| No. of exceedances/worst summer | 1 | 4 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0.2 |
| No. of exceedances/worst year | 0 | 2 |
| No. of exceedances/summer | 0 | 0 |
| No. of exceedances/worst summer | 0 | 0 |
| Annual average concentration (ug/l) | 0.86 | 1.13 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 1.07 | 3.35 |
| 90%ile | 3.00 | 7.73 |
| 95%ile | 5.89 | 14.68 |
| 99%ile | 12.25 | 54.20 |

Step 2

Velocity 0.02 m/s — Tier 1 is used for the calculation

DI 180.19

% settlement needed 45 %

#### In River (with mitigation)

Step 3

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds freshoils RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI -

JACOBS

## Routine Runoff Assessment: Cumulative Assessments

### Route Option 1B: Drainage Catchments 3 & 4

**Summary of predictions**

| Prediction of impact | | Soluble - Acute Impact | | Sediment - Chronic Impact | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Copper | Zinc | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| | Step1 | | | | | | | | | | |
| | Step2 | | | | | | | | | | |
| | Step3 | | | | | | | | | | |

**DETAILED RESULTS**

**In Runoff**

Step 1

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.00 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.00 | 20.60 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 23.36 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.36 | 372.28 |

Step 1

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| Toxicity Threshold | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | | | | | | | | |
| | | | | | | | | |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

**In River (no mitigation)**

Step 2

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 1.1 | 2.2 |
| No. of exceedances/worst year | 3 | 5 |
| No. of exceedances/summer | 0.6 | 1.2 |
| No. of exceedances/worst summer | 3 | 5 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0.6 |
| No. of exceedances/worst year | 0 | 2 |
| No. of exceedances/summer | 0 | 0.3 |
| No. of exceedances/worst summer | 0 | 2 |
| Annual average concentration (ug/l) | 0.68 | 2.08 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 1.88 | 5.67 |
| 90%ile | 5.50 | 13.55 |
| 95%ile | 9.61 | 26.22 |
| 99%ile | 19.20 | 79.42 |

Step 2

Velocity [ ] m/s  Tier 1 is used for the calculation

DI [ ]

% settlement needed [ ] %

**In River (with mitigation)**

Step 3

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI [ ]

## Route Option 2B: Drainage Catchments 4 & 5

### Summary of predictions

| Prediction of impact | Soluble - Acute Impact: Copper | Soluble - Acute Impact: Zinc |
|---|---|---|
| Step1 | | |
| Step2 | | |
| Step3 | | |

| Sediment - Chronic Impact | | | | | | | |
|---|---|---|---|---|---|---|---|
| Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

### DETAILED RESULTS

#### In Runoff

**Step 1**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.00 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.00 | 20.60 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 68 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 23.36 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.36 | 372.28 |

**Step 1**

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| | | | | Toxicity Threshold | | | | |
| Allowable Exceedances/year | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No. of exceedances/year | | | | | | | | |
| No. of exceedances/worst year | | | | | | | | |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

#### In River (no mitigation)

**Step 2**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 1.1 | 2.2 |
| No. of exceedances/worst year | 3 | 5 |
| No. of exceedances/summer | 0.6 | 1.2 |
| No. of exceedances/worst summer | 3 | 5 |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0.6 |
| No. of exceedances/worst year | 0 | 2 |
| No. of exceedances/summer | 0 | 0.3 |
| No. of exceedances/worst summer | 0 | 2 |
| Annual average concentration (ug/l) | 0.68 | 2.08 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 68 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 1.88 | 5.67 |
| 90%ile | 5.50 | 13.55 |
| 95%ile | 9.61 | 26.22 |
| 99%ile | 19.20 | 79.42 |

**Step 2**

Velocity [ ] m/s Tier 1 is used for the calculation

DI [ ]

% settlement needed [ ] %

#### In River (with mitigation)

**Step 3**

| | Copper | Zinc |
|---|---|---|
| RST24 | | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| RST6 | | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 68 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI [ ]

## Route Option 3B: Drainage Catchments 3 & 4

### Summary of predictions

| | | Soluble - Acute Impact | |
|---|---|---|---|
| | | Copper | Zinc |
| Prediction of impact | Step1 | | |
| | Step2 | | |
| | Step3 | | |

| Sediment - Chronic Impact | | | | | | | |
|---|---|---|---|---|---|---|---|
| Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

### DETAILED RESULTS

#### In Runoff

**Step 1**

| | Copper | Zinc |
|---|---|---|
| | RST24 | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 63.00 | 56.70 |
| No. of exceedances/worst year | 81 | 64 |
| | RST6 | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 18.00 | 20.60 |
| No. of exceedances/worst year | 24 | 27 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 23.36 | 67.70 |
| 90%ile | 45.65 | 147.58 |
| 95%ile | 54.99 | 194.62 |
| 99%ile | 96.36 | 372.28 |

**Step 1**

| | Copper | Zinc | Cadmium | Total PAH | Pyrene | Fluoranthene | Anthracene | Phenanthrene |
|---|---|---|---|---|---|---|---|---|
| | | | | Toxicity Threshold | | | | |
| | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | | | | | | | | |
| | | | | | | | | |
| | (mg/kg) | (mg/kg) | (mg/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) | (ug/kg) |
| Toxicity Threshold | 197 | 315 | 3.5 | 16770 | 875 | 2355 | 245 | 515 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

#### In River (no mitigation)

**Step 2**

| | Copper | Zinc |
|---|---|---|
| | RST24 | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | 1.1 | 2.2 |
| No. of exceedances/worst year | 3 | 5 |
| No. of exceedances/summer | 0.6 | 1.2 |
| No. of exceedances/worst summer | 3 | 5 |
| | RST6 | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | 0 | 0.6 |
| No. of exceedances/worst year | 0 | 2 |
| No. of exceedances/summer | 0 | 0.3 |
| No. of exceedances/worst summer | 0 | 2 |
| Annual average concentration (ug/l) | 0.68 | 2.08 |
| | (ug/l) | (ug/l) |
| Thresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | 1.88 | 5.67 |
| 90%ile | 5.50 | 13.55 |
| 95%ile | 9.61 | 26.22 |
| 99%ile | 19.20 | 79.42 |

**Step 2**

Velocity [ ] m/s  Tier 1 is used for the calculation

DI [ ]

% settlement needed [ ] %

#### In River (with mitigation)

**Step 3**

| | Copper | Zinc |
|---|---|---|
| | RST24 | |
| Allowable Exceedances/year | 2 | 2 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| | RST6 | |
| Allowable Exceedances/year | 1 | 1 |
| No. of exceedances/year | - | - |
| No. of exceedances/worst year | - | - |
| No. of exceedances/summer | - | - |
| No. of exceedances/worst summer | - | - |
| Annual average concentration (ug/l) | - | - |
| | (ug/l) | (ug/l) |
| Thresholds hresholds RST24 | 21 | 60 |
| Thresholds RST6 | 42 | 120 |
| Event Statistics Mean | - | - |
| 90%ile | - | - |
| 95%ile | - | - |
| 99%ile | - | - |

DI [ ]

# 4 Accidental Spillage Risk Assessment – Calculation Tables

4.1.1 The following tables show details results site of Spillage Risk Assessment for all route options (1A, 1B, 2A, 2B, 3A and 3B) in relation to Method D – Assessment of Pollution Impacts from Spillages, outlined in DMRB Volume 11, Section 3, Part 10, HD45/09.

## Spillage Risk Results

### Route Option 1A

**Drainage Catchment 1**

| 2036 Do Something Catchment 1 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road within 100m of roundabout | 0.1 | 5.35 | 21,936 | 1.44 | 0.00006168315 | 0.45 | 2.77574E-05 | 36026 | 0.003 |
| Road within 100m of side road | 0.02 | 1.81 | 21,936 | 1.44 | 0.00000417370 | 0.45 | 1.87817E-06 | 532434 | 0.000 |
| Road within 100m of side road | 0.02 | 1.81 | 21,883 | 1.44 | 0.00000416362 | 0.45 | 1.87363E-06 | 533723 | 0.000 |
| Road within 100m of side road | 0.1 | 1.81 | 21,883 | 1.44 | 0.00002081809 | 0.45 | 9.36814E-06 | 106744 | 0.001 |
| Road no junction | 0.28 | 0.31 | 21,883 | 1.44 | 0.00000998348 | 0.45 | 4.49257E-06 | 222589 | 0.000 |
| | Total for Catchment 1 | | | | 0.00010082204 | 0.45 | 4.53699E-05 | 22041 | 0.005 |

**Drainage Catchment 2**

| 2036 Do Something Catchment 2 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road no junction | 0.47 | 0.31 | 21,883 | 1.44 | 0.00001675798 | 0.45 | 7.54109E-06 | 132607 | 0.001 |
| Road within 100m of roundabout | 0.1 | 5.35 | 21,883 | 1.44 | 0.00006153412 | 0.45 | 2.76904E-05 | 36114 | 0.003 |
| Road within 100m of roundabout | 0.1 | 5.35 | 5,199 | 3.10 | 0.00003147228 | 0.45 | 1.41625E-05 | 70609 | 0.001 |
| Road within 100m of side road | 0.04 | 1.81 | 5,199 | 3.10 | 0.00000425905 | 0.45 | 1.91657E-06 | 521765 | 0.000 |
| Road within 100m of roundabout | 0.08 | 5.35 | 7,187 | 1.39 | 0.00001560627 | 0.45 | 7.02282E-06 | 142393 | 0.001 |
| Road within 100m of roundabout | 0.1 | 5.35 | 2,514 | 1.46 | 0.00000716745 | 0.45 | 3.22535E-06 | 310044 | 0.000 |
| Road no junction | 0.12 | 0.31 | 2,514 | 1.46 | 0.00000049837 | 0.45 | 2.24268E-07 | 4458960 | 0.000 |
| Road within 100m of roundabout | 0.1 | 5.35 | 28,760 | 1.12 | 0.00006290042 | 0.45 | 2.83052E-05 | 35329 | 0.003 |
| Road no junction | 0.29 | 0.31 | 28,760 | 1.12 | 0.00001056962 | 0.45 | 4.75633E-06 | 210246 | 0.000 |
| | Total for Catchment 2 | | | | 0.00021076557 | 0.45 | 9.48445E-05 | 10544 | 0.009 |

**Drainage Catchment 3**

| 2036 Do Something Catchment 3 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road no junction | 0.18 | 0.31 | 28,760 | 1.12 | 0.00000656046 | 0.45 | 2.9522E-06 | 338730 | 0.000 |
| Road within 100m of roundabout | 0.1 | 5.35 | 28,760 | 1.12 | 0.00006290042 | 0.45 | 2.83052E-05 | 35329 | 0.003 |
| Road within 100m of roundabout | 0.1 | 5.35 | 22,162 | 1.43 | 0.00006188589 | 0.45 | 2.78487E-05 | 35908 | 0.003 |
| Road no junction | 0.42 | 0.31 | 22,162 | 1.43 | 0.00001255069 | 0.45 | 5.64781E-06 | 177060 | 0.001 |
| | Total for Catchment 3 | | | | 0.00014389745 | 0.45 | 6.47539E-05 | 15443 | 0.006 |

**Drainage Catchment 4**

| 2036 Do Something Catchment 4 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road no junction | 0.39 | 0.31 | 22,162 | 1.43 | 0.00001398505 | 0.45 | 6.29327E-06 | 158900 | 0.001 |
| Road within 100m of roundabout | 0.1 | 5.35 | 22,162 | 1.43 | 0.00006188589 | 0.45 | 2.78487E-05 | 35908 | 0.003 |
| | Total for Catchment 4 | | | | 0.00007587094 | 0.45 | 3.41419E-05 | 29290 | 0.003 |

**Drainage Catchment 5**

| 2036 Do Something Catchment 5 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road within 100m of roundabout | 0.1 | 5.35 | 6,404 | 0.55 | 0.00000687798 | 0.45 | 3.09509E-06 | 323092 | 0.000 |
| Road no junction | 0.35 | 0.31 | 6,404 | 0.55 | 0.00000139488 | 0.45 | 6.27696E-07 | 1593129 | 0.000 |
| | Total for Catchment 5 | | | | 0.00000827286 | 0.45 | 3.72278E-06 | 268616 | 0.000 |

**Route Option 1B**

**Drainage Catchment 1**

| 2036 Do Something Catchment 1 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road within 100m of roundabout | 0.1 | 5.35 | 21,936 | 1.44 | 0.00006168315 | 0.45 | 2.77574E-05 | 36026 | 0.003 |
| Road within 100m of side road | 0.02 | 1.81 | 21,936 | 1.44 | 0.00000417370 | 0.45 | 1.87817E-06 | 532434 | 0.000 |
| Road within 100m of side road | 0.02 | 1.81 | 21,883 | 1.44 | 0.00000416362 | 0.45 | 1.87363E-06 | 533724 | 0.000 |
| Road within 100m of side road | 0.1 | 1.81 | 21,883 | 1.44 | 0.00002081809 | 0.45 | 9.36814E-06 | 106745 | 0.001 |
| Road no junction | 0.28 | 0.31 | 21,883 | 1.44 | 0.00000998348 | 0.45 | 4.49257E-06 | 222590 | 0.000 |
| | Total for Catchment 1 | | | | 0.00010082204 | 0.45 | 4.53699E-05 | 22041 | 0.005 |

**Drainage Catchment 2**

| 2036 Do Something Catchment 2 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road no junction | 0.47 | 0.31 | 21,883 | 1.44 | 0.00001675798 | 0.45 | 7.54109E-06 | 132607 | 0.001 |
| Road within 100m of roundabout | 0.1 | 5.35 | 21,883 | 1.44 | 0.00006153412 | 0.45 | 2.76904E-05 | 36114 | 0.003 |
| Road within 100m of roundabout | 0.1 | 5.35 | 5,199 | 3.10 | 0.00003147228 | 0.45 | 1.41625E-05 | 70609 | 0.001 |
| Road within 100m of side road | 0.04 | 1.81 | 5,199 | 3.10 | 0.00000425905 | 0.45 | 1.91657E-06 | 521765 | 0.000 |
| Road within 100m of roundabout | 0.08 | 5.35 | 7,187 | 1.39 | 0.00001560627 | 0.45 | 7.02282E-06 | 142393 | 0.001 |
| Road within 100m of roundabout | 0.1 | 5.35 | 2,514 | 1.46 | 0.00000716745 | 0.45 | 3.22535E-06 | 310044 | 0.000 |
| Road no junction | 0.12 | 0.31 | 2,514 | 1.46 | 0.00000049837 | 0.45 | 2.24268E-07 | 4458960 | 0.000 |
| Road within 100m of roundabout | 0.1 | 5.35 | 28,760 | 1.12 | 0.00006290042 | 0.45 | 2.83052E-05 | 35329 | 0.003 |
| Road no junction | 0.3 | 0.31 | 28,760 | 1.12 | 0.00001093409 | 0.45 | 4.92034E-06 | 203238 | 0.000 |
| | Total for Catchment 2 | | | | 0.00021113004 | 0.45 | 9.50085E-05 | 10525 | 0.010 |

**Drainage Catchment 3**

| 2036 Do Something Catchment 3 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road no junction | 0.06 | 0.31 | 28,760 | 1.12 | 0.00000218682 | 0.45 | 9.84068E-07 | 1016190 | 0.000 |
| Road within 100m of roundabout | 0.1 | 5.35 | 28,760 | 1.12 | 0.00006290042 | 0.45 | 2.83052E-05 | 35329 | 0.003 |
| Road within 100m of roundabout | 0.1 | 5.35 | 22,162 | 1.43 | 0.00006188589 | 0.45 | 2.78487E-05 | 35908 | 0.003 |
| Road no junction | 0.11 | 0.31 | 22,162 | 1.43 | 0.00000394450 | 0.45 | 1.77503E-06 | 563372 | 0.000 |
| Road within 100m of side road | 0.1 | 1.81 | 22,162 | 1.43 | 0.00002093710 | 0.45 | 9.42169E-06 | 106138 | 0.001 |
| Road within 100m of side road | 0.1 | 1.81 | 22,162 | 1.43 | 0.00002093710 | 0.45 | 9.42169E-06 | 106138 | 0.001 |
| Road no junction | 0.21 | 0.31 | 22,162 | 1.43 | 0.00000753041 | 0.45 | 3.38869E-06 | 295100 | 0.000 |
| | Total for Catchment 3 | | | | 0.00018032223 | 0.45 | 8.1145E-05 | 12324 | 0.008 |

**Drainage Catchment 4**

| 2036 Do Something Catchment 4 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road no junction | 0.41 | 0.31 | 22,162 | 1.43 | 0.00001470224 | 0.45 | 6.61601E-06 | 151149 | 0.001 |
| Road within 100m of roundabout | 0.1 | 5.35 | 22,162 | 1.43 | 0.00006188589 | 0.45 | 2.78487E-05 | 35908 | 0.003 |
| | Total for Catchment 4 | | | | 0.00007658813 | 0.45 | 3.44647E-05 | 29015 | 0.003 |
| | | | | | | | | | |

**Drainage Catchment 5**

| 2036 Do Something Catchment 5 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road within 100m of roundabout | 0.1 | 5.35 | 6,404 | 0.55 | 0.00000687798 | 0.45 | 3.09509E-06 | 323092 | 0.000 |
| Road no junction | 0.54 | 0.31 | 6,404 | 0.55 | 0.00000215210 | 0.45 | 9.68445E-07 | 1032583 | 0.000 |
| | Total for Catchment 5 | | | | 0.00000903008 | 0.45 | 4.06353E-06 | 246091 | 0.000 |

**Cumulative annual probability from catchments 3 and 4 = 0.012%**

**Route Option 2A**

**Drainage Catchment 1**

| 2036 Do Something Catchment 1 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road within 100m of roundabout | 0.1 | 5.35 | 27,711 | 2.48 | 0.00013419939 | 0.45 | 6.03897E-05 | 16559 | 0.006 |
| Road within 100m of side road | 0.02 | 1.81 | 27,711 | 2.48 | 0.00000908041 | 0.45 | 4.08618E-06 | 244727 | 0.000 |
| Road within 100m of side road | 0.02 | 1.81 | 27,826 | 2.45 | 0.00000900779 | 0.45 | 4.05351E-06 | 246700 | 0.000 |
| Road within 100m of side road | 0.1 | 1.81 | 27,826 | 2.45 | 0.00004503895 | 0.45 | 2.02675E-05 | 49340 | 0.002 |
| Road no junction | 0.18 | 0.31 | 27,826 | 2.45 | 0.00001388494 | 0.45 | 6.24822E-06 | 160046 | 0.001 |
| Road within 100m of crossroad | 0.1 | 1.46 | 27,826 | 2.45 | 0.00003632976 | 0.45 | 1.63484E-05 | 61168 | 0.002 |
| | Total for Catchment 1 | | | | 0.00024754124 | 0.45 | 0.000111394 | 8977 | 0.011 |

**Drainage Catchment 2**

| 2036 Do Something Catchment 2 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road within 100m of crossroad | 0.1 | 1.46 | 9,351 | 2.44 | 0.00001215888 | 0.45 | 5.4715E-06 | 182765 | 0.001 |
| Road no junction | 0.37 | 0.31 | 9,351 | 2.44 | 0.00000955222 | 0.45 | 4.2985E-06 | 232639 | 0.000 |
| Road within 100m of slip road | 0.1 | 0.36 | 9,351 | 2.44 | 0.00000299808 | 0.45 | 1.34914E-06 | 741215 | 0.000 |
| Road within 100m of crossroad | 0.1 | 1.46 | 5,039 | 3.41 | 0.00000915682 | 0.45 | 4.12057E-06 | 242685 | 0.000 |
| Road no junction | 0.17 | 0.31 | 5,039 | 3.41 | 0.00000330523 | 0.45 | 1.48736E-06 | 672334 | 0.000 |
| Road within 100m of slip road | 0.1 | 0.36 | 5,039 | 3.41 | 0.00000225784 | 0.45 | 1.01603E-06 | 984223 | 0.000 |
| | Total for Catchment 2 | | | | 0.00003942907 | 0.45 | 1.77431E-05 | 56360 | 0.002 |

**Drainage Catchment 3**

| 2036 Do Something Catchment 3 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road within 100m of crossroad | 0.1 | 1.46 | 23,835 | 1.96 | 0.00002489528 | 0.45 | 1.12029E-05 | 89263 | 0.001 |
| Road no junction | 0.36 | 0.31 | 23,835 | 1.96 | 0.00001902954 | 0.45 | 8.56329E-06 | 116778 | 0.001 |
| Road within 100m of roundabout | 0.1 | 5.35 | 23,835 | 1.96 | 0.00009122584 | 0.45 | 4.10516E-05 | 24360 | 0.004 |
| Road within 100m of roundabout | 0.1 | 5.35 | 7,426 | 1.55 | 0.00002247674 | 0.45 | 1.01145E-05 | 98868 | 0.001 |
| Road within 100m of side road | 0.04 | 1.81 | 7,426 | 1.55 | 0.00000304171 | 0.45 | 1.36877E-06 | 730583 | 0.000 |
| Road within 100m of roundabout | 0.08 | 5.35 | 6,414 | 3.90 | 0.00003907781 | 0.45 | 1.7585E-05 | 56867 | 0.002 |
| Road within 100m of roundabout | 0.1 | 5.35 | 3,518 | 1.55 | 0.00001064815 | 0.45 | 4.79167E-06 | 208696 | 0.000 |
| Road no junction | 0.12 | 0.31 | 3,518 | 1.55 | 0.00000074039 | 0.45 | 3.33178E-07 | 3001402 | 0.000 |
| Road within 100m of roundabout | 0.1 | 5.35 | 29,087 | 1.13 | 0.00006418359 | 0.45 | 2.88826E-05 | 34623 | 0.003 |
| Road no junction | 0.29 | 0.31 | 29,087 | 1.13 | 0.00001078524 | 0.45 | 4.85336E-06 | 206043 | 0.000 |
| | Total for Catchment 3 | | | | 0.00028610430 | 0.45 | 0.000128747 | 7767 | 0.013 |

**Drainage Catchment 4**

| 2036 Do Something Catchment 4 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road no junction | 0.18 | 0.31 | 29,087 | 1.13 | 0.00000669429 | 0.45 | 3.01243E-06 | 331958 | 0.000 |
| Road within 100m of roundabout | 0.1 | 5.35 | 29,087 | 1.13 | 0.00006418359 | 0.45 | 2.88826E-05 | 34623 | 0.003 |
| Road within 100m of roundabout | 0.1 | 5.35 | 22,726 | 1.46 | 0.00006479217 | 0.45 | 2.91565E-05 | 34298 | 0.003 |
| Road no junction | 0.42 | 0.31 | 22,726 | 1.46 | 0.00001576811 | 0.45 | 7.09565E-06 | 140931 | 0.001 |
| | Total for Catchment 4 | | | | 0.00015143816 | 0.45 | 6.81472E-05 | 14674 | 0.007 |

**Drainage Catchment 5**

| 2036 Do Something Catchment 5 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road no junction | 0.39 | 0.31 | 22,726 | 1.46 | 0.00001464182 | 0.45 | 6.58882E-06 | 151772 | 0.001 |
| Road within 100m of roundabout | 0.1 | 5.35 | 22,726 | 1.46 | 0.00006479217 | 0.45 | 2.91565E-05 | 34298 | 0.003 |
| | Total for Catchment 5 | | | | 0.00007943399 | 0.45 | 3.57453E-05 | 27976 | 0.004 |

**Drainage Catchment 6**

| 2036 Do Something Catchment 6 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road within 100m of roundabout | 0.1 | 5.35 | 5,991 | 0.23 | 0.00000136626 | 0.45 | 6.14817E-07 | 1626499 | 0.000 |
| Road no junction | 0.35 | 0.31 | 5,991 | 0.23 | 0.00000022863 | 0.45 | 1.02881E-07 | 9719934 | 0.000 |
| | Total for Catchment 6 | | | | 0.00000159489 | 0.45 | 7.17699E-07 | 1393342 | 0.000 |

**Route Option 2B**

**Drainage Catchment 1**

| 2036 Do Something Catchment 1 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road within 100m of roundabout | 0.1 | 5.35 | 27,711 | 2.48 | 0.00013419939 | 0.45 | 6.03897E-05 | 16559 | 0.006 |
| Road within 100m of side road | 0.02 | 1.81 | 27,711 | 2.48 | 0.00000908041 | 0.45 | 4.08618E-06 | 244727 | 0.000 |
| Road within 100m of side road | 0.02 | 1.81 | 27,826 | 2.45 | 0.00000900779 | 0.45 | 4.05351E-06 | 246700 | 0.000 |
| Road within 100m of side road | 0.1 | 1.81 | 27,826 | 2.45 | 0.00004503895 | 0.45 | 2.02675E-05 | 49340 | 0.002 |
| Road no junction | 0.18 | 0.31 | 27,826 | 2.45 | 0.00001388494 | 0.45 | 6.24822E-06 | 160045 | 0.001 |
| Road within 100m of crossroad | 0.1 | 1.46 | 27,826 | 2.45 | 0.00003632976 | 0.45 | 1.63484E-05 | 61168 | 0.002 |
| | Total for Catchment 1 | | | | 0.00024754124 | 0.45 | 0.000111394 | 8977 | 0.011 |

**Drainage Catchment 2**

| 2036 Do Something Catchment 2 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road within 100m of crossroad | 0.1 | 1.46 | 9,351 | 2.44 | 0.00001215888 | 0.45 | 5.4715E-06 | 182765 | 0.001 |
| Road no junction | 0.37 | 0.31 | 9,351 | 2.44 | 0.00000955222 | 0.45 | 4.2985E-06 | 232639 | 0.000 |
| Road within 100m of slip road | 0.1 | 0.36 | 9,351 | 2.44 | 0.00000299808 | 0.45 | 1.34914E-06 | 741215 | 0.000 |
| Road within 100m of crossroad | 0.1 | 1.46 | 5,039 | 3.41 | 0.00000915682 | 0.45 | 4.12057E-06 | 242685 | 0.000 |
| Road no junction | 0.17 | 0.31 | 5,039 | 3.41 | 0.00000330523 | 0.45 | 1.48736E-06 | 672334 | 0.000 |
| Road within 100m of slip road | 0.1 | 0.36 | 5,039 | 3.41 | 0.00000225784 | 0.45 | 1.01603E-06 | 984223 | 0.000 |
| | Total for Catchment 2 | | | | 0.00003942907 | 0.45 | 1.77431E-05 | 56360 | 0.002 |

**Drainage Catchment 3**

| 2036 Do Something Catchment 3 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road within 100m of crossroad | 0.1 | 1.46 | 23,835 | 1.96 | 0.00002489528 | 0.45 | 1.12029E-05 | 89263 | 0.001 |
| Road no junction | 0.36 | 0.31 | 23,835 | 1.96 | 0.00001902954 | 0.45 | 8.56329E-06 | 116778 | 0.001 |
| Road within 100m of roundabout | 0.1 | 5.35 | 23,835 | 1.96 | 0.00009122584 | 0.45 | 4.10516E-05 | 24360 | 0.004 |
| Road within 100m of roundabout | 0.1 | 5.35 | 7,426 | 1.55 | 0.00002247674 | 0.45 | 1.01145E-05 | 98868 | 0.001 |
| Road within 100m of side road | 0.04 | 1.81 | 7,426 | 1.55 | 0.00000304171 | 0.45 | 1.36877E-06 | 730583 | 0.000 |
| Road within 100m of roundabout | 0.08 | 5.35 | 6,414 | 3.90 | 0.00003907781 | 0.45 | 1.7585E-05 | 56867 | 0.002 |
| Road within 100m of roundabout | 0.1 | 5.35 | 3,518 | 1.55 | 0.00001064815 | 0.45 | 4.79167E-06 | 208696 | 0.000 |
| Road no junction | 0.12 | 0.31 | 3,518 | 1.55 | 0.00000074039 | 0.45 | 3.33178E-07 | 3001402 | 0.000 |
| Road within 100m of roundabout | 0.1 | 5.35 | 29,087 | 1.13 | 0.00006418359 | 0.45 | 2.88826E-05 | 34623 | 0.003 |
| Road no junction | 0.3 | 0.31 | 29,087 | 1.13 | 0.00001115715 | 0.45 | 5.02072E-06 | 199175 | 0.001 |
| | Total for Catchment 3 | | | | 0.00028647620 | 0.45 | 0.000128914 | 7757 | 0.013 |

**Drainage Catchment 4**

| 2036 Do Something Catchment 4 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road no junction | 0.06 | 0.31 | 29,087 | 1.13 | 0.00000223143 | 0.45 | 1.00414E-06 | 995874 | 0.000 |
| Road within 100m of roundabout | 0.1 | 5.35 | 29,087 | 1.13 | 0.00006418359 | 0.45 | 2.88826E-05 | 34623 | 0.003 |
| Road within 100m of roundabout | 0.1 | 5.35 | 22,726 | 1.46 | 0.00006479217 | 0.45 | 2.91565E-05 | 34298 | 0.003 |
| Road no junction | 0.11 | 0.31 | 22,726 | 1.46 | 0.00000412974 | 0.45 | 1.85838E-06 | 538102 | 0.000 |
| Road within 100m of side road | 0.1 | 1.81 | 22,726 | 1.46 | 0.00002192034 | 0.45 | 9.86415E-06 | 101377 | 0.001 |
| Road within 100m of side road | 0.1 | 1.81 | 22,726 | 1.46 | 0.00002192034 | 0.45 | 9.86415E-06 | 101377 | 0.001 |
| Road no junction | 0.21 | 0.31 | 22,726 | 1.46 | 0.00000788406 | 0.45 | 3.54783E-06 | 281863 | 0.000 |
| | Total for Catchment 4 | | | | 0.00018706167 | 0.45 | 8.41778E-05 | 11880 | 0.008 |

**Drainage Catchment 5**

| 2036 Do Something Catchment 5 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road no junction | 0.41 | 0.31 | 22,726 | 1.46 | 0.00001539268 | 0.45 | 6.92671E-06 | 144369 | 0.001 |
| Road within 100m of roundabout | 0.1 | 5.35 | 22,726 | 1.46 | 0.00006479217 | 0.45 | 2.91565E-05 | 34298 | 0.003 |
| | Total for Catchment 5 | | | | 0.00008018485 | 0.45 | 3.60832E-05 | 27714 | 0.004 |

**Drainage Catchment 6**

| 2036 Do Something Catchment 6 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road within 100m of roundabout | 0.1 | 5.35 | 5,991 | 0.23 | 0.00000136626 | 0.45 | 6.14817E-07 | 1626499 | 0.000 |
| Road no junction | 0.54 | 0.31 | 5,991 | 0.23 | 0.00000035274 | 0.45 | 1.58731E-07 | 6299957 | 0.000 |
| | Total for Catchment 6 | | | | 0.00000171900 | 0.45 | 7.73549E-07 | 129743 | 0.000 |

**Cumulative annual probability from catchments 4 and 5 = 0.012%**

**Route Option 3A**

**Drainage Catchment 1**

| 2036 Do Something Catchment 1 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road no junction | 0.28 | 0.31 | 33,307 | 2.74 | 0.00002891337 | 0.45 | 1.3011E-05 | 76858 | 0.001 |
| Road within 100m of side road | 0.08 | 1.81 | 33,307 | 2.74 | 0.00004823336 | 0.45 | 2.1705E-05 | 46072 | 0.002 |
| | Total for Catchment 1 | | | | 0.00007714673 | 0.45 | 3.4716E-05 | 28805 | 0.003 |

**Drainage Catchment 2**

| 2036 Do Something Catchment 2 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road within 100m of roundabout | 0.1 | 5.35 | 15,555 | 2.32 | 0.00007047006 | 0.45 | 3.17115E-05 | 31534 | 0.003 |
| Road within 100m of side road | 0.04 | 1.81 | 15,555 | 2.32 | 0.00000953651 | 0.45 | 4.29143E-06 | 233023 | 0.000 |
| Road within 100m of roundabout | 0.08 | 5.35 | 6,742 | 1.64 | 0.00001727306 | 0.45 | 7.77288E-06 | 128653 | 0.001 |
| Road within 100m of roundabout | 0.1 | 5.35 | 1,939 | 1.90 | 0.00000719413 | 0.45 | 3.23736E-06 | 308894 | 0.000 |
| Road no junction | 0.12 | 0.31 | 1,939 | 1.90 | 0.00000050023 | 0.45 | 2.25102E-07 | 4442427 | 0.000 |
| Road within 100m of roundabout | 0.1 | 5.35 | 20,892 | 1.54 | 0.00006282715 | 0.45 | 2.82722E-05 | 35370 | 0.003 |
| Road no junction | 0.29 | 0.31 | 20,892 | 1.54 | 0.00001055731 | 0.45 | 4.75079E-06 | 210491 | 0.000 |
| | Total for Catchment 2 | | | | 0.00017835845 | 0.45 | 8.02613E-05 | 12459 | 0.008 |

**Drainage Catchment 3**

| 2036 Do Something Catchment 3 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road no junction | 0.18 | 0.31 | 20,892 | 1.54 | 0.00000655281 | 0.45 | 2.94877E-06 | 339125 | 0.000 |
| Road within 100m of roundabout | 0.1 | 5.35 | 16,159 | 1.83 | 0.00005774471 | 0.45 | 2.59851E-05 | 38484 | 0.003 |
| Road within 100m of roundabout | 0.1 | 5.35 | 16,159 | 1.83 | 0.00005774471 | 0.45 | 2.59851E-05 | 38484 | 0.003 |
| Road no junction | 0.42 | 0.31 | 16,159 | 1.83 | 0.00001171084 | 0.45 | 5.26988E-06 | 189758 | 0.001 |
| | Total for Catchment 3 | | | | 0.00013375308 | 0.45 | 6.01889E-05 | 16614 | 0.006 |

**Drainage Catchment 4**

| 2036 Do Something Catchment 4 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road no junction | 0.39 | 0.31 | 16,159 | 1.83 | 0.00001304923 | 0.45 | 5.87215E-06 | 170295 | 0.001 |
| Road within 100m of roundabout | 0.1 | 5.35 | 16,159 | 1.83 | 0.00005774471 | 0.45 | 2.59851E-05 | 384834 | 0.003 |
| | Total for Catchment 4 | | | | 0.00007079394 | 0.45 | 3.18573E-05 | 31390 | 0.003 |

**Drainage Catchment 5**

| 2036 Do Something Catchment 5 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road within 100m of roundabout | 0.1 | 5.35 | 4,793 | 0.85 | 0.00000795560 | 0.45 | 3.58002E-06 | 279328 | 0.000 |
| Road no junction | 0.35 | 0.31 | 4,793 | 0.85 | 0.00000161343 | 0.45 | 7.26042E-07 | 1377332 | 0.000 |
| | Total for Catchment 5 | | | | 0.00000956903 | 0.45 | 4.30606E-06 | 232231 | 0.000 |

**Route Option 3B**

**Drainage Catchment 1**

| 2036 Do Something Catchment 1 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road no junction | 0.28 | 0.31 | 33,307 | 2.74 | 0.00002891337 | 0.45 | 1.3011E-05 | 76858 | 0.001 |
| Road within 100m of side road | 0.08 | 1.81 | 33,307 | 2.74 | 0.00004823336 | 0.45 | 2.1705E-05 | 46072 | 0.002 |
| | Total for Catchment 1 | | | | 0.00007714673 | 0.45 | 3.4716E-05 | 28805 | 0.003 |

**Drainage Catchment 2**

| 2036 Do Something Catchment 2 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road within 100m of roundabout | 0.1 | 5.35 | 15,555 | 2.32 | 0.00007047006 | 0.45 | 3.17115E-05 | 31534 | 0.003 |
| Road within 100m of side road | 0.04 | 1.81 | 15,555 | 2.32 | 0.00000953651 | 0.45 | 4.29143E-06 | 233023 | 0.000 |
| Road within 100m of roundabout | 0.08 | 5.35 | 6,742 | 1.64 | 0.00001727306 | 0.45 | 7.77288E-06 | 128653 | 0.001 |
| Road within 100m of roundabout | 0.1 | 5.35 | 1,939 | 1.90 | 0.00000719413 | 0.45 | 3.23736E-06 | 308894 | 0.000 |
| Road no junction | 0.12 | 0.31 | 1,939 | 1.90 | 0.00000050023 | 0.45 | 2.25102E-07 | 4442427 | 0.000 |
| Road within 100m of roundabout | 0.1 | 5.35 | 20,892 | 1.54 | 0.00006282715 | 0.45 | 2.82722E-05 | 35370 | 0.003 |
| Road no junction | 0.29 | 0.31 | 20,892 | 1.54 | 0.00001055731 | 0.45 | 4.75079E-06 | 210491 | 0.000 |
| | Total for Catchment 2 | | | | 0.00017835845 | 0.45 | 8.02613E-05 | 12459 | 0.008 |

**Drainage Catchment 3**

| 2036 Do Something Catchment 3 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road no junction | 0.06 | 0.31 | 20,892 | 1.54 | 0.00000218427 | 0.45 | 9.82922E-07 | 1017375 | 0.000 |
| Road within 100m of roundabout | 0.1 | 5.35 | 20,892 | 1.54 | 0.00006282715 | 0.45 | 2.82722E-05 | 35370 | 0.003 |
| Road within 100m of roundabout | 0.1 | 5.35 | 16,159 | 1.83 | 0.00005774471 | 0.45 | 2.59851E-05 | 38484 | 0.003 |
| Road no junction | 0.11 | 0.31 | 16,159 | 1.83 | 0.00000368055 | 0.45 | 1.65625E-06 | 603774 | 0.000 |
| Road within 100m of side road | 0.1 | 1.81 | 16,159 | 1.83 | 0.00001953606 | 0.45 | 8.79123E-06 | 113750 | 0.001 |
| Road within 100m of side road | 0.1 | 1.81 | 16,159 | 1.83 | 0.00001953606 | 0.45 | 8.79123E-06 | 113750 | 0.001 |
| Road no junction | 0.21 | 0.31 | 16,159 | 1.83 | 0.00000702651 | 0.45 | 3.16193E-06 | 316263 | 0.000 |
| | Total for Catchment 3 | | | | 0.00017253532 | 0.45 | 7.76409E-05 | 12880 | 0.008 |

**Drainage Catchment 4**

| 2036 Do Something Catchment 4 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road no junction | 0.41 | 0.31 | 16,159 | 1.83 | 0.00001371842 | 0.45 | 6.17329E-06 | 161988 | 0.001 |
| Road within 100m of roundabout | 0.1 | 5.35 | 16,159 | 1.83 | 0.00005774471 | 0.45 | 2.59851E-05 | 38484 | 0.003 |
| | Total for Catchment 4 | | | | 0.00007146313 | 0.45 | 3.21584E-05 | 31096 | 0.003 |

**Drainage Catchment 5**

| 2036 Do Something Catchment 5 | Total Annual Accident Probability (Pacc) | | | | | Annual Pollution Incident Probability (Pinc) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Road Length (km) | Serious Spillage Risk Factor | Two-way AADT | %HGV | Annual Probability (Pacc) | Probability Factor (Ppol) | Probability | Return Period (years) | Percentage Probability (%) |
| Road within 100m of roundabout | 0.1 | 5.35 | 4,793 | 0.85 | 0.00000795560 | 0.45 | 3.58002E-06 | 279328 | 0.000 |
| Road no junction | 0.54 | 0.31 | 4,793 | 0.85 | 0.00000248929 | 0.45 | 1.12018E-06 | 892715 | 0.000 |
| | Total for Catchment 5 | | | | 0.00001044489 | 0.45 | 4.7002E-06 | 212757 | 0.000 |

**Cumulative annual probability from catchments 3 and 4 = 0.011%**