Norwich Western Link

Environmental Statement

Chapter 12: Road Drainage and the Water Environment

Appendix 12.1: Drainage Network Water Quality Assessment

Sub Appendix C: Additional Routine Runoff on Groundwater Quality Data

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Document Reference: 3.12.01c

Version Number: 00

Date: March 2024

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1 HEWRAT assessment of pollution impacts from routine runoff to groundwater

1.1.1 **Table 1.1** to **Table 1.4** below provide a full summary of the input parameters and results for each individual outfall assessed. **Table 1.5** to **Table 1.8** below provide a full summary of the input parameters and results for the cumulative assessment.

Table 1-1 - Step One Runoff Quality Parameters

Outfall Reference	Easting	Northing	Receiving Watercourse	AADT DS 2041	Climatic Region	Rainfall Site
Basin 1	614655	315477	River Wensum (via groundwater)	47, 120 (Proposed Scheme) 16,485 (NDR Scheme) (50 – 100,000)	Warm Dry	Ipswich
Basin 2	613575	315054	River Wensum (via groundwater)	47,120 (>10,000 – 50,000)	Warm Dry	Ipswich
Basin A1067	614049	315775	River Wensum (via groundwater)	18,991 (>10,000 – 50,000)	Warm Dry	Ipswich
Basin 3	612448	315185	River Wensum (via groundwater)	47,120 (>10,000 – 50,000)	Warm Dry	Ipswich
Basin 4	612732	315018	River Wensum (via groundwater)	47,120 (>10,000 – 50,000)	Warm Dry	Ipswich

Table 1-2 – Step Two River Impacts Parameters

Outfall Reference	Base Flow Index (BFI)	Hardness (mg CaCO3/l)	Q95 Flow (m3/s)	Impermeable Area Drained to the Outfall (ha)	Permeable Area Drained to the Outfall (ha)	River Width (m)	Downstream Structure within 100m of Outfall?	Discharge in or within 1km U/S of a Designated Site?
Basin 1	0.72	High >200	0.868	4.933 (2.033 Proposed Scheme) (2.9 NDR Scheme)	1.978 (1.278 Proposed Scheme) (0.7 NDR Scheme)	10.1	No	Yes (River Wensum SSSI)
Basin 2	0.72	High >200	0.868	5.719	4.141	10.1	No	Yes (River Wensum SSSI)
Basin A1067	0.72	High >200	0.868	0.828	0.945	10.1	No	Yes (River Wensum SSSI)

Outfall Reference	Base Flow Index (BFI)	Hardness (mg CaCO3/l)	Q95 Flow (m3/s)	Impermeable Area Drained to the Outfall (ha)	Permeable Area Drained to the Outfall (ha)	River Width (m)	Downstream Structure within 100m of Outfall?	Discharge in or within 1km U/S of a Designated Site?
Basin 3	0.72	High >200	0.868	1.056	1.492	10.1	No	Yes (River Wensum SSSI)
Basin 4	0.72	High >200	0.868	6.607	2.759	10.1	No	Yes (River Wensum SSSI)

Table 1.3 – Step Three Mitigation Parameters

Outfall Reference	Existing Measures	Treatment for Solubles (%)	Discharge Rate (l/s)	Settlement of Sediments (%)
Basin 1	N/A	53 Swale (13% (25% of runoff passes through)) + 2 Basins (40% - 50% reduction from 80%)	No restriction	63 Swale (13%) (25% of runoff passes through)) + 2 Basins (50% - 50% reduction from 100%)
Basin 2	N/A	45 Swale (25%) + Basin (20% - 50% reduction from 40%)	No restriction	50 Swale (25%) + Basin (25% - 50% reduction from 50%)
Basin A1067	N/A	40 Basin (40%)	No restriction	50 Basin (50%)
Basin 3	N/A	70 Swale (50%) + Basin (20% - 50% reduction from 40%)	No restriction	100 Swale (50%) + Basin (25% - 50% reduction from 50%)
Basin 4	N/A	70 Swale (50%) + Basin (20% - 50% reduction from 40%)	No restriction	100 Swale (50%) + Basin (25% - 50% reduction from 50%)

Table 1.4 – Results

Outfall Reference	Step	Soluble Pollutants: Acute Impact Assessment of Copper	EQS Assessment: Annual Average Concentration of Copper (µg/l) due to Road Runoff	Soluble Pollutants: Acute Impact Assessment of Zinc	EQS Assessment: Annual Average Concentration of Zinc (µg/l) due to Road Runoff	Sediments: Chronic Impact Assessment of Sediment	Cumulative Assessment Required?
Basin 1	Tier 1 Step 2	Pass	0.00 (Pass)	Pass	0.01 (Pass)	Pass	Yes
Basin 1	Tier 1 Step 3	Pass	0.00 (Pass)	Pass	0.01 (Pass)	Pass	Yes
Basin 2	Tier 1 Step 2	Pass	0.00 (Pass)	Pass	0.01 (Pass)	Pass	Yes
Basin 2	Tier 1 Step 3	Pass	0.00 (Pass)	Pass	0.01 (Pass)	Pass	Yes
Basin A1067	Tier 1 Step 2	Pass	0.00 (Pass)	Pass	0.00 (Pass)	Pass	Yes
Basin A1067	Tier 1 Step 3	Pass	0.00 (Pass)	Pass	0.00 (Pass)	Pass	Yes

Outfall Reference	Step	Soluble Pollutants: Acute Impact Assessment of Copper	EQS Assessment: Annual Average Concentration of Copper (µg/l) due to Road Runoff	Soluble Pollutants: Acute Impact Assessment of Zinc	EQS Assessment: Annual Average Concentration of Zinc (µg/l) due to Road Runoff	Sediments: Chronic Impact Assessment of Sediment	Cumulative Assessment Required?
Basin 3	Tier 1 Step 2	Pass	0.00 (Pass)	Pass	0.00 (Pass)	Pass	Yes
Basin 3	Tier 1 Step 3	Pass	0.00 (Pass)	Pass	0.00 (Pass)	Pass	Yes
Basin 4	Tier 1 Step 2	Pass	0.00 (Pass)	Pass	0.01 (Pass)	Pass	Yes
Basin 4	Tier 1 Step 3	Pass	0.00 (Pass)	Pass	0.00 (Pass)	Pass	Yes

Table 1.5 – Step One Runoff Quality Parameters Cumulative Assessment

Outfall Reference	Receiving Watercourse	AADT DS 2041	Climatic Region	Rainfall Site
Basin 1 Basin 2 Basin A1067 Basin 3 Basin 4	River Wensum (via groundwater)	47,120 (Proposed Scheme) 16,485 (NDR Scheme) (50 – 100,000)	Warm Dry	Ipswich

Table 1.6 – Step Two River Impacts Parameters Cumulative Assessment

Outfall Reference	Base Flow Index (BFI)	Hardness (mg CaCO3/l)	Q95 Flow (m3/s)	Impermeable Area Drained to the Outfall (ha)	Permeable Area Drained to the Outfall (ha)	River Width (m)	Downstream Structure within 100m of Outfall?	Discharge in or within 1km U/S of a Designated Site?
Basin 1 Basin 2 Basin A1067 Basin 3 Basin 4	0.72	High >200	0.868	19.143 (16.243 Proposed Scheme) (2.9 NDR Scheme)	11.315 (10.615 Proposed Scheme) (0.7 NDR Scheme)	10.1	No	Yes (River Wensum SSSI)

Table 1.7 – Step Three Mitigation Parameters Cumulative Assessment

Outfall Reference	Existing Measures	Treatment for Solubles (%)	Discharge Rate (l/s)	Settlement of Sediments (%)
Basin 1 Basin 2 Basin A1067 Basin 3 Basin 4	N/A	40	No restriction	40

Table 1.8 – Results Cumulative Assessment

Outfall Reference	Step	Soluble Pollutants: Acute Impact Assessment of Copper	EQS Assessment: Annual Average Concentration of Copper (µg/l) due to Road r=Runoff	Soluble Pollutants: Acute Impact Assessment of Zinc	EQS Assessment: Annual Average Concentration of zinc (µg/l) due to Road r=Runoff	Sediment: Chronic Impact Assessment of Sediment
Basin 1 Basin 2 Basin A1067 Basin 3 Basin 4	Tier 1 Step 2	Pass	0.02 (Pass)	Pass	0.04 (Pass)	Pass
Basin 1 Basin 2 Basin A1067 Basin 3 Basin 4	Tier 1 Step 3	Pass	0.01 (Pass)	Pass	0.02 (Pass)	Pass