Cottam Parkway Railway Station

HEWRAT Assessment

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Lancashire County Council

Cottam Parkway Railway Station

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Contents

1. Introduction

Water quality assessments for road schemes consider both the discharge of routine runoff to the water environment and its impact upon water quality in receiving watercourses and risk of accidental spillage resulting in a pollution event in receiving watercourses. Methods for these assessments are described in DMRB, Volume 11, Section 3, Part 10: LA 113 Road Drainage and the Water Environment, published by National Highways (previously Highways England) in March 2020. LA 113 replaces HD45/09.

A broad range of potential pollutants are associated with routine runoff from operational roads. There are a number of factors which influence both the pollutant concentrations in routine runoff and whether the runoff is likely to have an impact on the receiving watercourse, including Annual Average Daily Traffic (AADT) Flows and climatic region. The potential impact of pollutants on the ecology of surface waters is also dependent on the characteristics of the receiving waters, particularly its water quality, hardness, flow volume and velocity.

The National Highways Water Risk Assessment Tool (HEWRAT) (as described in LA 113) is used to quantify these impacts.

The assessment considers concentrations of dissolved copper and dissolved zinc used as indicators of the level of impact from soluble pollutants as they are both relatively eco-toxic and for which there are well-defined Environmental Quality Standards (EQS). These two pollutants are assessed as a proxy for other pollutants (both dissolved and total), which may be present in road runoff.

2. Method

The HEWRAT tool provides an assessment of the short-term (acute) risks related to the intermittent nature of road runoff and longer-term (chronic) risks. The assessment methodology provides results which are taken as an indicator as to whether there is sufficient dispersion and dilution available such that the impacts from routine runoff are limited.

HEWRAT uses a three-step approach to assess the impacts of both soluble and sediment-bound pollutants and indicates whether the drainage system would ‘pass’ or ‘fail’ in terms of water quality in the receiving watercourse. The three-step approach is as follows:

- Step 1, runoff quality (prior to any pre-treatment and discharge into a water body);
- Step 2, in-river impacts (after dilution and dispersion); and
- Step 3, in-river impacts post-mitigation.

At Step 1, HEWRAT predicts the statistical distribution of key pollutant concentrations in untreated and undiluted highway runoff (the ‘worst-case’ scenario) over a long release period. The results are assessed on a pass/fail basis against the toxicity thresholds. These represent broad indication of runoff quality in the absence of detailed site-specific parameters and in the absence of any pre-treatment within the drainage system or in-river dilution and dispersion. The assessment typically 'fails' this step and requires progression to Step 2 which considers dilution in the receiving water (in-river impacts). Therefore Step 1 has not been recorded in Section 3 HEWRAT Assessment.

At Step 2 the assessment is more representative of site-specific conditions and requires details of the drainage catchment draining to the outfall, the low-flow volume of the receiving watercourse (Q95) and its physical dimensions to calculate the dilution of soluble pollutants and potential dispersion of sediment-bound pollutants. For the soluble pollutants that cause acute impact, this involves a simple mass balance approach. For the sediment-bound pollutants that cause chronic impact, the ability of the receiving watercourse to disperse sediments is considered based on flow velocity. If sediment is expected to accumulate, an indication of the potential extent of sediment coverage (the Deposition Index) is also provided. If the Deposition Index (DI) exceeds the set threshold (DI=100) the tool provides an indication of the level of treatment (as a percentage) required to provide a 'pass.' Step 2 contains two tiers of assessment for sediment accumulation:

- Tier 1 is a simple assessment requiring only an estimate of the river width; and
- Tier 2 is a more detailed assessment which requires specific physical dimensions of the river (such as cross section and downstream gradient).

If a Tier 1 assessment indicates no risk, then unnecessary work for a Tier 2 assessment is avoided.

Step 3 is described further in Section 2.3 Mitigation – Step 3.

In accordance with LA 113 (National Highways *et al.*, 2020a) guidance outfalls discharging from the scheme within 100m of each other have been assessed in combination for sediment-bound pollutants and within 1km of each other for soluble pollutants.

2.1 Soluble Pollution

HEWRAT uses Runoff Specific Thresholds (RSTs) developed for dissolved copper (Cu) and dissolved zinc (Zn). The RSTs are intended to protect organisms in receiving waters from short-term (acute) exposure (six hours and 24 hours) to these pollutants. The approach used to generate the RSTs is consistent with that adopted for the derivation of EQSs under the Water Environment Regulations (WER). The RSTs have been agreed with the EA and incorporated within the HEWRAT assessment tools and guidance. The RST 24 hour is designed to protect against worst case conditions whereas the RST 6 hour is designed to protect against more typical exposure conditions of aquatic organisms.

Table 1 summarises the RSTs for dissolved Cu and dissolved Zn used within HEWRAT.

Table 1: RSTs for short-term exposure

Threshold	Cu (µg/l)	Zn (µg/l) Hardness		
		Low (<50mg CaCO3/l)	Medium (50 – 200mg CaCO3/l)	High (>200mg CaCO3/l)
RST 24 hour	21	60	92	385
RST 6 hour	42	120	184	770

A HEWRAT ‘pass’ or ‘fail’ for RSTs is determined through a calculation of the number of exceedances per year; Table 2 shows the number of exceedances used to determine a HEWRAT ‘pass’.

Table 2: Number of exceedances per year required to achieve a HEWRAT ‘pass’

Pollutant	Not within 1km of Protected Site		Within 1km of Protected Site	
	RST 24	RST 6	RST 24	RST 6
Dissolved Cu	<2	<1	<1	<0.5
Dissolved Zn	<2	<1	<1	<0.5

An assessment of the long-term risks is also required to complete the risk assessment process. HEWRAT estimates in-river annual average concentrations for dissolved Cu and dissolved Zn. These concentrations can be compared with published EQSs as shown in Table 3, to assess whether there is likely to be a long-term impact on ecology.

Table 3: EQS for Cu and Zn required to achieve ‘Good’ status under WER

Pollutant	Annual mean bioavailable concentration (µg/l)
Dissolved Cu	1
Dissolved Zn	10.9

HEWRAT calculates concentrations for total dissolved Cu and Zn, and in the absence of long-term water quality data, a comparison is made for exceedance against EQS for bioavailable Cu and Zn. This results in a conservative ‘worst-case’ assessment assuming that all dissolved Cu and Zn is bioavailable and therefore has the potential to have long-term negative environmental impacts on aquatic flora and fauna.

2.2 Sediment-bound Pollution

HEWRAT also assesses chronic impacts on aquatic ecology within watercourses associated with sediment-bound pollutants. Two standards are used for metals and polycyclic aromatic hydrocarbon (PAH) in sediment respectively, these are:

- Threshold Effect Level (TEL) – concentration below which toxic effects are extremely rare; and
- Probable Effect Level (PEL) – concentration above which toxic effects are observed on most occasions.

An alert is given for outfalls that would otherwise pass the assessment for sediment-bound pollutants, were it not for the following features being present downstream:

- a protected site within 1km of the point of discharge; and
- a structure, lake or pond within 100m of the point of discharge.

In both cases, the alert indicates the need for further consideration of the proposed outfall and the agreement of appropriate settlement measures with the Environment Agency.

2.3 Mitigation – Step 3

Step 3 allows mitigation measures to be included in the assessment. Treatment efficiencies for a range of solutions (including Sustainable Drainage Systems (SuDS)) are presented in Table 8.6.4N3 'Pollution and flow control measures options' of DMRB, CG 501 Design of Highways Drainage systems (National Highways, March 2020b). The treatment efficiencies within this table for pollution control have been used in the calculation of the treatment efficiencies of the drainage systems for the Scheme.

2.3.1 Mitigation – treatment train calculations

Through recent correspondence (February 2021) directly with National Highways, to determine the combined treatment efficiency of SuDS in series (treatment train) the efficiency of each treatment component should be simply multiplied together as follows:

- converting each individual % treatment efficiency into a factor (or decimal) and subtracting it from one (1 representing total pollutant load), representing percentage of pollutant remaining after treatment;
- multiplied factors together to represent a decimal of pollutants remaining after treatment;
- subtract decimal from one (1 representing total pollutant load); and
- converting value into % to give overall treatment efficiency.

For example, CG501 suggests a Filter Drain will remove 60% of Total Suspended Solids (TSS) and a Detention Basin (dry pond) will remove 50% (see Table 2.1). Where a SuDS treatment train consists of a Filter Drain followed by a Detention Basin, the combined efficiency is calculated as follows:

- Treatment efficiencies for TSS, for a Filter Drain and a Detention basin are 60% and 50% or 0.6 and 0.5 as decimals. Subtracted from one to representing decimal of pollutant remaining, 1 – 0.6 = 0.4 and 1 – 0.5 = 0.5;
- 0.4 [Filter Drain factor] × 0.5 [Detention Basin factor] = 0.2 [combined factor];
- 1 – 0.2 [combined factor] = 0.8 (represents decimal of pollutants treated), then converting 0.8 back to a percentage to give the overall efficiency for a SuDS treatment train with Filter Drains and a Detention Basin of 80%.

2.3.2 Calculating catchment weighted treatment efficiencies

The following methodology has been used to calculate a weighted averaged treatment efficiency when treatment trains vary between two catchments (or within the same catchment) that discharged to the same watercourse and need a cumulative assessment performed.

The three main steps of the methodology are as follows:

- Step 1: Calculate percentage contribution of each catchment to the total catchment area e.g., X% = X / (X+Y);
- Step 2: Multiply catchment percentage (X%) to relevant treatment train efficiency; and
- Step 3: Add values from step 2 for final weighted treatment efficiency. Round down to the nearest whole number to avoid overestimation

2.4 Cumulative assessment methodology

Where more than one outfall discharges into the same reach of a watercourse the combined effects are typically more significant and therefore require a cumulative assessment is undertaken (subject to the proximity of the outfalls). This requires the drained areas to be added together.

The point for cumulative assessment should be downstream of the last outfall in the reach. For soluble pollutants, only outfalls within 1km of each other (measured along the watercourse) are assessed. For sediment-bound pollutants, only outfalls within 100m of each other are assessed.

2.5 HEWRAT Spillage risk assessment

For all roads, there is a risk that a spillage or vehicle fire may lead to an acute pollution incident. Generally, the risk on any road is proportionate to the risk of a Heavy Goods Vehicle (HGV) road traffic collision. Where spillages do reach a surface watercourse the pollution impact can be severe, but is usually of short duration, typical of an acute pollution impact.

The spillage risk assessment within DMRB LA 113 Appendix D (Highways England *et al.*, 2019) has been designed to calculate spillage risk during the operation of the Scheme and the associated probability of a serious pollution incident. The method initially estimates the risk that there will be an incident causing the spillage of a potentially polluting substance on the length of road being assessed. It then calculates the risk, assuming a spillage has occurred, that the pollutant will reach and impact on the receiving watercourse. The risks are expressed as annual probabilities of such an event occurring. In accordance with DMRB LA 113, cumulative spillage risk assessments should be undertaken when more than one outfall discharges into the same watercourse.

The risk of a serious pollution incident is deemed within acceptable limits if the Annual Exceedance Probability (AEP) is less than 1% (i.e., a 1 in 100-year return period or greater). Where the spillage is within 1km of a sensitive area the risk of a serious pollutant incident is deemed within acceptable limits if the AEP is less than 0.5% (i.e., a 1 in 200-year return period or greater).

3. HEWRAT Assessment

3.1 Proposed drainage

Attenuation is to be provided using oversized pipes, detention tanks and retention ponds from the drainage catchments as detailed in Table 4. Further details of the proposed drainage can be found in Appendix 11.1 (FRA) of this ES.

Table 4: Proposed attenuation and treatment for drainage catchments

Drainage Catchment (and Associated Outfall)	Northing	Easting	Receiving Watercourse	Location	Proposed Total Drainage Catchment Impermeable Area (ha)	Proposed Total Drainage Catchment Permeable Area (ha)	Attenuation Feature/ SuDS	Proposed Treatment of Cu (%)	Proposed Treatment of Zn (%)	Discharge Rate from SuDS Outfall (l/s)	Proposed Settlement of Sediments (%)
Catchment 1 (to OF1)	348816	431766	Western Watercourse	Cottam Link Road approaches	0.265 1.464 including Preston Western Distributor Road (PWDR)	0.022 0.320 including PWDR	Retention pond (as part of the PWDR scheme)	40	30	1.6 (restricted to 5l/s and unrestricted at PWDR outfall)	60
Catchment 2 (to OF2)	348819	431721	Western Watercourse	Access roundabout and approach link to canal	0.289	0.120	Retention pond	40	30	2.2 (restricted to 5l/s)	60
Catchment 3 (to OF3a and OF3b)	348840 (OF3a) 348861 (OF3b)	431598 (OF3a) 431551 (OF3b)	Western Watercourse	Cattle creeps	0.024*	0.069*	No attenuation. Piped to filter catch pits.	0	0	0.5** (restricted to 5l/s)	0
Catchment 4 (to OF4)	349337	431354	Central Watercourse	Access road from canal to Lea Road	1.064	0.241	Online attenuation tanks and oversized pipes	0	0	7.1 (restricted to 7.1l/s)	0

Drainage Catchment (and Associated Outfall)	Northing	Easting	Receiving Watercourse	Location	Proposed Total Drainage Catchment Impermeable Area (ha)	Proposed Total Drainage Catchment Permeable Area (ha)	Attenuation Feature/ SuDS	Proposed Treatment of Cu (%)	Proposed Treatment of Zn (%)	Discharge Rate from SuDS Outfall (l/s)	Proposed Settlement of Sediments (%)
Catchment 5 (to OF5)	349330	431290	Central Watercourse	Southern platform	0.081	0.000	Oversized pipes	0	0	0.4 (restricted to 5l/s)	0
Catchment 6 (to OF6)	349607	431243	Lady Head Runnel	Secondary means of escape muster area and access road	0.162	0.065	Oversized pipes	0	0	1.2 (restricted to 5l/s)	0
Catchment 7 (to OF7)	349331	431268	Central Watercourse	Secondary means of escape	0.026	0.040	No attenuation.	0	0	0.4 (restricted to 5l/s)	0
Catchment 8 (to OF8)	349334	431304	Central Watercourse	Carpark, concourse and northern platform	1.155	0.066	Attenuation tank	0	0	6.6 (restricted to 6.6l/s)	0

*Total area for the combined catchment of Catchment 3. Assume area draining to each outfall, OF3a and OF3b will be approximately half this value.

**Value based on total catchment area of Catchment 3. Assume value will be approximately half for each outfall, OF3a and OF3b due to reduced area draining to each outfall.

3.2 Approach to Assessment

Potential for impacts from routine runoff were assessed for the Western Watercourse and Central Watercourse as these are proposed to receive road drainage from outfalls.

The proposed drainage design will consist of new and existing outfalls. Drainage catchments 1, 2 and 4 all drain active roads and a HEWRAT assessment for routine runoff has been undertaken on the outfalls corresponding to these catchments. Drainage catchment 1 has been designed to combine with a catchment in the PWDR scheme, and receive treatment from the same retention pond before discharging to Western Watercourse. This additional catchment has been reported in the assessments below for 'OF1 single assessment' and 'OF1 to OF2 cumulative assessment'. Drainage catchments 3, 5, 6, 7 and 8 drain traffic free or low traffic areas (cattle creeps, the southern platform, secondary means of escape muster area, access road, secondary means of escape, the station car park, concourse and northern platform, respectively). Therefore, outfalls 3a, 3b, 5, 6, 7 and 8 have been scoped out of the HEWRAT assessment..

3.3 Data used in the Routine Runoff Assessments – Simple Level

The input data and associated sources used within the routine runoff assessments are presented in Table 5 and Table 6 provides the remaining input data specific to each drainage catchment in addition to the data in Table 4. All assessments passed for sediment bound pollutants at Step 2 Tier 1 and thus it was not deemed necessary to undertake Step 2 Tier 2 assessments.

Table 5: Parameters used in HEWRAT and sources for the values used

Parameter	Value Used	Notes/ Data Sources
Annual Average Daily Traffic (AADT)	>10,000 and <50,000	Design year 2039. Source: Jacobs' traffic modelling team.
Climatic Region	Colder Wet	Source: HEWRAT Help v2.0 (National Highways, 2015).
Rainfall Site	Warrington (SAAR 830mm).	Source: HEWRAT Help v2.0 (National Highways, 2015).
Hardness	High = >200mg $CaCO_3$/l	Worst-case scenario. EA water quality monitoring data for Deepdale Brook (west of study area) as donor information (EA, 2021).
Q95 (95th percentile) River Flow (m^3/s)	Specific to each outfall location	Source: Wallingford Hydro Solutions (2021) and Jacobs' hydrologists.
Baseflow Index (BFI)	Specific to each outfall location	Source: Flood Estimation Handbook (FEH) Web Service (CEH, 2021).
Impermeable and permeable area draining to outfall (ha)	Specific to each drainage catchment	Source: Scheme information.
Receiving watercourse dimensions for Tier 1(estimated river width at Q95)	Specific to each outfall location	Source: assume lowest permissible value of 0.1m due to low flow conditions.

Parameter	Value Used	Notes/ Data Sources
Receiving watercourse dimensions for Tier 2 (bed width, side slope and long slope)	N/A. Tier 2 not required	N/A. Tier 2 not required.
Receiving watercourse Manning's n	N/A. Tier 2 not required	N/A. Tier 2 not required.
Existing treatment of solubles and sediment (%)	0	Precautionary approach to assume no existing treatment.
Proposed treatment of solubles and sediments (%)	Specific to each drainage catchment	Sources: SuDS Manual (C753) Table 26.13 – Performance of SuDS components in reducing urban runoff contamination (CIRIA, 2015) and DMRB CG 501 (National Highways *et al.*, 2020b) Table 8.6.4N3 – Indicative Treatment Efficiencies of Drainage Systems.
Proposed attenuation – restricted discharge rate (l/s) to QBAR	Specific to each drainage catchment	Source: Scheme information.

Traffic data AADT values for the assessed catchments for 2039 are all below 10,000. HEWRAT lowest traffic band for running the assessments is 10,000 to 50,000 AADT, therefore the result will be conservative when assessed at this higher band.

Q95 values for Savick Brook and Lady Head Runnel have been purchased from Wallingford Hydro Solutions (2021). Q95 values at the individual outfall locations have been estimated from these values based upon a proportional area calculation. Where these values are less than 0.0011 m^3/s, the lowest Q95 permissible in HEWRAT before the watercourse is considered to be a soakaway (0.0011 m^3/s) has been used.

The low flow (Q95) data provided by WHS (2021) for Savick Brook and Lady Head Runnel indicates a BFI of 0.376 for the Savick Brook catchment and 0.351 for Lady Head Runnel catchment. The later of these values has been used to best represent the other catchments within the assessments.

Water quality data from monitored sites by the Environment Agency (EA, 2021) provided water hardness values, as total CaCO3, in mg/l or water for Deepdale Brook. Deepdale Brook is within the Savick Brook catchment, downstream of the study area and drains a catchment of 4.89km^2 to the west of the Scheme. The monitored data covers monthly hardness levels from 2014 and 2015 ranges from 204-272 mg/l with an average of 241 mg/l. The assessments were therefore run with High water hardness, as the values are >200mg CaCO3 / l.

There are no statutory designated nature conservation sites within 1km downstream of any outfalls from the Scheme.

Table 6: Additional input data for HEWRAT Assessments

Outfall Number	Receiving Watercourse	AADT from 2039 traffic Model	Annual Q95 River Flow (m3/s)	BFI Index	Is the Discharge within 1km of Protected Site?	For dissolved Cu only - Ambient background (ug/l)	Downstream Structure Reducing Velocity within 100m? (Yes/No)	Estimated River Width at Q95 (m)
1	Western Watercourse	4714	0.001	0.351	No	0	No	0.1
1 (including PWDR)	Western Watercourse	4714	0.001	0.351	No	0	No	0.1
2	Western Watercourse	4714	0.001	0.351	No	0	Yes	0.1
4	Central Watercourse	1120	0.002	0.351	No	0	Yes	0.1

3.4 Summary of results – simple assessment

A Step 2 Tier 1 assessment was undertaken using HEWRAT based upon the input parameters presented in Table 7 for catchments 1, 2 and 4 at the corresponding proposed outfalls individually, and cumulatively for catchments 1 and 2, prior to any mitigation being considered. The results of the assessments are summarised in Table 7. Within these tables, a traffic light system has been used to aid interpretation:- green shading indicates a HEWRAT 'pass', and red shading indicates HEWRAT 'fail'. Where a Pass result is accompanied with an 'Alert', the reasons for this 'Alert' are detailed in brackets.

Table 7: Routine Runoff Assessment (Step 2 Tier 1) Results for Single and Cumulative outfalls without mitigation

Outfall	**Sediment -bound pollutants (Pass/Fail)(Deposition index – where fails)**	**Annual average concentration soluble***		**Acute Soluble Copper & Zinc: Number of exceedances per year (RST exceedance limits in brackets)**			
		Copper (ug/l) (EQS = 1)	**Zinc (ug/l) (EQS = 10.9)**	**Copper RST 24 (2)**	**Copper RST 6 (1)**	**Zinc RST 24 (2)**	**Zinc RST 6 (1)**
Single Outfall Assessments							
1	Pass	0.18	0.65	0.10	0.00	0.00	0.00
1 (including PWDR)	Pass	0.74	2.53	0.90	0.20	0.00	0.00
2	Pass (with Alert due to d/s structure)	0.20	0.69	0.10	0.00	0.00	0.00
4	Pass (with Alert due to d/s structure)	0.36	1.27	0.20	0.10	0.00	0.00
Cumulative Outfall Assessments							
1 and 2	Pass (with Alert due to d/s structure)	0.35	1.21	0.20	0.10	0.00	0.00
1 (including PWDR) and 2	Pass (with Alert due to d/s structure)	0.84	2.85	1.20	0.20	0.00	0.00

All single and cumulative assessments undertaken passed all aspects of the HEWRAT routine runoff assessment at the Step 2 stage, including EQS compliance for Copper and Zinc. An 'Alert' warning is associated with the Pass results for the sediment-bound pollutant aspect of the assessment for single outfalls 2 and 4 and cumulative outfalls 1 and 2. This is due to the presence of a culvert within 100m downstream of the respective proposed outfall locations.

3.4.1 Step 3 Assessment for Mitigation for acute soluble impacts

As all aspects of HEWRAT pass at Step 2, the impact of SuDS considered as part of Step 3 (inclusion of mitigation measures), and incorporated into the design, demonstrate the betterment of water quality delivered within the receiving watercourses of the Scheme outfalls.

Treatment efficiencies used are presented in Table 6.

Table 8 presents the results of the Step 3 assessments for those outfalls with acute soluble failures.

All single and cumulative assessments undertaken passed all aspects of the HEWRAT routine runoff assessment at the Step 2 stage, including EQS compliance for Copper and Zinc. An 'Alert' warning is associated with the Pass results for the sediment-bound pollutant aspect of the assessment for single outfalls 2 and 4 and cumulative outfalls 1 and 2. This is due to the presence of a culvert within 100m downstream of the respective proposed outfall locations.

Table 8: Step 3 Results

Outfall	**Mitigation Proposed in design and included in Step 3 assessment**	**Sediment - bound pollutants (Pass/Fail) (Deposition index – where fails)**	**Annual average concentration soluble***		**Acute Soluble Copper & Zinc: Number of exceedances per year (RST exceedance limits in brackets)**			
			Copper (ug/l) (EQS = 1)	**Zinc (ug/l) (EQS = 10.9)**	**Copper RST 24 (2)**	**Zinc RST 24 (2)**	**Copper RST 6 (1)**	**Zinc RST 6 (1)**
Single Outfall Assessments								
1	Retention Pond	Pass	0.11	0.45	0.00	0.00	0.00	0.00
1 (including PWDR)	Retention Pond	Pass	0.44	1.77	0.20	0.10	0.00	0.00
2	Retention Pond	Pass (with Alert due to d/s structure)	0.12	0.48	0.00	0.00	0.00	0.00
4	Pipe surcharge and offline detention tank	Pass (with Alert due to d/s structure)	0.36	1.27	0.20	0.10	0.00	0.00
Cumulative Outfall Assessments								
1 and 2	Retention Ponds	Pass (with Alert due to d/s structure)	0.21	0.85	0.10	0.00	0.00	0.00
1 (including PWDR) and 2	Retention Ponds	Pass (with Alert due to d/s structure)	0.50	1.99	0.30	0.10	0.00	0.00

The treatment efficiencies (%) given by the Step 3 assessments are very precise, however, current best practice does not provide precise, accurate or robust treatment efficiencies for the available treatment options. Therefore, a degree of pragmatism is required when designing a drainage system to meet the required treatment.

With the mitigation proposed within the current design, for single and cumulative assessments, the Step 3 assessments show all outfalls pass for EQS compliance and acute soluble pollutants.

3.5 Accidental Spillage Risk Results

This section presents the results of the HEWRAT spillage risk assessment for the Scheme. With reference to Table 9, an annual probability of a serious pollutant incident occurring less than 0.5% (return period of >200 years) is deemed to have a Negligible magnitude of impact. This magnitude of impact, regardless of importance of receptor always results in a residual effect that is not environmentally significant (Slight or Neutral), in accordance with DMRB LA 113 (National Highways *et al*., 2020a).

Where outfalls deemed part of the Scheme, are not documented in Table 9 (i.e., catchments 3a, 3b, 5, 6, 7 and 8), this indicates paved areas within these drainage catchments have not been included in the traffic model due to them being very low or non-trafficked roads.

Table 9: Summary of Spillage Risk Assessment results

Outfall Number and Receiving Watercourse	Return Period (Years) of Spillage	Does it Meet Acceptable Limits, i.e., Return Period >100 / >200 years / Negligible Magnitude of Impact?	Overall Environmental Significance
Single Catchment Assessments			
Catchment 1, Western Watercourse	209,780	Yes	Not Significant
Catchment 2, Western Watercourse	461,765	Yes	Not Significant
Catchment 4, Central Watercourse	21,084,427	Yes	Not Significant
Cumulative Catchment Assessment			
Catchment 1 and 2, Western Watercourse	144,248	Yes	Not Significant

Table 9 shows that for all outfalls throughout the Scheme, spillage risk assessment results are deemed to be well within acceptable limits in accordance with DMRB LA 113, even when compared to the most sensitive annual probability threshold (0.5% or return period >200 years). All results from the spillage risk assessment represent a negligible environmental impact.

3.6 Residual significance of effect and conclusions

Table 3.71 of DMRB LA 113 details the criteria for identifying the magnitude of impacts and includes criteria relating to routine runoff, and this is reproduced in Table 10 below.

Accidental spillage risk criteria are also included in DMRB LA 113 for the determination of magnitude of impact upon water receptors. All catchments recorded a pass for accidental spillage for all outfalls and thus this has not been a factor in determining the magnitude of impact.

Table 10: Routine runoff criteria for establishing the magnitude of impact

Magnitude of impact	Criteria
Major adverse	Failure of both acute-soluble and chronic-sediment related pollutants in HEWRAT and compliance failure with EQS values.
Moderate adverse	Failure of both acute-soluble and chronic-sediment related pollutants in HEWRAT but compliance with EQS values.
Minor adverse	Failure of either acute soluble or chronic sediment related pollutants in HEWRAT.
Negligible	No risk identified by HEWRAT (pass both acute-soluble and chronic-sediment related pollutants).

Given the criteria above, operational drainage has a negligible effect on surface water quality. The resulting residual significance of effect when combined with importance of the receiving watercourse is presented in Table 11. Overall, the significance of effect is Neutral which is non-significant in EIA regulations.

Table 11: Residual significance of effect on watercourses assessed with HEWRAT

Receiving Watercourse	Assigned Importance of Watercourse	Magnitude of impact of operational drainage, based on HEWRAT routine runoff and spillage risk assessments	Residual Significance of effect
Western Watercourse	Medium	Negligible	Neutral
Central Watercourse	Medium	Negligible	Neutral

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