

A14 Cambridge to Huntingdon improvement scheme

Environmental Statement

Appendices

Appendix 17.2: Highways Agency Water Risk Assessment Tool (HAWRAT)

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6.3

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1	Introduction	1
1.1	Introduction	1
2	Methodology	2
2.1	Introduction	2
2.2	Method A – Effects of routine runoff on surface waters	2
2.3	Environmental Quality Standards within HAWRAT	3
2.4	Method D – Pollution impacts from accidental spillages	3
2.5	Limitations	4
3	Overview of the HAWRAT input parameters	5
4	Results of the assessment	7
4.2	Method A results: Effects of routine runoff – non cumulative and cumulative outfall assessment	7
4.3	Environmental quality standards within HAWRAT	9
4.4	Method D results: Accidental spillages	10
4.5	Assessment	12
4.6	Summary of HAWRAT outputs	15
5	Conclusion	28
6	Bibliography	29
	Annex 1: Road drainage outfall details	
	Annex 2: Individual assessment inputs and outputs	
	Annex 3: Cumulative assessment inputs and outputs	
	Annex 4: Accidental spillage risk calculation	

1 Introduction

1.1 Introduction

- 1.1.1 This report is an appendix of the A14 Cambridge to Huntingdon improvement scheme (the scheme) *Environmental Statement (ES)*. It presents a summary of the water quality assessment undertaken to assess potential impacts of routine runoff and accidental spillage risk to watercourses resulting from the scheme. It also presents the policy and legislative context within which the environmental impact assessment (EIA) has been carried out. Impacts on and mitigation for water quality are considered in *Chapter 17 of the ES*.
- 1.1.2 This assessment of routine runoff has been undertaken using the Highways Agency Water Risk Assessment Tool (HAWRAT), as prescribed in Method A of the *Design Manual for Roads and Bridges Volume 11, Section 3, Part 10, HD45/09- Road Drainage and the Water Environment (DMRB HD45/09)* (Highways Agency et al., 2009).
- 1.1.3 The assessment of accidental spillage risk has been undertaken using Method D as prescribed in the *DMRB HD45/09* (Highways Agency et al., 2009).
- 1.1.4 This technical note forms part of the environmental impact assessment (EIA) for the scheme and as such should be read in conjunction with the relevant sections in *Chapter 17 of the ES*.

2 Methodology

2.1 Introduction

2.1.1 This assessment has been undertaken in accordance with the *DMRB HD45/09* (Highways Agency et al., 2009), specifically:

- Method A - Effects of routine runoff on surface waters; and
- Method D - Pollution impacts from accidental spillages.

2.2 Method A – Effects of routine runoff on surface waters

Effects of routine runoff - HAWRAT assessment

2.2.1 The Method A assessment is undertaken using the Highways Agency Water Risk Assessment Tool (HAWRAT). HAWRAT adopts a tiered approach as follows:

- Step 1: Runoff quality. This predicts concentrations of pollutants in untreated and undiluted highway runoff prior to any treatment and dilution in a water body.
- Step 2: In-river impacts. This predicts concentrations of pollutants after mixing within the receiving water body. At this stage, the ability of the receiving watercourse to disperse sediments is considered and, if sediment is predicted to accumulate, the potential extent of sediment coverage (i.e. the deposition index, DI) is also considered.

Step 2 also incorporates two 'tiers' of assessment for sediment accumulation, based on different levels of input parameters. If one or more risks are defined as unacceptable at Tier 1, i.e. 'fail', then a more detailed Tier 2 assessment is undertaken, requiring values for further parameters relating to the physical dimensions of the receiving watercourse.

- Step 3: In-river impacts with mitigation. Steps 1 and 2 assume that the road drainage system incorporates no mitigation measures to reduce the risk. Step 3 includes mitigation in the form of Sustainable Drainage Systems (SuDS), taking into account the risk reduction associated with any existing measures or any proposed new measures.

Cumulative assessment within HAWRAT

2.2.2 Following *DMRB HD45/09* (Highways Agency et al., 2009) guidance, all outfalls along a river stretch within 1km have been assessed in combination for soluble pollutants, whilst all outfalls along a river stretch within 100m have been assessed in combination for sediment-bound pollutants.

2.2.3 Using the above guidance and ArcGIS techniques, an approximate distance between outfalls in the drainage scheme has been assessed and the requirements for in-combination assessments identified. The outfall assessment point is usually at, or close to, the outfall furthest downstream in the reach. Specification of the exact point within the watercourse for the in-combination drainage outfall assessment is based on professional judgement of suitably qualified and experienced specialists, as listed in *Appendix 6.1 of the ES*.

2.3 Environmental Quality Standards within HAWRAT

2.3.1 To complete the water quality assessment process long term risks on receiving water ecology (using annual average concentrations) have also been appraised. HAWRAT estimates in-river annual average concentrations for soluble pollutants (dissolved copper and dissolved zinc), including the contribution from road runoff. These concentrations have been compared against published Environmental Quality Standards (EQS) values to assess whether a long-term impact on ecology would be likely to occur, as shown in *Table 2.1*. These figures have been taken from the *DMRB HD 45/09* (Highways Agency et al., 2009), where it is noted that the figures for dissolved zinc are provisional.

Table 2.1: EQS for the protection of all freshwater life

Parameter	Hardness range (mg/l CaCO ₃)	Freshwater EQS (µg/l) (annual average)
Dissolved Copper	0 – 50	1
	>50 – 100	6
	>100 – 250	10
	>250	28
Dissolved Zinc	0 – 50	7.8
	>50 – 100	
	>100 – 250	
	>250	

2.4 Method D – Pollution impacts from accidental spillages

2.4.1 Assessment of accidental spillages of polluting substances from roads has been carried out using Method D as prescribed in *DMRB HD45/09* (Highways Agency et al., 2009) to ensure provision of appropriate drainage design measures where the risk of a serious pollution incident is more frequent than the 1% annual exceedance probability (AEP) (or more frequent than 1 in 100 year return period). For more sensitive watercourses, a higher level of protection has been afforded up to the 0.5% AEP (or more frequent than 1 in 200 years).

- 2.4.2 The results of the assessment are reported as 'pass' or 'fail'. The risk of an acute pollution incident due to accidental spillage or vehicle fire is considered proportionate to the risk of a heavy goods vehicle (HGV) road traffic collision. Thus, the percentage of HGV's on a given road is the main parameter used in assessment of the risk of serious pollution accidents. Other parameters considered include the type and length of road, two-way annual average daily traffic (AADT) flow (projected for the design year 2035 "do something" scenario) and emergency services response time depending on whether a site is in an urban, rural or remote setting. If the accidental spillage is less than or equal to 1% AEP (or 0.5% AEP for sensitive watercourses), the risk is considered acceptable.

2.5 Limitations

- 2.5.1 Definition of the catchment areas for some of the watercourses has been difficult due to the low lying nature of the land and the historic human interventions in draining the Fens in the 17th century. This has produced a complex network of drains which do not necessarily tie in with the small variations in topography. As a result, standard approaches regularly used in road schemes do not provide fine enough topographical resolution to delineate the catchments. To overcome this, LiDAR data was processed to produce a high resolution watershed map of the corridor of the road route, with drainage paths inferred. This high resolution data could still not incorporate all the detail of the drainage network; therefore final catchments were derived by hand, combining map, watershed analysis and site visit information. The catchments have been used to define low flow estimates using areal scaling of low flows enterprise (LFE) flow estimates for a series of representative catchments, primarily assigned on soils information.
- 2.5.2 Many of the watercourses identified as receptors are small, and consequently have very low flow (Q95, i.e. the flow that is expected to be exceeded 95% of the time) estimates. In these instances the default value of 0.001m³/s, as recommended by *DMRB HD45/09* (Highways Agency et al., 2009), has been utilised.
- 2.5.3 HAWRAT calculates the dilution potential of soluble pollutants based on the watercourse flow rate under low flow conditions. This is when exceedances of the ecological thresholds are most likely; referred to as 'Q95' (the flow that is expected to be exceeded 95% of the time), and also takes into account the river velocity to estimate whether sediment is likely to accumulate. When the Q95 value is low (0.0001m³/s) this indicates to HAWRAT that there is limited to no dilution potential available in the watercourse. In these instances when the Q95 is low even with mitigation (i.e. SuDS) in place, a 'pass' result is difficult to achieve as the HAWRAT tool assumes that there is very limited dilution of pollutants.
- 2.5.4 HAWRAT is an indicative assessment tool only, and the pass/fail result is not intended to be rigid.
- 2.5.5 The exact drainage arrangements on the existing A1 and A14 and surrounding road were not known at the time of the assessment.
- 2.5.6 There was no detailed topographical information available at the time of the assessment.

3 Overview of the HAWRAT input parameters

- 3.1.1 The study area for the HAWRAT assessment encompasses all the watercourses that would receive road runoff from the proposed development (*Figure 17.4*). In total there would be 78 outfalls (drainage catchments) discharging from the proposed development to over 20 watercourses. *Annex 1* contains a list of the outfalls, receiving watercourse, impermeable/permeable road drainage areas and SuDS proposals for each outfall.
- 3.1.2 This section provides an overview of the input parameters used within the HAWRAT. Detailed input parameters for the individual and cumulative outfall assessments are provided in *Annex 2* and *Annex 3*, respectively.
- 3.1.3 The main parameters used in the HAWRAT are as follows: two-way annual average daily traffic (AADT), standard average annual rainfall (SAAR), Q95 flow in a given watercourse, road area drained, water hardness and physical attributes of a given watercourse. To complete the assessment, drainage design measures (or mitigation measures) were incorporated into an assessment.
- 3.1.4 The following input parameters were provided by the drainage design team:
- location of the outfalls;
 - receiving watercourse;
 - permeable and impermeable road area drained to outfall; and
 - type and number of treatment (SuDS) proposals.
- 3.1.5 *Chapter 3 of the ES* provides details of the engineering proposals including the drainage design measures for the proposed development, such as:
- swales;
 - sediment tanks/basins;
 - vortex grit removers;
 - storage ditches;
 - ditches;
 - treatment ponds;
 - balancing pond including reed beds;
 - settlement forebays; and
 - spillage containment.
- 3.1.6 Reference has been made to the two-way AADT figures for the scheme for the design year 2035 “do something” scenario.
- 3.1.7 The study area falls within the climatic region “warm and dry” and the rainfall site “Huntington” with a SAAR of 600mm.

- 3.1.8 Low flows (Q95) have been calculated for each watercourse receiving runoff. LFE flow estimate data for three locations along the A14 were obtained; the LFE data contains a flow duration curve which includes the Q95. The catchment characteristics of each outfall location have been analysed and each outfall grouped to a particular LFE location. The LFE Q95 values were then scaled by area to produce a Q95 estimate for each outfall location.
- 3.1.9 Water quality data collected in 2007 (ENVIRONUK, 2009) was used to determine the appropriate water hardness band to be applied in HAWRAT. For any watercourse not sampled as part of the 2007 monitoring, the relevant value was assumed from nearby 'donor' watercourses where sampling had been undertaken. All watercourses have been deemed to have high water hardness, i.e. greater than 200mg CaCO₃/l.
- 3.1.10 Information to inform the 'Tier 1' assessment for sediment accumulation, more specifically the watercourse widths, was obtained from OS mapping. As stated in *Section 2.5* (limitations) above, there was no detailed topographical information available at the time of the assessment.
- 3.1.11 The drainage design measures treatment efficiencies (%) were provided by the Highways Agency and these have been agreed between the Highways Agency and the Environment Agency. Where there would be more than one SuDS measure proposed in the drainage design, i.e. a swale in combination with an attenuation/treatment pond, a cumulative efficiency percentage has been applied in agreement with the drainage design team.

Table 3.1 Drainage System Efficiencies

System	Copper	Zinc	Sediment
One treatment/storage pond	40	30	70
Swales	50	50	80
Swales + one treatment/storage pond	70	65	90
One treatment/storage pond + one sedimentation tank	40	30	82
One treatment/storage pond + one vortex grit remover	40	40	82
One treatment/storage pond + one sedimentation tank + one vortex grit remover	40	40	90
One treatment/storage pond + a ditch (with a valve)	50	40	78
One treatment/storage pond + a ditch (with a valve) + one sedimentation tank	50	40	87
Storage Ditch including reed bed area and spillage containment shut-off valve at outfall	30	25	50
Storage Ditch including reed bed area and spillage containment shut-off valve at outfall + one sedimentation tank	30	25	70
Storage Ditch including reed bed area and spillage containment shut-off valve at outfall + one vortex grit remover	30	40	70
Storage Ditch including reed bed area and spillage containment shut-off valve at outfall + one sedimentation tank + one vortex grit remover	30	30	82

4 Results of the assessment

4.1.1 This section summarises the results of the HAWRAT routine runoff and accidental spillage risk assessments. The potential impacts from the scheme have also been assessed and presented within *Chapter 17 of the ES*.

4.2 Method A results: Effects of routine runoff – non cumulative and cumulative outfall assessment

4.2.1 A summary of the results for the individual and in-combination HAWRAT assessments for the drainage outfalls are provided in *Tables 4.1* and *Table 4.2*, respectively. Detailed results are shown in *Tables 4.4* and *Table 4.5*. The inputs and detailed outputs of the HAWRAT individual and in-combination outfall assessments are provided in *Annex 2* and *Annex 3*, respectively.

4.2.2 The results of the HAWRAT individual outfall assessments indicate that 45 of the 78 outfalls, without considering the drainage scheme (Step 2: In-river impacts), could compromise water quality in the receiving watercourse, i.e. 'fail' the HAWRAT assessments. A number of iterations the HAWRAT were undertaken to determine the appropriate level mitigation required for each outfall. With the drainage scheme in place (Step 3), a total of 12 outfalls had fails as follows:

- five for dissolved copper only;
- five for sediment only; and
- two for both dissolved copper and sediment.

4.2.3 Dissolved zinc did not fail as water hardness and toxicity of zinc is inversely proportional. Therefore, a high water hardness resulted in low toxicity.

Table 4.1: Summary of individual outfall routine runoff assessments

Number of outfalls	Assessment against EQS no. of fails prior to drainage design	HAWRAT assessment no. of fails prior to drainage design	Assessment against EQS no. of fails with drainage design	HAWRAT assessment no. of fails with drainage design	HAWRAT assessment no. of fails with drainage design (both dissolved copper and sediment)
Section 1 - A14 offline					
14 (outfalls 1-14)	0	12	0	4	1
Section 1 - A1					
11 (outfalls 15-25)	0	5	0	1	0

Number of outfalls	Assessment against EQS no. of fails prior to drainage design	HAWRAT assessment no. of fails prior to drainage design	Assessment against EQS no. of fails with drainage design	HAWRAT assessment no. of fails with drainage design	HAWRAT assessment no. of fails with drainage design (both dissolved copper and sediment)
Section1 - Huntingdon town centre					
3 (HTC1-HTC-3)	0	0	0	0	0
Section 2 - A14 online					
39 (outfalls 26-64)	0	20	0	5	0
Section 3 - Girton interchange					
9 (outfalls 65-73)	0	6	0	0	0
Section 4 - A14 Cambridge Northern bypass					
2 (outfalls-74&75)	1	2	0	2	1
Total					
78 (outfalls-1-75& HTC1-HTC-3)	1	45	0	12	2

4.2.4 For the combined assessment a number of iterations of the HAWRAT assessment were undertaken. These iterations centred around the appropriate combined assessment traffic band to be used. Not all permeable/impermeable areas assessed under the combined assessment are subject to the same traffic levels. For example the mainline may be subject to traffic in the region of 40,000 to 100,000 AADT however, side roads, slip roads and roundabouts would be subject in many instances to much lower levels. To reflect this in the combined assessment the percentage of the combined drainage catchments areas were broken into percentages subject to the various traffic levels. For example combined assessment number No. 10 (outfalls 33-39) is broken down as follows; 20% of the combined drainage catchments is subject to 100,000+ AADT, 60% is subject to 50,000+ AADT and, 20% is subject to 10,000 to 20,000 AADT. Therefore, the appropriate traffic band is 50,000-100,000 AADT. This is the approach taken to derive the traffic bands on all combined drainage catchments.

4.2.5 *Table 4.2* provides a summary of routine runoff results from HAWRAT for the in-combination assessments. A total of 24 in-combination assessments were undertaken; 18 for sediment-bound and soluble pollutants (i.e. outfalls within 100m along a reach) and six for soluble pollutants only (i.e. outfalls within 100m and 1km along a reach). Without mitigation, 22 of the 24 in-combination assessments failed the HAWRAT assessments. With the drainage scheme in place a total of 14 in-combination assessments had failures. Regarding the soluble pollutants-only assessments there was three 'fails' for copper only. For the sediment and soluble assessments there were:

- no 'fails' for both soluble copper and sediment;
- four for copper only; and
- seven for sediment only.

Table 4.2: Summary of combined outfall routine runoff assessments

Assessment type	No.	Assessment against EQS no. of fails prior to drainage design	HAWRAT assessment no. of fails prior to drainage design	Assessment against EQS no. of fails with drainage design	HAWRAT assessment no. of fails with drainage design
Soluble pollutant only	6	2	5	0	3
Soluble and sediment pollutants	18	3	17	0	11
Total	24	5	22	0	14

4.3 Environmental quality standards within HAWRAT

4.3.1 The HAWRAT outputs (annual average concentrations for soluble pollutants dissolved copper and dissolved zinc) were compared against the Environmental Quality Standards (EQS) contained within *DMRB HD45/09*, and in the majority of cases, levels were below the annual average EQS (AA-EQS). However, one out of the 78 individual outfall assessments exceeded the provisional EQS for dissolved zinc (7.8ug/l) prior to consideration of the drainage scheme. However, with mitigation in place this outfall has been assessed as being within the provisional EQS for dissolved zinc (*Table 4.1*).

4.3.2 For the combined outfall assessments, five of the 24 combined assessments exceeded the provisional EQS for dissolved zinc (7.8ug/l) prior to consideration of the drainage scheme. However, with the drainage scheme in place, no outfalls exceed the provisional EQS for dissolved zinc (*Table 4.2*).

4.4 Method D results: Accidental spillages

- 4.4.1 The accidental spillage risk assessment has been carried out in accordance with Method D and this is presented within *Annex 4*. The function within the HAWRAT tool was also used to validate the results; however, due to the scale of the scheme, the outputs of the HAWRAT tool in relation to accidental spillage are not presented within this appendix.
- 4.4.2 *Table 4.3* summarises the accidental spillage risk assessment results and shows that, without consideration of the drainage scheme, there would be no discharge with a serious spillage risk more frequent than the 1% and 0.5% AEP (1 in 100 year and 1 in 200 year return period) thresholds, as detailed in *Section 2.4*.

Table 4.3: Results for accidental spillage risk

Outfall reference	Receiving watercourse	Risk threshold	Spillage risk pass/fail
Section 1 - A14 offline			
1	Brampton Drain/Brook	0.5%	Pass
2	Brampton Drain/Brook	0.5%	Pass
3	Brampton Drain/Brook	0.5%	Pass
4	Grafham Road Drain	1%	Pass
5	IDB Drain	1%	Pass
6	Ouse East Drain	1%	Pass
7	Offord Road Drain	1%	Pass
8	Huntingdonshire D.C. Award Drain	1%	Pass
9	West Brook	1%	Pass
10	Hilton Road Drain	1%	Pass
11	Conington Road Drain	1%	Pass
12	Conington Road Drain	1%	Pass
13	Conington Road Drain	1%	Pass
14	Oxholme Drain	1%	Pass
Section 1 - A1			
15	Brampton Drain/Brook	0.5%	Pass
16	Brampton Drain/Brook	0.5%	Pass
17	Drain to Ellington Brook	1%	Pass
18	Drain to Ellington Brook	1%	Pass
19	Drain to Ellington Brook	1%	Pass
20	Drain to Ellington Brook.	1%	Pass
21	Land Drain to Alconbury Brook	1%	Pass
22	Drain to Cock Brook	1%	Pass
23	Cock Brook	1%	Pass

Outfall reference	Receiving watercourse	Risk threshold	Spillage risk pass/fail
24	Cock Brook	1%	Pass
25	Cock Brook	1%	Pass
Section 1 - Huntingdon town centre			
HTC1	Great Ouse	0.5%	Pass
HTC2	Alconbury Brook	0.5%	Pass
HTC3	Existing A14 Highway drainage network	0.5%	Pass
Section 2 - A14 online			
26	Covell's Drain	1%	Pass
27	Drain to Fen Drayton	1%	Pass
28	Drain to Fen Drayton	1%	Pass
29	Drain to Fen Drayton	1%	Pass
30	Drain to Fen Drayton	1%	Pass
31	Drain to Fen Drayton	1%	Pass
32	Drain to Fen Drayton	1%	Pass
33	Swavesey Drain 1	0.5%	Pass
34	Swavesey Drain 1	0.5%	Pass
35	Swavesey Drain 1	0.5%	Pass
36	Swavesey Drain 1	0.5%	Pass
37	Swavesey Drain 1	0.5%	Pass
38	Swavesey Drain 1	0.5%	Pass
39	Swavesey Drain 1	0.5%	Pass
40	Swavesey Drain 2 (Utton's Drove Drain)	0.5%	Pass
41	Swavesey Drain 2 (Utton's Drove Drain)	0.5%	Pass
42	Swavesey Drain 2 (Utton's Drove Drain)	0.5%	Pass
43	Swavesey Drain 2 (Utton's Drove Drain)	0.5%	Pass
44	Swavesey Drain 3 (Ch24+707)	0.5%	Pass
45	Swavesey Drain 3 (Ch24+707)	0.5%	Pass
46	Longstanton Brook	1%	Pass
47	Longstanton Brook	1%	Pass
48	Longstanton Brook	1%	Pass
49	Longstanton Brook	1%	Pass
50	Drain to Longstanton Brook	1%	Pass
51	Drain to Longstanton Brook	1%	Pass
52	Oakington Brook	1%	Pass
53	Oakington Brook	1%	Pass
54	Oakington Brook	1%	Pass

Outfall reference	Receiving watercourse	Risk threshold	Spillage risk pass/fail
55	Oakington Brook	1%	Pass
56	Drain to Oakington Brook	1%	Pass
57	Drain to Oakington Brook	1%	Pass
58	Drain to Oakington Brook	1%	Pass
59	Drain to Oakington Brook	1%	Pass
60	Dry Drayton Junction Drain	1%	Pass
61	Cottenham Lode (Beck Brook)	1%	Pass
62	Cottenham Lode (Beck Brook)	1%	Pass
63	Swavesey Drain 3	1%	Pass
64	Dry Drayton Junction Drain	1%	Pass
Section 3 - Girton interchange			
65	Drain to Oakington Brook	1%	Pass
66	Cottenham Lode (Beck Brook)	1%	Pass
67	Cottenham Lode (Beck Brook)	1%	Pass
68	Cottenham Lode (Beck Brook)	1%	Pass
69	Drain to Washpit Brook	1%	Pass
70	Washpit Brook	1%	Pass
71	Drain to Washpit Brook	1%	Pass
72	Washpit Brook	1%	Pass
73	Washpit Brook	1%	Pass
Section 4 - A14 Cambridge northern bypass			
74	Public Drain	1%	Pass
75	13 th Public Drain	1%	Pass

4.5 Assessment

4.5.1 The results of these various HAWRAT assessments (individual, combined and comparison with AAQES) and the accidental spillage risk have been used to assign the residual effects on water quality for the watercourses receiving road drainage discharges from the scheme, this is summarised within *Chapter 17 of the ES*. Residual effects are also assessed and presented in *Table 4.4* and *Table 4.5* below.

- 4.5.2 The assessment criteria have been primarily based on the *Design Manual for Roads and Bridges (DMRB) (2009), Volume 11: Environmental Assessment, Section 3: Environmental Assessment Techniques, HD45/09: Road Drainage and the Water Environment* (Highways Agency, 2009). Using this method, the significance of a potential impact is arrived at by combining the 'importance' of the attribute and the 'magnitude' of the particular impact. The assessment determines the significance of impacts only for residual impacts remaining after mitigation has been applied. For full details of the impact assessment see *Chapter 17 of the ES*:
- 4.5.3 There are no failures related to soluble zinc or failures against the AAEQS for dissolved copper and zinc. There are two outfalls failing for both soluble copper and sediment these are Outfalls 7 and 75. The receiving watercourse for these outfalls are:
- **Offord Road Drain (Outfall 7)** – this is small roadside drain that, due to its connectivity with the river Great Ouse, has been assessed as of medium importance. Road drainage includes three levels of SuDS in series prior to discharge to Outfall 7; this includes a treatment/storage pond, a sediment tank upstream of the pond and a downstream ditch between the pond and the road drain. The road drainage at the outfall has passed when compared against the AAEQS for both dissolved copper and zinc before the application of mitigation. With mitigation in place, the levels are significantly lowered. Based on short term thresholds, after implementation of mitigation the outfall is failing by 5% for copper and 8% for sediment; however this results in a pass for dissolved zinc; these short term standards failures are close to HAWRAT requirements. Due to the low flow and dilution potential of the Offord Road Drain and the limitations of the HAWRAT tool, it is difficult to achieve a 'pass' result. However, this watercourse is considered to be of limited ecological potential and the level of treatment provided is considered appropriate for such a small watercourse. It is therefore considered that the overall residual impact to this watercourse is slight.

- **The 13th Public Drain (Outfall 75)** – this is small road side drain that due to its connectivity with the river Cam has been assessed as of low to medium importance. Road drainage includes two levels of SuDS in series prior to discharge to Outfall 75; this includes a treatment/storage pond and a vortex grit remover. The road drainage at the outfall has passed when compared against the AAEQS for both dissolved copper and zinc before with the application of mitigation. Based on short term thresholds, after implementation of mitigation the outfall is failing by 25% for copper and 3% for sediment; however it results in a pass for dissolved zinc. These short term standards failures for sediment are close to HAWRAT requirements. Due to the low flow and dilution potential of the 13th Public Drain and the limitations of the HAWRAT tool, it is difficult to achieve a ‘pass’ result. However, this watercourse is considered to be of limited ecological potential and the level of treatment provided is considered appropriate for such a small watercourse. It is therefore considered that the overall residual impact to this watercourse is slight.

4.5.4 In line with HD45/09 the Swavesey Drain is considered to be of high sensitivity due to its good status under the WFD. This watercourse in the proximity of the existing A14 is split into three tributaries, all of which are currently heavily modified. Two of these are substantially artificial drainage systems, one draining the waste water treatment plant (WWTP) and the other flowing through a small industrial estate close to the A14. Above the point where these three channels merge very limited habitat potential for biological elements was noted, see *Appendix 17.3 Water Framework Directive (WFD) compliance assessment*. This watercourse has a total of 13 outfalls discharging to it. Road drainage for these 13 outfalls includes either treatment/storage pond or storage ditches, see *Table 4.4*. One of these outfalls fails for dissolved copper (no failure of dissolved zinc or sediment) all other individual assessments pass for both sediment and dissolved copper and zinc. There are failures in the cumulative assessment associated with sediment in the region of 5%, these are close to HAWRAT requirements. There are no failures for comparison against the AAEQS. In addition there will be attenuation and treatment provided for the runoff discharging to this water course were limited or no attenuation and treatment exists. This watercourse is considered to be of limited ecological potential and the level of treatment provided is considered appropriate. Therefore, the overall residual impact to this watercourse is slight, see *Chapter 17 of the ES*.

4.5.5 It should also be noted that HAWRAT is an indicative assessment tool only, and the pass/fail result is not intended to be rigid.

4.5.6 In summary for the operational phase, the scheme would be likely to have a neutral/slight residual impact on all watercourses. Residual effects are also assessed and presented in *Table 4.4* and *Table 4.5* below.

4.6 Summary of HAWRAT outputs

Table 4.4: Results for individual outfall routine runoff assessments

Outfall no.	Receiving watercourse	Importance	Assessment against EQS - pass/fail		HAWRAT assessment - pass/fail		Sediment	Percentage of mitigation required for			Proposed mitigation	Level of performance treatment (% reduction)			Assessment against EQS - pass/fail		HAWRAT assessment - pass/fail		Sediment	Magnitude	Significance ¹
			Copper	Zinc	Copper	Zinc		Copper	Zinc	Sediment		Copper	Zinc	Sediment	Copper	Zinc	Copper	Zinc			
Section 1 - A14 offline																					
1	Brampton Brook	Medium	Pass	Pass	Pass	Pass	Pass	0	0	0	One treatment/storage pond	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
2	Brampton Brook	Medium	Pass	Pass	Pass	Pass	Pass	0	0	0	Treatment/storage pond + one sediment tank upstream of pond + a ditch between pond outfall and outfall to ditch network. One	50	30	87	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
3	Brampton Brook	Medium	Pass	Pass	Fail	Pass	Fail	12	0	26	Treatment/storage pond + one sediment tank upstream of pond + a ditch between pond outfall and outfall to ditch network. One	50	30	87	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
4	Grafham Road Drain	Medium	Pass	Pass	Pass	Pass	Fail	0	0	39	One treatment/storage pond	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
5	IDB Drain	Medium	Pass	Pass	Fail	Pass	Fail	49	0	88	One treatment/storage pond + a sediment tank upstream of pond + ditch between pond outfall and outfall to ditch network (penstock headwall to allow isolation)	50	40	70	N/A	N/A	Pass	Pass	Fail	Minor	Slight
6	Ouse East Drain	Medium	Pass	Pass	Fail	Pass	Pass	22	0	0	One treatment/storage pond	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral

¹ Including results for accidental spillage risk in *Table 4.3*.

Outfall no.	Receiving watercourse	Importance	Assessment against EQS - pass/fail		HAWRAT assessment - pass/fail		Sediment	Percentage of mitigation required for			Proposed mitigation	Level of performance treatment (% reduction)			Assessment against EQS - pass/fail		HAWRAT assessment - pass/fail		Sediment	Magnitude	Significance ¹
			Copper	Zinc	Copper	Zinc		Copper	Zinc	Sediment		Copper	Zinc	Sediment	Copper	Zinc	Copper	Zinc			
7	Offord Road Drain	Medium	Pass	Pass	Fail	Pass	Fail	55	0	95	One treatment/storage pond + one sediment tank upstream of pond + a ditch between pond outfall and outfall to ditch network (penstock headwall to allow isolation). One	50	40	87	N/A	N/A	Fail	Pass	Fail	Minor	Slight (see Section 4.5 above)
8	Huntingdonshire D.C. Award Drain	Medium	Pass	Pass	Fail	Pass	Fail	49	0	94	One treatment/storage pond + one sediment tank upstream of pond + a ditch between pond outfall and outfall to ditch network (penstock headwall to allow isolation). One	50	30	87	N/A	N/A	Pass	Pass	Fail	Minor	Slight
9	West Brook	Medium	Pass	Pass	Pass	Pass	Fail	0	0	54	One treatment/storage pond	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
10	Hilton Road Drain	Medium	Pass	Pass	Fail	Pass	Fail	46	0	92	1350m of Swales on each side of road, one treatment pond	70	65	90	N/A	N/A	Pass	Pass	Fail	Minor	Slight
11	Conington Road Drain	Medium	Pass	Pass	Fail	Pass	Fail	36	0	87	1000m of Swales on each side of road, one treatment pond	70	65	90	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
12	Conington Road Drain	Medium	Pass	Pass	Fail	Pass	Fail	5	0	77	500m of Swales on north side of road, one treatment pond	70	65	90	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
13	Conington Road Drain	Medium	Pass	Pass	Fail	Pass	Fail	5	0	77	500m of Swales on south side of road, one treatment pond.	70	65	90	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
14	Oxholme Drain	Medium	Pass	Pass	Fail	Pass	Fail	12	0	68	500m of Swales on each side of road, one treatment pond.	70	65	90	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral

Outfall no.	Receiving watercourse	Importance	Assessment against EQS - pass/fail		HAWRAT assessment - pass/fail		Sediment	Percentage of mitigation required for			Proposed mitigation	Level of performance treatment (% reduction)			Assessment against EQS - pass/fail		HAWRAT assessment - pass/fail		Sediment	Magnitude	Significance ¹
			Copper	Zinc	Copper	Zinc		Copper	Zinc	Sediment		Copper	Zinc	Sediment	Copper	Zinc	Copper	Zinc			
Section 1 – A1																					
15	Brampton Brook	Medium	Pass	Pass	Fail	Pass	Fail	54	0	84	One treatment/storage pond + pond + one sediment tank upstream of pond + a ditch to be provided between pond outfall and outfall to ditch network (penstock headwall to allow isolation)	50	35	87	N/A	N/A	Fail	Pass	Pass	Minor	Slight
16	Brampton Brook	Medium	Pass	Pass	Fail	Pass	Fail	47	0	80	One treatment/storage pond + a ditch to be provided between pond outfall and outfall to ditch network (penstock headwall to allow isolation)	50	35	78	N/A	N/A	Pass	Pass	Pass ²	Negligible	Neutral
17	Drain to Ellington Brook	Medium	Pass	Pass	Pass	Pass	Pass	0	0	0	One treatment pond.	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
18	Drain to Ellington Brook	Medium	Pass	Pass	Pass	Pass	Fail	0	0	4	One treatment/storage pond.	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
19	Drain to Ellington Brook	Medium	Pass	Pass	Pass	Pass	Fail	0	0	49	One treatment pond.	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
20	Drain to Ellington Brook.	Medium	Pass	Pass	Pass	Pass	Fail	0	0	21	One treatment/storage pond.	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
21	Land Drain to Alconbury Brook	Medium	Pass	Pass	Pass	Pass	Pass	0	0	0	340m of Swales, one treatment/storage pond.	70	65	90	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
22	Drain to Cock Brook	Medium	Pass	Pass	Pass	Pass	Pass	0	0	0	340m of Swales, one bypass separator, One treatment/storage pond.	70	65	90	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
23	Cock Brook	Medium	Pass	Pass	Pass	Pass	Pass	0	0	0	620m of Swales+ one treatment pond.	70	65	90	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
24	Cock Brook	Medium	Pass	Pass	Pass	Pass	Pass	0	0	0	620m of Swales + one treatment pond.	70	65	90	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral

² 1 - 2% over requirement is considered a pass result

Outfall no.	Receiving watercourse	Importance	Assessment against EQS - pass/fail		HAWRAT assessment - pass/fail		Sediment	Percentage of mitigation required for			Proposed mitigation	Level of performance treatment (% reduction)			Assessment against EQS - pass/fail		HAWRAT assessment - pass/fail		Sediment	Magnitude	Significance ¹
			Copper	Zinc	Copper	Zinc		Copper	Zinc	Sediment		Copper	Zinc	Sediment	Copper	Zinc	Copper	Zinc			
25	Cock Brook	Medium	Pass	Pass	Pass	Pass	Pass	0	0	0	One treatment/storage pond.	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
Section 1 - Huntingdon town centre																					
HTC1	Great Ouse	Medium	Pass	Pass	Pass	Pass	Pass	0	0	0	One oil interceptor	0	0	0	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
HTC2	Alconbury Brook	Medium	Pass	Pass	Pass	Pass	Pass	0	0	0	One oil interceptor + one treatment/storage pond.	40	30	72	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
HTC3	Existing A14 Highway drainage network	Medium	Pass	Pass	Pass	Pass	Pass	0	0	0	One oil interceptor + one treatment/storage pond	40	30	72	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
Section 2 - A14 online																					
26	Covell's Drain	Medium	Pass	Pass	Pass	Pass	Fail	0	0	43	Balancing Pond including reed bed area and spillage containment shut-off valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
27	Drain to Fen Drayton	Medium	Pass	Pass	Pass	Pass	Pass	0	0	0	Storage Ditch including reed bed area and spillage containment shut-off valve at outfall	30	25	50	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
28	Drain to Fen Drayton	Medium	Pass	Pass	Pass	Pass	Pass	0	0	0	Storage Ditch including reed bed area and spillage containment shut-off valve at outfall	30	25	50	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
29	Drain to Fen Drayton	Medium	Pass	Pass	Pass	Pass	Pass	0	0	0	Storage Ditch including reed bed area and spillage containment shut-off valve at outfall	30	25	50	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
30	Drain to Fen Drayton	Medium	Pass	Pass	Pass	Pass	Pass	0	0	0	Balancing Pond including reed bed area and spillage containment shut-off valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
31	Drain to Fen Drayton	Medium	Pass	Pass	Pass	Pass	Pass	0	0	0	Balancing Pond including reed bed area and spillage containment shut-off valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral

Outfall no.	Receiving watercourse	Importance	Assessment against EQS - pass/fail		HAWRAT assessment - pass/fail		Sediment	Percentage of mitigation required for			Proposed mitigation	Level of performance treatment (% reduction)			Assessment against EQS - pass/fail		HAWRAT assessment - pass/fail		Sediment	Magnitude	Significance ¹
			Copper	Zinc	Copper	Zinc		Copper	Zinc	Sediment		Copper	Zinc	Sediment	Copper	Zinc	Copper	Zinc			
32	Drain to Fen Drayton	Medium	Pass	Pass	Pass	Pass	Fail	0	0	5	Balancing Pond including reed bed area and spillage containment shut-off valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
33	Swavesey Drain 1	High	Pass	Pass	Pass	Pass	Fail	0	0	27	Balancing Pond including reed bed area and spillage containment shut-off valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
34	Swavesey Drain 1	High	Pass	Pass	Pass	Pass	Fail	0	0	40	Balancing Pond including reed bed area and spillage containment shut-off valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
35	Swavesey Drain 1	High	Pass	Pass	Pass	Pass	Fail	0	0	51	Balancing Pond including reed bed area and spillage containment shut-off valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
36	Swavesey Drain 1	High	Pass	Pass	Pass	Pass	Fail	0	0	33	Balancing Pond including reed bed area and spillage containment shut-off valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
37	Swavesey Drain 1	High	Pass	Pass	Pass	Pass	Pass	0	0	0	Storage Ditch including reed bed area and spillage containment shut-off valve at outfall	30	25	50	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
38	Swavesey Drain 1	High	Pass	Pass	Pass	Pass	Fail	0	0	17	Storage Ditch including reed bed area and spillage containment shut-off valve at outfall	30	25	50	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
39	Swavesey Drain 1	High	Pass	Pass	Pass	Pass	Pass	0	0	0	Storage Ditch including reed bed area and spillage containment shut-off valve at outfall	30	25	50	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
40	Swavesey Drain 2 (Utton's Drove Drain)	High	Pass	Pass	Pass	Pass	Pass	0	0	0	Balancing Pond including reed bed area and spillage containment shut-off valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral

Outfall no.	Receiving watercourse	Importance	Assessment against EQS - pass/fail		HAWRAT assessment - pass/fail		Sediment	Percentage of mitigation required for			Proposed mitigation	Level of performance treatment (% reduction)			Assessment against EQS - pass/fail		HAWRAT assessment - pass/fail		Sediment	Magnitude	Significance ¹
			Copper	Zinc	Copper	Zinc		Copper	Zinc	Sediment		Copper	Zinc	Sediment	Copper	Zinc	Copper	Zinc			
41	Swavesey Drain 2(Utton's Drove Drain)	High	Pass	Pass	Fail	Pass	Fail	1	0	1	Balancing Pond including reed bed area and spillage containment shut-off valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
42	Swavesey Drain 2(Utton's Drove Drain)	High	Pass	Pass	Pass	Pass	Pass	0	0	0	Balancing Pond including reed bed area and spillage containment shut-off valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
43	Swavesey Drain 2 (Utton's Drove Drain)	High	Pass	Pass	Fail	Pass	Fail	30	0	45	Balancing Pond including reed bed area and spillage containment shut-off valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
44	Swavesey Drain 3 (Ch24+707)	High	Pass	Pass	Pass	Pass	Pass	0	0	0	Balancing Pond including reed bed area and spillage containment shut-off valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
45	Swavesey Drain 3 (Ch24+707)	High	Pass	Pass	Fail	Pass	Fail	56	0	52	Balancing Pond including reed bed area and spillage containment shut-off valve at outfall	40	30	70	N/A	N/A	Fail	Pass	Pass	Minor	Slight
46	Longstanton Brook	Medium	Pass	Pass	Pass	Pass	Pass	0	0	0	Storage Ditch including reed bed area and spillage containment shut-off valve at outfall	30	25	50	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
47	Longstanton Brook	Medium	Pass	Pass	Fail	Pass	Fail	13	0	20	Balancing Pond including reed bed area and spillage containment shut-off valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
48	Longstanton Brook	Medium	Pass	Pass	Pass	Pass	Pass	0	0	0	Storage Ditch including reed bed area and spillage containment shut-off valve at outfall	30	25	50	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
49	Longstanton Brook	Medium	Pass	Pass	Fail	Pass	Fail	33	0	56	Balancing Pond including reed bed area and spillage containment shut-off valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral

Outfall no.	Receiving watercourse	Importance	Assessment against EQS - pass/fail		HAWRAT assessment - pass/fail		Sediment	Percentage of mitigation required for			Proposed mitigation	Level of performance treatment (% reduction)			Assessment against EQS - pass/fail		HAWRAT assessment - pass/fail		Sediment	Magnitude	Significance ¹
			Copper	Zinc	Copper	Zinc		Copper	Zinc	Sediment		Copper	Zinc	Sediment	Copper	Zinc	Copper	Zinc			
50	Drain to Longstanton Brook	Medium	Pass	Pass	Pass	Pass	Fail	0	0	67	Storage Ditch including reed bed area and spillage containment shut-off valve at outfall	30	25	50	N/A	N/A	Pass	Pass	Fail	Minor	Slight
51	Drain to Longstanton Brook	Medium	Pass	Pass	Pass	Pass	Pass	0	0	0	Balancing Pond including reed bed area and spillage containment shut-off valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
52	Oakington Brook	Medium	Pass	Pass	Pass	Pass	Pass	0	0	0	Balancing Pond including reed bed area and spillage containment shut-off valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
53	Oakington Brook	Medium	Pass	Pass	Fail	Pass	Fail	45	0	61	Storage Ditch including reed bed area and spillage containment shut-off valve at outfall + one sediment basin	30	25	70	N/A	N/A	Fail	Pass	Pass	Minor	Slight
54	Oakington Brook	Medium	Pass	Pass	Pass	Pass	Pass	0	0	0	Storage Ditch including reed bed area and spillage containment shut-off valve at outfall	30	25	50	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
55	Oakington Brook	Medium	Pass	Pass	Pass	Pass	Pass	0	0	0	Storage Ditch including reed bed area and spillage containment shut-off valve at outfall	30	25	50	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
56	Drain to Oakington Brook	Medium	Pass	Pass	Pass	Pass	Pass	0	0	0	Balancing Pond including reed bed area and spillage containment shut-off valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
57	Drain to Oakington Brook	Medium	Pass	Pass	Fail	Pass	Fail	56	0	48	Balancing Pond including reed bed area and spillage containment shut-off valve at outfall	40	30	70	N/A	N/A	Fail	Pass	Pass	Minor	Slight
58	Drain to Oakington Brook	Medium	Pass	Pass	Pass	Pass	Pass	0	0	0	Storage Ditch including reed bed area and spillage containment shut-off valve at outfall	30	25	50	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral

Outfall no.	Receiving watercourse	Importance	Assessment against EQS - pass/fail		HAWRAT assessment - pass/fail		Sediment	Percentage of mitigation required for			Proposed mitigation	Level of performance treatment (% reduction)			Assessment against EQS - pass/fail		HAWRAT assessment - pass/fail		Sediment	Magnitude	Significance ¹
			Copper	Zinc	Copper	Zinc		Copper	Zinc	Sediment		Copper	Zinc	Sediment	Copper	Zinc	Copper	Zinc			
59	Drain to Oakington Brook	Medium	Pass	Pass	Fail	Pass	Pass	38	0	0	Balancing Pond including reed bed area and spillage containment shut-off valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
60	Dry Drayton Junction Drain	Medium	Pass	Pass	Fail	Pass	Fail	48	0	60	Storage Ditch including reed bed area and spillage containment shut-off valve at outfall + sediment basin	30	25	70	N/A	N/A	Fail	Pass	Pass	Minor	Slight
61	Cottenham Lode (Beck Brook)	Medium	Pass	Pass	Pass	Pass	Fail	0	0	2	Balancing Pond including reed bed area and spillage containment shut-off valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
62	Cottenham Lode (Beck Brook)	Medium	Pass	Pass	Pass	Pass	Fail	0	0	4	Balancing Pond including reed bed area and spillage containment shut-off valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
63	Swavesey Drain 3	High	Pass	Pass	Fail	Pass	Fail	7	0	52	Balancing Pond including reed bed area and spillage containment shut-off valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
64	Dry Drayton Junction Drain	Medium	Pass	Pass	Pass	Pass	Pass	0	0	0	Storage Ditch including reed bed area and spillage containment shut-off valve at outfall	30	25	50	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
Section 3 - Girton interchange																					
65	Drain to Oakington Brook	Medium	Pass	Pass	Pass	Pass	Pass	0	0	0	One combined treatment/storage pond with spillage containment valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
66	Cottenham Lode (Beck Brook)	Medium	Pass	Pass	Fail	Pass	Fail	1	0	8	One combined treatment/storage pond with spillage containment valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
67	Cottenham Lode (Beck Brook)	Medium	Pass	Pass	Pass	Pass	Pass	0	0	0	One combined treatment/storage pond with spillage containment valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral

Outfall no.	Receiving watercourse	Importance	Assessment against EQS - pass/fail		HAWRAT assessment - pass/fail		Sediment	Percentage of mitigation required for			Proposed mitigation	Level of performance treatment (% reduction)			Assessment against EQS - pass/fail		HAWRAT assessment - pass/fail		Sediment	Magnitude	Significance ¹
			Copper	Zinc	Copper	Zinc		Copper	Zinc	Sediment		Copper	Zinc	Sediment	Copper	Zinc	Copper	Zinc			
68	Cottenham Lode (Beck Brook)	Medium	Pass	Pass	Fail	Pass	Fail	25	0	34	One combined treatment/storage pond with spillage containment valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
69	Drain to Washpit Brook	Medium	Pass	Pass	Pass	Pass	Fail	0	0	15	One combined treatment/storage pond with spillage containment valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
70	Washpit Brook	Medium	Pass	Pass	Pass	Pass	Pass	0	0	0	One combined treatment/storage pond with spillage containment valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
71	Drain to Washpit Brook	Medium	Pass	Pass	Pass	Pass	Fail	0	0	30	One combined treatment/storage pond with spillage containment valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
72	Washpit Brook	Medium	Pass	Pass	Pass	Pass	Fail	0	0	18	One combined treatment/storage pond with spillage containment valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
73	Washpit Brook	Medium	Pass	Pass	Pass	Pass	Fail	0	0	48	One combined Treatment/Storage pond with spillage containment valve at outfall	40	30	70	N/A	N/A	Pass	Pass	Pass	Negligible	Neutral
Section 4 - A14 Cambridge Northern bypass																					
74	Public Drain	Low - Medium	Pass	Fail	Fail	Pass	Fail	66	0	86	One combined treatment/storage pond with spillage containment valve at outfall + a sedimentation tank + a vortex grit remover	40	40	90	N/A	Pass	Fail	Pass	Pass	Minor	Slight
75	13 th Public Drain	Low - Medium	Pass	Pass	Fail	Pass	Fail	65	0	85	One combined treatment/storage pond with spillage containment valve at outfall + a vortex grit remover	40	40	82	N/A	N/A	Fail	Pass	Fail	Minor	Slight (see Section 4.5 above)

Table 4.5: Results for in-combination outfall routine runoff assessments

No	Outfalls	Combined Assessment Test Type ³	Receiving Watercourse	Importance	WFD EQS - Pass/Fail		RST EQS - Pass/Fail		Sediment	Percentage of mitigation required for			Proposed Mitigation	Level of performance treatment			WFD EQS - Pass/Fail		RST EQS - Pass/Fail		Sediment	Magnitude	Significance
					Copper	Zinc	Copper	Zinc		Copper	Zinc	Sediment		Copper	Zinc	Sediment	Copper	Zinc	Copper	Zinc			
1	24,25	Sediment-bound and Soluble pollutant tests	Cock Brook	Medium	Pass	Pass	Pass	Pass	Fail	0	0	1	Swales & treatment pond	70	65	90	Pass	Pass	Pass	Pass	Pass	Negligible	Neutral
2	22,23,24,25	Soluble pollutants only	Cock Brook	Medium	Pass	Pass	Pass	Pass	n/a	0	0	n/a	Swales & treatment pond	70	65	90	Pass	Pass	Pass	Pass	n/a	Negligible	Neutral
3	22,23	Sediment-bound and Soluble pollutant tests	Cock Brook	Medium	Pass	Pass	Pass	Pass	Pass	0	0	0	Swales & treatment pond	70	65	90	Pass	Pass	Pass	Pass	Pass	Negligible	Neutral
4	17,18,19,20	Sediment-bound and Soluble pollutant tests	Tributary of Ellington Brook	Medium	Pass	Pass	Fail	Pass	Fail	31	0	80	Treatment/storage pond	40	30	70	Pass	Pass	Pass	Pass	Fail	Minor	Slight
5	2,3,16	Sediment-bound and Soluble pollutant tests	Brampton Brook	Medium	Pass	Fail	Pass	Pass	Fail	58	0	79	Outfall 2 & 3: Treatment/storage pond + one sediment tank upstream of pond + a ditch between pond outfall and outfall to ditch network. Outfall 16: treatment/storage pond + a ditch to be provided between pond outfall and outfall to ditch network	50	30	80	Pass	Pass	Fail	Pass	Pass	Minor	Slight
6	2,3,15,16	Soluble pollutants only	Brampton Brook	Medium	Pass	Fail	Pass	Fail	n/a	64	10	n/a	Treatment/storage pond	40	30	70	Pass	Pass	Fail	Pass	n/a	Minor	Slight
7	11,12,13	Soluble pollutants only	Conington Road Drain	Medium	Pass	Pass	Fail	Pass	n/a	53	0	n/a	Swales & treatment pond	70	65	90	Pass	Pass	Pass	Pass	n/a	Negligible	Neutral

³ Sediment-bound pollutant test required (outfalls within 100m) or Soluble pollutant test required (outfalls within 1km)

No	Outfalls	Combined Assessment Test Type3	Receiving Watercourse	Importance	WFD EQS - Pass/Fail		RST EQS - Pass/Fail		Sediment	Percentage of mitigation required for			Proposed Mitigation	Level of performance treatment			WFD EQS - Pass/Fail		RST EQS - Pass/Fail		Sediment	Magnitude	Significance
					Copper	Zinc	Copper	Zinc		Copper	Zinc	Sediment		Copper	Zinc	Sediment	Copper	Zinc	Copper	Zinc			
8	12,13	Sediment-bound and Soluble pollutant tests	Conington Road Drain	Medium	Pass	Pass	Fail	Pass	Fail	39	0	89	Swales & treatment/storage pond	70	65	90	Pass	Pass	Pass	Pass	Pass	Negligible	Neutral
9	27,28,29,30,31,32	Sediment-bound and Soluble pollutant tests	Drain to Fen Drayton	Medium	Pass	Fail	Fail	Pass	Fail	33	0	73	Both treatment/storage pond & storage ditches, shut-off valve	40	30	70	Pass	Pass	Pass	Pass	Fail	Minor	Slight
10	33,34,35,36,37,38,39	Sediment-bound and Soluble pollutant tests	Swavesey Drain 1	High	Pass	Pass	Fail	Pass	Fail	44	0	89	Outfalls 33,34,35,36: Balancing pond including reed bed area and spillage containment shut-off valve at outfall + a ditch between pond outfall and outfall to ditch network. Outfalls 37,38,39: Storage ditch including reed bed area and spillage containment shut-off valve at outfall	44	40	84	Pass	Pass	Pass	Pass	Fail	Minor	Slight
11	40,41,42,43	Sediment-bound and Soluble pollutant tests	Swavesey Drain 2 (Utton's Drove Drain)	High	Pass	Pass	Fail	Pass	Fail	14	0	75	Treatment/storage pond, shut-off valve	40	30	70	Pass	Pass	Pass	Pass	Fail	Minor	Slight
12	44,45	Sediment-bound and Soluble pollutant tests	Swavesey Drain 3 (Ch24+707)	High	Pass	Pass	Fail	Pass	Fail	27	0	63	Treatment/storage pond, shut-off valve	40	30	70	Pass	Pass	Pass	Pass	Pass	Negligible	Neutral

No	Outfalls	Combined Assessment Test Type3	Receiving Watercourse	Importance	WFD EQS - Pass/Fail		RST EQS - Pass/Fail		Sediment	Percentage of mitigation required for			Proposed Mitigation	Level of performance treatment			WFD EQS - Pass/Fail		RST EQS - Pass/Fail		Sediment	Magnitude	Significance
					Copper	Zinc	Copper	Zinc		Copper	Zinc	Sediment		Copper	Zinc	Sediment	Copper	Zinc	Copper	Zinc			
13	44,45,63	Soluble pollutants only	Swavesey Drain 3 (Ch24+707)	High	Pass	Fail	Fail	Pass	n/a	41	0	n/a	Treatment/ storage pond, shut-off valve	40	30	70	Pass ⁴	Pass	Pass	Pass	n/a	Negligible	Neutral
14	46,47,48,49	Sediment-bound and Soluble pollutant tests	Longstanton Brook	Medium	Pass	Pass	Fail	Pass	Fail	9	0	76	Storage ditches	30	25	50	Pass	Pass	Pass	Pass	Fail	Minor	Slight
15	50,51	Sediment-bound and Soluble pollutant tests	Drain to Longstanton Brook	Medium	Pass	Pass	Pass	Pass	Fail	0	0	72	Both treatment/ storage pond & storage ditches, shut-off valve	40	30	70	Pass	Pass	Pass	Pass	Fail	Minor	Slight
16	52,53,54,55	Sediment-bound and Soluble pollutant tests	Oakington Brook	Medium	Pass	Pass	Fail	Pass	Fail	51	0	72	Both treatment/ storage pond & storage ditches, shut-off valve	40	30	70	Pass	Pass	Fail	Pass	Pass ⁵	Minor	Slight
17	56,57,58,59	Sediment-bound and Soluble pollutant tests	Drain to Oakington Brook	Medium	Pass	Pass	Fail	Pass	Fail	36	0	76	Both treatment/ storage pond & storage ditches, shut-off valve	40	30	70	Pass	Pass	Pass	Pass	Fail	Minor	Slight
18	60,64	Sediment-bound and Soluble pollutant tests	Dry Drayton Junction Drain	Medium	Pass	Pass	Fail	Pass	Fail	21	0	71	Storage ditches	30	25	50	Pass	Pass	Pass	Pass	Fail	Minor	Slight
19	61,62,66, 67,68	Soluble pollutants only	Cottenham Lode (Beck Brook)	Medium	Pass	Pass	Fail	Pass	n/a	56	0	n/a	Treatment/ storage pond	40	30	70	Pass	Pass	Fail	Pass	N/a	Minor	Slight
20	61,68	Sediment-bound and Soluble pollutant tests	Cottenham Lode (Beck Brook)	Medium	Pass	Pass	Fail	Pass	Fail	44	0	61	Treatment/ storage pond	40	30	70	Pass	Pass	Fail	Pass	Pass	Minor	Slight
21	62,66	Sediment-bound and Soluble pollutant tests	Cottenham Lode (Beck Brook)	Medium	Pass	Pass	Fail	Pass	Fail	45	0	52	Treatment/ storage pond	40	30	70	Pass	Pass	Fail	Pass	Pass	Minor	Slight
22	69,70,71, 72,73	Soluble pollutants only	Washpit Brook	Medium	Pass	Pass	Fail	Pass	n/a	55	0	n/a	Treatment/ storage pond	40	30	70	Pass	Pass	Fail	Pass	N/a	Minor	Slight

⁴ 1 - 2% over requirement is considered a pass result

⁵ 1 - 2% over requirement is considered a pass result

No	Outfalls	Combined Assessment Test Type3	Receiving Watercourse	Importance	WFD EQS - Pass/Fail		RST EQS - Pass/Fail		Sediment	Percentage of mitigation required for			Proposed Mitigation	Level of performance treatment			WFD EQS - Pass/Fail		RST EQS - Pass/Fail		Sediment	Magnitude	Significance
					Copper	Zinc	Copper	Zinc		Copper	Zinc	Sediment		Copper	Zinc	Sediment	Copper	Zinc	Copper	Zinc			
23	72,73	Sediment-bound and Soluble pollutant tests	Washpit Brook	Medium	Pass	Pass	Pass	Pass	Fail	0	0	66	Treatment/storage pond	40	30	70	Pass	Pass	Pass	Pass	Pass	Negligible	Neutral
24	69,71	Sediment-bound and Soluble pollutant tests	Drain to Washpit Brook	Medium	Pass	Pass	Fail	Pass	Fail	12	0	62	Treatment/storage pond	40	30	70	Pass	Pass	Pass	Pass	Pass	Negligible	Neutral

5 Conclusion

- 5.1.1 For the operational phase, the scheme would be likely to have a neutral/slight residual impact on all watercourses.

6 Bibliography

Highways Agency Water Risk Assessment Tool (HAWRAT) version 1.0. November 2009.

Highways Agency (2006). Design Manual for Roads and Bridges, Volume 4, Section 2, Part 3, HD33/12 - Design of Highway Drainage Systems. Highways Agency.

Highways Agency et al. (2009). Design Manual for Roads and Bridges Volume 11, Section 3, Part 10, HD45/09 - Road Drainage and the Water Environment. Highways Agency, Transport Scotland, Welsh Assembly Government and The Department for Regional Development Northern Ireland.

Highways Agency (2012). Treatment Efficiencies of Drainage System – EA Consultation (unpublished).

ENVIRONUK (2009). A14 Ellington to Fen Ditton Water Quality Monitoring produced for the Highways Agency.

Annexes

Annex 1: Road drainage outfall details

Annex 2: Individual assessment inputs and outputs

Annex 3: Cumulative assessment inputs and outputs

Annex 4: Accidental spillage risk calculation

Please note, for those reading this ES in hard copy, annexes 2 and 3 are held on an accompanying CD.

Annex 1: Road drainage outfall details

Outfall no.	Pond reference	Chainage	Receiving watercourse	Permeable road area drained to outfall (m ²)	Impermeable road area drained to outfall (m ²)
Section 1 - A14 OFFLINE					
1	P1-A14-001	1475 (A14)	Brampton Drain	4955	17226
2	P1-A14-002	2650 (A14)	Brampton Drain	3673	15471
3	P1-A14-003	2825 (A14)	Brampton Drain	4046	27507
4	P1-A14-004	3750 (A14)	Grafham Road Drain	18517	23080
5	P1-A14-005	5750 (A14)	IDB Drain	9005	46497
6	P1-A14-006	6550 (A14)	Ouse East Drain	3578	19133
7	P1-A14-007	7100 (A14)	Offord Road Drain	85264	86552
8	P1-A14-008	11950 (A14)	Huntingdonshire D.C. Award Drain	123836	86790
9	P1-A14-009	13750 (A14)	West Brook	22527	59724
10	P1-A14-010	15250 (A14)	Hilton Road Drain	48221	62614
11	P1-A14-011	15700 (A14)	Conington Road Drain	33754	42561
12	P1-A14-012	16350 (A14)	Conington Road Drain	20137	23122
13	P1-A14-013	16400 (A14)	Conington Road Drain	20137	23122
14	P1-A14-014	17475 (A14)	Oxholme Drain	14019	17753
Section 1 - A1					
15	P1- A1-001	1400 (A1)	Brampton Brook	19406	64065
16	P1- A1-002	2100 (A1)	Brampton Brook	6059	51798

Outfall no.	Pond reference	Chainage	Receiving watercourse	Permeable road area drained to outfall (m ²)	Impermeable road area drained to outfall (m ²)
17	P1- A1-003	3550 (A1)	Drain to Ellington Brook	7063	7980 (1240 for A1, 6740 for LAR)
18	P1- A1-004	3550(A1)	Drain to Ellington Brook	1023	11425
19	P1- A1-005	3955 (A1)	Drain to Ellington Brook	33651	21260 (14230 for A1, 7030 for LAR)
20	P1- A1-006	3955 (A1)	Drain to Ellington Brook.	9631	13821
21	P1- A1-007	4870 (A1)	Land Drain to Alconbury Brook	19962	12410 (8545 for A1, 3865 for LAR)
22	P1- A1-008	4890 (A1)	Drain to Cock Brook	6310	8555
23	P1- A1-009	5190 (A1)	Cock Brook	17292	17100
24	P1- A1-010	5700 (A1)	Cock Brook	4942	12126
25	P1- A1-011	5700 (A1)	Cock Brook	5347	12416
HTC1	P1-HTC-001 Underground Attenuation Tank (Station Carpark)	N/A	Great Ouse	4000	10500
HTC2	P1-HTC-002	N/A	Alconbury Brook	2100	10200
HTC3	P1-HTC-003	N/A	Existing A14 Highway drainage network (Final Outfall T.B.C.)	2940	6025
Section 2 - A14 online					
26	P2-A14-001	20000 (A14)	Covell's Drain	21433	41273
27	No pond	21600 (A14)	Drain to Fen Drayton	7694	8319
28	No pond	21600 (A14)	Drain to Fen Drayton	8078	4315
29	No pond	21600 (A14)	Drain to Fen Drayton	5060	4324

Outfall no.	Pond reference	Chainage	Receiving watercourse	Permeable road area drained to outfall (m ²)	Impermeable road area drained to outfall (m ²)
30	P2-A14-002	21610 (A14)	Drain to Fen Drayton	17940	14647
31	P2-A14-003	21610 (A14)	Drain to Fen Drayton	9049	12038
32	P2-A14-004	21610 (A14)	Drain to Fen Drayton	11326	17653
33	P2-A14-005	22785 (A14)	Swavesey Drain 1	27317	11739
34	P2-A14-006	22785 (A14)	Swavesey Drain 1	49598	14255
35	P2-A14-007	22715 (A14)	Swavesey Drain 1	10894	17314
36	P2-A14-008	22640 (A14)	Swavesey Drain 1	7904	12841
37	No Pond	22783 (A14)	Swavesey Drain 1	4734	2860
38	No Pond	22783 (A14)	Swavesey Drain 1	27324	10284
39	No Pond	22650 (A14)	Swavesey Drain 1	6399	2986
40	P2-A14-009	23860 (A14)	Swavesey Drain 2 (Utton's Drove Drain)	12504	7177
41	P2-A14-010	23830 (A14)	Swavesey Drain 2 (Utton's Drove Drain)	13384	11402
42	P2-A14-011	23870 (A14)	Swavesey Drain 2 (Utton's Drove Drain)	3166	6208
43	P2-A14-012	23840 (A14)	Swavesey Drain 2 (Utton's Drove Drain)	14963	20598
44	P2-A14-013	24705 (A14)	Swavesey Drain 3 (Ch24+707)	12393	6485
45	P2-A14-014	24715 (A14)	Swavesey Drain 3 (Ch24+707)	7769	20635
46	No pond	25540 (A14)	Longstanton Brook	5269	2551
47	P2-A14-015	25510 (A14)	Longstanton Brook	6141	11080
48	No pond	25550 (A14)	Longstanton Brook	5559	2499
49	P2-A14-016	25550 (A14)	Longstanton Brook	31688	19887
50	No pond	26920 (A14)	Drain to Longstanton Brook	9040	16319
51	P2-A14-017	25920 (A14)	Drain to Longstanton Brook	3615	2425

Outfall no.	Pond reference	Chainage	Receiving watercourse	Permeable road area drained to outfall (m ²)	Impermeable road area drained to outfall (m ²)
52	P2-A14-018	26480 (A14)	Oakington Brook	5981	3134
53	No pond	26390 (A14)	Oakington Brook	5871	24923
54	No pond	26490 (A14)	Oakington Brook	1734	1021
55	No pond	26420 (A14)	Oakington Brook	2005	5675
56	P2-A14-019	27120 (A14)	Drain to Oakington Brook	9495	5259
57	P2-A14-020	27110 (A14)	Drain to Oakington Brook	4707	19183
58	No pond	27125 (A14)	Drain to Oakington Brook	8246	6257
59	P2-A14-021	27115 (A14)	Drain to Oakington Brook	5029	9728
60	No pond	27615 (A14)	Dry Drayton Junction Drain	10641	14685
61	P2-A14-022	28875 (A14)	Cottenham Lode (Beck Brook)	17754	17719
62	P2-A14-023	28710 (A14)	Cottenham Lode (Beck Brook)	11351	17736
63	P2-A14-024	24190 (A14)	Swavesey Drain 3	6965	20630
64	No Pond	27600 (A14)	Dry Drayton Junction Drain	1413	5475
Section 3 - Girton interchange					
65	P3-LAR-001	220 (LAR North)	Drain to Oakington Brook	2800	3500
66	P3-LAR-002	720 (LAR Main)	Cottenham Lode (Beck Brook)	7394	17612
67	P3-LAR-003	700 (LAR Main)	Cottenham Lode (Beck Brook)	2088	4972
68	P3-A14-001	28875 (A14)	Cottenham Lode (Beck Brook)	7112	26204
69	P3-A1307-001	1375 (A1307 Huntingdon Road))	Drain to Washpit Brook	6140	7520
70	P3-A1307-002	1100 (A1307 Huntingdon Road)	Washpit Brook	2631	3223
71	P3-A428-001	(A428)	Drain to Washpit Brook	9081	9081

Outfall no.	Pond reference	Chainage	Receiving watercourse	Permeable road area drained to outfall (m ²)	Impermeable road area drained to outfall (m ²)
72	P3-A1307-003	520 (A1307 Huntingdon Road)	Washpit Brook	2554	8890
73	P3-A1307-004	620 (A1307 Huntingdon Road)	Washpit Brook	4976	16576
Section 4 - A14 Cambridge Northern bypass					
74	P4-A14-001	32764 (A14)	Public Drain	2260	39792
75	P4-A14-002	35230 (A14)	13 th Public Drain	2764	36060

Annex 4: Accidental spillage risk calculation

Outfall/ Catchment	Chainage		Pond reference	Link description	Type of junction drained (potential)	Receiving watercourse	RL length (km)	SS	Response time < 1 hour	Design year 2035					
	from	to								AADT	% HGVs	Probability of accident (Pspl) - Note 1	Probability/ year (Plnc/year) Note 2	1 in years	Probability of accident %
Section 1 - A14 OFFLINE															
1	1370	2060	P1-A14-001	Mainline A-14 Offline	No junction	Brampton Drain	0.690	0.31	0.45	49333	24.5	0.00094	0.00042	2355	0.042%
2	2060	2640	P1-A14-002	Mainline A-14 Offline	No junction	Brampton Drain	0.580	0.31	0.45	49333	24.5	0.00079	0.00036	2802	0.036%
3	2640	3700	P1-A14-003	Mainline A-14 Offline	No junction	Brampton Drain	1.060	0.31	0.45	49333	24.5	0.00145	0.00065	1533	0.065%
4	3700	4620	P1-A14-004	Mainline A-14 Offline	No junction	Grafham Road Drain	0.920	0.31	0.45	49333	24.5	0.00126	0.00057	1766	0.057%
5	4620	6065	P1-A14-005	Mainline A-14 Offline	No junction	IDB Drain	1.445	0.31	0.45	95531	27.0	0.00422	0.00190	527	0.190%
6	6065	6750	P1-A14-006	Mainline A-14 Offline	No junction	Ouse East Drain	0.685	0.31	0.45	95531	27.0	0.00200	0.00090	1112	0.090%
7	6750	9550	P1-A14-007	Mainline A-14 Offline	No junction	Offord Road Drain	2.800	0.31	0.45	95531	27.0	0.00817	0.00368	272	0.368%
8	9550	11705	P1-A14-008	Mainline A-14 Offline	No junction	Huntingdonshire D.C. Award Drain	1.755	0.31	0.45	95531	29.0	0.00550	0.00248	404	0.248%
					Slip road	Huntingdonshire D.C. Award Drain	1.985	0.36	0.45	14404	7.0	0.00026	0.00012	8450	0.012%
					Roundabout	Huntingdonshire D.C. Award Drain	0.950	5.35	0.45	22335	7.0	0.00290	0.00131	766	0.131%
					Total	Huntingdonshire D.C. Award Drain			0.45			0.00866	0.00390	256	0.390%
9	11705	13680	P1-A14-009	Mainline A-14 Offline	No junction	West Brook	1.975	0.31	0.45	80669	30.0	0.00541	0.00243	411	0.243%
10	13680	15270	P1-A14-010	Mainline A-14 Offline	No junction	Hilton Road Drain	1.590	0.31	0.45	80669	30.0	0.00435	0.00196	510	0.196%
11	15270	16400	P1-A14-011	Mainline A-14 Offline	No junction	Conington Road Drain	1.130	0.31	0.45	80669	30.0	0.00309	0.00139	718	0.139%
12 Eastbound only	16400	17440	P1-A14-012	Mainline A-14 Offline	No junction	Conington Road Drain	1.040	0.31	0.45	42110	28.0	0.00139	0.00062	1602	0.062%
13 Westbound only	16400	17440	P1-A14-013	Mainline A-14 Offline	No junction	Conington Road Drain	1.040	0.31	0.45	38559	33.0	0.00150	0.00067	1484	0.067%
14	17440	18000	P1-A14-014	Mainline A-14 Offline	No junction	Oxholme Drain	0.560	0.31	0.45	80669	30.0	0.00153	0.00069	1449	0.069%

Outfall/ Catchment	Chainage		Pond reference	Link description	Type of junction drained (potential)	Receiving watercourse	RL length (km)	SS	Response time < 1 hour	Design year 2035					
	from	to								AADT	% HGVs	Probability of accident (PspI) - Note 1	Probability/ year (PInc/year) Note 2	1 in years	Probability of accident %
Section 1 - A1															
15	0	1750	P1- A1-001	Mainline A-1 Online	Slip road	Brampton Drain	2.530	0.36	0.45	22457	29.0	0.00217	0.00097	1026	0.097%
					No junction	Brampton Drain	1.550	0.31	0.45	92239	22.0	0.00356	0.00160	624	0.160%
					Total	Brampton Drain			0.45			0.00572	0.00258	388	0.258%
16	1750	3100	P1- A1-002	Mainline A-1 Online	No junction	Brampton Drain	1.350	0.31	0.45	92239	22.0	0.00310	0.00139	717	0.139%
17	3100	3610	P1- A1-003	Mainline A-1 Online	No junction	Drain to Ellington Brook	0.410	0.31	0.45	37400	22.0	0.00038	0.00017	5822	0.017%
					Side road	Drain to Ellington Brook	1.130	1.81	0.45	2559	6.5	0.00012	0.00006	17896	0.006%
					Total	Drain to Ellington Brook			0.45			0.00051	0.00023	4393	0.023%
18	3100	3610	P1- A1-004	Mainline A-1 Online	No junction	Drain to Ellington Brook	0.510	0.31	0.45	39184	19.0	0.00043	0.00019	5172	0.019%
19	3610	4530	P1- A1-005	Mainline A-1 Online	No junction	Drain to Ellington Brook	0.820	0.31	0.45	39879	21.0	0.00078	0.00035	2860	0.035%
					Side road	Drain to Ellington Brook	1.020	1.81	0.45	2559	6.5	0.00011	0.00005	19826	0.005%
					Total	Drain to Ellington Brook			0.45			0.00089	0.00040	2499	0.040%
20	3610	4530	P1- A1-006	Mainline A-1 Online	No junction	Drain to Ellington Brook	0.920	0.31	0.45	41649	19.0	0.00082	0.00037	2698	0.037%
21	4530	5130	P1- A1-007	Mainline A-1 Online	No junction	Land Drain to Alconbury Brook	0.600	0.31	0.45	41649	19.0	0.00054	0.00024	4136	0.024%
22	4530	5130	P1- A1-008	Mainline A-1 Online	No junction	Drain to Cock Brook	0.500	0.31	0.45	39879	21.0	0.00047	0.00021	4690	0.021%
					Side road	Drain to Cock Brook	0.600	1.81	0.45	2559	6.5	0.00007	0.00003	33704	0.003%
					Total	Drain to Cock Brook			0.45			0.00054	0.00024	4117	0.024%
23	5130	5730	P1- A1-009	Mainline A-1 Online	No junction	Cock Brook	0.600	0.31	0.45	81528	20.0	0.00111	0.00050	2007	0.050%
24	5730	6400	P1- A1-010	Mainline A-1 Online	No junction	Cock Brook	0.570	0.31	0.45	39879	21.0	0.00054	0.00024	4114	0.024%
					Slip road	Cock Brook	0.41	0.36	0.45	7147	7.0	0.00003	0.00001	82449	0.001%
					Total	Cock Brook			0.45			0.00057	0.00026	3919	0.026%

Outfall/ Catchment	Chainage		Pond reference	Link description	Type of junction drained (potential)	Receiving watercourse	RL length (km)	SS	Response time < 1 hour	Design year 2035					
	from	to								AADT	% HGVs	Probability of accident (PspI) - Note 1	Probability/ year (PInc/year) Note 2	1 in years	Probability of accident %
25	5730	6400	P1- A1-011	Mainline A-1 Online	No junction	Cock Brook	0.570	0.31	0.45	41649	19.0	0.00051	0.00023	4354	0.023%
					Slip road	Cock Brook	0.41	0.36	0.45	7676	6.0	0.00002	0.00001	89562	0.001%
					Total	Cock Brook			0.45			0.00054	0.00024	4152	0.024%
Section 1 - HTC															
HTC1a	Huntingdon Town Centre (East of Railway Line) from tie-in with A14	Brampton Road	P1-HTC-001 Underground Attenuation Tank (Station car park)	Huntingdon Town Centre	No junction	Great Ouse	0.42	0.31	0.45	24028	8.0	0.00009	0.00004	24326	0.004%
					Side road		0.37	1.81	0.45	380	2.0	0.00000	0.00000	121257 8	0.000%
					Total	Great Ouse			0.45			0.00009	0.00004	23848	0.004%
HTC1b	Huntingdon Town Centre (East of Railway Line) from tie-in with A14	Brampton Road	No pond	Huntingdon Town Centre	Side road	Existing Drainage Network	0.12	1.81	0.45	8529	10.0	0.00007	0.00003	32865	0.003%
HTC2	Huntingdon Town Centre (West of Railway Line) including half of connection	A14	P1-HTC-002	Huntingdon Town Centre	Side road	Alconbury Brook	0.20	1.81	0.45	13824	13.0	0.00024	0.00011	9359	0.011%
					Crossroad		0.39	1.46	0.45	7474	13.0	0.00020	0.00009	11005	0.009%
					Total	Alconbury Brook			0.45			0.00044	0.00020	5058	0.020%
HTC3	Huntingdon Town Centre (West of Railway Line) including Northern half of connection	A14	P1-HTC-003	Huntingdon Town Centre	Side road	Existing A14 Highway drainage network (Final Outfall T.B.C.)	0.08	1.81	0.45	13824	13.0	0.00009	0.00004	23396	0.004%
					Roundabout		0.27	5.35	0.45	16425	13.0	0.00113	0.00051	1974	0.051%
					Total	Existing A14 Highway drainage network (Final Outfall T.B.C.)			0.45			0.00122	0.00055	1820	0.055%
Section 2 - A14 ONLINE															
26	20000	21325	P2-A14-001	Mainline A-14 Offline	No junction	Covell's Drain	1.325	0.31	0.45	80669	30.0	0.00363	0.00163	612	0.163%
27	410m Side Road		No Pond	Local access road	Side road	Drain to Fen Drayton	0.410	1.81	0.45	34529	8.0	0.00075	0.00034	2970	0.034%
28	21325	21610	No Pond	Mainline A-14 Online	No junction	Drain to Fen Drayton	0.285	0.31	0.45	42110	28.0	0.00038	0.00017	5844	0.017%
29	21325	21610	No Pond	Mainline A-14 Online	No junction	Drain to Fen Drayton	0.285	0.31	0.45	38559	33.0	0.00041	0.00018	5416	0.018%

Outfall/ Catchment	Chainage		Pond reference	Link description	Type of junction drained (potential)	Receiving watercourse	RL length (km)	SS	Response time < 1 hour	Design year 2035					
	from	to								AADT	% HGVs	Probability of accident (PspI) - Note 1	Probability/ year (PInc/year) Note 2	1 in years	Probability of accident %
30	670m Side Road		P2-A14-002	Local Access road	Side road	Drain to Fen Drayton	0.670	1.81	0.45	34529	8.0	0.00122	0.00055	1817	0.055%
31	21610	22550	P2-A14-003	Mainline A-14 Online	No junction	Drain to Fen Drayton	0.840	0.31	0.45	42110	28.0	0.00112	0.00050	1983	0.050%
					Slip road	Drain to Fen Drayton	0.425	0.36	0.45	1851	10.0	0.00001	0.00000	214979	0.000%
					Total	Drain to Fen Drayton			0.45			0.00113	0.00051	1965	0.051%
32	21610	22550	P2-A14-004	Mainline A-14 Online	No junction	Drain to Fen Drayton	0.840	0.31	0.45	38559	33.0	0.00121	0.00054	1837	0.054%
					Slip road	Drain to Fen Drayton	0.755	0.36	0.45	1591	15.0	0.00002	0.00001	93861	0.001%
					Total	Drain to Fen Drayton			0.45			0.00123	0.00055	1802	0.055%
33	945 Side Road		P2-A14-005	Local access road	Roundabout	Swavesey Drain 1	0.755	5.35	0.45	43535	10.0	0.00642	0.00289	346	0.289%
					Side road	Swavesey Drain 1	0.555	1.81	0.45	17926	7.0	0.00046	0.00021	4830	0.021%
					Total	Swavesey Drain 1			0.45			0.00688	0.00310	323	0.310%
34	22550	22785	P2-A14-006	Mainline A-14 Online	No junction	Swavesey Drain 1	0.035	0.31	0.45	40259	29.0	0.00005	0.00002	48062	0.002%
					Slip road	Swavesey Drain 1	1.040	0.36	0.45	18512	10.0	0.00025	0.00011	8784	0.011%
					Total	Swavesey Drain 1			0.45			0.00030	0.00013	7427	0.013%
35	22550	22785	P2-A14-007	Mainline A-14 Online	No junction	Swavesey Drain 1	0.135	0.31	0.45	36969	34.0	0.00019	0.00009	11574	0.009%
					Slip road	Swavesey Drain 1	0.580	0.36	0.45	16559	8.0	0.00010	0.00005	22011	0.005%
					Total	Swavesey Drain 1			0.45			0.00029	0.00013	7585	0.013%
36	540m Side Road	n/a	P2-A14-008	Local access road	Roundabout	Swavesey Drain 1	0.400	5.35	0.45	36882	15.0	0.00432	0.00194	514	0.194%
					Side road	Swavesey Drain 1	0.340	1.81	0.45	17926	7.0	0.00028	0.00013	7884	0.013%
					Total	Swavesey Drain 1			0.45			0.00460	0.00207	483	0.207%

Outfall/ Catchment	Chainage		Pond reference	Link description	Type of junction drained (potential)	Receiving watercourse	RL length (km)	SS	Response time < 1 hour	Design year 2035					
	from	to								AADT	% HGVs	Probability of accident (PspI) - Note 1	Probability/ year (PInc/year) Note 2	1 in years	Probability of accident %
37	280 m Side Road		No Pond	Local access road	Side road	Swavesey Drain 1	0.280	1.81	0.45	4342	4.0	0.00003	0.00001	69168	0.001%
38	22785	23150	No Pond	A-14 Online	No junction	Swavesey Drain 1	0.065	0.31	0.45	112297	25.0	0.00021	0.00009	10762	0.009%
					Slip road	Swavesey Drain 1	1.440	0.36	0.45	18512	10.0	0.00035	0.00016	6344	0.016%
					Total	Swavesey Drain 1			0.45			0.00056	0.00025	3991	0.025%
39	175m Side Road	n/a	No Pond	Local access road	Side road	Swavesey Drain 1	0.075	1.81	0.45	5519	15.0	0.00004	0.00002	54176	0.002%
					Roundabout	Swavesey Drain 1	0.345	5.35	0.45	10885	15.0	0.00110	0.00049	2020	0.049%
					Total	Swavesey Drain 1			0.45			0.00114	0.00051	1948	0.051%
40	795m Side Road		P2-A14-009	Local access road	Side road	Swavesey Drain 2 (Utton's Drove Drain)	0.795	1.81	0.45	4342	4.0	0.00009	0.00004	24361	0.004%
41	23150	23860	P2-A14-010	Mainline A-14 Online	No junction	Swavesey Drain 2 (Utton's Drove Drain)	0.610	0.31	0.45	112297	25.0	0.00194	0.00087	1147	0.087%
					Slip road	Swavesey Drain 2 (Utton's Drove Drain)	0.630	0.36	0.45	5000	15.0	0.00006	0.00003	35792	0.003%
					Total	Swavesey Drain 2 (Utton's Drove Drain)			0.45			0.00200	0.00090	1111	0.090%
42	330m Side Road		P2-A14-011	Local access road	Side road	Swavesey Drain 2 (Utton's Drove Drain)	0.330	1.81	0.45	4342	4.0	0.00004	0.00002	58688	0.002%
43	23860	24710	P2-A14-012	Mainline A-14 Online	No junction	Swavesey Drain 2 (Utton's Drove Drain)	0.850	0.31	0.45	112297	25.0	0.00270	0.00122	823	0.122%
44	585m Side Road		P2-A14-013	Local access road	Side road	Swavesey Drain 3	0.585	1.81	0.45	4405	4.0	0.00007	0.00003	32633	0.003%

Outfall/ Catchment	Chainage		Pond reference	Link description	Type of junction drained (potential)	Receiving watercourse	RL length (km)	SS	Response time < 1 hour	Design year 2035					
	from	to								AADT	% HGVs	Probability of accident (PspI) - Note 1	Probability/ year (PInc/year) Note 2	1 in years	Probability of accident %
45	24710	25295	P2-A14-014	Mainline A-14 Online	No junction	Swavesey Drain 3	0.485	0.31	0.45	112297	25.0	0.00154	0.00069	1442	0.069%
					Slip road	Swavesey Drain 3	0.515	0.36	0.45	4678	4.0	0.00001	0.00001	175495	0.001%
					Total	Swavesey Drain 3			0.45			0.00155	0.00070	1431	0.070%
46	270 Side Road		No Pond	Local access road	Side road	Longstanton Brook	0.270	1.81	0.45	4405	4.0	0.00003	0.00001	70704	0.001%
47	25295	25515	P2-A14-015	Mainline A-14 Online	Slip road	Longstanton Brook	0.640	0.36	0.45	4678	5.0	0.00002	0.00001	112975	0.001%
					No junction	Longstanton Brook	0.020	0.31	0.45	112297	25.0	0.00006	0.00003	34978	0.003%
					Total	Longstanton Brook			0.45			0.00008	0.00004	26709	0.004%
48	200 Side Road		No Pond	Local access road	Side road	Longstanton Brook	0.200	1.81	0.45	31018	4.0	0.00016	0.00007	13555	0.007%
					Roundabout	Longstanton Brook	0.340	5.35	0.45	23227	3.0	0.00046	0.00021	4803	0.021%
					Total	Longstanton Brook			0.45			0.00063	0.00028	3547	0.028%
49	25515	25985	P2-A14-016	Mainline A-14 Online	No junction	Longstanton Brook	0.270	0.31	0.45	102948	26.0	0.00082	0.00037	2718	0.037%
					Slip road	Longstanton Brook	0.650	0.36	0.45	4678	5.0	0.00002	0.00001	111237	0.001%
					Total	Longstanton Brook			0.45			0.00084	0.00038	2653	0.038%
50	545m Side Road		No Pond	Local access road	Side road	Drain to Longstanton Brook	0.545	1.81	0.45	31018	5.0	0.00056	0.00025	3980	0.025%
51	265m Side Road		P2-A14-017	Local access road	Side road	Drain to Longstanton Brook	0.265	1.81	0.45	14728	5.0	0.00013	0.00006	17237	0.006%
52	280m Side Road		P2-A14-018	Local access road	Side road	Oakington Brook	0.280	1.81	0.45	14728	5.0	0.00014	0.00006	16313	0.006%
53	25985	26390	No Pond	Mainline A-14 Online	No junction	Oakington Brook	0.205	0.31	0.45	135923	26.0	0.00082	0.00037	2711	0.037%
					Slip road	Oakington Brook	1.370	0.36	0.45	16059	3.0	0.00009	0.00004	25623	0.004%
					Total	Oakington Brook			0.45			0.00091	0.00041	2452	0.041%

Outfall/ Catchment	Chainage		Pond reference	Link description	Type of junction drained (potential)	Receiving watercourse	RL length (km)	SS	Response time < 1 hour	Design year 2035					
	from	to								AADT	% HGVs	Probability of accident (PspI) - Note 1	Probability/ year (PInc/year) Note 2	1 in years	Probability of accident %
54	165m Side Road		No pond	Local access road	Side road	Oakington Brook	0.165	1.81	0.45	14728	5.0	0.00008	0.00004	27683	0.004%
55	26390	26620	No pond	Mainline A-14 Online	No junction	Oakington Brook	0.230	0.31	0.45	135923	21.0	0.00074	0.00033	2992	0.033%
56	490m Side Road		P2-A14-019	Local access road	Side road	Drain to Oakington Brook	0.490	1.81	0.45	14728	4.0	0.00019	0.00009	11652	0.009%
57	26620	27110	P2-A14-020	Mainline A-14 Online	No junction	Drain to Oakington Brook	0.490	0.31	0.45	135923	21.0	0.00158	0.00071	1404	0.071%
58	320m Side Road		No pond	Local access road	Side road	Drain to Oakington Brook	0.220	1.81	0.45	14728	4.0	0.00009	0.00004	25953	0.004%
					Roundabout	Drain to Oakington Brook	0.255	5.35	0.45	21410	6.0	0.00064	0.00029	3474	0.029%
					Total	Drain to Oakington Brook			0.45			0.00073	0.00033	3064	0.033%
59	27110	27375	P2-A14-021	Mainline A-14 Online	No junction	Drain to Oakington Brook	0.265	0.31	0.45	135923	21.0	0.00086	0.00039	2596	0.039%
60	27375	27795	No pond	Mainline A-14 Online	No junction	Dry Drayton Junction Drain	0.420	0.31	0.45	135923	21.0	0.00136	0.00061	1638	0.061%
61	27795	28745	P2-A14-022	Mainline A-14 Online	No junction	Cottenham Lode (Beck Brook)	0.950	0.31	0.45	70158	20.0	0.00151	0.00068	1473	0.068%
62	27795	28720	P2-A14-023	Mainline A-14 Online	No junction	Cottenham Lode (Beck Brook)	0.925	0.31	0.45	65765	22.0	0.00151	0.00068	1467	0.068%
63	920m Side Road		P2-A14-024	Local access road	Side road	Cottenham Lode (Beck Brook)	0.920	1.81	0.45	4405	4.0	0.00011	0.00005	20750	0.005%
64	185m Side Road		No pond	Local access road	Side road	Dry Drayton Junction Drain	0.185	1.81	0.45	12080	6.0	0.00009	0.00004	25086	0.004%
Section 3 - GIRTON INTERCHANGE															
65	330m Side Road		P3-LAR_001	Local access road	Side road	Dry Drayton Junction Drain	0.23	1.81	0.45	12080	6.0	0.00011	0.00005	20178	0.005%
					Roundabout	Dry Drayton Junction Drain	0.23	5.35	0.45	13956	8.0	0.00049	0.00022	4530	0.022%
					Total	Dry Drayton Junction Drain			0.45			0.00060	0.00027	3700	0.027%
66	1927m Side Road		P3-LAR-002	No junction - Girton interchange	Side road	Cottenham Lode (Beck Brook)	1.93	1.81	0.45	3221	8.0	0.00033	0.00015	6774	0.015%
67	550m Side Road		P3-LAR-003	No junction - Girton interchange	Side road	Cottenham Lode (Beck Brook)	0.55	1.81	0.45	3221	8.0	0.00009	0.00004	23734	0.004%

Outfall/ Catchment	Chainage		Pond reference	Link description	Type of junction drained (potential)	Receiving watercourse	RL length (km)	SS	Response time < 1 hour	Design year 2035					
	from	to								AADT	% HGVs	Probability of accident (P _{spl}) - Note 1	Probability/ year (P _{inc/year}) Note 2	1 in years	Probability of accident %
68	1740m Side Road		P3-A14-001	Girton interchange	Slip road	Cottenham Lode (Beck Brook)	1.45	0.36	0.45	36053	24.0	0.00164	0.00074	1353	0.074%
					No Junction	Cottenham Lode (Beck Brook)	0.30	0.31	0.45	41848	23.0	0.00032	0.00014	6917	0.014%
					Total	Cottenham Lode (Beck Brook)			0.45			0.00196	0.00088	1131	0.088%
69	1130m Side Road		P3-A1307- 001	Girton interchange	Side road	Drain to Washpit Brook	0.83	1.81	0.45	27793	24.0	0.00366	0.00165	608	0.165%
					Roundabout	Drain to Washpit Brook	0.42	5.35	0.45	20707	5.0	0.00086	0.00039	2592	0.039%
					Total	Drain to Washpit Brook			0.45			0.00451	0.00203	492	0.203%
70	875m Side Road		P3-A1307- 002	Girton interchange	Side road	Washpit Brook	0.68	1.81	0.45	11365	5.0	0.00025	0.00011	8769	0.011%
					Roundabout	Washpit Brook	0.33	5.35	0.45	29065	5.0	0.00095	0.00043	2345	0.043%
					Total	Washpit Brook			0.45			0.00120	0.00054	1850	0.054%
71	1205m Side Road		P3-A428- 001	Slip road - Girton interchange	Side road	Drain to Washpit Brook	1.21	1.81	0.45	27793	24.0	0.00531	0.00239	418	0.239%
72	480m Side Road		P3-A1307- 003	Slip road - Girton interchange	Side road	Washpit Brook	0.48	1.81	0.45	18996	5.0	0.00030	0.00014	7378	0.014%
73	1300m Side Road		P3-A1307- 004	Slip road - Girton interchange	Side road	Washpit Brook	1.30	1.81	0.45	28041	23.0	0.00554	0.00249	401	0.249%
Section 4 - A14 CAMBRIDGE NORTHERN BYPASS															
74	32710	34020	P4-A14-001	A14 Cambridge Northern By	No junction	Public Drain	1.11	0.31	0.45	105861	18.0	0.00239	0.00108	929	0.108%
					Slip road	Public Drain	0.78	0.36	0.45	11705	3.0	0.00004	0.00002	62144	0.002%
					Total	Public Drain			0.45			0.00243	0.00109	915	0.109%
75	34360	35300	P4-A14-002	A14 Cambridge Northern By	No junction	13 th Public Drain	0.74	0.31	0.45	104860	18.0	0.00158	0.00071	1406	0.071%
					Slip road	13 th Public Drain	0.73	0.36	0.45	15264	10.0	0.00015	0.00007	15178	0.007%
					Total	13th Public Drain			0.45			0.00173	0.00078	1287	0.078%

Note 1 $P_{SPL} = RL \times SS \times (AADT \times 365 \times 10^{-9}) \times (\%HGV/100)$

Note 2 $P_{INC} = P_{SPL} \times P_{POL}$