

A303 Amesbury to Berwick Down TR010025

6.3 Environmental Statement Appendices

Appendix 11.1 Water Quality Risk Assessments

APFP Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

October 2018





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1 Introduction

1.1 Purpose of this appendix

- 1.1.1 This appendix provides the results of the assessments of the road drainage of the Scheme on water quality. These include:
 - Effects of routine runoff on surface waters;
 - Assessment of the impacts on groundwater; and
 - Spillage risk assessment.

1.2 Methodology

- 1.2.1 The method for assessing the importance, magnitude and significance of effects is based on the Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 10 HD45 Road Drainage and the Water Environment. It has been amended to reflect best practice. This was done to incorporate an updated methodology for assessing the effects on groundwater quality and new methodologies for assessing the effects on groundwater flows, groundwater-dependent terrestrial ecosystems and the local hydromorphology. Appendices A, B, C and E detail these methodologies and are provided in Annex 1. Together with the latest version of the Highways England Water Risk Assessment Tool (HEWRAT), these appendices represent the changes from the extant version of HD45.
- 1.2.2 HEWRAT, version 2.0.3, was used to undertake the water quality risk assessments which include the methods outlined in HD45 as follows:
 - Method A Effects of routine runoff on surface waters;
 - Method C Assessment of the impacts on groundwater; and
 - Method D Pollution impacts from accidental spillages.

1.3 Water quality risk assessments

1.3.1 The results of the water quality risk assessments are provided in Annex 2.



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Appendix 11.1 Annex 1 Appendices with methodologies used to update HD45

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The following appendices outline the methodologies used to update DMRB Volume 11, Section 3, Part 10 HD45 – Road Drainage and the Water Environment.

Appendix A Groundwater levels and flow

A1 Introduction

This methodology constitutes a simple assessment approach. It is based upon Ref 10.I & 11.I but has been modified to accommodate the range of impacts related to road construction and operation and to fit the overall assessment process for roads and the water environment. A summary of the assessment process for groundwater levels and flows is provided in Table A.1 and this section provides further information on each step.

Table A.1 Groundwater Levels and Flows Assessment

Step 1	Establish regional groundwater body status.
Step 2	Develop a conceptual model for the surrounding area.
Step 3	Based on the conceptual model, identify all potential features which are susceptible to groundwater level and flow impacts.

A2 Step 1 Establish regional groundwater body status.

Determine the status of all regional groundwater bodies within the vicinity of the planned project.

A3 Step 2 Develop a conceptual model for the surrounding area.

Develop a conceptual model to express the current understanding of the characteristics and processes inherent in the groundwater regime and how this influences the behaviour of groundwater, including its interaction with surface water.

The purpose of the model is to understand groundwater flow directions, depth to groundwater, aquifer layering, water quality, interaction with surface water and dependent ecosystems, overall water balance etc. all of which will assist with assessing the risks to groundwater. For simple assessment, the conceptual model should be developed from information and data that are readily available from published sources, such as the EA, SEPA, the BGS, and the Centre for Ecology and Hydrology (CEH) or any available monitoring data.

Conceptual models can be developed at different scales and to different levels of detail depending on the specific task they are designed for. The minimum recommended information can be summarised as:

- a) A definition, based on the regional geology and hydrogeology, of the extent of the study area (including defining the WFD water body and its status and the groundwater management unit) and its subdivision into appropriate zones (vertically and horizontally);
 - a. A description of the hydrogeological conditions and flows at the boundaries of the unit (including vertical boundaries, where the adjoining strata should be identified as aquitards, aquicludes, leaky aquifers etc.);



- b. An estimate of the plausible range of aquifer parameters in the unit, and a description of the likely groundwater flow paths or flow patterns;
- c. Identification of water dependent features of the area such as rivers, ponds, wetlands, springs, seepages, estuaries etc.
- d. Identification of the major water resources and water quality pressures on the unit (such as other abstractions, and point sources of pollution);
- e. A description of the likely mechanisms and locations of interaction between groundwater and surface water features;
- f. Interpretation of available water quality data; and
- g. A description of the limitations of the current conceptual understanding, and the major sources of uncertainty.

The conceptual model should also establish the propensity for the groundwater body to contribute to groundwater flood risk, groundwater emergence and water logging and potential effects on the geotechnical properties of the impacted area.

A4 Step 3 Identify all potential features which are susceptible to groundwater level and flow impacts

This step focusses on which water features are likely to be affected by the proposed works. The assessment will only progress to this step if a sensitive groundwater receptor is present.

It requires the identification of all the potential water features that are susceptible to groundwater level and flow impacts. This may include, for example, rivers, and some lakes or wetlands, groundwater abstractions, underground structures and aquifer flow regimes. Deciding how far afield to look for potential water features is a matter of professional judgement. Further information is provided in Ref 10.I.

Following completion of Step 3, the conceptual model should be revisited to determine any remaining uncertainties (if any), where the greatest of these may lie and where efforts to reduce uncertainty would best be focussed.



Appendix B Groundwater dependent terrestrial ecosystems

B1 Introduction

Assessment of impacts on groundwater dependent terrestrial ecosystems (GWDTE) should be undertaken following a stepped, risk based approach which depends upon establishing linkages between potential impacts from the road development on the hydrological and hydrogeological regime and a GWDTE.

The simple assessment determines whether there is a hydrogeological link with the GWDTE, the importance of the GWDTE, the magnitude of any potential impact on the GWDTE and thereby the overall significance of risk to the GWDTE.

B2 Step 1 Identify potential linkages

A site specific conceptual hydrogeological model should be developed to provide an overview of the interactions between groundwater, surface water and to identify potential linkages between potential impacts from the road (during construction or operation) and GWDTE.

Groundwater flow paths, groundwater levels and the proximity of the GWDTE should be taken into account in the conceptual hydrogeological model.

If a site specific conceptual hydrogeological model has been developed for the assessment of impacts on groundwater level and flow then this model may be adapted for use to assess impacts on GWDTE.

If the conceptual model demonstrates there is no linkage between the potential impacts from the road and the GWDTE then there is negligible risk and no further assessment is required.

If there is a linkage between the potential impacts from the road and the GWDTE, or a linkage cannot be ruled out, the assessment should proceed to Step 2.

B3 Step 2 Assess GWDTE importance

The UKTAG Wetland Task Team (WTT) provide guidance on using the National Vegetation Classification (NVC) to determine groundwater dependency of vegetation (Ref 28.I). Plant communities that are dependent on groundwater are listed using the NVC and are assigned associated groundwater dependency scores. The NVC score, indicating dependence on groundwater, is separated into three groups (3 = low, 2 = moderate, 1 = high) (Ref 28.I).

The importance of the GWDTE is assessed on a three point scale that mirrors the NVC groundwater dependency levels (Table B.3). The importance of the GWDTE is taken as the highest of the 'Flora and Fauna' and 'Habitat' receptors.



Table B.3 Classification and Importance of GWDTE

Receptor	Low	Moderate	High
Flora and Fauna NVC plant communities	Species are not protected or listed. They are abundant / common and not critical for GWDTE functions, such as predator/prey species or important host flora for protected or listed species.	Species are not globally common species that are rare in UK, or important to GWDTE functioning, such as predator/prey species, or a species that is under threat or the population is declining.	Regionally significant populations of globally threatened or endangered species, Species important to GWDTE functioning, such as predator or prey species. NVC Dependency
	NVC Dependency Level on Groundwater 3	NVC Dependency Level on Groundwater 2	Level on Groundwater 1
Habitat	Sites of local	Habitats that are	Sites designated for
As per International Natura 2000 codes Annex I and II and National SSSI	biodiversity value but not intact, fragile or unique.	suffering significant decline at a national or regional level.	protection at national (SSSI) or international level (Natura 2000).
Eleven broad categories grouped by the UKTAG WTT	Habitats that recover quickly following disturbance (i.e.	Habitats of high species number or habitat diversity or	Broad categories grouped by the UKTAG WTT
 Quaking bog Wet dune Fen (mesotrophic) and Fen meadow Fen (oligotrophic) and wetlands at tufa forming springs Wet grassland 	habitats comprising marine species that readily recolonise disturbed areas).	'naturalness'. Habitats that are capable of unassisted recovery to natural conditions following disturbance, although this may	Habitats recognised as intact or unique or areas recognised by non-governmental organisations as having high environmental value.
 Wet heath Peat bog and woodland on peat bog, Wetland directly irrigated by spring or seepage Swamp (mesotrophic) and reed bed Swamp (oligotrophic) 		require several years (habitats where growing conditions are favourable)	Habitats that are unlikely to return to natural conditions without some intervention, but which are capable of assisted recovery.
Wet woodland			

Notes

- 1. NVC Communities defined in UKTAG 2009 (Ref 28.I).
- 2. The JNCC website provides listings of NVC communities and sub-communities (Ref 29.I).
- 3. Dependency on Groundwater of species defined in UKTAG 2009 (Ref 28.I).
- 4. UKTAG Wetland Task Team, UKTAG 2014 (Ref 30.I)



B4 Step 3 Assess potential impacts

Table B.4 identifies typical potential impacts and the general means for their assessment which (at this simple assessment level) should be qualitative, based on the conceptual model.

Table B.4 Potential impacts from groundwater on GWDTE

Impact Type		Potential Impact	Assessment Method
Groundwater quantity	Groundwater flow/ flux	Change in discharge of groundwater via springs and seepages Change in groundwater flow/ flux through GWDTE	Qualitative identification of relative change in volume/flow of groundwater discharge to/ through the GWDTE
	Groundwater level	Change in water level beneath the GWDTE Change in upward hydraulic gradient and/or	Qualitative identification of change in relative elevations of groundwater within the groundwater body and the
	saturation/ soil moisture	flow from a deeper groundwater body to the near surface deposits	GWDTE Qualitative determination of potential change in soil hydraulic properties and saturation related to groundwater level and flow
Groundwater quality	Nutrients (Nitrate/ Phosphate)	Change in nutrient loading to GWDTE	Qualitative determination of potential change in nutrient loading
	Metalloid and organic compounds	Change in quantities of potentially toxic chemicals derived from road runoff and drainage	Refer to routine runoff and surface water quality, routine runoff and groundwater quality and spillage assessment methodologies

Based on the results of the assessments, the magnitude of the potential change in the groundwater regime at the GWDTE is determined using Table B.4a.

Table B.4a Magnitude of impact on a GWDTE

Magnitude	Example
Major Adverse	Total or partial loss of groundwater flow or changes in groundwater quality such that the GWDTE is no longer supported or is prevented it from reaching favourable condition. Reduction in classification under the WFD.
Moderate Adverse	Partial loss of groundwater flow, or change in groundwater level or quality at the GWDTE such that there are measurable effects on the habitat or flora and fauna of the GWDTE but which are insufficient to lead to a change in its status or classification under the WFD or prevent it from reaching favourable condition.
Minor Adverse	Minor changes in groundwater levels, flow or quality at the GWDTE which have no measurable effect on the habitat or flora and fauna of the GWDTE.
Negligible	No measurable change in groundwater levels, flow or quality at the GWDTE.



There may be some circumstances under which the road and its drainage may potentially contribute to and provide some beneficial support to a GWDTE. Where this is the case it should be taken into account in the overall assessment.

B5 Step 4 Establish risk to GWDTE

To establish the risk to GWDTE the importance (Step 2) is combined with the magnitude of the potential impact magnitude determined (Step 3) using the matrix in Table B.5

Table B.5 Risk matrix for GWDTE

		Magnitude			
		Major	Moderate	Minor	Negligible
Importance	High	Significant risk	Significant risk	Moderate risk	Negligible risk
	Moderate	Significant risk	Moderate risk	Moderate risk	Negligible risk
	Low	Moderate risk	Negligible risk	Negligible risk	Negligible risk

B6 Step 5 Assessment outcomes and actions

If the simple assessment identifies that there is a significant risk to GWDTE from the project then, unless there is mitigation incorporated to address the risk, a more detailed assessment and characterisation of the GWDTE will be necessary. In turn this may be used to develop more appropriate and robust mitigation measures.

If the simple assessment identifies that there is a moderate risk to GWDTE from the project then, the need for a more detailed assessment will depend upon the nature of the impact from the change in groundwater regime, the proximity of the GWDTE to the development and the sensitivity of the GWDTE. Where this risk can be addressed by suitable mitigation, no further detailed assessment will be necessary.

The aim of the more detailed assessment is to establish a more precise assessment of the significance of such risk and aid the identification and design of any mitigation measures.

No guidance is provided here for detailed characterisation and assessment as this can only be carried out on a site by site basis, however in broad terms the approach should be similar to that set out in Table B.4 but replacing the qualitative analysis with a more quantitative analysis.

With respect to groundwater quantity this should quantify the departure from the required environmental supporting conditions within the GWDTE.

With respect to groundwater quality this may require the quantification of any departure from defined GWDTE threshold values established by UKTAG (Ref 29.I).



Appendix C Groundwater quality and runoff

C1 Introduction

This appendix describes the parameters and manual calculations used in a simple assessment for determining the risk of impact on groundwater quality from routine runoff.

The method is based on the 'source-pathway-receptor' pollutant linkage principle which is widely used and explained in Model Procedures for the Management of Contaminated Land (EA/Defra, 2004) (Ref 31.I). In the context of road drainage, the source is the road runoff with any pollutants it contains. The pathways are the processes which may modify the pollutants during transmission through the discharge system and unsaturated zone. The receptor is the groundwater.

The key factors affecting the persistence and movement of pollutants within the pathway to groundwater are illustrated in Figure C.1. From these factors the risk matrix shown in Table C.1 was developed. The matrix is used to carry out the groundwater quality and runoff simple assessment.

C2 Using the groundwater risk assessment matrix

To use the matrix (Table C.1) first establish the risk level (low, medium or high) for each parameter and the relevant risk factor (1, 2, 3 respectively). This is then multiplied by the weighting factor for that parameter to provide a score. For example, if the runoff is from a road with a traffic flow of 70,000 AADT the risk for this parameter would be medium or '2' and this is then multiplied by the weighting factor for this parameter of 10, giving a score for traffic flow of 20.

This process is repeated for all parameters and the scores are then summed to provide an overall risk score. The lowest possible overall score is 100 and the highest is 300. The higher the score the greater the risk to groundwater. The overall score determines whether the risk is low, medium or high as follows:

<150 low risk
 150-250 medium risk
 >250 high risk

The risk category determines what actions are then taken and the need for further assessment.

The process of working through the matrix will help to identify which parameters are associated with the greatest risk and therefore where more detailed assessment would be most usefully targeted. Similarly, working through the matrix will give an indication as to how best to mitigate the risk to break the source-pathway-receptor linkage.

HEWRAT contains an automated version of the matrix in Table C.1, though manual calculation may be used if preferred.

C2.1 Matrix Parameters

Many of the parameters in the matrix are self-explanatory. For those which are not, further information is given below.



Drainage area ratio

The ratio is determined as 'drainage area of road'/'active surface area of infiltration device', where the active surface area is that part of the device through which the majority of downward discharge will occur.

Infiltration method

Whether the form of the infiltration system is 'continuous', 'region' or 'point'. The terms 'continuous', 'region' and 'point' are specific asset definitions from HD 43 (Ref 32.I).

Unsaturated zone

The minimum depth of the unsaturated zone accounting for seasonal variations in groundwater level.

Flow type

This parameter incorporates the type of flow through the ground and the effective grain size.

- Dominantly intergranular flow occurs in, for example, non-fractured consolidated deposits or unconsolidated deposits of fine-medium sand or finer.
- Mixed fracture and intergranular flow occurs in, for example, consolidated deposits or unconsolidated deposits of medium coarse sand.
- Flow dominated by fractures/fissures occurs in, for example, well consolidated sedimentary deposits, igneous and metamorphic rocks or unconsolidated deposits of very coarse sand or coarser.



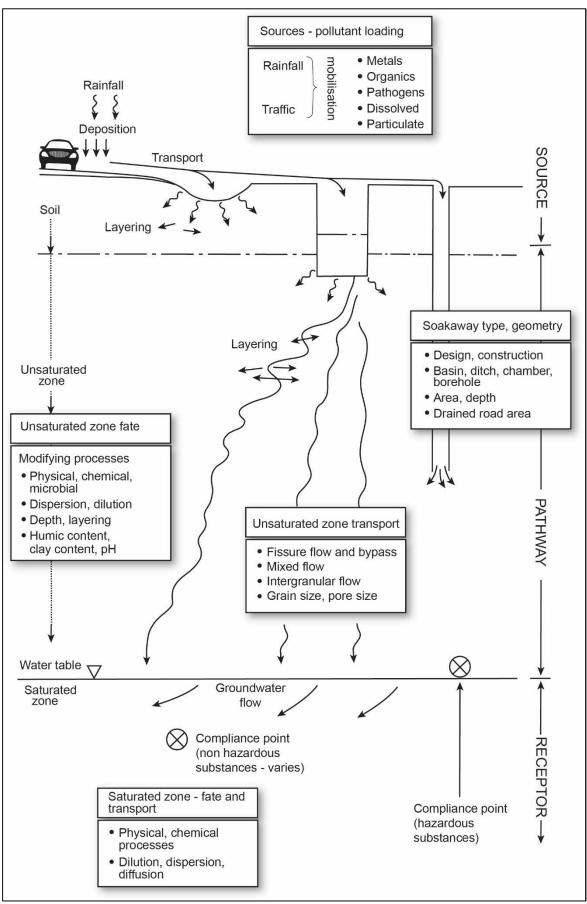


Figure C.1 Schematic of source, transport and fate of road runoff



Table C.1 Groundwater quality and runoff risk assessment matrix

	Parameter	Weighting Factor	Low Risk (Score 1)	Medium Risk (Score 2)	High Risk (Score 3)
ш	Traffic flow	10	≤50,000 AADT	>50,000 AADT to <100,000 AADT	≥100,000 AADT
SOURCE	Rainfall depth (annual averages)	10	≤740 mm	>740 mm to <1060 mm	≥1060 mm
	Drainage area ratio	10	≤50	>50 to <150	≥150
	Infiltration method	15	"Continuous" shallow linear (e.g. unlined ditch, swale, grassed channel)	"Region", shallow infiltration systems, (e.g. infiltration basin).	"Point" systems (e.g. chamber soakaways, deep shafts) 2
 	Unsaturated zone	20	Depth to water table ≥15 m and unproductive strata	Depth to water table <15 m and >5 m	Depth to water table ≤5 m
PATHWAY	Flow type	20	Dominantly intergranular flow	Mixed fracture and intergranular flow	Flow dominated by fractures/ fissures
	Unsaturated Zone Clay Content	5	≥15 % clay minerals	<15 % to >1 % clay minerals	≤1 % clay minerals
	Organic Carbon	5	≥15 % Soil Organic Matter	<15% to >1% Soil Organic Matter	≤1 % Soil Organic Matter
	Unsaturated zone soil pH	5	pH ≥8	pH <8 to >5	pH ≤5



Appendix E Hydromorphological assessment

E1 Introduction

The hydromorphological assessment should identify the natural river processes that would have operated before any development had affected the river or catchment, and then assess the impacts of the project in terms of deviations from natural conditions.

E2 Hydromorphological assessment

A simple assessment is a desk-based survey which should be tailored to the nature of proposed project and potentially affected watercourses. It should include, where relevant, details of:

- flow processes;
- 2. sediment movement;
- 3. boundary conditions (channel bed and banks);
- 4. riparian zones;
- 5. floodplains;
- 6. downstream and catchment-channel connectivity;
- 7. the general form and function of the channel and near-channel zones; and
- 8. the setting of the watercourse within the wider catchment.

The assessment should determine how the above characteristics are likely to be affected by the project and what impacts these changes might have on the hydromorphological characteristics of, or the ecology within, that watercourse and downstream water bodies.

A detailed assessment takes the assessment a stage further and should include site surveys and may include modelling. Documents such as that by Haycock Associates (Ref 34.I) are available to guide the scope and appropriate methods of such surveys.



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Appendix 11.1 Annex 2a Surface Water Assessment Results

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A303 Amesbury to Berwick Down Baseline Surface Water Quality Assessment

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User parameters

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Location Details

Road Number	A303T	Assessment type		Cumulative assessme	nt including sediments (outfalls within
HE Area/DBFO number	Area 2	Assessment type		100m)	
OS grid reference of assessment point (m)	Easting 415132	Receiving watercourse		River Avon	
OS grid reference of assessment point (iii)	Northing 141936	EA receiving water Detailed River N	letwork ID	eaew1001000000179	934
OS grid reference of outfall structure (m)	Easting 415209	Assessor and affiliation		Bernadine Maguire	
os grid reference of outrail structure (III)	Northing 141949	Date of assessment		20/06/2018	
Outfall number	SU1541_2098a.1	Version of assessment		Final	
List of outfalls in cumulative assessment	SU1542_4700b.1	SU1541_5099a.1	SU1542.7505a.1		
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A Mulantocal Workstood ypge		ugri	I			
Water body type						
Length of road drawing to could all m		- 1	-			
Sead Type						
A road of a situ utan or mari?						
Author type			-			
Interest took (Apt Now way)						
Traille Time (AADT from way)		-	-			
Spillage factor	Traffic flow (AADT two way)	-	-			
Civiling measures factor	% HGV	-	-			
Section Programme Sector	Spillage factor	no/109H	=			
Sishting measures factor		GVkm/y				
Proposed measures factor		ear				
Water tooly type		-	-			
Length of road draining to cutfall March	Proposed measures factor	-	=			
Length of road draining to cutfall March	В					
Soad Type (Aroad or Motorway)						
A road, is site urban or rural? 						
Junction type						
Location						
Traffic flow (AADT two way)						
SHOY						
Spillage factor						
Cykmy ear						
Easiling measures factor						
Existing measures factor - - - - - - - - -						
Proposed measures factor	Existing measures factor		-			
Water body type			<u>-</u>			
Length of road draining to outfall m .	С					
Length of road draining to outfall m .	Water body type					
Road Type (A-road or Motorway) -	Longth of road draining to outfall		<u> </u>			
Junction type	Length of road draining to outrail		- -			
Location	Road Type (A-road or Motorway)	m -	-			
Traffic flow (AADT two way) % HGV 5 pillage factor 6 proposed measures factor 7 proposed measures factor 8 proposed measures factor 8 proposed measures factor 8 proposed measures factor 8 proposed measures factor 9 proposed measures factor 10 proposed measures factor 10 proposed measures factor 10 proposed measures factor 11 proposed measures factor 12 proposed measures factor 13 proposed measures factor 14 proposed measures factor 15 proposed measures factor 16 proposed measures factor 17 proposed measures factor 18 proposed measures factor 19 proposed measures factor 10 proposed measures factor 10 proposed measures factor 11 proposed measures factor 12 proposed measures factor 13 proposed measures factor 14 proposed measures factor 15 proposed measures factor 16 proposed measures factor 17 proposed measures factor 18 proposed measures factor 19 proposed measures factor 10 propo	Road Type (A-road or Motorway) If A road, is site urban or rural?	m -	- -			
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Spillage factor	Road Type (A-road or Motorway) If A road, is site urban or rural? Junction type Location	m - -				
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Existing measures factor	Road Type (A-road or Motorway) If A road, is site urban or rural? Junction type Location Traffic flow (AADT two way) % HGV	m				
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Description	Road Type (A-road or Motorway) If A road, is site urban or rural? Junction type Location Traffic flow (AADT two way) % HGV Spillage factor	m no/109H GVkm/y ear				
Length of road draining to outfall m - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -	Road Type (A-road or Motorway) If A road, is site urban or rural? Junction type Location Traffic flow (AADT two way) & HGV Spillage factor Existing measures factor	m no/109H GVkm/y ear -				
Length of road draining to outfall m - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -	Road Type (A-road or Motorway) If A road, is site urban or rural? Junction type Location Traffic flow (AADT two way) & HGV Spillage factor Existing measures factor	m no/109H GVkm/y ear -				
Road Type (A-road or Motorway)	Road Type (A-road or Motorway) If A road, is site urban or rural? Junction type Location Traffic flow (AADT two way) % HGV Spillage factor Existing measures factor Proposed measures factor D	m no/109H GVkm/y ear -				
If A road, is site urban or rural? - - Junction type - - Location - - Traffic flow (AADT two way) - - % HGV - - Spillage factor no/109H - Existing measures factor - - Proposed measures factor - - Erroposed measures factor - - Every type - - Length of road draining to outfall m -	Road Type (A-road or Motorway) If A road, is site urban or rural? Junction type Location Traffic flow (AADT two way) % HGV Spillage factor Existing measures factor Proposed measures factor D Water body type	m				
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Spillage factor	Road Type (A-road or Motorway) If A road, is site urban or rural? Junction type Location Traffic flow (AADT two way) % HGV Spillage factor Existing measures factor Proposed measures factor D Water body type Length of road draining to outfall Road Type (A-road or Motorway) If A road, is site urban or rural? Junction type Location	m				
GVkm/y ear Existing measures factor	Road Type (A-road or Motorway) If A road, is site urban or rural? Junction type Location Traffic flow (AADT two way) % HGV Spillage factor Existing measures factor Proposed measures factor D Water body type Length of road draining to outfall Road Type (A-road or Motorway) If A road, is site urban or rural? Junction type Location Traffic flow (AADT two way)	m				
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If A road, is site urban or rural?	-	-	
Junction type	-	÷	
Location	-	i i	
Traffic flow (AADT two way)	-	÷	
% HGV	-	=	
Spillage factor	no/109H	=	
	GVkm/y		
	ear		
Existing measures factor	-	=-	
Proposed measures factor	-	=	
F			
Water body type	-	=	
Length of road draining to outfall	m	-	
Road Type (A-road or Motorway)	-	=	
If A road, is site urban or rural?	-	-	
Junction type	-	=	
Location	-	-	
Traffic flow (AADT two way)	-	=	
% HGV	-	=	
Spillage factor	no/109H		
	GVkm/y		
	ear		
Existing measures factor	-	=	
Proposed measures factor	-	-	
Justification for choice of existing measures factors			
Justification for choice of proposed measures factors			
Groundwater Assessments	•		
Traffic flow	-	-	
Rainfall depth (annual averages)	-	-	
Drainage area ratio	-	-	
Infiltration method	-	-	
Unsaturated zone	-	-	
Flow type (Incorporates flow type an effective grain size)	-	-	
Unsaturated Zone Clay Content	-	-	
Organic Carbon	-	-	
Unsaturated zone soil pH	-	-	
<u> </u>			



Summary of predictions Soluble - Acute Impact Sediment - Chronic Impact Copper Zinc Cadmium Total PAH Pyrene Fluoranthene Prediction of impact A303 Amesbury to Berwick Down Baseline Surface Water Quality Assessment In Runoff Step 1 Copper Zinc Zinc Cadmium Total PAH Pyrene Copper Fluoranthene Anthracene Phenanthrene RST24 Allowable Exceedances/year
No. of exceedances/year
No. of exceedances/worst year Allowable Exceedances/year
No. of exceedances/year
No. of exceedances/worst year (ug/l) (ug/l) (mg/kg) (ug/kg) (ug/kg) (ug/kg) (ug/kg) (mg/kg) (mg/kg) (ug/kg) Thresholds 84.71 172.88 255.14 446.19 Event Statistics 518 1319 2781 3569 5477 28184 56234 112202 4876 9729 19411 4679 9335 18626 786 In River (no mitigation) Step 2 Zinc RST24 Allowable Exceedances/year

No. of exceedances/year

No. of exceedances/worst year

No. of exceedances/summer

No. of exceedances/worst summer **0.11** m/s Tier 1 is used for the calculation Velocity DI Allowable Exceedances/year
No. of exceedances/year
No. of exceedances/worst year
No. of exceedances/summer
No. of exceedances/worst summer Annual average concentration (ug/l) 0.01 (ug/l) (ug/l) Thresholds Thresholds RST24 Event Statistics Mean 90%ile 95%ile 99%ile 0.02 0.06 0.10 0.33 0.12 In River (with mitigation) Copper Zinc Allowable Exceedances/year

No. of exceedances/year

No. of exceedances/worst year

No. of exceedances/summer

No. of exceedances/worst summer DI Allowable Exceedances/year

No. of exceedances/year

No. of exceedances/worst year

No. of exceedances/summer

No. of exceedances/worst summer Annual average concentration (ug/I) (ug/l) (ug/l) Thresholds hresholds RST6 Thresholds Event Statistics Mean 90%ile 95%ile 99%ile

Details of the chosen rainfall sit	e
SAAR (mm)	820
Altitude (m)	25
Easting	3561
Northing	1754
Coastal distance (km)	10



A303 Amesbury to Berwick Down Scheme Surface Water Quality Assessment

england	Highways England	Water RISK Assessment To	OI	Version 2.0.3 Nov	ember 2016			
		Soluble					Sediment - C	Chronic Impact
Step 2 Tier 1 fail. Go t	EQS - Annual Average Cor Copper 1.01 D Tier 2 Lusing UK TAG or Step 3 mitigation 0.99	Zinc 0.01	ugil	Copper Pass	Zinc Pass	A	Alert, Prote fediment deposition for focumulating? No No	
Road number		A303T		HE Area / DBFO	number		Area 2	
Assessment type	NAME OF THE OWNER OWNER OF THE OWNER OWNE	Cumulative assessment incl	uding sediment	s (outfalls within 100m)				
OS grid reference of assessm		Easting 415132			Northing	141936		
OS grid reference of outfall str	ucture (m)	Easting 415209			Northing	141949	T	T
Outfall number		Downstream outfall not id	entified as ass	set on List of outfalls in assessment	cumulative	SU1542_4700b.1		SU1542.7505a.1
Receiving watercourse		River Avon				SU1541_2098a.1	THE RESERVE THE PROPERTY OF THE PARTY OF THE	20 03
EA receiving water Detailed Ri	ver Network ID	eaew1001000000179934	1	Assessor and aff			Bernadine Maguire	
Date of assessment Notes		20/06/2018 Outfall not identified - catchr		Version of asses			Final	
Step 1 Runoff Quality	AADT >10,000 and <50	.000	Climatic regio	n WarmWet -	Rainfall site		uthampton (SAAR 820mm)	-1
	AADT 210,000 and Coo	.000	Climatic regio	Marm Wet -	Kaintali site	Sou	Ithampton (SAAR 820mm)	
Step 2 River Impacts (Enter zero in Annual Q _{9S} river flow box to assess Step 1 runoff quality only)	Annual Q _{ss} river flow (m ⁵ /s) Impermeable road area drai Permeable area draining to	Construction and the construction	1.127 5.855 4.577	Freshwater EQS limits Bioavailable diss Bioavailable diss	solved copper (µg/l)	1	1 0.9	
0.00	Base Flow Index (BFI)		0.91	Is the discharge in or with	nin 1 km upstream o	f a protected s	ite for conservation?	Yes •
For dissolved zinc only	Water hardness	Medium = 50-200 CaCO3/I		For dissolved copp	per only Ambier	nt background	concentration (µg/l)	0.99
For sediment impact only		ture, lake, pond or canal that reduc everwidth (m) n)	15	ithin 100m of the point of dis	Marion. - 00,40	de slope (m/m	No - D	slope (m/m) 0.0001
Step 3 Mitigation				Treatment for	Estimated effective Attenuation for sol	ubles - S	Settlement of ediments (%)	
		Brief description		solubles (%)	estricted discharge r	ato (110)	difficilis (%)	
Evicting measures	Unlined ditries	Brief description			3111 Same 1 Commence 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		ediments (%)	
Existing measures Proposed measures	Unlined ditches Ponds planted with reeds	Brief description		0 0	No restriction	- D 0 - D 25	ournerits (76)	



User parameters	A303 Amesbury to Berwick Down Sche	me Surface Water Quality Assessment				
Location Details						
Road Number	A303T	Assessment type			ment including sedim	ents (outfalls within
HE Area/DBFO number	Area 2	Assessment type		100m)		
OS grid reference of assessment point (m)	Easting 415132	Receiving watercourse		River Avon		
OS grid reference of assessment point (iii)	Northing 141936	EA receiving water Detailed River Network	ID	eaew10010000001	79934	
OS grid reference of outfall structure (m)	Easting 415209	Assessor and affiliation		Bernadine Maguire		
OS grid reference of outlan structure (III)	Northing 141949	Date of assessment		20/06/2018		
	Downstream outfall not identified as	Version of assessment		Final		
Outfall number	asset on HADDMS					
	SU1541_2098a.1	SU1541_5099a.1	SU1542.7505a.1	SU1542.7505a.1		
		SU1542_4700b.1				
List of outfalls in cumulative assessment						
Notes	Outfall not identified - catchment 13, S	SU1541_2098a.1 - catchment 12, 14, 15 & 16, St	J1541_5099a.1 - cat	chment 17 & 18, SL	J1542.7505a.1 - cato	hment 19 & 20

List of outfalls in cumulative assessment	0.46-11			111541 5000-1		11540 7505- 1	
Notes	Outfall no	ot identified - catchment 13, SI	U1541_2098a.1 - catchment 12, 14, 15 & 16, S	U1541_5099a.1 - cat	chment 1 / & 18, SI	U1542.7505a.1 - cat	chment 19 & 20
Parameter	Units	Default Value	Value used		No	otes	
Runoff Risk Assessments	1		1	1			
AADT	vpd	>10,000 and <50,000	>10,000 and <50,000				
Climatic Region	-	Warm Dry	Warm Wet				
Rainfall Site	-	Ashford (SAAR 710mm)	Southampton (SAAR 820mm)				
Q95 River flow	m3/s	0	1.127				
Baseflow Index	-	0.5	0.91				
Impermeable road area drained Permeable area draining to outfall	ha ha	1 0	5.655 4.577				
Is the discharge in or within 1 km upstream of a protected		No	Yes				
site for conservation?	-	INO	res				
Is there a downstream structure, lake, pond or canal that	-	No					
reduces the velocity within 100m of the point of			No				
discharge?							
Hardness	-	Low = <50mg CaCO3/I	Medium = 50-200 CaCO3/I				
Use Tier 1	-	TRUE	TRUE				
Use Tier 2	-	FALSE	FALSE				
Tier 1 Estimated river width at Q95	0	5 3	15 3				
Tier2 Bed width Tier2 Side slope	m m/m	0.5	0.5				
Tier2 Long slope	m/m	0.0001	0.0001				
Tier2 Mannings' n	-	0.07	0.07				
Existing treatment for solubles	%	0	0	Description for	Unlined ditches		
Existing attenuation -restricted discharge rate	I/s	No restriction	No restriction	existing			
Existing settlement of sediments	%	0	0	measures			
Proposed treatment for solubles	%	0	25	Description for	Ponds planted w	ith reeds	
Proposed attenuation -restricted discharge rate	I/s	No restriction	No restriction	proposed			
Proposed settlement of sediments	%	0	25	measures	<u> </u>		
EQS, bio avail dissolved Cu	ug/l	1	1				
EQS, bio avail dissolved Zn	ug/l	10.9	10.9				
Ambient background concentration, dissolved copper	ug/l	0	0.99				
Spillage Risk Assessments							
A MainRoad Water body type	1 -	-	Surface watercourse	Catchment 13			
Length of road draining to outfall		-	510	Catchinent 13			
Road Type (A-road or Motorway)	m -	-	A				
If A road, is site urban or rural?	1 -	-	Urban				
Junction type	-	-	No junction				
Location	-	-	< 20 minutes				
Traffic flow (AADT two way)	-	-	18442				
% HGV	-	-	8				
Spillage factor	no/109H	-	0.36				
	GVkm/y						
	ear						
Existing measures factor	-	-	0.7				
Proposed measures factor	-	-	1				
Mater hady type	-	-	Surface watercourse	Catalymenta 12 1	14 15 9 16		
Water body type Length of road draining to outfall	m	-	2201	Catchments 12, 1	14, 15 & 16		
Road Type (A-road or Motorway)	- "		A				
If A road, is site urban or rural?	-	-	Urban				
Junction type	-	-	Slip road				
Location	-	-	< 20 minutes				
Traffic flow (AADT two way)	-	-	36799				
% HGV	-	-	16				
Spillage factor	no/109H	-	0.36				
	GVkm/y						
Evicting magazines factor	ear		0.7				
Existing measures factor Proposed measures factor	-	-	0.7 0.5				
r roposeu measures ractor C	1 -	<u> </u>	U.5				
Water body type	-	-	Surface watercourse	Catchments 17 &	18		
Length of road draining to outfall	m	-	1033	Datominorito 17 de			
Road Type (A-road or Motorway)	-	-	A				
If A road, is site urban or rural?	-	-	Urban				
Junction type	-	÷	Slip road				
Location	-	-	< 20 minutes		•	•	
Traffic flow (AADT two way)	-	-	45686				
% HGV	-	-	15				
Spillage factor	no/109H	=	0.36				
	GVkm/y						
Existing measures factor	ear	-	0.7				
Proposed measures factor	-	-	0.7				
D	1	1		1			
Water body type		-	Surface watercourse	Catchments 19 &	20		
	-	i e	1111	22 . 0 0			
Length of road draining to outfall	- m	-	11111				
Length of road draining to outfall Road Type (A-road or Motorway)		- -	A				
Road Type (A-road or Motorway) If A road, is site urban or rural?	m		A Urban				
Road Type (A-road or Motorway) If A road, is site urban or rural? Junction type	m - -	- - -	A Urban Slip road				
Road Type (A-road or Motorway) If A road, is site urban or rural? Junction type Location	m		A Urban Slip road < 20 minutes				
Road Type (A-road or Motorway) If A road, is site urban or rural? Junction type Location Traffic flow (AADT two way)	m		A Urban Slip road < 20 minutes 45686				
Road Type (A-road or Motorway) If A road, is site urban or rural? Junction type Location Traffic flow (AADT two way) % HGV	m	-	A Urban Slip road < 20 minutes 45686				
Road Type (A-road or Motorway) If A road, is site urban or rural? Junction type Location Traffic flow (AADT two way)	m - - - - - - - no/109H		A Urban Slip road < 20 minutes 45686				
Road Type (A-road or Motorway) If A road, is site urban or rural? Junction type Location Traffic flow (AADT two way) % HGV	m	-	A Urban Slip road < 20 minutes 45686				
Road Type (A-road or Motorway) If A road, is site urban or rural? Junction type Location Traffic flow (AADT two way) % HGV Spillage factor	m no/109H GVkm/y ear	-	A Urban Slip road < 20 minutes 45686 15 0.7				
Road Type (A-road or Motorway) If A road, is site urban or rural? Junction type Location Traffic flow (AADT two way) % HGV Spillage factor Existing measures factor	m no/109H GVkm/y ear	-	A Urban Slip road < 20 minutes 45686 115 0.7				
Road Type (A-road or Motorway) If A road, is site urban or rural? Junction type Location Traffic flow (AADT two way) % HGV Spillage factor	m no/109H GVkm/y ear	-	A Urban Slip road < 20 minutes 45686 15 0.7				
Road Type (A-road or Motorway) If A road, is site urban or rural? Junction type Location Traffic flow (AADT two way) % HGV Spillage factor Existing measures factor	m no/109H GVkm/y ear	-	A Urban Slip road < 20 minutes 45686 115 0.7				



	,	I	ı	
Length of road draining to outfall	m	-		
Road Type (A-road or Motorway)	-	-		
If A road, is site urban or rural?	-	-		
Junction type	-	-		
Location	-	-		
Traffic flow (AADT two way)	-	-		
% HGV	-	-		
Spillage factor	no/109H	=		
	GVkm/y			
	ear			
Existing measures factor	-	-		
Proposed measures factor	-	=		
F	1	•		
Water body type	-	-		
Length of road draining to outfall	m	-		
Road Type (A-road or Motorway)	-	-		
If A road, is site urban or rural?	-	-		
Junction type	-	-		
Location	-	-		
Traffic flow (AADT two way)	-	-		
% HGV	-	-		
Spillage factor	no/109H	-		
	GVkm/y			
	ear			
Existing measures factor	-	=		
Proposed measures factor	-	=		
Justification for choice of existing measures factors				Existing runoff discharges to an unlined ditch before eventual outfall to the Avon
Justification for choice of proposed measures factors				A - runoff will continue to discharge to the existing ditch as previous B, C & D - runoff will discharge to storage ponds before eventual outfall to the Avon
Groundwater Assessments				
Traffic flow	-	-		
Rainfall depth (annual averages)	-	-		
Drainage area ratio	-	-		
Infiltration method	-	-		
Unsaturated zone	-	-		
Flow type (Incorporates flow type an effective grain size)	1	_		
	-			
Unsaturated Zone Clay Content	-	=		
		-		



Summary of predictions Soluble - Acute Impact Sediment - Chronic Impact Copper Zinc Cadmium Total PAH Pyrene Anthracene Prediction of impact A303 Amesbury to Berwick Down Scheme Surface Water Quality Assessment In Runoff Step 1 Copper Zinc Zinc Cadmium Total PAH Pyrene Copper Fluoranthene Anthracene Phenanthrene RST24 Allowable Exceedances/year No. of exceedances/year No. of exceedances/worst year Allowable Exceedances/year No. of exceedances/year No. of exceedances/worst year (ug/l) (ug/l) (mg/kg) (ug/kg) (ug/kg) (ug/kg) (mg/kg) (mg/kg) (ug/kg) (ug/kg) 84.71 172.88 255.14 446.19 Event Statistics 28184 56234 112202 4679 9335 18626 1319 786 4876 In River (no mitigation) Zinc RST24 Allowable Exceedances/year No. of exceedances/year No. of exceedances/worst year No. of exceedances/summer No. of exceedances/worst summer **0.11** m/s Tier 1 is used for the calculation Velocity DI Allowable Exceedances/year No. of exceedances/year No. of exceedances/worst year No. of exceedances/summer No. of exceedances/worst summer Annual average concentration (ug/l) 0.01 (ug/l) (ug/l) Thresholds Thresholds RST24 Event Statistics Mean 90%ile 95%ile 99%ile 0.22 In River (with mitigation) Copper Zinc Allowable Exceedances/year No. of exceedances/year No. of exceedances/worst year No. of exceedances/summer No. of exceedances/worst summer DI Allowable Exceedances/year No. of exceedances/year No. of exceedances/worst year No. of exceedances/summer No. of exceedances/worst summer 0.99 0.01 Annual average concentration (ug/l) (ug/l) (ug/l) Thresholds hresholds RST6 Thresholds 0.04 0.09 0.16 0.53 Event Statistics 90%ile 95%ile 99%ile

SAAR (mm) Altitude (m) Easting

Northing Coastal distance (km)

10



Metal Bioavailability Assessment

					NPUT DATA							RESULTS	(Copper)			RESUL	TS (Zinc)			RESUL	TS (Mn)			RESUL	.TS (Ni)	
ID	Location	Waterbody		Concentratio	Concentratio	Concentratio	Measured Ni Concentratio n (dissolved) (μg Γ¹)		DOC	Ca	Site-specific PNEC Dissolved Copper (µg l ⁻¹)		Bioavailable Copper Concentratio n (µg l ⁻¹)	Risk Characterisati	Site-specific PNEC Dissolved Zinc (µg l ⁻¹)	BioF	Bioavailable Zinc Concentratio n (μg Γ¹)	Risk	Site-specific PNEC Dissolved Manganese (µg [¹)		Bioavailable Manganese Concentratio n (μg l ⁻¹)	Risk Characterisati	Site-specific PNEC Dissolved Nickel (µg l ⁻¹)		Bioavailable Nickel Concentratio n (μg l ⁻¹)	Risk Characterisati on Ratio
1	A303 Amesbury	River Avon	20/06/2018	1.01	4.9			8	2.41	109.14	6.08	0.16	0.17	0.17	20.71	0.53	2.58	0.24	219.55	0.56			7.57	0.53		

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A303 Amesbury to Berwick Down Surface Water Quality Assessment Assessment of Priority Outfalls Method D - assessment of risk from accidental spillage Additional columns for use if other roads drain to the same outfa A (main road) D1 Water body type
D2 Length of road draining to outfall (m) Surface watercourse 510 1,111 2,201 1,033 D3 Road Type (A-road or Motorway
D4 If A road, is site urban or rural? Urban Urban Urban Urban D5 Junction type
D6 Location (response time for emergency services)
D7 Traffic flow (AADT two way) Slip road < 20 minutes 45,686 Slip road < 20 minutes Slip road < 20 minutes 18,442 45,686 D8 % HGV D8 Spillage factor (no/109HGVkm/year) D9 Risk of accidental spillage 0.00170 0.00000 0.00000 0.00010 0.00093 0.00100 D10 Probability factor 0.45 D11 Risk of pollution incident 0.00000 0.00004 0.00045 Return Period (years) D12 Is risk greater than 0.01? No 0.00004 **No** 0.00045 **Totals** 0.0017 No 0.00077 No 0.00042 D13 Return period without pollution reduction measures 0.00000 0.00000 D14 Existing measures factor
D15 Return period with existing pollution reduction measures 0.00054 0.7 0.7 0.00003 0.00000 0.00000 0.0012 851 D16 Proposed measures factor
D17 Residual with proposed Pollution reduction measures 0.5 0.5 0.5 0.00003 0.00000 0.00000 0.0006 1657 Justification for choice of existing measures factors: Justification for choice of proposed measures factors: A - runoff will continue to discharge to the existing ditch as previous D - runoff will discharge to storage ponds before eventual outfall to the Avon Existing runoff discharges to an unlined ditch before eventual outfall to the Avon

The worksheet should be read in conjunction with DMRB 11.3.10.



<u>User Parameters – Defaults and Ranges</u> A303 Amesbury to Berwick Down Surface Water Assessment

Params	Unit	Default	Min	Max
AADT	vpd	>10,000 and <50,000	-	-
Climatic Region	-	Warm Dry	-	-
Rainfall Site	-	Ashford (SAAR 710mm)	-	-
Q95 River flow	m3/s	0	0	50
Baseflow Index	-	0.5	0	1
Impermeable road area drained	ha	1	0	1000
			, and the second	1000
Permeable area draining to outfall	ha	0	0	1000
Is the discharge in or within 1 km				
upstream of a protected site for				
conservation?	-	No	-	-
Is there a downstream structure,				
lake, pond or canal that reduces				
the velocity within 100m of the				
point of discharge?	-	No	-	-
Hardness	-	Low = <50mg CaCO3/I		
Use Tier 1	-	TRUE	-	-
Use Tier 2	-	FALSE	-	-
Tier 1 Estimated river width at				
Q95	0	5	0	500
Tier2 Bed width	m	3	0	500
Tier2 Side slope	m/m	0.5	0.1	10
Tier2 Long slope	m/m	0.0001	0.000001	0.1
Tier2 Mannings' n	-	0.07	0.01	1
Existing treatment for solubles	%	0	0	100
Proposed treatment for solubles	%	0	0	100
Existing attenuation -restricted			-	
discharge rate	l/s	No restriction	0	1E+12
Proposed attenuation -restricted			-	
discharge rate	l/s	No restriction	0	1E+12
Existing settlement of sediments	%	0	0	100
Proposed settlement of				
sediments	%	0	0	100
Water body type	-	-	-	-
Length of road draining to				
outfall	m	-	0	10000000
			-	
Road Type (A-road or Motorway)	-	<u> </u> _	_	_
If A road, is site urban or rural?	_	-		-
Junction type	_	-		+
Location	-	1.	-	
Traffic flow (AADT two way)	_		0	100000000
% HGV	-		0	100
Spillage factor	no/109HGVkm/year		0	5.35
Existing measures factor		-	0	
	-	-		1
Proposed measures factor	- ,	-	0	1
EQS, bio avail dissolved Cu	ug/l	1	0.1	100
EQS, bio avail dissolved Zn	ug/l	10.9	0.1	100

Acute Impact Thresholds Concentration thresholds

Threshold Name			Zn ug/l						
		Hardness							
	Cu ug/l	Low = <50mg CaCO3/I	Medium = 50-200 CaCO3/I	High = >200mg CaCO3/I					
RST24hr	21	60	92	385					
RST6hr	42	120	184	770					

Allowable frequence of exceedances for Step 1

Thresholds	Max number of exceedances allowed per year
>RST24hr	1

Allowable frequence of exceedances for Step 2/3

	Max number of exceeda	ances allowed per year	Traffic light ass	essment
	>RST24hr	>RST6hr	Both criteria met	Either criteria failed
Non-SAC	2	1	Green	Red
SAC/SPA	1	0.5	Green	Red

Chronic Impact Thresholds Toxicity thresholds

Substance	Copper	Zinc	Cadmium	Total PAH	Pyrene	Fluoranthene	Anthracene	Phenanthrene
Unit	(mg/kg)	(mg/kg)	(mg/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
Threshold value	197	315	3.5	16770	875	2355	245	515

Sediment quality guideline values (for reference only, not used by the program)

Substance	Copper	Zinc	Cadmium	Total PAH	Pyrene	Fluoranthene	Anthracene	Phenanthrene
Unit	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
TEL	35.7	123	0.6	1684	53	111	46.9	41.9
PEL	197	315	3.5	16770	875	2355	245	515

Allowable frequence of exceedances for toxicity threshold (for Step 1)

Max number of exceedances	Copper	Zinc	Cadmium	Total PAH	Pyrene	Fluoranthene	Anthracene	Phenanthrene
allowed in 1 year	1	1	1	1	1	1	1	1

0.1 m/s Threshold mean velocity Vt Deposition Index (DI) threshold 100

Other Parameters

11



Summer period (inclusive)			
Summer Start Month	4	Summer End Month	9

Runoff calculation assumptions

Rainfall Initial Loss

Concentrations in upstream river (for runoff impact assessments)

Consolitation in apolitation (for failor impact accommitte)					
Dissolved copper	0	ug/l			
Dissolved zinc	0	ug/l			

Concentrations in upstream rive	r (for annual average c	Min	Max		
Dissolved copper	issolved copper 0		0	50	
Dissolved zinc	0	ug/l		<u>-</u>	

Runoff coefficients

Impermeable areas	Permeable areas			
0.5	0.1			

Sediment calculation factors

Median EMC for SS	139	mg/l		
Event Selection Type	2		1 - AII	2- Below Threshold mean velocity
Density of the sediment	2000	kg/m3		

Display the "Accumulation" and "Extensive" cells on the interface in Amber if the velocity/percentage coverage is within \pm

10 % of the threshold value

Spillage Risk Parameters

Probability of a Serious Pollution Incident occurring as a result of a serious accidental spillage

Receiving Water	Urban (response time	Rural (response time to	Remote (response time to site > 1
	to site < 20 min)	site < 1 hour)	hour)
Surface watercourse	0.45	0.60	0.75
Groundwater	0.45	0.60	0.75



A303 Amesbury to Berwick Down TR010025

6.3 Environmental Statement Appendices

Appendix 11.1 Annex 2b Groundwater Assessment Results

APFP Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

October 2018





DTA1

Groundwater Assessment

Component Number			Weighting Factor Property or Parameter Risk Score		Component score	Weighted component score
1		10	Traffic flow	<=50,000 AADT	1	10
2	SOURCE	10	Rainfall depth (annual averages)	>740 to <1060 mm rainfall	2	20
3		10	Drainage area ratio	<=50	1	10
4		15	Infiltration method	"Region", shallow infiltration systems (e.g. infiltration basin)	2	30
5		20	Unsaturated zone	Depth to water table <15 m to >5 m	2	40
6	PATHWAY	20	Flow type (Incorporates flow type an effective grain size)	Flow dominated by fractures/ fissures (e.g. well consolidated sedimentary deposits, igneous and metamorphic rocks or unconsolidated deposits of very coarse sand and coarser)	3	60
7	Ī	5	Unsaturated Zone Clay Content	<=1% clay minerals	3	15
8		5	Organic Carbon	<=1% SOM	3	15
9		5	Unsaturated zone soil pH	pH <=5	3	15

TOTAL SCORE 215
RISK SCREENING LEVEL Medium



	DT14						
User parameters Location Details	DTA1						
Road Number	A303		Assessment type		Non-cumulative ass	sessment (single outfa	all)
HE Area/DBFO number			Assessment type				
OS grid reference of assessment point (m)	Easting	406728	Receiving watercourse		Chalk Aquifer		
OS grid reference of assessment point (iii)	Northing	141619	EA receiving water Detailed River Network ID		GB40801G806900		
OS grid reference of outfall structure (m)	Easting	406728	Assessor and affiliation		AmW		
OS grid reference of outrain structure (iii)	Northing	141619	Date of assessment		17/05/2018		
Outfall number	DTA1		Version of assessment		1		
List of outfalls in cumulative assessment							
Notes							

Parameter	Units	Default Value	Value used	Notes
Runoff Risk Assessments	Ointo	Delault Value	Value asea	Hotes
AADT	vpd	>10.000 and <50.000	>10.000 and <50.000	
Climatic Region	vpu	Warm Dry	Warm Wet	
Rainfall Site	-	Ashford (SAAR 710mm)	Southampton (SAAR 820mm)	
Spillage Risk Assessments	<u> </u>	ASHIOIU (SAAR / IUIIIII)	Southampton (SAAR 620mm)	
A MainRoad				
Water body type	-	=	Groundwater	
Length of road draining to outfall	m	-	2200	
Road Type (A-road or Motorway)	-	-	A	
If A road, is site urban or rural?	-	=	Rural	
Junction type	-	=	No junction	
Location	-	-	< 20 minutes	Estimated time
Traffic flow (AADT two way)	-	•	28851	DCO Traffic data https://mace365.sharepoint.com/:x:/r/sites/project-34292/WorkStream/Traffic/_layouts/15/WopiFrame.aspx?sourcedoc=%78B452BA3-0E52-418A-B2BA-926D8CE054A7%7D&file=DCO%20Traffic%20data%20for%20water%20assessments.xlsx&action=default
% HGV	-	-	18	DCO Traffic data https://mace365.sharepoint.com/:x:/r/sites/project-34292/WorkStream/Traffic/_layouts/15/WopiFrame.aspx?sourcedoc=%7BB452BA3-0E52-418A-B2BA-926D8CE054A7%7D&file=DCO%20Traffic%20data%20for%20water%20assessments.xlsx&action=default
Spillage factor	no/109H GVkm/y ear	-	0.29	Rural trunk road
Existing measures factor	-	ē	0.7	Unlined ditch
Proposed measures factor	-	-	0.6	Soakaway basin / inflitration basin
Justification for choice of existing measures factors				Existing road drainage to unlined ditch
Justification for choice of proposed measures factors				Road drainage to lined infiltration basin
Groundwater Assessments			•	
Traffic flow	-	-	<=50.000 AADT	Provided by traffic assesment
Rainfall depth (annual averages)	-	-	>740 to <1060 mm rainfall	HAWRAT v2.0 User Guide pg. 70
Drainage area ratio	-	-	<=50	Drainage area of road / active surface area of infiltration device
Infiltration method	-	-	"Region", shallow infiltration systems (e.g. infiltration basin)	eranago aroa er roas raos roomaso aroa er minason acros
Unsaturated zone	-	-	Depth to water table <15 m to >5 m	Peak modelled groundwater level compared with elevation of base of infiltration device
Flow type (Incorporates flow type an effective grain size)	-	-	Flow dominated by fractures/ fissures (e.g. well consolidated sedimentary deposits, igneous and metamorphic rocks or unconsolidated deposits of very coarse sand and coarser)	Chalk aquifer
Unsaturated Zone Clay Content	-	=	<=1% clay minerals	Conservatively chosen as highest risk due to lack of site specific data
Organic Carbon	-	-	<=1% SOM	Conservatively chosen as highest risk due to lack of site specific data
Unsaturated zone soil pH	1 . 1	_	pH <=5	Conservatively chosen as highest risk due to lack of site specific data



DTA1									
	essment of Priority Outfalls								
	Johnson of Friends								
Method D - assessment of risk from accidental spillage		Additional columns for	or use if other roads dr	ain to the same outfall			1		
		A (main road)	В	С	D	E	F	1	
D1	Water body type	Groundwater						1	
D2	Length of road draining to outfall (m)	2,200						1	
D3	Road Type (A-road or Motorway)	A						1	
D4	If A road, is site urban or rural?	Rural							
D5	Junction type	No junction						1	
D6	Location (response time for emergency services)	< 20 minutes						1	
	Traffic flow (AADT two way)	28,851						1	
D8	% HGV	18						1	ļ
D8	Spillage factor (no/109HGVkm/year)	0.29						1	
D9	Risk of accidental spillage	0.00121	0.00000	0.00000	0.00000	0.00000	0.00000	1	
D10	Probability factor	0.45	0.45	0.45				1	
D11	Risk of pollution incident	0.00054	0.00000	0.00000	0.00000	0.00000	0.00000		Return Period
D12	Is risk greater than 0.01?	No	No	No				Totals	(years)
D13	Return period without pollution reduction measures	0.00054	0.00000	0.00000	0.00000	0.00000	0.00000	0.0005	1838
D14	Existing measures factor	0.7							
D15	Return period with existing pollution reduction measures	0.00038	0.00000	0.00000	0.00000	0.00000	0.00000	0.0004	2625
D16	Proposed measures factor	0.6							
D17	Residual with proposed Pollution reduction measures	0.00023	0.00000	0.00000	0.00000	0.00000	0.00000	0.0002	4375
			•	•	•				
	Justification for choice of existing measures factors:			Justification for cho	ice of proposed mea	sures factors:			
	Existing road drainage to unlined ditch			Highway ditch drain	aing past Blick mead	and lined with propriet	y treatment system		
				3 .,	31		, ,		
								-	
The w	orksheet should be read in conjunction with DMRB 11.3.10.								



Spillage Risk Parameters

Probability of a Serious Pollution Incident occurring as a result of a serious accidental spillage

	\ '	Rural (response time to site < 1 hour)	Remote (response time to site > 1 hour)		
Surface watercourse	0.45	0.60	0.75		
Groundwater	0.45	0.60	0.75		



DTA2

Groundwater Assessment

Component Number		Weighting Factor	Property or Parameter	Risk Score	Component score	Weighted component score
1		10	Traffic flow	<=50,000 AADT	1	10
2	SOURCE	10	Rainfall depth (annual averages)	>740 to <1060 mm rainfall	2	20
3		10	Drainage area ratio	<=50	1	10
4		15	Infiltration method	"Region", shallow infiltration systems (e.g. infiltration basin)	2	30
5		20	Unsaturated zone	Depth to water table <=5 m	3	60
6	PATHWAY	20	Flow type (Incorporates flow type an effective grain size)	Flow dominated by fractures/ fissures (e.g. well consolidated sedimentary deposits, igneous and metamorphic rocks or unconsolidated deposits of very coarse sand and coarser)	3	60
7		5	Unsaturated Zone Clay Content	<=1% clay minerals	3	15
8		5	Organic Carbon	<=1% SOM	3	15
9		5	Unsaturated zone soil pH	pH <=5	3	15

TOTAL SCORE	235
RISK SCREENING LEVEL	Medium



User parameters

DTA2

Road Number	A303		Assessment type		Non-cumulative assessment (single outfall)				
HE Area/DBFO number									
OS grid reference of assessment point (m)	Easting	407485	Receiving watercourse	Chalk Groundwater					
	Northing	141551	EA receiving water Detailed River Network ID	GB40801G806900					
	Easting	407485	Assessor and affiliation	AmW					
	Northing	141551	Date of assessment	17/05/2018					
Outfall number	DTA2		Version of assessment		1				
List of outfalls in cumulative assessment							·		
Notos									

Parameter	Units	Default Value	Value used	Notes
Runoff Risk Assessments				
AADT	vpd	>10,000 and <50,000	>10,000 and <50,000	
Climatic Region	-	Warm Dry	Warm Wet	
Rainfall Site	-	Ashford (SAAR 710mm)	Southampton (SAAR 820mm)	
Spillage Risk Assessments		,		•
A MainRoad				
Water body type	-	e	Groundwater	
Length of road draining to outfall	m	-	1190	
Road Type (A-road or Motorway)	-	e	A	
If A road, is site urban or rural?	_	_	Rural	
Junction type	- 1	_	No junction	
Location	-	_	< 20 minutes	Estimated time
Traffic flow (AADT two way)	- 1	_	28851	DCO Traffic data https://mace365.sharepoint.com/:x:/r/sites/project-
Traine new (Vier the may)			20007	34292/WorkStream/Traffic/_layouts/15/WopiFrame.aspx?sourcedoc=%
				7BB452BA30-0E52-418A-B2BA-
				926D8CE054A7%7D&file=DCO%20Traffic%20data%20for%20water%
				20assessments.xlsx&action=default
% HGV	-	-	18	DCO Traffic data https://mace365.sharepoint.com/:x:/r/sites/project-
				34292/WorkStream/Traffic/_layouts/15/WopiFrame.aspx?sourcedoc=%
				7BB452BA30-0E52-418A-B2BA-
				926D8CE054A7%7D&file=DCO%20Traffic%20data%20for%20water%
				20assessments.xlsx&action=default
Spillage factor	no/109H	-	0.29	Rural trunk road
	GVkm/y			
	ear			
Existing measures factor	-	-	0.7	Unlined ditch
Proposed measures factor	-	-	0.6	Soakaway basin / inflitration basin
Justification for choice of existing measures factors				Existing road drainage to unlined ditch
Justification for choice of proposed measures factors				Road drainage to lined infiltration basin
Groundwater Assessments			1	1
Traffic flow	-	-	<=50.000 AADT	Provided by traffic assesment
Rainfall depth (annual averages)	-	-	>740 to <1060 mm rainfall	HAWRAT v2.0 User Guide pg. 70
Drainage area ratio	_	_	<=50	Drainage area of road / active surface area of infiltration device
Infiltration method	-	-	"Region", shallow infiltration systems	Dramage and or roady active carrace and or immination device
			(e.g. infiltration basin)	
Unsaturated zone	-	-	Depth to water table <=5 m	Peak modelled groundwater level compared with elevation of base of
				infiltration device
Flow type (Incorporates flow type an effective grain size)	-	-	Flow dominated by fractures/ fissures	Chalk aquifer
,			(e.g. well consolidated sedimentary	
			deposits, igneous and metamorphic	
			rocks or unconsolidated deposits of	
			very coarse sand and coarser)	
Unsaturated Zone Clay Content	-	-	<=1% clay minerals	Conservatively chosen as highest risk due to lack of site specific data
Organic Carbon	-	-	<=1% SOM	Conservatively chosen as highest risk due to lack of site specific data
Unsaturated zone soil pH	-	-	pH <=5	Conservatively chosen as highest risk due to lack of site specific data



DTA2	DTA2								
Asse	essment of Priority Outfalls								
Method D - assessment of risk from accidental spillage A (main road)			Additional columns f	or use if other roads d	rain to the same outfal	I			
		A (main road)	В	С	D	E	F		
D1	Water body type	Groundwater							
D2	Length of road draining to outfall (m)	1,190							
D3	Road Type (A-road or Motorway)	A							
D4	If A road, is site urban or rural?	Rural							
D5	Junction type	No junction							
D6	Location (response time for emergency services)	< 20 minutes							
D7	Traffic flow (AADT two way)	28,851							
D8	% HGV	18							
D8	Spillage factor (no/109HGVkm/year)	0.29							
	Risk of accidental spillage	0.00065	0.00000	0.00000	0.00000	0.00000	0.00000		
D10	Probability factor	0.45	0.45	0.45					
D11	Risk of pollution incident	0.00029	0.00000	0.00000	0.00000	0.00000	0.00000		Return Period
D12	Is risk greater than 0.01?	No	No	No				Totals	(years)
D13	Return period without pollution reduction measures	0.00029	0.00000	0.00000	0.00000	0.00000	0.00000	0.0003	3397
D14	Existing measures factor	0.7							
D15	Return period with existing pollution reduction measures	0.00021	0.00000	0.00000	0.00000	0.00000	0.00000	0.0002	4853
	Proposed measures factor	0.6							
D17	Residual with proposed Pollution reduction measures	0.00012	0.00000	0.00000	0.00000	0.00000	0.00000	0.0001	8088
					•	•			
	Justification for choice of existing measures factors:			Justification for cho	ice of proposed me	asures factors:			
	Existing road drainage to unlined ditch			Grass channel with	online soakaways				
	3 3								
								_	
The w	orksheet should be read in conjunction with DMRB 11.3.10.								



<u>User Parameters – Defaults and Ranges</u> DTA2

Spillage Risk Parameters

	\	` '	Remote (response time to site > 1 hour)		
Surface watercourse	0.45	0.60	0.75		
Groundwater	0.45	0.60	0.75		



DTA3

Groundwater Assessment

Component Number			Weighting Factor Property or Parameter Risk Score		Component score	Weighted component score
1		10	Traffic flow	<=50,000 AADT	1	10
2	SOURCE	10	Rainfall depth (annual averages)	>740 to <1060 mm rainfall	2	20
3		10	Drainage area ratio	1	10	
4		15	Infiltration method	"Region", shallow infiltration systems (e.g. infiltration basin)	2	30
5		20	Unsaturated zone	Depth to water table <=5 m	3	60
6	PATHWAY	20	Flow type (Incorporates flow type an effective grain size)	Flow dominated by fractures/ fissures (e.g. well consolidated sedimentary deposits, igneous and metamorphic rocks or unconsolidated deposits of very coarse sand and coarser)	3	60
7		5	Unsaturated Zone Clay Content	<=1% clay minerals	3	15
8		5	Organic Carbon	<=1% SOM	3	15
9		5	Unsaturated zone soil pH	pH <=5	3	15

TOTAL SCORE	235
RISK SCREENING LEVEL	Modium



						0.19.	G	
User parameters	DTA3							
Location Details								
Road Number	A303		Assessment type		Non-cumulative assessment (single outfall)			
HE Area/DBFO number			Addedding type	Assessment type				
OS grid reference of assessment point (m)	Easting	407959	Receiving watercourse		Chalk aquifer			
os grid reference of assessment point (iii)	Northing	141369	EA receiving water Detailed River Network ID		GB40801G806900			
OS grid reference of outfall structure (m)	Easting	407959	Assessor and affiliation		AmW			
os gna reference of outlan structure (m)	Northing	141369	Date of assessment		18/05/2018			
Outfall number	DTA3		Version of assessment		1			
List of outfalls in cumulative assessment							·	
Notes								

			· · · · · ·	
Parameter	Units	Default Value	Value used	Notes
Runoff Risk Assessments			1	
AADT	vpd	>10,000 and <50,000	>10,000 and <50,000	
Climatic Region	-	Warm Dry	Warm Wet	
Rainfall Site	-	Ashford (SAAR 710mm)	Southampton (SAAR 820mm)	
Spillage Risk Assessments				
A MainRoad				
Water body type	-	-	Groundwater	
Length of road draining to outfall	m	-	815	
Road Type (A-road or Motorway)	-	-	Α	
If A road, is site urban or rural?	-	-	Rural	
Junction type	-		No junction	
Location	-	-	< 20 minutes	Estimated time
Traffic flow (AADT two way)	-	-	28851	DCO Traffic data https://mace365.sharepoint.com/:x/r/sites/project-34292/WorkStream/Traffic/_layouts/15/WopiFrame.aspx?sourcedoc=%7BB452BA30-0E52-418A-B2BA-926D8CE054A7%7D8file=DC0%20Traffic%20data%20for%20water%20assessments.xlsx&action=default
% HGV	=	-	18	DCO Traffic data https://mace365.sharepoint.com/:x:/r/sites/project-34292/WorkStream/Traffic/_layouts/15/WopiFrame.aspx?sourcedoc=%7BB452BA30-0E52-418A-B2BA-926D8CE054A7%7D&file=DCO%20Traffic%20data%20for%20water%20assessments.xlsx&action=default
Spillage factor	no/109H GVkm/y ear	-	0.29	Rural trunk road no junction
Existing measures factor	-	-	0.7	Unlined ditch
Proposed measures factor	-	-	0.6	Soakaway basin / inflitration basin
Justification for choice of existing measures factors				Existing road drainage to unlined ditch
Justification for choice of proposed measures factors				Road drainage to lined infiltration basin
Groundwater Assessments				
Traffic flow	-	-	<=50,000 AADT	Provided by traffic assesment
Rainfall depth (annual averages)	-	-	>740 to <1060 mm rainfall	HAWRAT v2.0 User Guide pg. 70
Drainage area ratio	-	П	<=50	Drainage area of road / active surface area of infiltration device
Infiltration method	-	=	"Region", shallow infiltration systems (e.g. infiltration basin)	
Unsaturated zone	-	-	Depth to water table <=5 m	Peak modelled groundwater level compared with elevation of base of infiltration device
Flow type (incorporates flow type an effective grain size)	-	-	Flow dominated by fractures/ fissures (e.g. well consolidated sedimentary deposits, igneous and metamorphic rocks or unconsolidated deposits of very coarse sand and coarser)	Chalk aquifer
Unsaturated Zone Clay Content	-	=	<=1% clav minerals	Conservatively chosen as highest risk due to lack of site specific data
Organic Carbon	—	-	<=1% SOM	Conservatively chosen as highest risk due to lack of site specific data
Unsaturated zone soil pH			pH <=5	Conservatively chosen as highest risk due to lack of site specific data



DTA	3								
Ass	sessment of Priority Outfalls								
Meti	nod D - assessment of risk from accidental spillage				drain to the same outf				
		A (main road)	В	С	D	E	F		
	Water body type	Groundwater							
	Length of road draining to outfall (m)	815							
D3	Road Type (A-road or Motorway)	A							
D4		Rural							
	Junction type	No junction							
D6	Location (response time for emergency services)	< 20 minutes							
D7		28,851							
D8		18							
D8		0.29							
	Risk of accidental spillage	0.00045	0.00000	0.00000	0.00000	0.00000	0.00000		
	Probability factor	0.45							
D11	Risk of pollution incident	0.00020	0.00000	0.00000	0.00000	0.00000	0.00000		Return Period
D12	Is risk greater than 0.01?	No						Totals	(years)
D13	Return period without pollution reduction measures	0.00020	0.00000	0.00000	0.00000	0.00000	0.00000	0.0002	4960
D14	Existing measures factor	0.7							
D15	Return period with existing pollution reduction measures	0.00014	0.00000	0.00000	0.00000	0.00000	0.00000	0.0001	7086
	Proposed measures factor	0.6							
D17	Residual with proposed Pollution reduction measures	0.00008	0.00000	0.00000	0.00000	0.00000	0.00000	0.0001	11810
		•	•	•	•	•	•		
	Justification for choice of existing measures factors:			Justification for c	hoice of proposed m	neasures factors:			
	Existing road drainage to unlined ditch		1	Grass channel wi	th online soakaways				
	Existing road drawage to drawing aron			Oldoo oldisiloi wi	ar orano ocananayo				
1									
1									
-									
The	worksheet should be read in conjunction with DMRB 11.3.10.								
	,								



User Parameters - Defaults and Ranges

Spillage Risk Parameters

u v	` '	Rural (response time to site < 1 hour)	Remote (response time to site > 1 hour)		
Surface watercourse	0.45	0.60	0.75		
Groundwater	0.45	0.60	0.75		



DTA4 Groundwater Assessment

Component Number			Property or Parameter	Risk Score	Component score	Weighted component score
1		10	Traffic flow	<=50,000 AADT	1	10
2	SOURCE	10	Rainfall depth (annual averages)	>740 to <1060 mm rainfall	2	20
3	10		Drainage area ratio	<=50	1	10
4		15	Infiltration method	"Region", shallow infiltration systems (e.g. infiltration basin)	2	30
5		20	Unsaturated zone	Depth to water table <=5 m	3	60
6	PATHWAY	20	Flow type (Incorporates flow type an effective grain size)	Flow dominated by fractures/fissures (e.g. well consolidated sedimentary deposits, igneous and metamorphic rocks or unconsolidated deposits of very coarse sand and coarser)	3	60
7		5	Unsaturated Zone Clay Content	<=1% clay minerals	3	15
8		5	Organic Carbon	<=1% SOM	3	15
9		5	Unsaturated zone soil pH	pH <=5	3	15

TOTAL SCORE	235
RISK SCREENING LEVEL	Medium



<u>User parameters</u> DTA4

Location Details

Road Number	A303		Assessment type		Non-cumulative assessment (single outfall)			
HE Area/DBFO number			Assessment type					
OS grid reference of assessment point (m)	Easting	408336	Receiving watercourse		Chalk aquifer			
os grid reference of assessment point (iii)	Northing	141589	EA receiving water Detailed River Network ID		GB40801G806900			
OS grid reference of outfall structure (m)	Easting	408336	Assessor and affiliation		AmW			
os gna reference of battan structure (m)	Northing	141589	Date of assessment		18/05/2018			
Outfall number	DTA4		Version of assessment		1			
List of outfalls in cumulative assessment		•						
Notes								

_			1	T
Parameter	Units	Default Value	Value used	Notes
Runoff Risk Assessments				
AADT	vpd	>10,000 and <50,000	>10,000 and <50,000	
Climatic Region	-	Warm Dry	Warm Wet	
Rainfall Site	-	Ashford (SAAR 710mm)	Southampton (SAAR 820mm)	
Spillage Risk Assessments				
A MainRoad				
Water body type	-	-	Groundwater	
Length of road draining to outfall	m	-	1035	
Road Type (A-road or Motorway)	-	-	A	
If A road, is site urban or rural?	-	-	Rural	
Junction type	-	-	No iunction	
Location	_	=	< 20 minutes	Estimated time
Traffic flow (AADT two way)	1 -	-	28851	DCO Traffic data https://mace365.sharepoint.com/:x:/r/sites/project-
numerow (ver the way)			20071	34292/WorkStream/Traffic/_layouts/15/WopiFrame.aspx/sourcedoc=% 7BB452BA30-0E52-418A-B2BA- 926D8CE054A7%7D8file=DCO%20Traffic%20data%20for%20water% 20assessments.xlsx&action=default
% HGV	-	-	18	DCO Traffic data https://mace365.sharepoint.com/:x:/r/sites/project-34292/WorkStream/Traffic/_layouts/15/WopiFrame.aspx?sourcedoc=%7BB452BA30-0E52-418A-B2BA-926D8CE054A7%7D&file=DC0%20Traffic%20data%20for%20water%20assessments.xlsx&action=default
Spillage factor	no/109H GVkm/y ear	-	0.29	Rural trunk road
Existing measures factor	-	-	0.7	Unlined ditch
Proposed measures factor	_	=	0.6	Soakaway basin / inflitration basin
Justification for choice of existing measures factors				Existing road drainage to unlined ditch
Justification for choice of proposed measures factors				Road drainage to lined infiltration basin
Groundwater Assessments			•	
Traffic flow	1 . 1	_	<=50.000 AADT	Provided by traffic assesment
Rainfall depth (annual averages)	1 -	-	>740 to <1060 mm rainfall	HAWRAT v2.0 User Guide pg. 70
Drainage area ratio	+ -		<=50	Drainage area of road / active surface area of infiltration device
Infiltration method	-	-	"Region", shallow infiltration systems (e.g. infiltration basin)	Stanlage and of road / delive surface and of minimation device
Unsaturated zone	-	-	Depth to water table <=5 m	Peak modelled groundwater level compared with elevation of base of infiltration device
Flow type (incorporates flow type an effective grain size)	-	-	Flow dominated by fractures/ fissures (e.g. well consolidated sedimentary deposits, igneous and metamorphic rocks or unconsolidated deposits of very coarse sand and coarser)	Chalk aquifer
Unsaturated Zone Clay Content	-	-	<=1% clay minerals	Conservatively chosen as highest risk due to lack of site specific data
Organic Carbon	+ -	_	<=1% SOM	Conservatively chosen as highest risk due to lack of site specific data
Unsaturated zone soil pH	+		pH <=5	Conservatively chosen as highest risk due to lack of site specific data
orisaturateu zone son pri	-	-	p:: >=0	Conservatively chosen as mignest risk due to lack of site specific data



Additional columns for use if other roads drain to the same outfall	DTA									
Additional columns for use if other roads drain to the same outfall A (main road) B C D E F										
A (main road) B C D E F	Ass	essment of Priority Outfalls								
A (main road) B C D E F	Meth	od D - assessment of risk from accidental spillage		Additional columns f	Additional columns for use if other reads drain to the same outfall					
Dit Water body type	Wicti	ou b - assessment of risk from accidental spinage	A (main road)					F	1	
102 Longth of road draining to outfall (m) 1,035	D1	Water body type							1	
D3 Road Type (A-road or Motorway) A									1	
Decision									1	
Description	D4	If A road, is site urban or rural?	Rural						1	
Dec Location (response time for emergency services) < 20 minutes	D5	Junction type								
D7 Traffic flow (AADT two way) 28,851	D6	Location (response time for emergency services)								
D8 Spillage factor (no/109HGVkm/year) D.29	D7								1	
Description		% HGV							1	
D10 Probability factor	D8	Spillage factor (no/109HGVkm/year)	0.29						1	
D11 Risk of pollution incident 0.00026 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000	D9	Risk of accidental spillage	0.00057	0.00000	0.00000	0.00000	0.00000	0.00000	1	
D12 Striks greater than 0.01?			0.45							
D13 Return period without pollution reduction measures 0.00026 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000	D11	Risk of pollution incident	0.00026	0.00000	0.00000	0.00000	0.00000	0.00000		Return Period
D14 Existing measures factor 0.7 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000			No						Totals	(years)
D15 Return period with existing pollution reduction measures 0.00018 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0	D13	Return period without pollution reduction measures	0.00026	0.00000	0.00000	0.00000	0.00000	0.00000	0.0003	3906
D16 Proposed measures factor D17 Residual with proposed Pollution reduction measures 0.00011 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 Justification for choice of existing measures factors: Existing road drainage to unlined ditch Grass channel with online soakaways			0.7							
D17 Residual with proposed Pollution reduction measures 0.00011 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000			0.00018	0.00000	0.00000	0.00000	0.00000	0.00000	0.0002	5580
Justification for choice of existing measures factors: Existing road drainage to unlined ditch Grass channel with online soakaways Grass channel with online soakaways			0.6							
Existing road drainage to unlined ditch Grass channel with online soakaways Grass channel with online soakaways	D17	Residual with proposed Pollution reduction measures	0.00011	0.00000	0.00000	0.00000	0.00000	0.00000	0.0001	9300
Existing road drainage to unlined ditch Grass channel with online soakaways Grass channel with online soakaways										
Existing road drainage to unlined ditch Grass channel with online soakaways Grass channel with online soakaways										
		Justification for choice of existing measures factors:			Justification for ch	oice of proposed me	asures factors:			
		Existing road drainage to unlined ditch			Grass channel with	online soakaways				
The world have a bright have discovering the WND 44.640				_					-	
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The world has a bright have the property with DND 44 040										
The worksheet should be read in conjunction with DMKB 11.3.10.	The v	vorksheet should be read in conjunction with DMRB 11.3.10.								



<u>User Parameters – Defaults and Ranges</u>

Spillage Risk Parameters

3	` '	\ I	Remote (response time to site > 1 hour)
Surface watercourse	0.45	0.60	0.75
Groundwater	0.45	0.60	0.75



DIAS

Groundwater Assessment

Component Number		Weighting Factor	Property or Parameter	Risk Score	Component score	Weighted component score
1		10	Traffic flow	<=50,000 AADT	1	10
2	SOURCE	10	Rainfall depth (annual averages)	>740 to <1060 mm rainfall	2	20
3		10	Drainage area ratio	<=50	1	10
4		15	Infiltration method	"Region", shallow infiltration systems (e.g. infiltration basin)	2	30
5		20	Unsaturated zone	Depth to water table >=15 m	1	20
6	PATHWAY	20	Flow type (Incorporates flow type an effective grain size)	Flow dominated by fractures/ fissures (e.g. well consolidated sedimentary deposits, igneous and metamorphic rocks or unconsolidated deposits of very coarse sand and coarser)	3	60
7		5	Unsaturated Zone Clay Content	<=1% clay minerals	3	15
8		5	Organic Carbon	<=1% SOM	3	15
9		5	Unsaturated zone soil pH	pH <=5	3	15

TOTAL SCORE 195
RISK SCREENING LEVEL Medium



<u>User parameters</u>	DTA5						
Location Details							
Road Number	A303		Assessment type		Non-cumulative assessment (single outfall)		
HE Area/DBFO number			Assessment type				
OS grid reference of assessment point (m)	Easting	408906	Receiving watercourse		Chalk aquifer		
oo grid reference of assessment point (iii)	Northing	141216	EA receiving water Detailed River Network ID		GB40801G806900		
OS grid reference of outfall structure (m)	Easting	408906	Assessor and affiliation		AmW		
OS grid reference of outrain structure (iii)	Northing	141216	Date of assessment		18/05/2018		
Outfall number	DTA5		Version of assessment		1		
List of outfalls in cumulative assessment		•					
Notes							

<u>-</u>				
Parameter	Units	Default Value	Value used	Notes
Runoff Risk Assessments				
AADT	vpd	>10,000 and <50,000	>10,000 and <50,000	
Climatic Region	-	Warm Dry	Warm Wet	
Rainfall Site	-	Ashford (SAAR 710mm)	Southampton (SAAR 820mm)	
Spillage Risk Assessments				
A MainRoad			-	
Water body type	-	-	Groundwater	
Length of road draining to outfall	m	-	715	
Road Type (A-road or Motorway)	-	÷	A	
If A road, is site urban or rural?	-	-	Rural	
Junction type	-	-	No junction	
Location	-	-	< 20 minutes	Estimated time
Traffic flow (AADT two way)	-	-	36799	DCO Traffic data https://mace385.sharepoint.com/:x:/r/sites/project- 34292/WorkStream/Traffic/_layouts/15/WopiFrame.aspx?sourcedoc=% 7BB452BA30-0E52-418A-B2BA- 926D8CE054A7%7D&file=DCO%20Traffic%20data%20for%20water% 20assessments.xisx&action=default
% HGV	-	-	16	DCO Traffic data https://mace365.sharepoint.com/:x:/r/sites/project-34292/WorkStream/Traffic/_layouts/15/WopiFrame.aspx?sourcedoc=%7BB452BA30-0E52-418A-B2BA-926D8CE054A7%7D8file=DCO%20Traffic%20data%20for%20water%20assessments.xlsx&action=default
Spillage factor	no/109H	-	0.29	Rural trunk road
	GVkm/y ear			
Existing measures factor	- Cai		0.7	Unlined ditch
Proposed measures factor	1 -	-	0.6	Soakaway basin / inflitration basin
R			0.0	Coakaway basiii) iiiiiiiiation basiii
Water body type		_	Groundwater	
Length of road draining to outfall	m	-	180	
Road Type (A-road or Motorway)	- 111	-	Δ	
If A road, is site urban or rural?	-	-	Rural	
	-	-		
Junction type Location	-	-	Roundabout	
	-	-	< 20 minutes	
Traffic flow (AADT two way) % HGV	-	-	36799	
	/4.0011	-	16	
Spillage factor	no/109H GVkm/y ear	-	3.09	
Existing measures factor	-	-	0.7	
Proposed measures factor	-	-	0.6	
C				
Water body type	-	-	Groundwater	
Length of road draining to outfall	m	-	1265	
Road Type (A-road or Motorway)	-	-	Α	
If A road, is site urban or rural?	-	-	Rural	
Junction type	-	a a	Slip road	
Location	-	-	< 20 minutes	
Traffic flow (AADT two way)	-	-	36799	
% HGV	-	-	16	
Spillage factor	no/109H GVkm/y ear	-	0.83	
Existing measures factor	-	-	0.7	
Proposed measures factor	-	-	0.6	
Justification for choice of existing measures factors				Existing road drainage to unlined ditch
Justification for choice of proposed measures factors				Road drainage to lined infiltration basin
Groundwater Assessments				
Traffic flow	-	-	<=50,000 AADT	
Rainfall depth (annual averages)	-		>740 to <1060 mm rainfall	
Drainage area ratio	-	-	<=50	
Infiltration method	-	=	"Region", shallow infiltration systems (e.g. infiltration basin)	
Unsaturated zone Flow type (Incorporates flow type an effective grain size)	-	-	Depth to water table >=15 m Flow dominated by fractures/fissures (e.g. well consolidated sedimentary deposits, igneous and metamorphic rocks or unconsolidated deposits of	
	 		very coarse sand and coarser)	
Unsaturated Zone Clay Content	<u> </u>	-	<=1% clay minerals	
Organic Carbon	<u> </u>	-	<=1% SOM	
Unsaturated zone soil pH	-	-	pH <=5	



DTA5										
Ass	essment of Priority Outfalls		_	_	_	_				
I	•							_		
Meth	od D - assessment of risk from accidental spillage		Additional columns for use if other roads drain to the same outfall					1		
		A (main road)	В	С	D	E	F	1		
D1	Water body type	Groundwater	Groundwater	Groundwater				1		
D2	Length of road draining to outfall (m)	715	180	1,265				1		
	Road Type (A-road or Motorway)	A	A	A				1		
D4	If A road, is site urban or rural?	Rural	Rural	Rural				1		
D5	Junction type	No junction	Roundabout	Slip road				1		
D6	Location (response time for emergency services)	< 20 minutes	< 20 minutes	< 20 minutes				1		
D7	Traffic flow (AADT two way)	36,799	36,799	36,799				1		
D8	% HGV	16	16	16				1		
D8	Spillage factor (no/109HGVkm/year)	0.29	3.09	0.83				1		
D9	Risk of accidental spillage	0.00045	0.00120	0.00226	0.00000	0.00000	0.00000	1		
D10	Probability factor	0.45	0.45	0.45						
D11	Risk of pollution incident	0.00020	0.00054	0.00102	0.00000	0.00000	0.00000		Return Period	
D12	Is risk greater than 0.01?	No	No	No				Totals	(years)	
D13	Return period without pollution reduction measures	0.00020	0.00054	0.00102	0.00000	0.00000	0.00000	0.0018	570	
	Existing measures factor	0.7	0.7	0.7						
D15	Return period with existing pollution reduction measures	0.00014	0.00038	0.00071	0.00000	0.00000	0.00000	0.0012	815	
	Proposed measures factor	0.6	0.6	0.6						
D17	Residual with proposed Pollution reduction measures	0.00008	0.00023	0.00043	0.00000	0.00000	0.00000	0.0007	1358	
	Justification for choice of existing measures factors:			Justification for cho	ice of proposed mea	asures factors:				
	Existing road drainage to unlined ditch			Grass channel with	online soakaways					
								-		
The v	vorksheet should be read in conjunction with DMRB 11.3.10.									



<u>User Parameters – Defaults and Ranges</u> DTA5

Spillage Risk Parameters

Receiving Water	er Urban (response time		Remote (response time to site >	
	to site < 20 min)	site < 1 hour)	hour)	
Surface watercourse	0.45	0.60	0.75	
Groundwater	0.45	0.60	0.75	



A303 Eastern portal Groundwater Assessment

Component Number			Factor Property or Parameter Risk Score		Component score	Weighted component score
1		10	Traffic flow	<=50,000 AADT	1	10
2	SOURCE	10	Rainfall depth (annual averages)	>740 to <1060 mm rainfall	2	20
3	3 10		Drainage area ratio <=50		1	10
4		15	Infiltration method	"Region", shallow infiltration systems (e.g. infiltration basin)	2	30
5		20	Unsaturated zone	Depth to water table <=5 m	3	60
6	PATHWAY	20	Flow type (Incorporates flow type an effective grain size)	Flow dominated by fractures/ fissures (e.g. well consolidated sedimentary deposits, igneous and metamorphic rocks or unconsolidated deposits of very coarse sand and coarser)	3	60
7		5	Unsaturated Zone Clay Content	<=1% clay minerals	3	15
8		5	Organic Carbon	<=1% SOM	3	15
9		5	Unsaturated zone soil pH	pH <=5	3	15

TOTAL SCORE RISK SCREENING LEVEL



A303 Eastern portal

User parameters Location Details	A303 Eastern portal		
Road Number	A303	Assessment type	Non-cumulative assessment (single outfall)
HE Area/DBFO number		Assessment type	
OS grid reference of assessment point (m)	Easting 414081	Receiving watercourse	Chalk aquifer
OS grid reference of assessment point (iii)	Northing 142112	EA receiving water Detailed River Network ID	GB40801G806900
OS grid reference of outfall structure (m)	Easting 414081	Assessor and affiliation	AmW
OS grid reference of outrail structure (iii)	Northing 142112	Date of assessment	18/05/2018
Outfall number	Eastern portal	Version of assessment	1
List of outfalls in cumulative assessment			
Notes			

			1	
Parameter	Units	Default Value	Value used	Notes
Runoff Risk Assessments				
AADT	vpd	>10,000 and <50,000	>10,000 and <50,000	
Climatic Region	-	Warm Dry	Warm Wet	
Rainfall Site	-	Ashford (SAAR 710mm)	Southampton (SAAR 820mm)	
Spillage Risk Assessments				
A MainRoad				
Water body type	-	-	Groundwater	
Length of road draining to outfall	m	-	270	
Road Type (A-road or Motorway)	-	-	Α	
If A road, is site urban or rural?	-	•	Rural	
Junction type	-	-	No junction	
Location	-	-	< 20 minutes	Estimated time
Traffic flow (AADT two way)	-	-	36799	DCO Traffic data https://mace365.sharepoint.com/:x:/r/sites/project-
, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				34292/WorkStream/Traffic/ layouts/15/WopiFrame.aspx?sourcedoc=%
				7BB452BA30-0E52-418A-B2BA-
				926D8CE054A7%7D&file=DCO%20Traffic%20data%20for%20water%
				20assessments.xlsx&action=default
% HGV	-	-	16	DCO Traffic data https://mace365.sharepoint.com/:x:/r/sites/project-
				34292/WorkStream/Traffic/ layouts/15/WopiFrame.aspx?sourcedoc=%
				7BB452BA30-0E52-418A-B2BA-
				926D8CE054A7%7D&file=DCO%20Traffic%20data%20for%20water%
				20assessments.xlsx&action=default
Spillage factor	no/109H	-	0.29	Rural trunk road
Spillage factor	GVkm/y	-	0.29	Kurai tiurik rodu
	,			
Existing measures factor	ear		0.7	Unlined ditch
Proposed measures factor	+ -	<u>-</u>	0.6	Soakaway basin / inflitration basin
Justification for choice of existing measures factors	-	-	0.0	Existing road drainage to unlined ditch
Justification for choice of existing measures factors Justification for choice of proposed measures factors	+			Road drainage to unlined ditch
Groundwater Assessments				Road drainage to lined militration crates
	1 1			D 11 11 1 11 11 11 11 11 11 11 11 11 11
Traffic flow	-	-	<=50,000 AADT	Provided by traffic assesment
Rainfall depth (annual averages)	-	-	>740 to <1060 mm rainfall	HAWRAT v2.0 User Guide pg. 70
Drainage area ratio	-	=	<=50	Drainage area of road / active surface area of infiltration device
Infiltration method	- 1	=	"Region", shallow infiltration systems	
			(e.g. infiltration basin)	
Unsaturated zone	-	=	Depth to water table <=5 m	Peak modelled groundwater level compared with elevation of base of
				infiltration device
Flow type (Incorporates flow type an effective grain size)	-	-	Flow dominated by fractures/ fissures	Chalk aquifer
			(e.g. well consolidated sedimentary	
			deposits, igneous and metamorphic	
			rocks or unconsolidated deposits of	
	4		very coarse sand and coarser)	
Unsaturated Zone Clay Content	-	-	<=1% clay minerals	Conservatively chosen as highest risk due to lack of site specific data
Organic Carbon	-	-	<=1% SOM	Conservatively chosen as highest risk due to lack of site specific data
Unsaturated zone soil pH	1 - 1	=	pH <=5	Conservatively chosen as highest risk due to lack of site specific data



A303 Eastern portal								
Assessment of Priority Outfalls								
•								
Method D - assessment of risk from accidental spillage		Additional columns	s for use if other roads drain to the same outfall					
	A (main road)	В	С	D	E	F		
D1 Water body type	Groundwater							
D2 Length of road draining to outfall (m)	270							
D3 Road Type (A-road or Motorway)	A							
D4 If A road, is site urban or rural?	Rural							
D5 Junction type	No junction							
D6 Location (response time for emergency services)	< 20 minutes							
D7 Traffic flow (AADT two way)	36,799							
D8 % HGV	16							
D8 Spillage factor (no/109HGVkm/year)	0.29							
D9 Risk of accidental spillage	0.00017	0.00000	0.00000	0.00000	0.00000	0.00000		
D10 Probability factor	0.45	0.45	0.45					
D11 Risk of pollution incident	0.00008	0.00000	0.00000	0.00000	0.00000	0.00000		Return Period
D12 Is risk greater than 0.01?	No	No	No				Totals	(years)
D13 Return period without pollution reduction measures	0.00008	0.00000	0.00000	0.00000	0.00000	0.00000	0.0001	13206
D14 Existing measures factor	0.7							
D15 Return period with existing pollution reduction measures	0.00005	0.00000	0.00000	0.00000	0.00000	0.00000	0.0001	18866
D16 Proposed measures factor	0.6							
D17 Residual with proposed Pollution reduction measures	0.00003	0.00000	0.00000	0.00000	0.00000	0.00000	0.0000	31443
Justification for choice of existing measures factors:			Justification for c	hoice of proposed m	neasures factors:			
Existing road drainage to unlined ditch			Grass channel wi	ith online soakaways				
ů								
The worksheet should be read in conjunction with DMRB 11.3.10.								
The worksheet should be read in conjunction with DIVIND 11.5.10.								



<u>User Parameters – Defaults and Ranges</u> A303 Eastern portal

Params	Unit	Default	Min	Max
AADT	vpd	>10,000 and <50,000	-	-
Climatic Region	-	Warm Dry	-	-
Rainfall Site	-	Ashford (SAAR 710mm)	-	-

Spillage Risk Parameters

•	\	\	Remote (response time to site > 1
	to site < 20 min)	site < 1 hour)	hour)
Surface watercourse	0.45	0.60	0.75
Groundwater	0.45	0.60	0.75



A303 - Exsisting A303 drainage upgrade Groundwater Assessment

Component Number		Weighting Factor	Property or Parameter Risk Score		Component score	Weighted component score
1		10	Traffic flow	<=50,000 AADT	1	10
2	SOURCE	10	Rainfall depth (annual averages)	>740 to <1060 mm rainfall	2	20
3		10	Drainage area ratio	<=50	1	10
4		15	Infiltration method	"Region", shallow infiltration systems (e.g. infiltration basin)	2	30
5		20	Unsaturated zone	Depth to water table <=5 m	3	60
6	PATHWAY	20	Flow type (Incorporates flow type an effective grain size)	Flow dominated by fractures/fissures (e.g. well consolidated sedimentary deposits, igneous and metamorphic rocks or unconsolidated deposits of very coarse sand and coarser)	3	60
7		5	Unsaturated Zone Clay Content	<=1% clay minerals	3	15
8		5	Organic Carbon	<=1% SOM	3	15
9		5	Unsaturated zone soil pH	pH <=5	3	15

TOTAL SCORE	235
RISK SCREENING LEVEL	Medium



User parameters

A303 - Exsisting A303 drainage upgrade

Location Details

Southern Southern Services								
Road Number	A303		Assessment type		Non-cumulative assessment (single outfall)			
HE Area/DBFO number			Assessment type					
OS grid reference of assessment point (m)	Easting	414343	Receiving watercourse		Chalk aquifer			
os grid reference of assessment point (iii)	Northing 142131 EA receiving water Detailed River Network ID			GB40801G806900				
OS grid reference of outfall structure (m)	Easting	414343	Assessor and affiliation		AmW			
os gna reference of outlan structure (m)	Northing	142131	Date of assessment		18/05/2018			
Outfall number	Existing A	303 drainage upgrade	Version of assessment					
List of outfalls in cumulative assessment								
Notes								

Parameter	Units	Default Value	Value used	Notes
Runoff Risk Assessments				
AADT	vpd	>10.000 and <50.000	>10,000 and <50,000	
Climatic Region	- 1	Warm Dry	Warm Wet	
Rainfall Site	_	Ashford (SAAR 710mm)	Southampton (SAAR 820mm)	
Spillage Risk Assessments		/ismora (Grant / Torring)		
A MainRoad				
Water body type		_	Groundwater	
Length of road draining to outfall	m	_	510	
Road Type (A-road or Motorway)		_	A	
If A road, is site urban or rural?	-	_	Rural	
Junction type	-	-	No junction	
Location	1 .	_	< 20 minutes	Estimated time
Traffic flow (AADT two way)	-	-	36799	DCO Traffic data https://mace365.sharepoint.com/:x:/r/sites/project-
Traine now (WE) two way)			30733	34292/WorkStream/Traffic/_layouts/15/WopiFrame.aspx?sourcedoc=%
				7BB452BA30-0E52-418A-B2BA-
				926D8CE054A7%7D&file=DCO%20Traffic%20data%20for%20water%
				20assessments.xlsx&action=default
% HGV	-	-	16	DCO Traffic data https://mace365.sharepoint.com/:x:/r/sites/project-
				34292/WorkStream/Traffic/_layouts/15/WopiFrame.aspx?sourcedoc=%
				7BB452BA30-0E52-418A-B2BA-
				926D8CE054A7%7D&file=DCO%20Traffic%20data%20for%20water%
				20assessments.xlsx&action=default
Spillage factor	no/109H	-	0.29	Rural trunk road
	GVkm/y			
	ear			
Existing measures factor	-	-	0.7	Unlined ditch
Proposed measures factor	-	-	0.6	Soakaway basin / inflitration basin
Justification for choice of existing measures factors				Existing road drainage to unlined ditch
Justification for choice of proposed measures factors				Highway ditch drainaing past Blick mead and lined with proprietry
Groundwater Assessments				
Traffic flow	-	-	<=50,000 AADT	Provided by traffic assesment
Rainfall depth (annual averages)	-	-	>740 to <1060 mm rainfall	HAWRAT v2.0 User Guide pg. 70
Drainage area ratio	-	-	<=50	Drainage area of road / active surface area of infiltration device
Infiltration method	-	-	"Region", shallow infiltration systems	
			(e.g. infiltration basin)	
Unsaturated zone	-	-	Depth to water table <=5 m	Peak modelled groundwater level compared with elevation of base of
				infiltration device
Flow type (Incorporates flow type an effective grain size)	-	-	Flow dominated by fractures/ fissures	Chalk aquifer
			(e.g. well consolidated sedimentary	
			deposits, igneous and metamorphic	
			rocks or unconsolidated deposits of	
			very coarse sand and coarser)	
Unsaturated Zone Clay Content	-	-	<=1% clay minerals	Conservatively chosen as highest risk due to lack of site specific data
Organic Carbon	-	8	<=1% SOM	Conservatively chosen as highest risk due to lack of site specific data
Unsaturated zone soil pH	-	-	pH <=5	Conservatively chosen as highest risk due to lack of site specific data



A303	- Exsisting A303 drainage upgrade								
	essment of Priority Outfalls								
	· · · · · · · · · · · · · · · · · · ·								
Meth	od D - assessment of risk from accidental spillage		Additional columns for use if other roads drain to the same outfall						
		A (main road)	В	С	D	E	F		
D1	Water body type	Groundwater						1	
D2	Length of road draining to outfall (m)	510							
D3	Road Type (A-road or Motorway)	A							
D4	If A road, is site urban or rural?	Rural							
D5	Junction type	No junction						1	
D6	Location (response time for emergency services)	< 20 minutes							
D7	Traffic flow (AADT two way)	36,799						1	
D8	% HGV	16						1	
	Spillage factor (no/109HGVkm/year)	0.29						Ī	
D9	Risk of accidental spillage	0.00032	0.00000	0.00000	0.00000	0.00000	0.00000	1	
D10	Probability factor	0.45							
D11	Risk of pollution incident	0.00014	0.00000	0.00000	0.00000	0.00000	0.00000		Return Period
D12	Is risk greater than 0.01?	No						Totals	(years)
D13	Return period without pollution reduction measures	0.00014	0.00000	0.00000	0.00000	0.00000	0.00000	0.0001	6992
D14	Existing measures factor	0.7							
D15	Return period with existing pollution reduction measures	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.0001	9988
	Proposed measures factor	0.6							
D17	Residual with proposed Pollution reduction measures	0.00006	0.00000	0.00000	0.00000	0.00000	0.00000	0.0001	16646
	Justification for choice of existing measures factors:			Justification for cho	pice of proposed me	asures factors:			
	Existing road drainage to unlined ditch			Highway ditch drain	aing past Blick mead	and lined with propriet	ry treatment system		
								_	
1									
The v	orksheet should be read in conjunction with DMRB 11.3.10.								



<u>User Parameters – Defaults and Ranges</u> A303 - Exsisting A303 drainage upgrade

Params	Unit	Default	Min	Max
AADT	vpd	>10,000 and <50,000	-	-
Climatic Region	-	Warm Wet	-	-
Rainfall Site	-	Southampton (SAAR 820mm)	-	-

Spillage Risk Parameters

	\	Rural (response time to site < 1 hour)	Remote (response time to site > 1 hour)	
Surface watercourse	0.45	0.60	0.75	
Groundwater	0.45	0.60	0.75	



A303 - Link to Winterborne Stoke Groundwater Assessment

Component Number		Weighting Factor	Property or Parameter	Risk Score		Weighted component score
1		10	Traffic flow	<=50,000 AADT	1	10
2	SOURCE	10	Rainfall depth (annual averages)	>740 to <1060 mm rainfall	2	20
3		10	Drainage area ratio	<=50	1	10
4		15	Infiltration method	"Region", shallow infiltration systems (e.g. infiltration basin)	2	30
5		20	Unsaturated zone	Depth to water table >=15 m	1	20
6	PATHWAY	20	Flow type (Incorporates flow type an effective grain size)	Flow dominated by fractures/ fissures (e.g. well consolidated sedimentary deposits, igneous and metamorphic rocks or unconsolidated deposits of very coarse sand and coarser)	3	60
7		5	Unsaturated Zone Clay Content	<=1% clay minerals	3	15
8		5	Organic Carbon	<=1% SOM	3	15
9		5	Unsaturated zone soil pH	pH <=5	3	15

TOTAL SCORE RISK SCREENING LEVEL



User parameters

A303 - Link to Winterborne Stoke

Location Details

Southern Potential								
Road Number	A303		Assessment type		Non-cumulative assessment (single outfall)			
HE Area/DBFO number			Assessment type					
OS grid reference of assessment point (m)	Easting	409359	Receiving watercourse		Chalk aquifer			
OS grid reference of assessment point (iii)	Northing	141120	EA receiving water Detailed River Network ID		GB40801G806900			
OS grid reference of outfall structure (m)	Easting	409359	Assessor and affiliation		AmW			
os gria reference of outlan structure (iii)	Northing	141120	Date of assessment		18/05/2018			
Outfall number	Link to W	interborne Stoke	Version of assessment 1		1			
List of outfalls in cumulative assessment		•						
Notes								

	1 1	B (1/1/1		T. N.
Parameter	Units	Default Value	Value used	Notes
Runoff Risk Assessments				
AADT	vpd	>10,000 and <50,000	>10,000 and <50,000	
Climatic Region	-	Warm Dry	Warm Wet	
Rainfall Site	-	Ashford (SAAR 710mm)	Southampton (SAAR 820mm)	
Spillage Risk Assessments				
A MainRoad				
Water body type	-	-	Groundwater	
Length of road draining to outfall	m	-	560	
Road Type (A-road or Motorway)	-	-	Α	
If A road, is site urban or rural?	-	-	Rural	
Junction type	-	-	Side road	
Location	-	-	< 20 minutes	Estimated time
Traffic flow (AADT two way)	-	-	12407	DCO Traffic data https://mace365.sharepoint.com/:x:/r/sites/project-
,			.2.0.	34292/WorkStream/Traffic/_layouts/15/WopiFrame.aspx?sourcedoc=%
				7BB452BA30-0E52-418A-B2BA-
				926D8CE054A7%7D&file=DCO%20Traffic%20data%20for%20water%
				20assessments.xlsx&action=default
% HGV	-	_	14	DCO Traffic data https://mace365.sharepoint.com/:x:/r/sites/project-
701104			17	34292/WorkStream/Traffic/ layouts/15/WopiFrame.aspx?sourcedoc=%
				7BB452BA30-0E52-418A-B2BA-
				926D8CE054A7%7D&file=DCO%20Traffic%20data%20for%20water%
				20assessments.xlsx&action=default
Spillage factor	no/109H		0.93	Rural trunk road
Spillage factor		=	0.93	Kurai tiurik todu
	GVkm/y			
Fulchia and a factor	ear			Linding and officials
Existing measures factor	-	-	0.7	Unlined ditch
Proposed measures factor	-	-	0.6	Soakaway basin / inflitration basin
Justification for choice of existing measures factors	+ -			Existing road drainage to unlined ditch
Justification for choice of proposed measures factors				Grass channel with online soakaways
Groundwater Assessments			_	
Traffic flow	-	-	<=50,000 AADT	Provided by traffic assesment
Rainfall depth (annual averages)	-	-	>740 to <1060 mm rainfall	HAWRAT v2.0 User Guide pg. 70
Drainage area ratio	-	-	<=50	Drainage area of road / active surface area of infiltration device
Infiltration method	-	-	"Region", shallow infiltration systems	
			(e.g. infiltration basin)	
Unsaturated zone	-	-	Depth to water table >=15 m	Peak modelled groundwater level compared with elevation of base of
				infiltration device
Flow type (Incorporates flow type an effective grain size)	-	-	Flow dominated by fractures/ fissures	Chalk aquifer
			(e.g. well consolidated sedimentary	
			deposits, igneous and metamorphic	
			rocks or unconsolidated deposits of	
			very coarse sand and coarser)	
Unsaturated Zone Clay Content	-		<=1% clay minerals	Conservatively chosen as highest risk due to lack of site specific data
Organic Carbon	-	-	<=1% SOM	Conservatively chosen as highest risk due to lack of site specific data
Unsaturated zone soil pH	-	-	pH <=5	Conservatively chosen as highest risk due to lack of site specific data



A303	- Link to Winterborne Stoke					•			
Asse	essment of Priority Outfalls								
								_	
Meth	od D - assessment of risk from accidental spillage		Additional columns	ĺ					
		A (main road)	В	С	D	E	F		
D1	Water body type	Groundwater						1	
	Length of road draining to outfall (m)	560						1	
D3	Road Type (A-road or Motorway)	A						1	
D4	If A road, is site urban or rural?	Rural						1	
D5	Junction type	Side road						1	
	Location (response time for emergency services)	< 20 minutes						1	
	Traffic flow (AADT two way)	12,407						1	
	% HGV	14							
	Spillage factor (no/109HGVkm/year)	0.93							
	Risk of accidental spillage	0.00033	0.00000	0.00000	0.00000	0.00000	0.00000	1	
	Probability factor	0.45							
	Risk of pollution incident	0.00015	0.00000	0.00000	0.00000	0.00000	0.00000		Return Period
	Is risk greater than 0.01?	No						Totals	(years)
	Return period without pollution reduction measures	0.00015	0.00000	0.00000	0.00000	0.00000	0.00000	0.0001	6730
	Existing measures factor	0.7							
	Return period with existing pollution reduction measures	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.0001	9615
	Proposed measures factor	0.6							
D17	Residual with proposed Pollution reduction measures	0.00006	0.00000	0.00000	0.00000	0.00000	0.00000	0.0001	16024
	Justification for choice of existing measures factors:			Justification for ch	oice of proposed me	asures factors:			
	Existing road drainage to unlined ditch			Highway ditch drai	naing past Blick mead	and lined with propriet	ry treatment system		
			1					I	
	•		·	·			·		<u> </u>
The v	orksheet should be read in conjunction with DMRB 11.3.10.								



Spillage Risk Parameters

S	\ 1		Remote (response time to site > 1 hour)		
Surface watercourse	0.45	0.60	0.75		
Groundwater	0.45	0.60	0.75		



A303 - Realigned A360 North Groundwater Assessment

Component Number		Weighting Factor	Property or Parameter	Risk Score	Component score	Weighted component score
1		10	Traffic flow	<=50,000 AADT	1	10
2	SOURCE	10	Rainfall depth (annual averages)	>740 to <1060 mm rainfall	2	20
3		10	Drainage area ratio	<=50	1	10
4		15	Infiltration method	"Region", shallow infiltration systems (e.g. infiltration basin)	2	30
5		20	Unsaturated zone	Depth to water table <15 m to >5 m	2	40
6	PATHWAY	20	Flow type (Incorporates flow type an effective grain size)	Flow dominated by fractures/ fissures (e.g. well consolidated sedimentary deposits, igneous and metamorphic rocks or unconsolidated deposits of very coarse sand and coarser)	3	60
7		5	Unsaturated Zone Clay Content	<=1% clay minerals	3	15
8		5	Organic Carbon	<=1% SOM	3	15
9		5	Unsaturated zone soil pH	pH <=5	3	15

TOTAL SCORE	215
DISK SCREENING LEVEL	Modium



User parameters

A303 - Realigned A360 North

Location Details

Road Number	A303		Assessment type		Non-cumulative assessment (single outfall)		
HE Area/DBFO number			Assessment type				
OS grid reference of assessment point (m)	Easting	409417	Receiving watercourse		Chalk aquifer		
os grid reference of assessment point (iii)	Northing	141442	EA receiving water Detailed River Network ID		GB40801G806900		
OS grid reference of outfall structure (m)	Easting	409417	Assessor and affiliation		AmW		
os gna reference of battan structure (m)	Northing	141442	Date of assessment		17/05/2018		
Outfall number	Realigned	A360 north	Version of assessment		1		
List of outfalls in cumulative assessment							
Notes							

Parameter	Units	Default Value	Value used	Notes
2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2	Units	Default Value	value used	Notes
Runoff Risk Assessments		40.000 1.50.000	40.000 4 .50.000	
AADT	vpd	>10,000 and <50,000	>10,000 and <50,000	
Climatic Region	-	Warm Dry	Warm Wet Southampton (SAAR 820mm)	
Rainfall Site	-	Ashford (SAAR 710mm)	Soutnampton (SAAR 820mm)	
Spillage Risk Assessments				
A MainRoad				
Water body type	-	=	Groundwater	
Length of road draining to outfall	m	-	1055	
Road Type (A-road or Motorway)	-	-	A	
If A road, is site urban or rural?	-	=	Rural	
Junction type	-	=	No junction	5 0 10
Location	-	-	< 20 minutes	Estimated time
Traffic flow (AADT two way)	-	-	11506	DCO Traffic data https://mace365.sharepoint.com/:x:/r/sites/project-34292/WorkStream/Traffic/_layouts/15/WopiFrame.aspx?sourcedoc=%7BB452BA30-0E52-418A-B2BA-926D8CE054A7%7D8file=DCO%20Traffic%20data%20for%20water%20assessments.xlsx&action=default
% HGV	-	-	11	DCO Traffic data https://mace365.sharepoint.com/:x:/r/sites/project-34292/WorkStream/Traffic/_layouts/15/WopiFrame.aspx?sourcedoc=%7BB452BA3-0-E52-418A-B2BA-926D8CE054A7%7D&file=DCO%20Traffic%20data%20for%20water%20assessments.xlsx&action=default
Spillage factor	no/109H GVkm/y ear	-	0.29	Rural trunk road roundabout
Existing measures factor	-	-	0.7	Unlined ditch
Proposed measures factor	-	-	0.6	Soakaway basin / inflitration basin
Justification for choice of existing measures factors	1			Existing road drainage to unlined ditch
Justification for choice of proposed measures factors				Grass channel with online soakaways
Groundwater Assessments				
Traffic flow	-	-	<=50,000 AADT	Provided by traffic assesment
Rainfall depth (annual averages)	-	-	>740 to <1060 mm rainfall	HAWRAT v2.0 User Guide pg. 70
Drainage area ratio	-	-	<=50	Drainage area of road / active surface area of infiltration device
Infiltration method	-	÷	"Region", shallow infiltration systems (e.g. infiltration basin)	
Unsaturated zone	-	÷	Depth to water table <15 m to >5 m	Peak modelled groundwater level compared with elevation of base of infiltration device
Flow type (Incorporates flow type an effective grain size)	-	-	Flow dominated by fractures/ fissures (e.g. well consolidated sedimentary deposits, igneous and metamorphic rocks or unconsolidated deposits of very coarse sand and coarser)	Chalk aquifer
Unsaturated Zone Clay Content	-	-	<=1% clay minerals	Conservatively chosen as highest risk due to lack of site specific data
Organic Carbon	-	-	<=1% SOM	Conservatively chosen as highest risk due to lack of site specific data
Unsaturated zone soil pH	-	-	pH <=5	Conservatively chosen as highest risk due to lack of site specific data



A303	3 - Realigned A360 North								
_	essment of Priority Outfalls								
	* *************************************							_	
Meth	od D - assessment of risk from accidental spillage		Additional columns for	or use if other roads d	ain to the same outfall			1	
L		A (main road)	В	С	D	E	F		
D1	Water body type	Groundwater						1	
D2	Length of road draining to outfall (m)	1,055						1	
D3		A						1	
D4	If A road, is site urban or rural?	Rural						1	
D5	Junction type	No junction							
D6		< 20 minutes							
D7	Traffic flow (AADT two way)	11,506							
D8	% HGV	11							
D8		0.29							
D9	Risk of accidental spillage	0.00014	0.00000	0.00000	0.00000	0.00000	0.00000		
	Probability factor	0.45							
	Risk of pollution incident	0.00006	0.00000	0.00000	0.00000	0.00000	0.00000		Return Period
	Is risk greater than 0.01?	No						Totals	(years)
	Return period without pollution reduction measures	0.00006	0.00000	0.00000	0.00000	0.00000	0.00000	0.0001	15723
	Existing measures factor	0.7							
	Return period with existing pollution reduction measures	0.00004	0.00000	0.00000	0.00000	0.00000	0.00000	0.0000	22461
	Proposed measures factor	0.6							
D17	Residual with proposed Pollution reduction measures	0.00003	0.00000	0.00000	0.00000	0.00000	0.00000	0.0000	37435
	Justification for choice of existing measures factors:			Justification for cho	ice of proposed mea	asures factors:			
	Existing road drainage to unlined ditch			Grass channel with	online soakaways				
	_	-			_				_
The	worksheet should be read in conjunction with DMRB 11.3.10.								



<u>User Parameters – Defaults and Ranges</u>

A303 - Realigned A360 North

Spillage Risk Parameters

	\ '	Rural (response time to site < 1 hour)	Remote (response time to site > 1 hour)
Surface watercourse	0.45	0.60	0.75
Groundwater	0.45	0.60	0.75



A303 - Realigned A360 south Groundwater Assessment Weighted component score Component Number Weighting Factor Component score Property or Parameter Risk Score Traffic flow <=50,000 AADT >740 to <1060 mm rainfall SOURCE Rainfall depth (annual averages) >740 to <1060 mm rainfall <=50 *Region*, shallow infiltration systems (e.g. infiltration basin) Depth to water table >=15 m Flow dominated by fractures/ fissures (e.g. well consolidated sedimentary deposits, igneous and metamorphic rocks or unconsolidated deposits of very coarse sand and coarser) <=1% clay minerals <=1% SOM pH <=5 Drainage area ratio Infiltration method Unsaturated zone Flow type (Incorporates flow type an effective grain size) 20 60 6 PATHWAY Unsaturated Zone Clay Content Organic Carbon Unsaturated zone soil pH 15 TOTAL SCORE RISK SCREENING LEVEL



User parameters

A303 - Realigned A360 south

Location Dotaile

Road Number	A303	Non-cumulative assessment (sin				cocemont (cinalo outfo	all)
Road Number	ASUS		Assessment type		Non-currulative assessment (single outrail)		
HE Area/DBFO number			,				
OS grid reference of assessment point (m)	Easting	409441	Receiving watercourse		Chalk aquifer groundwater		
OS grid reference of assessment point (iii)	Northing	141105	EA receiving water Detailed River Network ID		GB40801G806900		
OS grid reference of outfall structure (m)	Easting	409441	Assessor and affiliation		AmW		
grid reference of outlan structure (iii)	Northing	141105	Date of assessment		17/05/2018		
Outfall number	Realigned	A360 South	Version of assessment		1		
List of outfalls in cumulative assessment							
Notes							

Parameter	Units	Default Value	Value used	Notes
Runoff Risk Assessments	Offics	Delault Value	value useu	Notes
AADT		10.000 1 1 10.000	>10.000 and <50.000	
V 100 100 100 100 100 100 100 100 100 10	vpd	>10,000 and <50,000	.,	
Climatic Region	-	Warm Dry	Warm Wet Southampton (SAAR 820mm)	
Rainfall Site	-	Ashford (SAAR 710mm)	Southampton (SAAR 820mm)	
Spillage Risk Assessments				
A MainRoad			_	_
Water body type	-	-	Groundwater	
Length of road draining to outfall	m	-	730	
Road Type (A-road or Motorway)	-	<u> </u>	Α	
If A road, is site urban or rural?	-	-	Rural	
Junction type	-	-	No junction	
Location	-	-	< 20 minutes	Estimated time
Traffic flow (AADT two way)	-	÷	12407	DCO Traffic data https://mace365.sharepoint.com/:x:/r/sites/project-34292/WorkStream/Traffic/ Layouts/15/WopiFrame.aspx?sourcedoc=%78B452BA30-0E52-418A-B2BA-926D8CE054A7%7D&file=DCO%20Traffic%20data%20for%20water%20assessments.xlsx&action=default
% HGV	-	-	14	DCO Traffic data https://mace365.sharepoint.com/:x:/r/sites/project-34292/WorkStream/Traffic/_layouts/15/WopiFrame.aspx?sourcedoc=%7B452BA30-0E52-418A-B2BA-92BASCE054A7%7D&file=DC0%20Traffic%20data%20for%20water%20assessments.xlsx&action=default
Spillage factor	no/109H GVkm/y ear	-	0.29	Rural trunk road roundabout
Existing measures factor	-	-	0.7	Unlined ditch
Proposed measures factor	- 1	=	0.6	Soakaway basin / inflitration basin
Justification for choice of existing measures factors				Existing road drainage to unlined ditch
Justification for choice of proposed measures factors				Grass channel with online soakaways
Groundwater Assessments				,
Traffic flow	- 1	-	<=50.000 AADT	Provided by traffic assesment
Rainfall depth (annual averages)	1 . 1	_	>740 to <1060 mm rainfall	HAWRAT v2.0 User Guide pg. 70
Drainage area ratio	-		<=50	Drainage area of road / active surface area of infiltration device
Infiltration method	-	-	"Region", shallow infiltration systems (e.g. infiltration basin)	Dramage area of Toda / active surface area of immittation device
Unsaturated zone	-	=	Depth to water table >=15 m	Peak modelled groundwater level compared with elevation of base of infiltration device
Flow type (incorporates flow type an effective grain size)	-	-	Flow dominated by fractures/ fissures (e.g. well consolidated sedimentary deposits, igneous and metamorphic rocks or unconsolidated deposits of very coarse sand and coarser)	Chalk aquifer
Unsaturated Zone Clay Content	-	-	<=1% clay minerals	Conservatively chosen as highest risk due to lack of site specific data
Organic Carbon	- 1	-	<=1% SOM	Conservatively chosen as highest risk due to lack of site specific data
Unsaturated zone soil pH	1 - 1	-	pH <=5	Conservatively chosen as highest risk due to lack of site specific data



A303 - Realigned A360 south								
Assessment of Priority Outfalls								
Assessment of Friority Guitains								
Method D - assessment of risk from accidental spillage		Additional columns f	or use if other roads dr	rain to the same outfal	ı		1	
moniou 2 - accessment of rick from accidental opinings	A (main road)	B	C	D	Е	F	1	
D1 Water body type	Groundwater	_		_	_		1	
D2 Length of road draining to outfall (m)	730						1	
D3 Road Type (A-road or Motorway)	A						1	
D4 If A road, is site urban or rural?	Rural						1	
D5 Junction type	No junction						1	
D6 Location (response time for emergency services)	< 20 minutes						1	
D7 Traffic flow (AADT two way)	12,407						1	
D8 % HGV	14						1	
D8 Spillage factor (no/109HGVkm/year)	0.29						i	
D9 Risk of accidental spillage	0.00013	0.00000	0.00000	0.00000	0.00000	0.00000	i	
D10 Probability factor	0.45						1	
D11 Risk of pollution incident	0.00006	0.00000	0.00000	0.00000	0.00000	0.00000		Return Period
D12 Is risk greater than 0.01?	No						Totals	(years)
D13 Return period without pollution reduction measures	0.00006	0.00000	0.00000	0.00000	0.00000	0.00000	0.0001	16557
D14 Existing measures factor	0.7							
D15 Return period with existing pollution reduction measures	0.00004	0.00000	0.00000	0.00000	0.00000	0.00000	0.0000	23653
D16 Proposed measures factor	0.6							
D17 Residual with proposed Pollution reduction measures	0.00003	0.00000	0.00000	0.00000	0.00000	0.00000	0.0000	39421
	•	•		•	•	•		
Justification for choice of existing measures factors:			Justification for cho	pice of proposed me	asures factors:			
Existing road drainage to unlined ditch			Grass channel with	online soakaways				
3								
							4	
The worksheet should be read in conjunction with DMRB 11.3.10.								
•								



<u>User Parameters – Defaults and Ranges</u>

A303 - Realigned A360 south

Spillage Risk Parameters

S	\ 1		Remote (response time to site > 1 hour)
Surface watercourse	0.45	0.60	0.75
Groundwater	0.45	0.60	0.75



A303 Western portal Groundwater Assessment

Component Number		Weighting Factor	Property or Parameter	Risk Score	Component score	Weighted component score
1		10	Traffic flow	<=50,000 AADT	1	10
2	SOURCE	10	Rainfall depth (annual averages)	>740 to <1060 mm rainfall	2	20
3		10	Drainage area ratio	<=50	1	10
4		15	Infiltration method	"Region", shallow infiltration systems (e.g. infiltration basin)	2	30
5		20	Unsaturated zone	Depth to water table <15 m to >5 m	2	40
6	PATHWAY	20	Flow type (Incorporates flow type an effective grain size)	Flow dominated by fractures/ fissures (e.g. well consolidated sedimentary deposits, igneous and metamorphic rocks or unconsolidated deposits of very coarse sand and coarser)	3	60
7		5	Unsaturated Zone Clay Content	<=1% clay minerals	3	15
8		5	Organic Carbon	<=1% SOM	3	15
9		5	Unsaturated zone soil pH	pH <=5	3	15

TOTAL SCORE	215
RISK SCREENING LEVEL	Modium



<u>User parameters</u> Location Details	A303 Western portal					
Road Number	A303	Assessment type	Non-cumulative assessment (single outfall)			
HE Area/DBFO number		Assessment type	i			
	Easting 410887	Receiving watercourse	Chalk aquifer			
	Northing 141594	EA receiving water Detailed River Network ID	GB40801G806900			
	Easting 410887	Assessor and affiliation	AmW			
	Northing 141594	Date of assessment	18/05/2018			
Outfall number	Westen Portal	Version of assessment	1			
List of outfalls in cumulative assessment						
Notes		_				

_				
Parameter	Units	Default Value	Value used	Notes
Runoff Risk Assessments				_
AADT	vpd	>10,000 and <50,000	>10,000 and <50,000	
Climatic Region	-	Warm Dry	Warm Wet	
Rainfall Site	-	Ashford (SAAR 710mm)	Southampton (SAAR 820mm)	
Spillage Risk Assessments				
A MainRoad				
Water body type	-	-	Groundwater	
Length of road draining to outfall	m	-	1245	
Road Type (A-road or Motorway)	-	-	A	
If A road, is site urban or rural?	-	-	Rural	
Junction type	-	-	No iunction	
Location	_	=	< 20 minutes	Estimated time
Traffic flow (AADT two way)	1 -	-	36799	DCO Traffic data https://mace365.sharepoint.com/:x:/r/sites/project-
			00.00	34292/WorkStream/Traffic/_layouts/15/WopiFrame.aspx?sourcedoc=%7BB452BA30-0E52-418A-B2BA-
				926D8CE054A7%7D&file=DCO%20Traffic%20data%20for%20water% 20assessments.xlsx&action=default
% HGV	-	-	16	DCO Traffic data https://mace365.sharepoint.com/:x/r/sites/project- 34292/WorkStream/Traffic/layouts/15/WopiFrame.aspx?sourcedoc=% 7BB452BA30-0E52-418A-B2BA- 926D8CE054A7%7D&file=DCO%20Traffic%20data%20for%20water% 20assessments.xisx&action=default
Spillage factor	no/109H GVkm/y ear	-	0.29	Rural trunk road
Existing measures factor	-	_	0.7	Unlined ditch
Proposed measures factor	1 -	_	0.6	Soakaway basin / inflitration basin
Justification for choice of existing measures factors			0.0	Existing road drainage to unlined ditch
Justification for choice of proposed measures factors				Road drainage to lined infiltration crates
Groundwater Assessments				road dramage to inter initiation crates
Traffic flow	1 . 1		<=50.000 AADT	Provided by traffic assesment
Rainfall depth (annual averages)	+ -		>740 to <1060 mm rainfall	
	-	-		HAWRAT v2.0 User Guide pg. 70
Drainage area ratio	-	<u> </u>	<=50	Drainage area of road / active surface area of infiltration device
Infiltration method	-	-	"Region", shallow infiltration systems (e.g. infiltration basin)	
Unsaturated zone	-	÷	Depth to water table <15 m to >5 m	Peak modelled groundwater level compared with elevation of base of infiltration device
Flow type (Incorporates flow type an effective grain size)	-	-	Flow dominated by fractures/ fissures (e.g. well consolidated sedimentary	Chalk aquifer
			deposits, igneous and metamorphic	
			rocks or unconsolidated deposits of	
			very coarse sand and coarser)	
Unsaturated Zone Clay Content	-	-	<=1% clay minerals	Conservatively chosen as highest risk due to lack of site specific data
Organic Carbon	+ -		<=1% Clay minerals	Conservatively chosen as highest risk due to lack of site specific data Conservatively chosen as highest risk due to lack of site specific data
Unsaturated zone soil pH	+ -		pH <=5	Conservatively chosen as highest risk due to lack of site specific data Conservatively chosen as highest risk due to lack of site specific data
Urisaturateu zone soli ph	-	=	μπ <=ə	Conservatively chosen as nignest risk due to lack of site specific data



	A (main road) Groundwater 1,245 A Rural No junction < 20 minutes 36,799 16 0.29 0.00078	Additional columns	for use if other roads C	drain to the same outfa	E	F		
D1 Water body type D2 Length of road draining to outfall (m) D3 Road Type (A-road or Motorway) D4 If A road, is site urban or rural? D5 Junction type D6 Location (response time for emergency services) D7 Traffic flow (AADT two way) D8 % HGV D8 Spillage factor (no/109HGVkm/year)	Groundwater 1,245 A Rural No junction 2 0 minutes 36,799 16 0.29		_	_		F		
D1 Water body type D2 Length of road draining to outfall (m) D3 Road Type (A-road or Motorway) D4 If A road, is site urban or rural? D5 Junction type D6 Location (response time for emergency services) D7 Traffic flow (AADT two way) D8 % HGV D8 Spillage factor (no/109HGVkm/year)	Groundwater 1,245 A Rural No junction 2 0 minutes 36,799 16 0.29		_	_		F		
D2 Length of road draining to outfall (m) D3 Road Type (A-road or Motorway) D4 If A road, is site urban or rural? D5 Junction type D6 Location (response time for emergency services) D7 Traffic flow (AADT two way) D8 % HGV D8 Spillage factor (no/109HGVkm/year)	Groundwater 1,245 A Rural No junction 2 0 minutes 36,799 16 0.29	В	С	D	E	F		
D2 Length of road draining to outfall (m) D3 Road Type (A-road or Motorway) D4 If A road, is site urban or rural? D5 Junction type D6 Location (response time for emergency services) D7 Traffic flow (AADT two way) D8 % HGV D8 Spillage factor (no/109HGVkm/year)	1,245 A Rural No junction < 20 minutes 36,799 16 0.29							
D3 Road Type (A-road or Motorway) D4 If A road, is site urban or rural? D5 Junction type D6 Location (response time for emergency services) D7 Traffic flow (AADT two way) D8 % HGV D8 Spillage factor (no/109HGVkm/year)	A Rural No junction < 20 minutes 36,799 16 0.29							
D4 If A road, is site urban or rural? D5 Junction type D6 Location (response time for emergency services) D7 Traffic flow (AADT two way) B % HGV D8 Spillage factor (no/109HGVkm/year)	Rural No junction < 20 minutes 36,799 16 0.29							
D5 Junction type D6 Location (response time for emergency services) D7 Traffic flow (AADT two way) D8 %-HGV D8 Spillage factor (no/109HGVkm/year)	No junction < 20 minutes 36,799 16 0.29							
D6 Location (response time for emergency services) D7 Traffic flow (AADT two way) B8 % HGV B8 Spillage factor (no/109HGVkm/year)	< 20 minutes 36,799 16 0.29							
D7 Traffic flow (AADT two way) D8 % HGV D8 Spillage factor (no/109HGVkm/year)	36,799 16 0.29							
D8 % HGV D8 Spillage factor (no/109HGVkm/year)	16 0.29							
D8 Spillage factor (no/109HGVkm/year)	0.29							
	0.00070							
D9 Risk of accidental spillage	0.00076	0.00000	0.00000	0.00000	0.00000	0.00000		
D10 Probability factor	0.45	0.45	0.45					
D11 Risk of pollution incident	0.00035	0.00000	0.00000	0.00000	0.00000	0.00000		Return Period
D12 Is risk greater than 0.01?	No	No	No				Totals	(years)
D13 Return period without pollution reduction measures	0.00035	0.00000	0.00000	0.00000	0.00000	0.00000	0.0003	2864
	0.7							
D15 Return period with existing pollution reduction measures	0.00024	0.00000	0.00000	0.00000	0.00000	0.00000	0.0002	4091
D16 Proposed measures factor	0.6							
D17 Residual with proposed Pollution reduction measures	0.00015	0.00000	0.00000	0.00000	0.00000	0.00000	0.0001	6819
				•				-
Justification for choice of existing measures factors:			Justification for cl	oice of proposed me	easures factors:			
Existing road drainage to unlined ditch			Grass channel wit	n online soakaways				
			,-					



<u>User Parameters – Defaults and Ranges</u>

A303 Western portal

Spillage Risk Parameters

S S	\ I		Remote (response time to site > 1 hour)
Surface watercourse	0.45	0.60	0.75
Groundwater	0.45	0.60	0.75

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