A303 Amesbury to Berwick Down

TR010025

Volume 6

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. NVC Dependency Level on Groundwater 3	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. NVC Dependency Level on Groundwater 2	Regionally significant populations of globally threatened or endangered species, Species important to GWDTE functioning, such as predator or prey species. NVC Dependency Level on Groundwater 1
Habitat As per International Natura 2000 codes Annex I and II and National SSSI Eleven 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 • Wet heath • Peat bog and woodland on peat bog, • Wetland directly irrigated by spring or seepage • Swamp (mesotrophic) and reed bed • Swamp (oligotrophic) • Wet woodland	Sites of local biodiversity value but not intact, fragile or unique. Habitats that recover quickly following disturbance (i.e. habitats comprising marine species that readily recolonise disturbed areas).	Habitats that are suffering significant decline at a national or regional level. Habitats of high species number or habitat diversity or 'naturalness'. Habitats that are capable of unassisted recovery to natural conditions following disturbance, although this may require several years (habitats where growing conditions are favourable)	Sites designated for protection at national (SSSI) or international level (Natura 2000). Broad categories grouped by the UKTAG WTT Habitats recognised as intact or unique or areas recognised by non-governmental organisations as having high environmental value. Habitats that are unlikely to return to natural conditions without some intervention, but which are capable of assisted recovery.

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 flow from a deeper groundwater body to the near surface deposits	Qualitative identification of change in relative elevations of groundwater within the groundwater body and the GWDTE Qualitative determination of potential change in soil hydraulic properties and saturation related to groundwater level and flow
	Soil saturation/ soil moisture		
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.

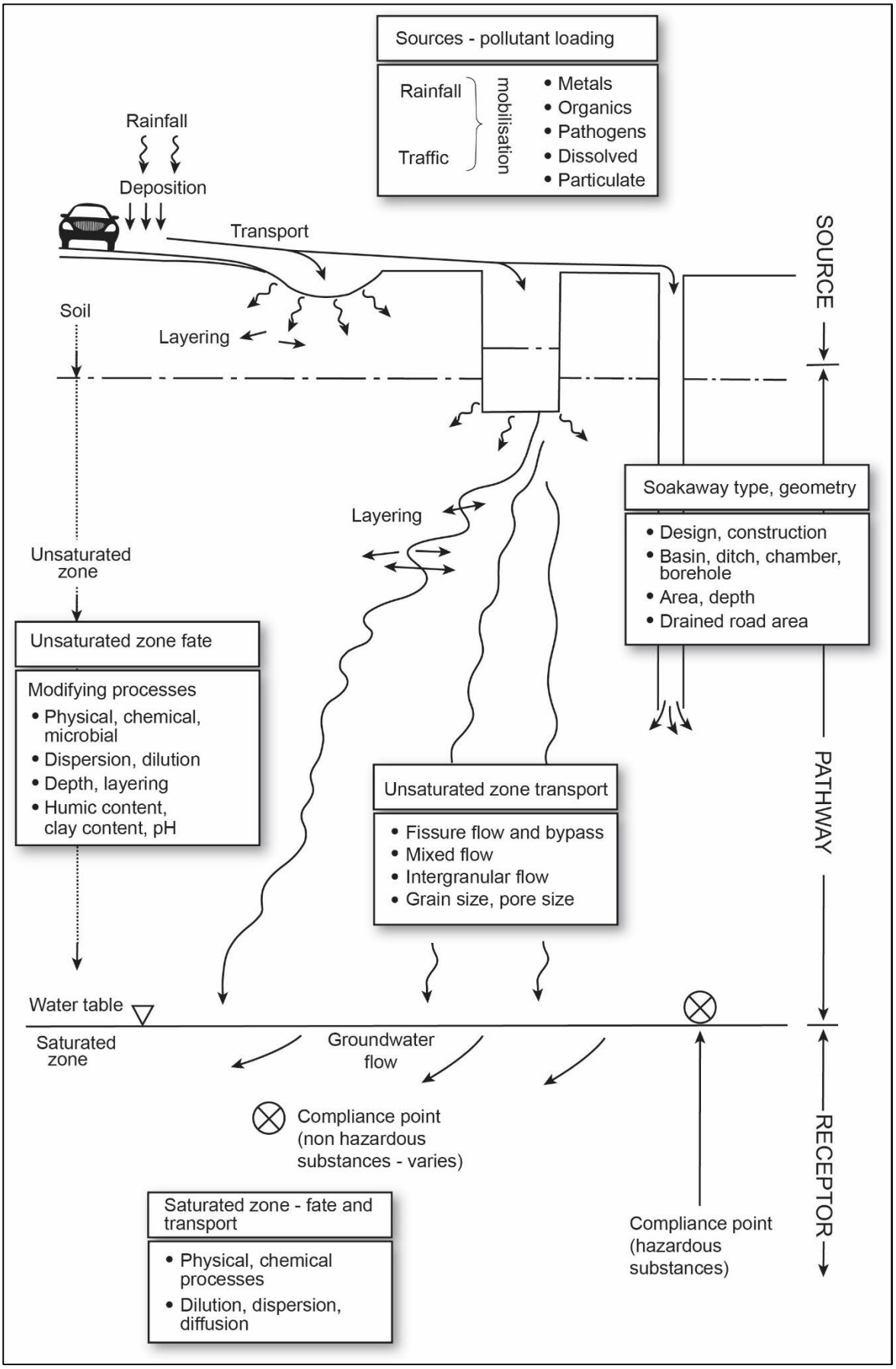

Figure C.1 Schematic of source, transport and fate of road runoff

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)
SOURCE	Traffic flow	10	≤50,000 AADT	>50,000 AADT to <100,000 AADT	≥100,000 AADT
	Rainfall depth (annual averages)	10	≤740 mm	>740 mm to <1060 mm	≥1060 mm
	Drainage area ratio	10	≤50	>50 to <150	≥150
PATHWAY	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
	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:

1. 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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APFP Regulation 5(2)(a)

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October 2018

Highways England Water Risk Assessment Tool Version 2.0.3 November 2016

Soluble

EQS – Annual Average Concentration

	Copper	Zinc	
Step 2	1.01 Tier 1 fail. Go to Tier 2 (using UK TAG M-BAT tool), or Step 3 mitigation.	0.01	ug/l
Step 3	-	-	ug/l

Acute Impact

Copper	Zinc
Pass	Pass

Sediment - Chronic Impact

Alert. Protected Area.

Sediment deposition for this site is judged as:

Accumulating?	No	0.11	Low flow Vel m/s
Extensive?	No	-	Deposition Index

Road number	A303 T		HE Area / DBFO number		Area 2	
Assessment type	Cumulative assessment including sediments (outfalls within 100m)					
OS grid reference of assessment point (m)	Easting	415132	Northing	141936		
OS grid reference of outfall structure (m)	Easting	415209	Northing	141949		
Outfall number	SU1541_2098a.1		List of outfalls in cumulative assessment	SU1542_4700b.1	SU1541_5099a.1	SU1542.7505a.1
Receiving watercourse	River Avon					
EA receiving water Detailed River Network ID	eaew1001000000179934		Assessor and affiliation		Bernadine Maguire	
Date of assessment	20/06/2018		Version of assessment		Final	
Notes	Existing catchment outfalls: SU1541_2098a.1 - west of Countess Roundabout; SU1542_4700b.1 - immediately east of Countess Roundabout; and SU1541_5099a.1 & SU1542.7505a.1 - immediately west of existing River Avon road bridge.					

Step 1 Runoff Quality

AADT: >10,000 and <50,000 | Climatic region: Warm Wet | Rainfall site: Southampton (SAAR 820mm)

Step 2 River Impacts

(Enter zero in Annual Q_{95} river flow box to assess Step 1 runoff quality only)

Annual Q_{95} river flow (m^3/s)	1.127
Impermeable road area drained (ha)	2.855
Permeable area draining to outfall (ha)	5.67
Base Flow Index (BFI)	0.91

Freshwater EQS limits:

Bioavailable dissolved copper (µg/l)	1
Bioavailable dissolved zinc (µg/l)	10.9

Is the discharge in or within 1 km upstream of a protected site for conservation? Yes

For dissolved zinc only Water hardness: Medium = 50-200 CaCO3/l

For dissolved copper only Ambient background concentration (µg/l): 0.99

For sediment impact only Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? No

Tier 1 – Estimated river width (m): 15

Tier 2 – Bed width (m): 3 | Manning's n: 0.07 | Side slope (m/m): 0.5 | Long slope (m/m): 0.0001

Step 3 Mitigation

	Brief description	Estimated effectiveness: Treatment for solubles (%)	Attenuation for solubles - restricted discharge rate (l/s)	Settlement of sediments (%)
Existing measures	Unlined ditches	0	No restriction	0
Proposed measures		0	No restriction	0

User parameters A303 Amesbury to Berwick Down Baseline Surface Water Quality Assessment

Location Details

Road Number	A303T		**Assessment type**			Cumulative assessment including sediments (outfalls within 100m)	
HE Area/DBFO number	Area 2						
OS grid reference of assessment point (m)	**Easting**	415132	**Receiving watercourse**			River Avon	
	Northing	141936	**EA receiving water Detailed River Network ID**			eaew1001000000179934	
OS grid reference of outfall structure (m)	**Easting**	415209	**Assessor and affiliation**			Bernadine Maguire	
	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			
Notes	Existing catchment outfalls: SU1541_2098a.1 - west of Countess Roundabout; SU1542_4700b.1 - immediately east of Countess Roundabout; and SU1541_5099a.1 & SU1542.7505a.1 - immediately west of existing River Avon road bridge.						

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)***		
Q95 River flow	m3/s	0	***1.127***		
Baseflow Index	-	0.5	***0.91***		
Impermeable road area drained	ha	1	***2.655***		
Permeable area draining to outfall	ha	0	***5.67***		
Is the discharge in or within 1 km upstream of a protected site for conservation?	-	No	***Yes***		
Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge?	-	No	***No***		
Hardness	-	Low = <50mg CaCO3/l	***Medium = 50-200 CaCO3/l***		
Use Tier 1	-	TRUE	***TRUE***		
Use Tier 2	-	FALSE	***FALSE***		
Tier 1 Estimated river width at Q95	0	5	***15***		
Tier2 Bed width	m	3	***3***		
Tier2 Side slope	m/m	0.5	***0.5***		
Tier2 Long slope	m/m	0.0001	***0.0001***		
Tier2 Mannings' n	-	0.07	***0.07***		
Existing treatment for solubles	%	0	***0***	***Description for existing measures***	Unlined ditches
Existing attenuation -restricted discharge rate	l/s	No restriction	***No restriction***		
Existing settlement of sediments	%	0	***0***		
Proposed treatment for solubles	%	0	***0***	***Description for proposed measures***	
Proposed attenuation -restricted discharge rate	l/s	No restriction	***No restriction***		
Proposed settlement of sediments	%	0	***0***		
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	-	-			
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/109HGVkm/year	-			
Existing measures factor	-	-			
Proposed measures factor	-	-			
B					
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/109HGVkm/year	-			
Existing measures factor	-	-			
Proposed measures factor	-	-			
C					
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/109HGVkm/year	-			
Existing measures factor	-	-			
Proposed measures factor	-	-			
D					
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/109HGVkm/year	-			
Existing measures factor	-	-			
Proposed measures factor	-	-			
E					
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/109HGVkm/year	-		
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/109HGVkm/year	-		
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	-	-		

Summary of predictions

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

A303 Amesbury to Berwick Down Baseline Surface Water Quality Assessment

In Runoff

		Step 1 Copper	*Step 1* Zinc	Copper	Zinc	Cadmium	Total PAH	Pyrene	Fluoranthene	Anthracene	Phenanthrene
		RST24						Toxicity Threshold			
Allowable Exceedances/year		1	1	1	1	1	1	1	1	1	1
No. of exceedances/year		**67.90**	**62.20**	**75.30**	**98.00**	**1.50**	**17.00**	**56.00**	**17.00**	**14.80**	**31.10**
No. of exceedances/worst year		89	75	99	120	4	25	71	25	22	39
		RST6									
Allowable Exceedances/year		1	1								
No. of exceedances/year		**21.70**	**25.30**								
No. of exceedances/worst year		28	29								
		(ug/l)	*(ug/l)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(ug/kg)*	*(ug/kg)*	*(ug/kg)*	*(ug/kg)*	*(ug/kg)*
Thresholds	*RST24*	21	92	*Toxicity Threshold* 197	315	3.5	16770	875	2355	245	515
Thresholds	*RST6*	42	184								
Event Statistics Mean		27.32	84.71	349	1168	1	11065	1914	1837	117	518
90%ile		52.94	172.88	786	2781	1	28184	4876	4679	299	1319
95%ile		68.76	255.14	968	3569	2	56234	9729	9335	596	2632
99%ile		113.86	446.19	1501	5477	4	112202	19411	18626	1189	5251

In River (no mitigation)

		Step 2 Copper	*Step 2* Zinc
		RST24	
Allowable Exceedances/year		1	1
No. of exceedances/year		**0**	**0**
No. of exceedances/worst year		0	0
No. of exceedances/summer		0	0
No. of exceedances/worst summer		0	0
		RST6	
Allowable Exceedances/year		0.5	0.5
No. of exceedances/year		**0**	**0**
No. of exceedances/worst year		0	0
No. of exceedances/summer		0	0
No. of exceedances/worst summer		0	0
Annual average concentration (ug/l)		1.01	0.01
		(ug/l)	*(ug/l)*
Thresholds	*RST24*	21	92
Thresholds	*RST6*	42	184
Event Statistics Mean		0.01	0.02
90%ile		0.02	0.06
95%ile		0.04	0.10
99%ile		0.12	0.33

Velocity 0.11 m/s — Tier 1 is used for the calculation

DI -

needed - %

In River (with mitigation)

		Step 3 Copper	*Step 3* Zinc
		RST24	
Allowable Exceedances/year		1	1
No. of exceedances/year		**-**	**-**
No. of exceedances/worst year		-	-
No. of exceedances/summer		-	-
No. of exceedances/worst summer		-	-
		RST6	
Allowable Exceedances/year		0.5	0.5
No. of exceedances/year		**-**	**-**
No. of exceedances/worst year		-	-
No. of exceedances/summer		-	-
No. of exceedances/worst summer		-	-
Annual average concentration (ug/l)		-	-
		(ug/l)	*(ug/l)*
Thresholds hresholds	*RST24*	21	92
Thresholds	*RST6*	42	184
Event Statistics Mean		-	-
90%ile		-	-
95%ile		-	-
99%ile		-	-

DI -

Details of the chosen rainfall site

SAAR (mm)	**820**
Altitude (m)	**25**
Easting	**3561**
Northing	**1754**
Coastal distance (km)	**10**

Highways England Water Risk Assessment Tool Version 2.0.3 November 2016

Soluble

EQS – Annual Average Concentration

	Copper	Zinc	
Step 2	1.01 Tier 1 fail. Go to Tier 2 (using UK TAG M-BAT tool), or Step 3 mitigation.	0.01	ug/l
Step 3	0.99	0.01	ug/l

Acute Impact

Copper	Zinc
Pass	Pass

Sediment – Chronic Impact

Alert. Protected Area.

Sediment deposition for this site is judged as:

Accumulating?	No	0.11	Low flow Vel m/s
Extensive?	No	–	Deposition Index

Road number	A303T		HE Area / DBFO number		Area 2	
Assessment type	Cumulative assessment including sediments (outfalls within 100m)					
OS grid reference of assessment point (m)	Easting	415132	Northing	141936		
OS grid reference of outfall structure (m)	Easting	415209	Northing	141949		
Outfall number	Downstream outfall not identified as asset on		List of outfalls in cumulative assessment	SU1542_4700b.1	SU1541_5099a.1	SU1542.7505a.1
Receiving watercourse	River Avon			SU1541_2098a.1		
EA receiving water Detailed River Network ID	eaew1001000000179934		Assessor and affiliation		Bernadine Maguire	
Date of assessment	20/06/2018		Version of assessment		Final	
Notes	Outfall not identified - catchment 13, SU1541_2098a.1 - catchment 12, 14, 15 & 16, SU1541_5099a.1 - catchment 17 & 18, SU1542.7505a.1 - catchment 19 & 20					

Step 1 Runoff Quality

AADT: >10,000 and <50,000 | Climatic region: Warm Wet | Rainfall site: Southampton (SAAR 820mm)

Step 2 River Impacts

(Enter zero in Annual Q_{95} river flow box to assess Step 1 runoff quality only)

Annual Q_{95} river flow (m^3/s)	1.127
Impermeable road area drained (ha)	5.855
Permeable area draining to outfall (ha)	4.577
Base Flow Index (BFI)	0.91

Freshwater EQS limits:

Bioavailable dissolved copper (µg/l)	1
Bioavailable dissolved zinc (µg/l)	10.9

Is the discharge in or within 1 km upstream of a protected site for conservation? Yes

For dissolved zinc only Water hardness: Medium = 50-200 CaCO3/l

For dissolved copper only Ambient background concentration (µg/l): 0.99

For sediment impact only Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge? No

Tier 1 Estimated river width (m): 15

Tier 2 Bed width (m): 3 Manning's n: 0.07 Side slope (m/m): 0.5 Long slope (m/m): 0.0001

Step 3 Mitigation

	Brief description	Estimated effectiveness: Treatment for solubles (%)	Attenuation for solubles - restricted discharge rate (l/s)	Settlement of sediments (%)
Existing measures	Unlined ditches	0	No restriction	0
Proposed measures	Ponds planted with reeds	25	No restriction	25

User parameters A303 Amesbury to Berwick Down Scheme Surface Water Quality Assessment

Location Details

Road Number	A303T		**Assessment type**			Cumulative assessment including sediments (outfalls within 100m)	
HE Area/DBFO number	Area 2						
OS grid reference of assessment point (m)	**Easting**	415132	**Receiving watercourse**			River Avon	
	Northing	141936	**EA receiving water Detailed River Network ID**			eaew1001000000179934	
OS grid reference of outfall structure (m)	**Easting**	415209	**Assessor and affiliation**			Bernadine Maguire	
	Northing	141949	**Date of assessment**			20/06/2018	
Outfall number	Downstream outfall not identified as asset on HADDMS		**Version of assessment**			Final	
List of outfalls in cumulative assessment	SU1541_2098a.1		SU1541_5099a.1 SU1542_4700b.1	SU1542.7505a.1	SU1542.7505a.1		
Notes	Outfall not identified - catchment 13, SU1541_2098a.1 - catchment 12, 14, 15 & 16, SU1541_5099a.1 - catchment 17 & 18, SU1542.7505a.1 - catchment 19 & 20						

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)***		
Q95 River flow	m3/s	0	***1.127***		
Baseflow Index	-	0.5	***0.91***		
Impermeable road area drained	ha	1	***5.655***		
Permeable area draining to outfall	ha	0	***4.577***		
Is the discharge in or within 1 km upstream of a protected site for conservation?	-	No	***Yes***		
Is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge?	-	No	***No***		
Hardness	-	Low = <50mg CaCO3/l	***Medium = 50-200 CaCO3/l***		
Use Tier 1	-	TRUE	***TRUE***		
Use Tier 2	-	FALSE	***FALSE***		
Tier 1 Estimated river width at Q95	0	5	***15***		
Tier2 Bed width	m	3	***3***		
Tier2 Side slope	m/m	0.5	***0.5***		
Tier2 Long slope	m/m	0.0001	***0.0001***		
Tier2 Mannings' n	-	0.07	***0.07***		
Existing treatment for solubles	%	0	***0***	***Description for existing measures***	Unlined ditches
Existing attenuation -restricted discharge rate	l/s	No restriction	***No restriction***		
Existing settlement of sediments	%	0	***0***		
Proposed treatment for solubles	%	0	***25***	***Description for proposed measures***	Ponds planted with reeds
Proposed attenuation -restricted discharge rate	l/s	No restriction	***No restriction***		
Proposed settlement of sediments	%	0	***25***		
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	-	-	***Surface watercourse***	Catchment 13	
Length of road draining to outfall	m	-	***510***		
Road Type (A-road or Motorway)	-	-	***A***		
If A road, is site urban or rural?	-	-	***Urban***		
Junction type	-	-	***No junction***		
Location	-	-	***< 20 minutes***		
Traffic flow (AADT two way)	-	-	***18442***		
% HGV	-	-	***8***		
Spillage factor	no/109HGVkm/year	-	***0.36***		
Existing measures factor	-	-	***0.7***		
Proposed measures factor	-	-	***1***		
B					
Water body type	-	-	***Surface watercourse***	Catchments 12, 14, 15 & 16	
Length of road draining to outfall	m	-	***2201***		
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/109HGVkm/year	-	***0.36***		
Existing measures factor	-	-	***0.7***		
Proposed measures factor	-	-	***0.5***		
C					
Water body type	-	-	***Surface watercourse***	Catchments 17 & 18	
Length of road draining to outfall	m	-	***1033***		
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/109HGVkm/year	-	***0.36***		
Existing measures factor	-	-	***0.7***		
Proposed measures factor	-	-	***0.5***		
D					
Water body type	-	-	***Surface watercourse***	Catchments 19 & 20	
Length of road draining to outfall	m	-	***1111***		
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/109HGVkm/year	-	***0.7***		
Existing measures factor	-	-	***0.5***		
Proposed measures factor	-	-	***0.45***		
E					
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/109HGVkm/year	-		
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/109HGVkm/year	-		
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)	-	-		
Unsaturated Zone Clay Content	-	-		
Organic Carbon	-	-		
Unsaturated zone soil pH	-	-		

Summary of predictions

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

A303 Amesbury to Berwick Down Scheme Surface Water Quality Assessment

In Runoff

	Step 1 Copper	Step 1 Zinc	Step 1 Copper	Step 1 Zinc	Step 1 Cadmium	Step 1 Total PAH	Step 1 Pyrene	Step 1 Fluoranthene	Step 1 Anthracene	Step 1 Phenanthrene
	RST24		Toxicity Threshold							
Allowable Exceedances/year	1	1	1	1	1	1	1	1	1	1
No. of exceedances/year	**67.90**	**62.20**	**75.30**	**98.00**	**1.50**	**17.00**	**56.00**	**17.00**	**14.80**	**31.10**
No. of exceedances/worst year	89	75	99	120	4	25	71	25	22	39
	RST6									
Allowable Exceedances/year	1	1								
No. of exceedances/year	**21.70**	**25.30**								
No. of exceedances/worst year	28	29								
	(ug/l)	*(ug/l)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(ug/kg)*	*(ug/kg)*	*(ug/kg)*	*(ug/kg)*	*(ug/kg)*
Thresholds RST24	21	92	***Toxicity Threshold*** 197	315	3.5	16770	875	2355	245	515
Thresholds RST6	42	184								
Event Statistics Mean	27.32	84.71	349	1168	1	11065	1914	1837	117	518
90%ile	52.94	172.88	786	2781	1	28184	4876	4679	299	1319
95%ile	68.76	255.14	968	3569	2	56234	9729	9335	596	2632
99%ile	113.86	446.19	1501	5477	4	112202	19411	18626	1189	5251

In River (no mitigation)

	Step 2 Copper	Step 2 Zinc
	RST24	
Allowable Exceedances/year	1	1
No. of exceedances/year	**0**	**0**
No. of exceedances/worst year	0	0
No. of exceedances/summer	0	0
No. of exceedances/worst summer	0	0
	RST6	
Allowable Exceedances/year	0.5	0.5
No. of exceedances/year	**0**	**0**
No. of exceedances/worst year	0	0
No. of exceedances/summer	0	0
No. of exceedances/worst summer	0	0
Annual average concentration (ug/l)	1.01	0.01
	(ug/l)	*(ug/l)*
Thresholds RST24	21	92
Thresholds RST6	42	184
Event Statistics Mean	0.02	0.05
90%ile	0.04	0.12
95%ile	0.08	0.22
99%ile	0.25	0.70

Velocity 0.11 m/s — Tier 1 is used for the calculation

DI -

needed - %

In River (with mitigation)

	Step 3 Copper	Step 3 Zinc
	RST24	
Allowable Exceedances/year	1	1
No. of exceedances/year	**0.00**	**0.00**
No. of exceedances/worst year	0	0
No. of exceedances/summer	0	0
No. of exceedances/worst summer	0	0
	RST6	
Allowable Exceedances/year	0.5	0.5
No. of exceedances/year	**0.00**	**0.00**
No. of exceedances/worst year	0	0
No. of exceedances/summer	0	0
No. of exceedances/worst summer	0	0
Annual average concentration (ug/l)	0.99	0.01
	(ug/l)	*(ug/l)*
Thresholds hresholds RST24	21	92
Thresholds RST6	42	184
Event Statistics Mean	0.01	0.04
90%ile	0.03	0.09
95%ile	0.06	0.16
99%ile	0.19	0.53

DI -

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

Metal Bioavailability Assessment

INPUT DATA											RESULTS (Copper)				RESULTS (Zinc)				RESULTS (Mn)				RESULTS (Ni)			
ID	Location	Waterbody	Date	Measured Cu Concentration (dissolved) (µg l^{-1})	Measured Zn Concentration (dissolved) (µg l^{-1})	Measured Mn Concentration (dissolved) (µg l^{-1})	Measured Ni Concentration (dissolved) (µg l^{-1})	pH	DOC	Ca	Site-specific PNEC Dissolved Copper (µg l^{-1})	BioF	Bioavailable Copper Concentration (µg l^{-1})	Risk Characterisation Ratio	Site-specific PNEC Dissolved Zinc (µg l^{-1})	BioF	Bioavailable Zinc Concentration (µg l^{-1})	Risk Characterisation Ratio	Site-specific PNEC Dissolved Manganese (µg l^{-1})	BioF	Bioavailable Manganese Concentration (µg l^{-1})	Risk Characterisation Ratio	Site-specific PNEC Dissolved Nickel (µg l^{-1})	BioF	Bioavailable Nickel Concentration (µg l^{-1})	Risk Characterisation 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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Assessment of Priority Outfalls

Method D - assessment of risk from accidental spillage

			Additional columns for use if other roads drain to the same outfall						
		A (main road)	B	C	D	E	F		
D1	Water body type	Surface watercourse	Surface watercourse	Surface watercourse	Surface watercourse				
D2	Length of road draining to outfall (m)	510	2,201	1,033	1,111				
D3	Road Type (A-road or Motorway)	A	A	A	A				
D4	If A road, is site urban or rural?	Urban	Urban	Urban	Urban				
D5	Junction type	No junction	Slip road	Slip road	Slip road				
D6	Location (response time for emergency services)	< 20 minutes	< 20 minutes	< 20 minutes	< 20 minutes				
D7	Traffic flow (AADT two way)	18,442	36,799	45,686	45,686				
D8	% HGV	8	16	15	15				
D8	Spillage factor (no/109HGVkm/year)	0.36	0.36	0.36	0.36				
D9	Risk of accidental spillage	0.00010	0.00170	0.00093	0.00100	0.00000	0.00000		
D10	Probability factor	0.45	0.45	0.45	0.45				
D11	Risk of pollution incident	0.00004	0.00077	0.00042	0.00045	0.00000	0.00000		
D12	Is risk greater than 0.01?	**No**	**No**	**No**	**No**			**Totals**	**Return Period (years)**
D13	Return period without pollution reduction measures	0.00004	0.00077	0.00042	0.00045	0.00000	0.00000	0.0017	595
D14	Existing measures factor	0.7	0.7	0.7	0.7				
D15	Return period with existing pollution reduction measures	0.00003	0.00054	0.00029	0.00032	0.00000	0.00000	0.0012	851
D16	Proposed measures factor	1	0.5	0.5	0.5				
D17	Residual with proposed Pollution reduction measures	0.00003	0.00027	0.00015	0.00016	0.00000	0.00000	0.0006	1657

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

The worksheet should be read in conjunction with DMRB 11.3.10.

User Parameters – Defaults and Ranges

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
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/l		
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)	-		-	-	-
If A road, is site urban or rural?	-		-	-	-
Junction type	-		-	-	-
Location	-		-	-	-
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/l	Medium = 50-200 CaCO3/l	High = >200mg CaCO3/l
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 exceedances allowed per year		Traffic light assessment	
	>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 allowed in 1 year	Copper	Zinc	Cadmium	Total PAH	Pyrene	Fluoranthene	Anthracene	Phenanthrene
	1	1	1	1	1	1	1	1

Threshold mean velocity Vt: 0.1 m/s

Deposition Index (DI) threshold: 100

Other Parameters

Summer period (inclusive)

Summer Start Month	4	Summer End Month	9

Runoff calculation assumptions

Rainfall Initial Loss	1	mm

Concentrations in upstream river (for runoff impact assessments)

Dissolved copper	0	ug/l
Dissolved zinc	0	ug/l

Concentrations in upstream river (for annual average concentration calc)			Min	Max
Dissolved copper	0	ug/l	0	50
Dissolved zinc	0	ug/l		

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 - All***	***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 ± 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 to site < 20 min)	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 Amesbury to Berwick Down

TR010025

6.3 Environmental Statement Appendices

Appendix 11.1 Annex 2b Groundwater Assessment Results

Volume 6

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	SOURCE	10	Traffic flow	<=50,000 AADT	1	10
2		10	Rainfall depth (annual averages)	>740 to <1060 mm rainfall	2	20
3		10	Drainage area ratio	<=50	1	10
4	PATHWAY	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		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	Medium

User parameters DTA1

Location Details

Road Number	A303		**Assessment type**	Non-cumulative assessment (single outfall)	
HE Area/DBFO number					
OS grid reference of assessment point (m)	**Easting**	406728	**Receiving watercourse**	Chalk Aquifer	
	Northing	141619	**EA receiving water Detailed River Network ID**	GB40801G806900	
OS grid reference of outfall structure (m)	**Easting**	406728	**Assessor and affiliation**	AmW	
	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				
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	-	***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=%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/109HGVkm/year	-	***0.29***	Rural trunk road
Existing measures factor	-	-	***0.7***	Unlined ditch
Proposed measures factor	-	-	***0.6***	Soakaway basin / infiltration 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)***	
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

DTA1

Assessment of Priority Outfalls

Method D - assessment of risk from accidental spillage

			Additional columns for use if other roads drain to the same outfall						
		A (main road)	B	C	D	E	F		
D1	Water body type	Groundwater							
D2	Length of road draining to outfall (m)	2,200							
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							
D9	Risk of accidental spillage	0.00121	0.00000	0.00000	0.00000	0.00000	0.00000		
D10	Probability factor	0.45	0.45	0.45					
D11	Risk of pollution incident	0.00054	0.00000	0.00000	0.00000	0.00000	0.00000		
D12	Is risk greater than 0.01?	**No**	**No**	**No**				**Totals**	**Return Period (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:

Existing road drainage to unlined ditch

Justification for choice of proposed measures factors:

Highway ditch drainaing past Blick mead and lined with proprietry treatment system

The worksheet 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

Receiving Water	Urban (response time to site < 20 min)	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	SOURCE	10	Traffic flow	<=50,000 AADT	1	10
2		10	Rainfall depth (annual averages)	>740 to <1060 mm rainfall	2	20
3		10	Drainage area ratio	<=50	1	10
4	PATHWAY	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		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

Location Details

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			
OS grid reference of outfall structure (m)	**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								
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	-	***1190***	
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=%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/109HGVkm/year	-	***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	-	-	***<=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 (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

DTA2

Assessment of Priority Outfalls

Method D - assessment of risk from accidental spillage

			Additional columns for use if other roads drain to the same outfall						
		A (main road)	B	C	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							
D9	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		
D12	Is risk greater than 0.01?	**No**	**No**	**No**				**Totals**	**Return Period (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
D16	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:

Existing road drainage to unlined ditch

Justification for choice of proposed measures factors:

Grass channel with online soakaways

The worksheet should be read in conjunction with DMRB 11.3.10.

User Parameters – Defaults and Ranges
DTA2

Spillage Risk Parameters

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

Receiving Water	Urban (response time to site < 20 min)	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

DTA3

Groundwater Assessment

Component Number		Weighting Factor	Property or Parameter	Risk Score	Component score	Weighted component score
1	SOURCE	10	Traffic flow	<=50,000 AADT	1	10
2		10	Rainfall depth (annual averages)	>740 to <1060 mm rainfall	2	20
3		10	Drainage area ratio	<=50	1	10
4	PATHWAY	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		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 DTA3

Location Details

Road Number	A303		**Assessment type**	Non-cumulative assessment (single outfall)				
HE Area/DBFO number								
OS grid reference of assessment point (m)	**Easting**	407959	**Receiving watercourse**	Chalk aquifer				
	Northing	141369	**EA receiving water Detailed River Network ID**	GB40801G806900				
OS grid reference of outfall structure (m)	**Easting**	407959	**Assessor and affiliation**	AmW				
	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				
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)	-	-	***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=%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/109HGVkm/year	-	***0.29***	Rural trunk road no junction
Existing measures factor	-	-	***0.7***	Unlined ditch
Proposed measures factor	-	-	***0.6***	Soakaway basin / infiltration 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)***	
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

DTA3

Assessment of Priority Outfalls

Method D - assessment of risk from accidental spillage

			Additional columns for use if other roads drain to the same outfall						
		A (main road)	B	C	D	E	F		
D1	Water body type	Groundwater							
D2	Length of road draining to outfall (m)	815							
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							
D9	Risk of accidental spillage	0.00045	0.00000	0.00000	0.00000	0.00000	0.00000		
D10	Probability factor	0.45							
D11	Risk of pollution incident	0.00020	0.00000	0.00000	0.00000	0.00000	0.00000		
D12	Is risk greater than 0.01?	**No**						**Totals**	**Return Period (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
D16	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:

Existing road drainage to unlined ditch

Justification for choice of proposed measures factors:

Grass channel with online soakaways

The worksheet should be read in conjunction with DMRB 11.3.10.

User Parameters – Defaults and Ranges

Spillage Risk Parameters

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

Receiving Water	Urban (response time to site < 20 min)	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		Weighting Factor	Property or Parameter	Risk Score	Component score	Weighted component score
1	SOURCE	10	Traffic flow	<=50,000 AADT	1	10
2		10	Rainfall depth (annual averages)	>740 to <1060 mm rainfall	2	20
3		10	Drainage area ratio	<=50	1	10
4	PATHWAY	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		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 DTA4

Location Details

Road Number	A303		**Assessment type**	Non-cumulative assessment (single outfall)	
HE Area/DBFO number					
OS grid reference of assessment point (m)	**Easting**	408336	**Receiving watercourse**	Chalk aquifer	
	Northing	141589	**EA receiving water Detailed River Network ID**	GB40801G806900	
OS grid reference of outfall structure (m)	**Easting**	408336	**Assessor and affiliation**	AmW	
	Northing	141589	**Date of assessment**	18/05/2018	
Outfall number	DTA4		**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	-	***1035***	
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=%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/109HGVkm/year	-	***0.29***	Rural trunk road
Existing measures factor	-	-	***0.7***	Unlined ditch
Proposed measures factor	-	-	***0.6***	Soakaway basin / infiltration 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)***	
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

DTA4

Assessment of Priority Outfalls

Method D - assessment of risk from accidental spillage

			Additional columns for use if other roads drain to the same outfall						
		A (main road)	B	C	D	E	F		
D1	Water body type	Groundwater							
D2	Length of road draining to outfall (m)	1,035							
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							
D9	Risk of accidental spillage	0.00057	0.00000	0.00000	0.00000	0.00000	0.00000		
D10	Probability factor	0.45							
D11	Risk of pollution incident	0.00026	0.00000	0.00000	0.00000	0.00000	0.00000		
D12	Is risk greater than 0.01?	**No**						**Totals**	**Return Period (years)**
D13	Return period without pollution reduction measures	0.00026	0.00000	0.00000	0.00000	0.00000	0.00000	0.0003	3906
D14	Existing measures factor	0.7							
D15	Return period with existing pollution reduction measures	0.00018	0.00000	0.00000	0.00000	0.00000	0.00000	0.0002	5580
D16	Proposed measures factor	0.6							
D17	Residual with proposed Pollution reduction measures	0.00011	0.00000	0.00000	0.00000	0.00000	0.00000	0.0001	9300

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

The worksheet should be read in conjunction with DMRB 11.3.10.

User Parameters – Defaults and Ranges

Spillage Risk Parameters

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

Receiving Water	Urban (response time to site < 20 min)	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

DTA5

Groundwater Assessment

Component Number		Weighting Factor	Property or Parameter	Risk Score	Component score	Weighted component score
1	SOURCE	10	Traffic flow	<=50,000 AADT	1	10
2		10	Rainfall depth (annual averages)	>740 to <1060 mm rainfall	2	20
3		10	Drainage area ratio	<=50	1	10
4	PATHWAY	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		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

User parameters DTA5

Location Details

Road Number	A303		**Assessment type**	Non-cumulative assessment (single outfall)	
HE Area/DBFO number					
OS grid reference of assessment point (m)	**Easting**	408906	**Receiving watercourse**	Chalk aquifer	
	Northing	141216	**EA receiving water Detailed River Network ID**	GB40801G806900	
OS grid reference of outfall structure (m)	**Easting**	408906	**Assessor and affiliation**	AmW	
	Northing	141216	**Date of assessment**	18/05/2018	
Outfall number	DTA5		**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	-	***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://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/109HGVkm/year	-	***0.29***	Rural trunk road
Existing measures factor	-	-	***0.7***	Unlined ditch
Proposed measures factor	-	-	***0.6***	Soakaway basin / infiltration basin
B				
Water body type	-	-	***Groundwater***	
Length of road draining to outfall	m	-	***180***	
Road Type (A-road or Motorway)	-	-	***A***	
If A road, is site urban or rural?	-	-	***Rural***	
Junction type	-	-	***Roundabout***	
Location	-	-	***< 20 minutes***	
Traffic flow (AADT two way)	-	-	***36799***	
% HGV	-	-	***16***	
Spillage factor	no/109HGVkm/year	-	***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)	-	-	***A***	
If A road, is site urban or rural?	-	-	***Rural***	
Junction type	-	-	***Slip road***	
Location	-	-	***< 20 minutes***	
Traffic flow (AADT two way)	-	-	***36799***	
% HGV	-	-	***16***	
Spillage factor	no/109HGVkm/year	-	***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	-	-	***Depth to water table >=15 m***	
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)***	
Unsaturated Zone Clay Content	-	-	***<=1% clay minerals***	
Organic Carbon	-	-	***<=1% SOM***	
Unsaturated zone soil pH	-	-	***pH <=5***	

DTA5

Assessment of Priority Outfalls

Method D - assessment of risk from accidental spillage

		A (main road)	B	C	D	E	F	Totals	Return Period (years)
		Additional columns for use if other roads drain to the same outfall							
D1	Water body type	Groundwater	Groundwater	Groundwater					
D2	Length of road draining to outfall (m)	715	180	1,265					
D3	Road Type (A-road or Motorway)	A	A	A					
D4	If A road, is site urban or rural?	Rural	Rural	Rural					
D5	Junction type	No junction	Roundabout	Slip road					
D6	Location (response time for emergency services)	< 20 minutes	< 20 minutes	< 20 minutes					
D7	Traffic flow (AADT two way)	36,799	36,799	36,799					
D8	% HGV	16	16	16					
D8	Spillage factor (no/109HGVkm/year)	0.29	3.09	0.83					
D9	Risk of accidental spillage	0.00045	0.00120	0.00226	0.00000	0.00000	0.00000		
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		
D12	Is risk greater than 0.01?	**No**	**No**	**No**					
D13	Return period without pollution reduction measures	0.00020	0.00054	0.00102	0.00000	0.00000	0.00000	0.0018	570
D14	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
D16	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:

Existing road drainage to unlined ditch

Justification for choice of proposed measures factors:

Grass channel with online soakaways

The worksheet should be read in conjunction with DMRB 11.3.10.

User Parameters – Defaults and Ranges

DTA5

Spillage Risk Parameters

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

Receiving Water	Urban (response time to site < 20 min)	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 Eastern portal

Groundwater Assessment

Component Number		Weighting Factor	Property or Parameter	Risk Score	Component score	Weighted component score
1	SOURCE	10	Traffic flow	<=50,000 AADT	1	10
2		10	Rainfall depth (annual averages)	>740 to <1060 mm rainfall	2	20
3		10	Drainage area ratio	<=50	1	10
4	PATHWAY	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		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 Eastern portal

Location Details

Road Number	A303		**Assessment type**		Non-cumulative assessment (single outfall)			
HE Area/DBFO number								
OS grid reference of assessment point (m)	**Easting**	414081	**Receiving watercourse**		Chalk aquifer			
	Northing	142112	**EA receiving water Detailed River Network ID**		GB40801G806900			
OS grid reference of outfall structure (m)	**Easting**	414081	**Assessor and affiliation**		AmW			
	Northing	142112	**Date of assessment**		18/05/2018			
Outfall number	Eastern 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	-	***270***	
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://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/109HGVkm/year	-	***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 crates
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 (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 Eastern portal

Assessment of Priority Outfalls

Method D - assessment of risk from accidental spillage

			Additional columns for use if other roads drain to the same outfall						
		A (main road)	B	C	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		
D12	Is risk greater than 0.01?	**No**	**No**	**No**				**Totals**	**Return Period (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:

Existing road drainage to unlined ditch

Justification for choice of proposed measures factors:

Grass channel with online soakaways

The worksheet should be read in conjunction with DMRB 11.3.10.

User Parameters – Defaults and Ranges

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

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

Receiving Water	Urban (response time to site < 20 min)	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 - Exsisting A303 drainage upgrade

Groundwater Assessment

Component Number		Weighting Factor	Property or Parameter	Risk Score	Component score	Weighted component score
1	SOURCE	10	Traffic flow	<=50,000 AADT	1	10
2		10	Rainfall depth (annual averages)	>740 to <1060 mm rainfall	2	20
3		10	Drainage area ratio	<=50	1	10
4	PATHWAY	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		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

Road Number	A303		**Assessment type**		Non-cumulative assessment (single outfall)			
HE Area/DBFO number								
OS grid reference of assessment point (m)	**Easting**	414343	**Receiving watercourse**		Chalk aquifer			
	Northing	142131	**EA receiving water Detailed River Network ID**		GB40801G806900			
OS grid reference of outfall structure (m)	**Easting**	414343	**Assessor and affiliation**		AmW			
	Northing	142131	**Date of assessment**		18/05/2018			
Outfall number	Existing A303 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	-	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	-	***510***	
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://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/109HGVkm/year	-	***0.29***	Rural trunk road
Existing measures factor	-	-	***0.7***	Unlined ditch
Proposed measures factor	-	-	***0.6***	Soakaway basin / infiltration 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 (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 - Exsisting A303 drainage upgrade

Assessment of Priority Outfalls

Method D - assessment of risk from accidental spillage

			Additional columns for use if other roads drain to the same outfall						
		A (main road)	B	C	D	E	F		
D1	Water body type	Groundwater							
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							
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	0.00032	0.00000	0.00000	0.00000	0.00000	0.00000		
D10	Probability factor	0.45							
D11	Risk of pollution incident	0.00014	0.00000	0.00000	0.00000	0.00000	0.00000		
D12	Is risk greater than 0.01?	**No**						**Totals**	**Return Period (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
D16	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:

Existing road drainage to unlined ditch

Justification for choice of proposed measures factors:

Highway ditch drainaing past Blick mead and lined with proprietry treatment system

The worksheet should be read in conjunction with DMRB 11.3.10.

User Parameters – Defaults and Ranges

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

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

Receiving Water	Urban (response time to site < 20 min)	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	Component score	Weighted component score
1	SOURCE	10	Traffic flow	<=50,000 AADT	1	10
2		10	Rainfall depth (annual averages)	>740 to <1060 mm rainfall	2	20
3		10	Drainage area ratio	<=50	1	10
4	PATHWAY	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		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

User parameters A303 - Link to Winterborne Stoke

Location Details

Road Number	A303		**Assessment type**	Non-cumulative assessment (single outfall)				
HE Area/DBFO number								
OS grid reference of assessment point (m)	**Easting**	409359	**Receiving watercourse**	Chalk aquifer				
	Northing	141120	**EA receiving water Detailed River Network ID**	GB40801G806900				
OS grid reference of outfall structure (m)	**Easting**	409359	**Assessor and affiliation**	AmW				
	Northing	141120	**Date of assessment**	18/05/2018				
Outfall number	Link to Winterborne Stoke		**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	-	***560***	
Road Type (A-road or Motorway)	-	-	***A***	
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-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-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/109HGVkm/year	-	***0.93***	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				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 (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 - Link to Winterborne Stoke

Assessment of Priority Outfalls

Method D - assessment of risk from accidental spillage

			Additional columns for use if other roads drain to the same outfall							
		A (main road)	B	C	D	E	F		
D1	Water body type	Groundwater							
D2	Length of road draining to outfall (m)	560							
D3	Road Type (A-road or Motorway)	A							
D4	If A road, is site urban or rural?	Rural							
D5	Junction type	Side road							
D6	Location (response time for emergency services)	< 20 minutes							
D7	Traffic flow (AADT two way)	12,407							
D8	% HGV	14							
D8	Spillage factor (no/109HGVkm/year)	0.93							
D9	Risk of accidental spillage	0.00033	0.00000	0.00000	0.00000	0.00000	0.00000		
D10	Probability factor	0.45							
D11	Risk of pollution incident	0.00015	0.00000	0.00000	0.00000	0.00000	0.00000		
D12	Is risk greater than 0.01?	**No**						**Totals**	**Return Period (years)**
D13	Return period without pollution reduction measures	0.00015	0.00000	0.00000	0.00000	0.00000	0.00000	0.0001	6730
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	9615
D16	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:

Existing road drainage to unlined ditch

Justification for choice of proposed measures factors:

Highway ditch drainaing past Blick mead and lined with proprietry treatment system

The worksheet 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

Receiving Water	Urban (response time to site < 20 min)	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 North

Groundwater Assessment

Component Number		Weighting Factor	Property or Parameter	Risk Score	Component score	Weighted component score
1	SOURCE	10	Traffic flow	<=50,000 AADT	1	10
2		10	Rainfall depth (annual averages)	>740 to <1060 mm rainfall	2	20
3		10	Drainage area ratio	<=50	1	10
4	PATHWAY	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		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	Medium

User parameters A303 - Realigned A360 North

Location Details

Road Number	A303		**Assessment type**	Non-cumulative assessment (single outfall)	
HE Area/DBFO number					
OS grid reference of assessment point (m)	**Easting**	409417	**Receiving watercourse**	Chalk aquifer	
	Northing	141442	**EA receiving water Detailed River Network ID**	GB40801G806900	
OS grid reference of outfall structure (m)	**Easting**	409417	**Assessor and affiliation**	AmW	
	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
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	-	***1055***	
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)	-	-	***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%7D&file=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=%7BB452BA30-0E52-418A-B2BA-926D8CE054A7%7D&file=DCO%20Traffic%20data%20for%20water%20assessments.xlsx&action=default
Spillage factor	no/109HGVkm/year	-	***0.29***	Rural trunk road roundabout
Existing measures factor	-	-	***0.7***	Unlined ditch
Proposed measures factor	-	-	***0.6***	Soakaway basin / infiltration 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 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 - Realigned A360 North

Assessment of Priority Outfalls

Method D - assessment of risk from accidental spillage

			Additional columns for use if other roads drain to the same outfall						
		A (main road)	B	C	D	E	F		
D1	Water body type	Groundwater							
D2	Length of road draining to outfall (m)	1,055							
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)	11,506							
D8	% HGV	11							
D8	Spillage factor (no/109HGVkm/year)	0.29							
D9	Risk of accidental spillage	0.00014	0.00000	0.00000	0.00000	0.00000	0.00000		
D10	Probability factor	0.45							
D11	Risk of pollution incident	0.00006	0.00000	0.00000	0.00000	0.00000	0.00000		
D12	Is risk greater than 0.01?	**No**						**Totals**	**Return Period (years)**
D13	Return period without pollution reduction measures	0.00006	0.00000	0.00000	0.00000	0.00000	0.00000	0.0001	15723
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	22461
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	37435

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

The worksheet should be read in conjunction with DMRB 11.3.10.

User Parameters – Defaults and Ranges

A303 - Realigned A360 North

Spillage Risk Parameters

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

Receiving Water	Urban (response time to site < 20 min)	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

Component Number		Weighting Factor	Property or Parameter	Risk Score	Component score	Weighted component score
1	SOURCE	10	Traffic flow	<=50,000 AADT	1	10
2		10	Rainfall depth (annual averages)	>740 to <1060 mm rainfall	2	20
3		10	Drainage area ratio	<=50	1	10
4	PATHWAY	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		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

User parameters A303 - Realigned A360 south

Location Details

Road Number	A303		**Assessment type**	Non-cumulative assessment (single outfall)
HE Area/DBFO number				
OS grid reference of assessment point (m)	**Easting**	409441	**Receiving watercourse**	Chalk aquifer groundwater
	Northing	141105	**EA receiving water Detailed River Network ID**	GB40801G806900
OS grid reference of outfall structure (m)	**Easting**	409441	**Assessor and affiliation**	AmW
	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				
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	-	***730***	
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)	-	-	***12407***	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	-	-	***14***	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/109HGVkm/year	-	***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				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 (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 - Realigned A360 south

Assessment of Priority Outfalls

Method D - assessment of risk from accidental spillage

			Additional columns for use if other roads drain to the same outfall						
		A (main road)	B	C	D	E	F		
D1	Water body type	Groundwater							
D2	Length of road draining to outfall (m)	730							
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)	12,407							
D8	% HGV	14							
D8	Spillage factor (no/109HGVkm/year)	0.29							
D9	Risk of accidental spillage	0.00013	0.00000	0.00000	0.00000	0.00000	0.00000		
D10	Probability factor	0.45							
D11	Risk of pollution incident	0.00006	0.00000	0.00000	0.00000	0.00000	0.00000		
D12	Is risk greater than 0.01?	**No**						**Totals**	**Return Period (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:

Existing road drainage to unlined ditch

Justification for choice of proposed measures factors:

Grass channel with online soakaways

The worksheet should be read in conjunction with DMRB 11.3.10.

User Parameters – Defaults and Ranges

A303 - Realigned A360 south

Spillage Risk Parameters

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

Receiving Water	Urban (response time to site < 20 min)	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 Western portal

Groundwater Assessment

Component Number		Weighting Factor	Property or Parameter	Risk Score	Component score	Weighted component score
1	SOURCE	10	Traffic flow	<=50,000 AADT	1	10
2		10	Rainfall depth (annual averages)	>740 to <1060 mm rainfall	2	20
3		10	Drainage area ratio	<=50	1	10
4	PATHWAY	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		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	Medium

User parameters A303 Western portal

Location Details

Road Number	A303		**Assessment type**		Non-cumulative assessment (single outfall)			
HE Area/DBFO number								
OS grid reference of assessment point (m)	**Easting**	410887	**Receiving watercourse**		Chalk aquifer			
	Northing	141594	**EA receiving water Detailed River Network ID**		GB40801G806900			
OS grid reference of outfall structure (m)	**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 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/109HGVkm/year	-	***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 crates
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 Western portal

Assessment of Priority Outfalls

Method D - assessment of risk from accidental spillage

			Additional columns for use if other roads drain to the same outfall						
		A (main road)	B	C	D	E	F		
D1	Water body type	Groundwater							
D2	Length of road draining to outfall (m)	1,245							
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	0.00078	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		
D12	Is risk greater than 0.01?	**No**	**No**	**No**				**Totals**	**Return Period (years)**
D13	Return period without pollution reduction measures	0.00035	0.00000	0.00000	0.00000	0.00000	0.00000	0.0003	2864
D14	Existing measures factor	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:

Existing road drainage to unlined ditch

Justification for choice of proposed measures factors:

Grass channel with online soakaways

The worksheet should be read in conjunction with DMRB 11.3.10.

User Parameters – Defaults and Ranges

A303 Western portal

Spillage Risk Parameters

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

Receiving Water	Urban (response time to site < 20 min)	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

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This document is also available on our website at **www.gov.uk/highways**

If you have any enquiries about this document email **info@a303stonehenge.co.uk** or call **0300 123 5000***.

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