HADDMS Priority Registers
Priority Outfalls Verification
User Guide

Date: 7 October 2010 **Issue: 1**

Document Control

Document Title	HADDMS Priority Registers
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Distribution	Santi Santhalingam Mike Whitehead DPoE
Document Status	Final

Revision History

Version	Date	Description	Author
1	7 October 2010	Final	Stephen Cox

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1 Introduction

This document provides guidance on the implementation of AMM130/10 for the method of verifying risks to the water environment from highway drainage through existing outfalls on the HA's network and explains the procedure to follow to populate the Priority Outfalls Register on HADDMS (Highways Agency Drainage Data Management System).

2 Background

The Highways Agency has a responsibility to minimise the impact of the strategic road network on the environment. Since 2000 the HA has had an ongoing programme of work to investigate and, where necessary, retrofit existing outfalls on the network that were identified as posing a potential pollution risk. This work contributed towards the HA's annual Environmental Key Performance Indicator with targets set based upon a 'Priority Outfalls Register'. The original register, developed in 2000, was based on limited asset information available at the time and environmental assessment techniques that have since been revised. In recent years the HA's knowledge of its drainage asset base has grown considerably together with the publication of more robust environmental assessment tools developed through its Research and Development Programme. These developments have meant that the existing Priority Outfalls Register has had to be updated to reflect current understanding and best practice.

Following extensive research into the nature of highway runoff and its effect on the ecology of surface watercourses, a new standard was published in November 2009 - HD45 (Design Manual for Roads and Bridges, Volume 11, Section 3, Part 10)[1]. To accompany the standard, the new HA Water Risk Assessment Tool (HAWRAT) was also released. HAWRAT facilitates the assessment of environmental risk from new and existing outfalls and use of it is now mandatory for such assessments.

HAWRAT requires site specific information to complete an assessment. However, as of April 2010, there were 12,000 outfalls recorded on the HA Drainage Data Management System (HADDMS). For the majority of these outfalls there is little information which could be used to complete a HAWRAT assessment. A method of prioritising those outfalls which needed more detailed assessment was required.

Using national datasets, a ranking system was developed to assign a baseline risk score to each outfall according to its potential to cause environmental harm. The baseline score was determined from information including: catchment area, traffic volume, river size and proximity to sensitive sites (such as Special Areas of Conservation). Those outfalls with the highest risk scores were placed into the Very High (A) risk category. Other outfalls with lower risks were assigned to High (B), Moderate (C) and Low (D) risk categories depending on their baseline score.

This new Priority Outfalls Register has been derived from regional scale information which may not always be accurate and upon which a number of assumptions have been made. In order that the risks may be fully defined, a verification process is required to ratify the baseline assessment and hence confirm the risk represented by routine runoff

[1] This document is subsequently referred to as HD45/09. Other HA Standards and Advice Notes are also referred to in this format, with full references provided at the end of this document.

to surface waters from an individual outfall. The method for verifying the baseline risk category is through applying HAWRAT at each outfall. The overall risk status includes the risk of a pollution incident arising from a spillage using the methodology set out within HD45. HAWRAT includes the facility to assess this risk.

The Priority Outfalls Register is one of a number of priority registers which also include soakaways, culverts and flooding hotspots. The register has been uploaded onto HADDMS. Verification of risk status and management of any actions required will be through the HADDMS platform.

Previously unknown/unidentified outfalls are being added to HADDMS regularly as the system is populated by the HA's Managing Agent Contractors. Outfalls added since April 2010 will not have been included in the initial baseline assessment. The HA will monitor the number of new outfalls added to HADDMS and it is the HA's intention that the baseline assessment will be periodically re-run so that a baseline risk category can be assigned to these outfalls.

3 Procedure and Processes

3.1 Overview

Outfalls should be assessed on a prioritised basis, beginning with those outfalls which have 'A (Very High)' risk status from the baseline assessment. As summarised in Figure 1 below, the assessment includes the following processes:

- Verify the outfall location (refer to "Outfall Surveys Guidance Note" which is available to download from HADDMS)
- Identify whether there are multiple outfalls within the same reach
- Verify the Baseline category/determine the Overall Risk Status by using HAWRAT to establish the:
    - spillage risk status
    - Environmental Quality Standard (EQS) status
    - soluble pollutant status
    - sediment-bound pollutant status
- The presence or absence of existing mitigation measures which may already address the risk from routine runoff and spillage should be included in the HAWRAT assessment
- Record results in HADDMS
- Update the verification and action status
- HADDMS then calculates the Overall Risk Status [A, B, C, D, or X[2]]
- Proposed solution - where necessary, establish and record in HADDMS a potential, generic, solution (and its cost) to mitigate the risks
- Actual solution – once implemented, record the actual solution put in place and its cost

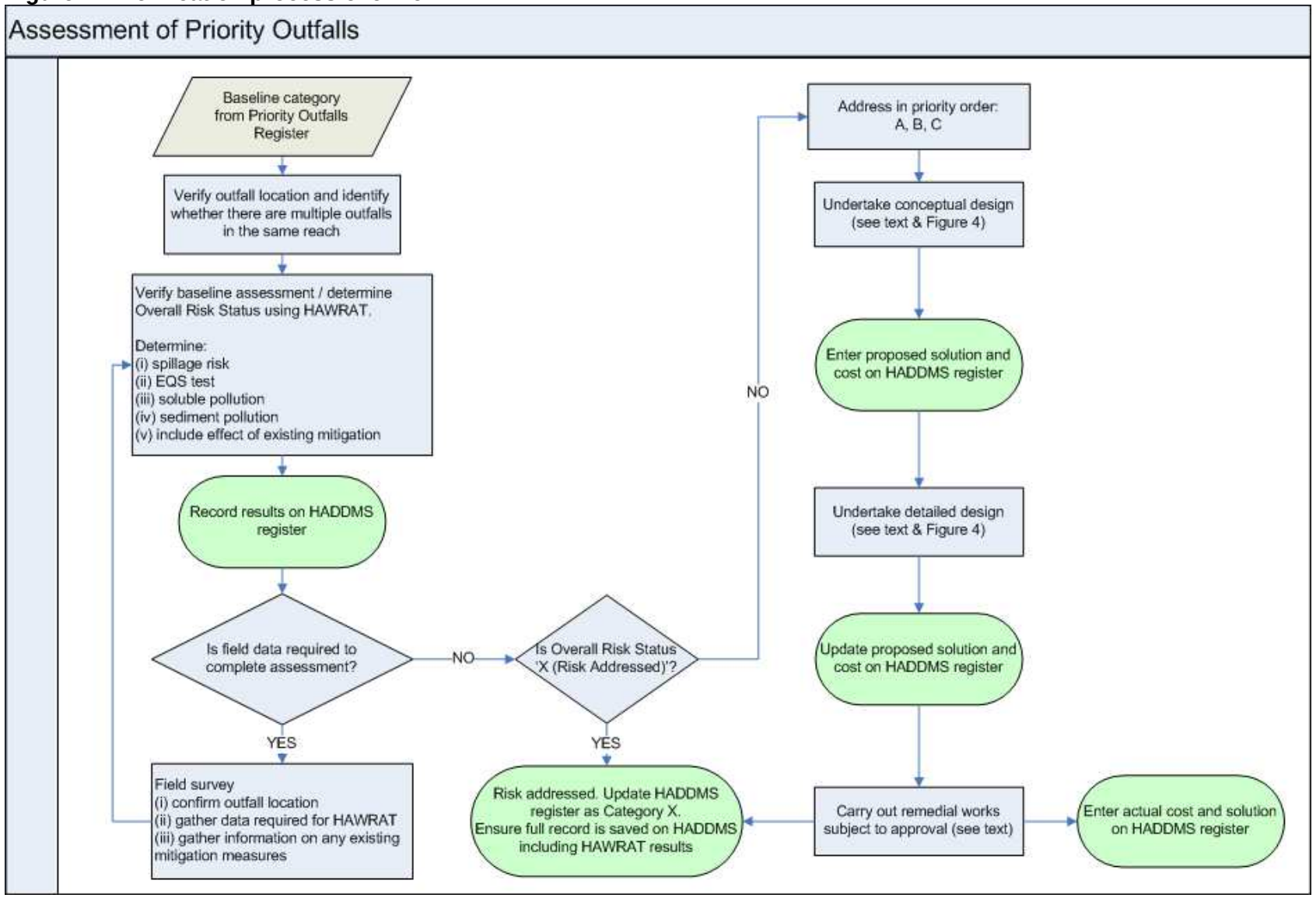
If, at any stage, the overall risk status is recorded as "X – Risk Addressed", the process is complete

Limitations

Although this user guide provides guidance for the different steps of the assessment and verification process, it cannot cover all permutations of risk to surface water from road drainage. Appropriate engineering and environmental solutions must be adopted based on site specific information. Further clarification can be provided by the HA if required.

[2] Status 'X' means that the risk has been addressed, for example if the HAWRAT assessment reports no risk or if treatment measure already exist which remove the risk.

Figure 1 – Verification process overview



3.2 Verification of outfall location

Duplicate or erroneous outfalls may exist on HADDMS and where this is the case, such outfalls may have been assigned a baseline risk category in the same way as genuine outfalls. Verifying that the outfall exists and that it is recorded at the correct location is essential for all subsequent work. If the location cannot be confirmed by desk study, it must be confirmed by field study. No Overall Risk Status can be recorded unless the location is first verified.

3.3 Outfall clusters

The term outfall, as used in this note, is slightly different from that defined in HD43 and other HA documents. In HD43 it is used to describe the structure, often a headwall, at which the highway runoff discharges to a receiving watercourse. As this note is concerned with the effect of runoff on watercourses, a wider definition has been used. Often, where a road crosses a river, there will be more than one such outfall structure discharging runoff, and it will be the cumulative impact of all these discharges which will define the risk of pollution. Similarly for a road running parallel to a river and discharging at several locations.

So in this note, the term outfall has been used to describe the group of outfall structures discharging highway runoff within any one reach of a watercourse. Where no reaches are defined (on minor watercourses), or where the boundary of a reach occurs close to, or even between outfall structures, a judgement must be made, and justified, on how the outfall is defined. Further information is provided in HD45 with respect to cumulative assessment of clustered outfalls (HD45, Annex 1, paragraphs A.15 to A.18).

The use of regional scale datasets to determine baseline risk has meant that outfalls lying in close proximity often have similar baseline risk scores. Where such outfall clusters exist, it will often be a more efficient use of time and resources to verify each of the outfalls in the cluster at the same time, both at desk study and field study level. HAWRAT includes functions for the cumulative assessment of outfalls. For newly recorded outfalls, users should consider whether they are also part of a cluster.

3.4 Method of verifying risk

The assessment and verification of the baseline risk status from routine runoff and spillage is undertaken through use of HAWRAT. Use of HAWRAT is described in detail in HD45 where worked examples are also presented. HAWRAT can be downloaded from **www.haddms.com**. A Help Guide accompanies the download and contains further detailed information about how the tool works and how to use it.

The basic features of HAWRAT which allow for the verification of the baseline risk status are explained below.

i. HAWRAT has been designed to be run using desk-based information in the first instance. If the outcome of such an assessment is ‘Pass’ then no field assessment is necessary. If the outcome is ‘Fail’ (for sediment effects) then the user is prompted to gather information from the field in order to provide more detail for a refined assessment. At this point the user should make a judgement

on the degree of the failure and determine whether a more refined field assessment is likely to make a difference to the outcome. The best indicator of the degree of the failure is the deposition index (D.I.) reported by HAWRAT. If the D.I. is close to 100 then a refined assessment may change the outcome. If the D.I. is much greater than 100, say 200+, then a refined assessment is unlikely to change the outcome.

ii. The risks from intermittent, higher concentration, discharges of highway runoff are assessed separately to the risk from a rise in the annual average pollutant concentration.

iii. The risk from soluble pollutants is reported separately to the risk from sediment-bound pollutants. HAWRAT reports Pass/Fail for both the soluble and sediment-bound pollutants.

iv. The annual average pollutant concentration must be compared with published Environmental Quality Standards (EQSs) to determine Pass/Fail status. The EQSs current in November 2009 are given in HD45.

v. HAWRAT allows for mitigation measures that may already be present on site to be factored in. This should be done *before* determining Pass/Fail status. If the nature of existing mitigation measures cannot be identified by desk study alone, field study will be required.

vi. HAWRAT includes a spreadsheet tool for assessing the risk of spillage and related pollution incidents. Further detail on the spillage risk assessment process is given in HD45 (Method D).

Prioritisation of Field Studies

Prior to proceeding to Field Study, the verification status “field study required” of the assessment should be recorded on the outfall register and any such studies prioritised

H&S and Environmental Risk Assessment

Prior to undertaking any field works, Health and Safety and environmental risk assessments must be undertaken. These should be based on all available information although safe access, working near water, and protected species must be key considerations.

4 Populating the Register

4.1 Making priority outfall register entries

Service Providers should access the Priority Outfall Register through HADDMS. The register is a subsection of the asset inventory. The relevant outfall can be found from the HADDMS map.

The outputs from the verification exercise are input into the register on HADDMS and an Overall Risk Status is automatically generated from the user entries. In addition, outputs from the HAWRAT assessment must attached to the outfall point in HADDMS. This provides an audit trail of the assessment process.

A screen-shot of HADDMS is given in Figure 2, showing a typical distribution of outfalls colour coded according to risk status. Figure 3 is a screen shot of the outfall register screen which is shown when any outfall is selected.

Details of the HADDMS data fields, possible entries and data entry rules are presented below.

Figure 2 – Screen shot of HADDMS showing status of outfalls

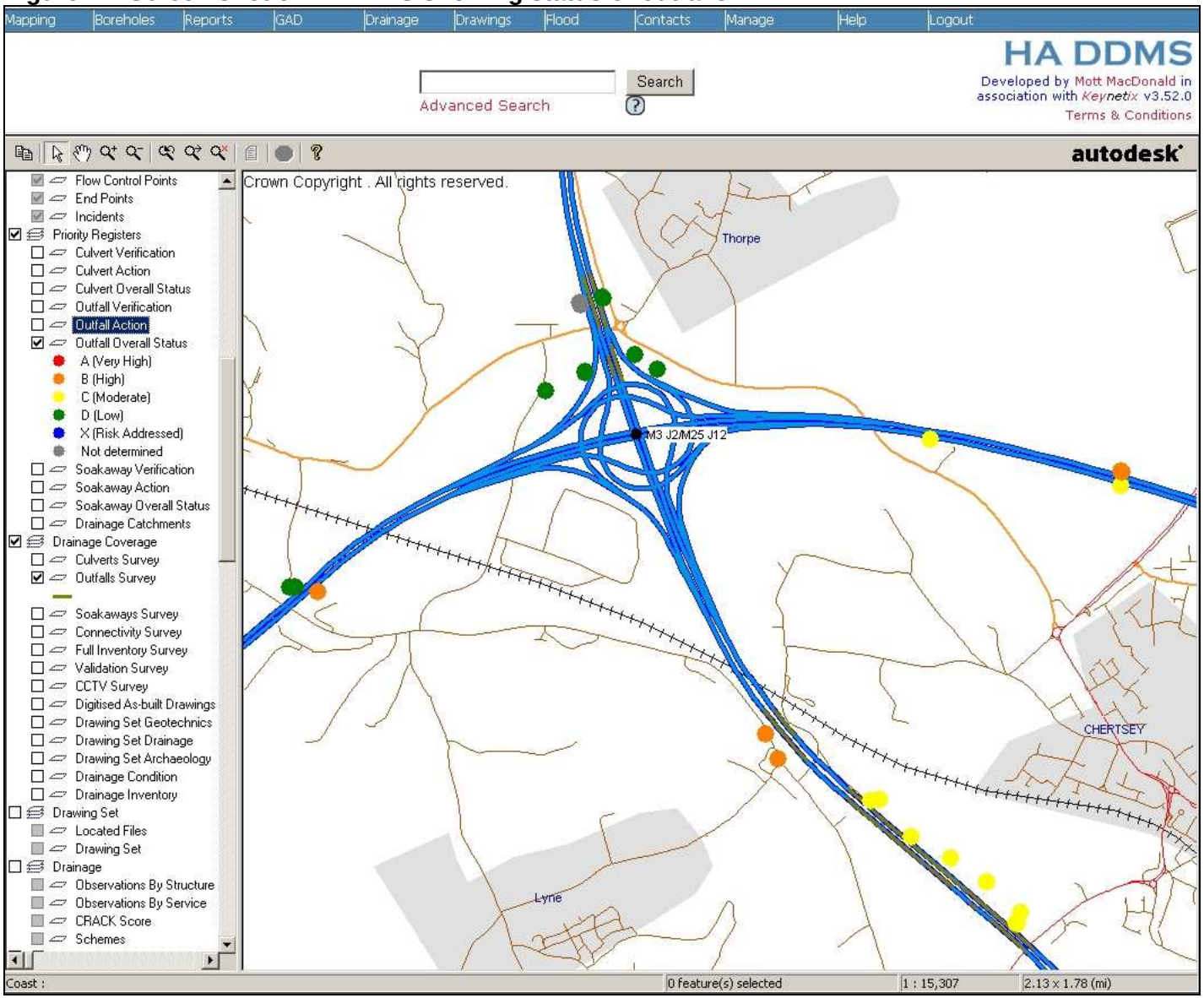


Figure 3 – Screen shot of HADDMS outfall register

Outfall Register	
Outfall Register ID	7213
HD43 asset ref	TQ0168_5102a
Item Type	OU - Outfall
Baseline assessment ID	746197
Baseline Category	D (Low)
Spillage risk	Not determined
EQS	Not determined
Soluble pollution	Not determined
Sediment pollution	Not determined
Deposition Index	0
Verification status	Baseline assessment carried out
Action status	Not determined
Overall risk status	D (Low)
Proposed solution	Not yet designed
Proposed cost (£)	
Actual solution	Not yet built
Actual cost (£)	
Last updated	16/06/2010
Comments	

4.2 Data fields

The data fields in the register are as follows:

Baseline information:

These fields are primarily populated with results from the baseline assessment.

- Outfall Register ID
- HD43 asset reference
    - The HD43 asset reference must be recorded in this field
- Item Type
    - Confirms that the asset is an outfall ('OU')
- Baseline assessment ID
    - This ID is taken from the regional scale study which was used to establish the baseline category for each outfall.
- Baseline Category
    - This is the unverified risk category derived from the baseline assessment and will be retained for historical information *(non editable)*

Verified information:

Populated after undertaking verification, as shown below:

- Spillage risk
    - This is the spillage risk assessment determined from the HD45 Method D assessment (facilitated through HAWRAT). Defined from pick list:
        - *Pass*
        - *Fail*
        - *Not determined*
- EQS
    - This is the assessment of the annual average concentration of soluble pollutants, determined by HAWRAT, and compared with published Environmental Quality Standards. Defined from pick list:
        - *Pass*
        - *Fail*
        - *Not determined*
- Soluble pollution
    - This is the assessment of the short-lived, higher concentration discharges of soluble pollutants determined by HAWRAT Defined from pick list:
        - *Pass*
        - *Fail*
        - *Not determined*

- Sediment pollution
    - This is the assessment of the sediment-bound pollutants in highway runoff determined by HAWRAT. Defined from pick list:
        - *Pass*
        - *Fail*
        - *Not determined*

- Deposition Index
    - This is a value reported by HAWRAT indicating the predicted extent of sediment coverage *(number field)*

- Verification status
    - This field defines progress through the verification process. Defined from pick list:
        - *No assessment carried out*
        - *Baseline assessment carried out*
        - *Desk study complete - no field study required*
        - *Desk study complete - field study required*
        - *Field study complete*

- Action status
    - This field identifies whether action is required to provide a solution. Defined from pick list:
        - *Required - complete*
        - *Required - not done or not completed*
        - *Not required*
        - *Not determined*

- Overall risk status
    - Once the above fields are completed HADDMS calculates the Overall Risk Status. The Overall Risk Status can be:
        - *A (Very High)*
        - *B (High)*
        - *C (Moderate)*
        - *D (Low)*
        - *X (Risk Addressed)*
        - *Not determined*

- Proposed solution
    - Generic definition of proposed solution. Defined from pick list:
        - *New build*
        - *Retrofit*
        - *Rebuild*
        - *Substitute*
        - *Active Management*

- Proposed cost
    - Estimated cost (£) of proposed solution *(number field)*

- Actual solution

- Identification of actual solution implemented. Defined from pick list:
  - *New build*
  - *Retrofit*
  - *Rebuild*
  - *Substitute*
  - *Active Management*

- Actual cost
  - Final cost (£) of implemented solution (*number field*)

- Last updated
  - The date on which the record was last updated (*not user editable and auto populated whenever record is saved)*

- Comments
  - *(Free text field, default blank)*

4.3 Data entry rules

In calculating Overall Risk Status, the following rules apply:

1. If the Verification Status and Action Status show that actions are complete or not required, the Overall Risk Status will be 'X (Risk Addressed)'.

2. If Spillage Risk, EQS, Soluble pollution or Sediment pollution is 'Not Determined' then Overall Risk Status will be the same as the Baseline Category.

3. If Spillage Risk is Fail then Overall Risk Status is A (Very High). If it is Pass, then Overall Risk Status is determined by other results.

4. If EQS is Fail then Overall Risk Status is A (Very High). If it is Pass, then Overall Risk Status is determined by other results.

5. If BOTH Soluble pollution and Sediment pollution are Fail then Overall Risk Status is 'B (High)' (unless overridden by Fail of either Spillage or EQS).

6. If EITHER Soluble and Sediment are Fail then Overall Risk Status is 'C (Moderate)' (unless overridden by Fail of either Spillage or EQS).

It is important to note that any failure of spillage risk or the EQS test defaults the overall risk status to 'A (Very High)'.

Risk status 'X (Risk addressed)' represents a risk that has been addressed - either through actions undertaken (e.g. remedial work) or through assessment which concludes that risk to surface water is minimal.

Although a risk status of ‘D (Low)’ exists in the baseline risk category, once verification has been carried out using HAWRAT, the Overall Risk Status cannot be D (Low). Either some risk will have been identified (C) or above, or there is no risk (X Risk Addressed).

The next step is to go to conceptual design of potential solutions on a prioritised basis – to first address those outfalls with Overall Risk Status of A, then B. Risk status C sites will not be allocated for mitigation measures until category A and B sites have been addressed.

4.4 Recording cumulative assessments for outfall clusters

The Overall Risk Status of each individual outfall in a cluster must be recorded against each outfall in HADDMS. In addition, the cumulative risk in a cluster must be recorded against the outfall which is furthest downstream in the cluster and a remark added to this effect. For example, individual outfalls in a cluster may have an Overall Risk Status of ‘B (High)’ but cumulatively the cluster has a risk of ‘A (Very High)’. The HAWRAT outputs for cumulative assessments should also be attached to the outfall in the cluster which is furthest downstream.

If actions are to be taken to reduce the risk, users must record the actions against the specific outfall(s) at which action will be taken. Where this outfall(s) is part of a cluster, the cumulative risk is to be reassessed and again recorded at the outfall furthest downstream. Once action is taken that addresses both the cumulative and individual risks from all outfalls in the cluster, then the Overall Risk Status for each and every outfall should be changed to ‘X (Risk Addressed), even if no action was taken at some of the outfalls in the cluster.

5 Identifying Solutions

5.1 Mitigation - conceptual design

Where it is established that mitigation measures are required, a conceptual (pre feasibility) design for treatment and/or containment should be developed. **Designers should ensure and seek to demonstrate that proposals are consistent with the principles of sustainability.** As a general rule Designers should ensure the following are a material consideration within the design process;

- the principles of sustainable drainage systems (SUDS) are, wherever technically possible, incorporated within the conceptual design and that the solution is proportionate to the level of identified risk;
- future maintenance regimes and whole life costs are considered as well as capital costs;
- mitigation works can be incorporated with other planned works;
- low technology solutions within the existing highway boundary; and
- use of recycled materials and/or low carbon technology

Measures (solutions) adopted may typically be as defined below:

Proposed Mitigation Measure / Solution	Definition	Example
New build	Addition of a new asset where nothing was available previously	Addition of a sediment pond upstream of an outfall where none previously present
Retrofit	Addition of a new asset or attribute to an existing asset	Adding a penstock to a sediment pond upstream of a outfall
Rebuild	Rebuilding an existing asset that had deteriorated such that it was no longer functional	Rebuilding of an oil interceptor
Substitute	Substitution of an existing asset with an alternative form of asset	Removal of filter drains an construction of a wet balancing pond
Active Management	Non-built, behavioural solutions	Enhanced signage, regular inspection with quick response measures such as sand bags for spillage containment

HA design guidance, particularly that provided in HD33/06 and HA103/06, should be taken into account during the conceptual design process.

The steps through conceptual design, summarised on the flow chart (Figure 4), include:

(i) Identify design constraints based on individual sites, including sensitivity of receiving surface water, space, access, landscape etc.

(ii) Identify and assess possible active management measures - i.e. can revised operational procedures provide the appropriate level of mitigation? (e.g. enhanced response to spillage, such as use of sandbags).

(iii) If these measures can be implemented, develop and seek approval for procedures and re-categorise the outfall on the register as Category X (Risk Addressed).

(iv) Identify and assess possible containment measures if there is a need to address spillage risk.

(v) Identify possible treatments for routine runoff and combined treatments to address both routine runoff and spillage risk.

(vi) Identify optimum treatment/containment solution and determine budget costs. Solutions should consider at minimum: sensitivity of receiving surface water; catchment size; flood risk; space constraints; access and H&S; landscape/ecological constraints; relative costs. Relevant HA design guidance should be used to determine appropriate measures.

Those outfalls requiring mitigation measures should be prioritised by carrying out a benefit cost analysis. This could be an assessment against other "outfall" appraisals (e.g. one high risk site needing a costly solution vs. five lower risk sites at the same cost) or could be a cost benefit analysis for different solutions at the same site. The Service Provider should also assess the opportunity for combining the mitigation measures with other planned works. Prioritisation criteria might include:

- forward programmes of work
- WFD requirements as identified in the relevant River Basin Management Plan Programme of Measures (POMS)
- EA requirements
- baseline final score
- historic events

5.2 Mitigation - detailed design

Once the conceptual design and costs are agreed, the following steps will be required to progress through to final design (summarised on the Figure 4):

(i) Re-evaluate conceptual design - this comprises a review of the chosen option to ensure it will meet treatment and containment objectives.

(ii) Undertake feasibility and cost estimate to determine construction costs, access, H&S, on going operational /maintenance requirements and costs, initiate CDM.

(iii) Confirm "regulatory" compliance

(iv) Seek scheme and budget approval for design and construction through the normal HA procedures.

The proposed solution and its estimated cost must be entered on the HADDMS Priority Outfalls Register

(v) Complete final design including setting out operational conditions.

(vi) Once budget approval is granted and resources identified, the measures should be implemented.

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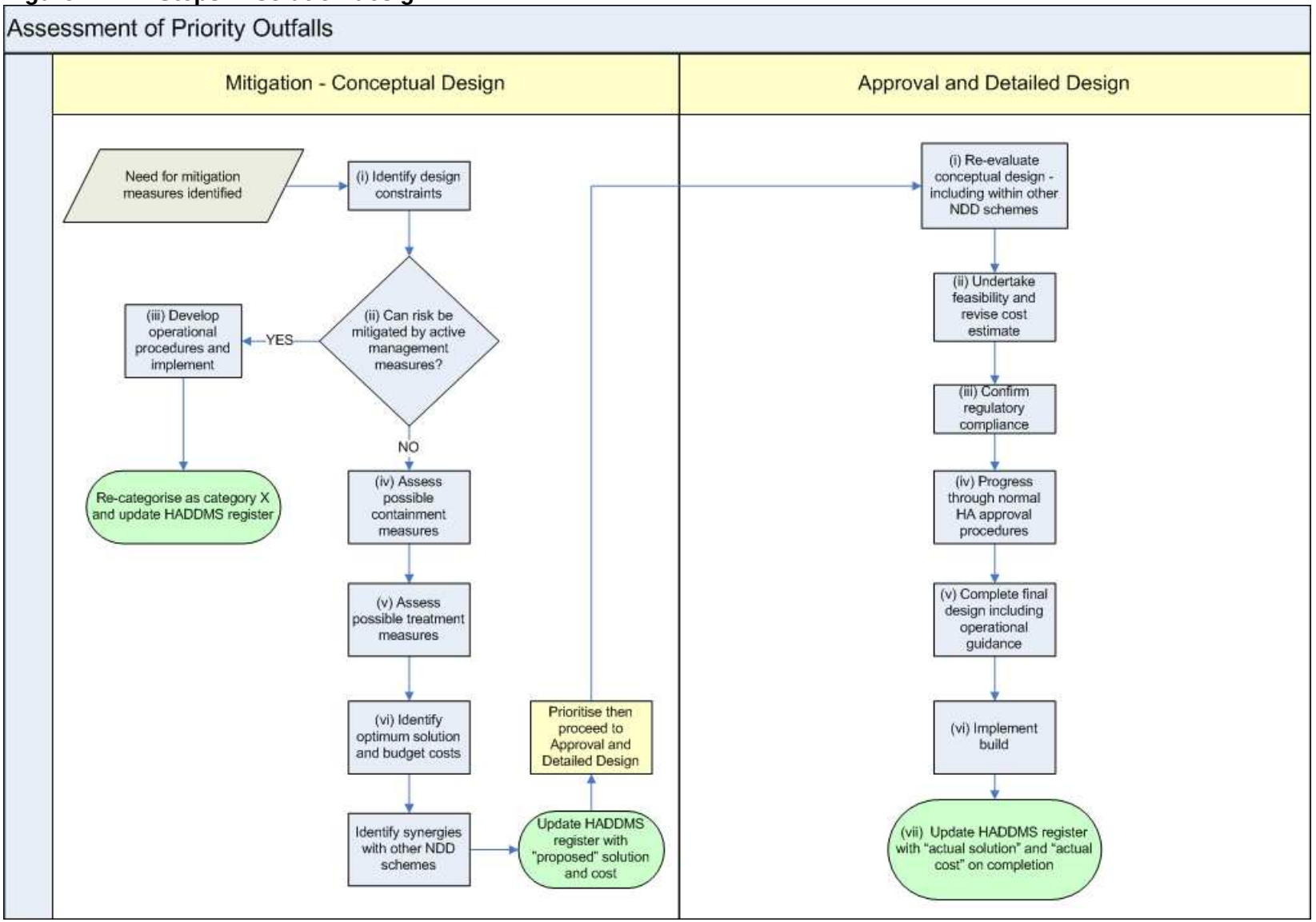
Once measures are complete, the solution adopted and its actual cost must be recorded on the HADDMS Priority Outfalls Register, and the action status changed to “Required Complete”. All design details etc. must be entered on HADDMS.

Figure 4 Steps in solution design



6 References

Design Manual for Roads and Bridges (DMRB):

Volume 4 Geotechnics and Drainage
Section 2 Drainage

Part 3 HD 33/06. Surface and Sub-surface Drainage systems for Highways

Part 4 HD 43/04. Drainage Data Management System for Highways. (Note that a revised Interim Advice Note - HADDMS Data Population Guidance is to be issued shortly)

Part 1 HA 103/06. Vegetated Drainage Systems for Highway Run-off

Volume 11 Environmental Assessment
Section 3 Environmental Assessment Techniques

Part 10 HD 45/09. Road Drainage and the Water Environment