Water Use

Oil storage at sites where there is an onward distribution

(WAT-SG-15-A) Supporting Guidance for Asset Improvement Plans

Version: v1
Released: Apr 2019

Copyright and Legal Information

Disclaimer

Whilst every effort has been made to ensure the accuracy of this document, SEPA cannot accept and hereby expressly excludes all or any liability and gives no warranty, covenant or undertaking (whether express or implied) in respect of the fitness for purpose of, or any error, omission or discrepancy in, this document and reliance on contents hereof is entirely at the user's own risk.

Registered Trademarks

All registered trademarks used in this document are used for reference purpose only.

Other brand and product names maybe registered trademarks or trademarks of their respective holders.

Update Summary

Version	Description
v1	Operator guidance for oil distribution storage depots required to produce an Asset Improvement Plan as part of a licence condition.

Notes

Printing the Document: This document is uncontrolled if printed and is only intended to be viewed online.
If you do need to print the document, the best results are achieved using Booklet printing or else double-sided, Duplex (2-on-1) A4 printing (both four pages per A4 sheet).

Always refer to the online document for accurate and up-to-date information.

Table of Contents

1. Key Points

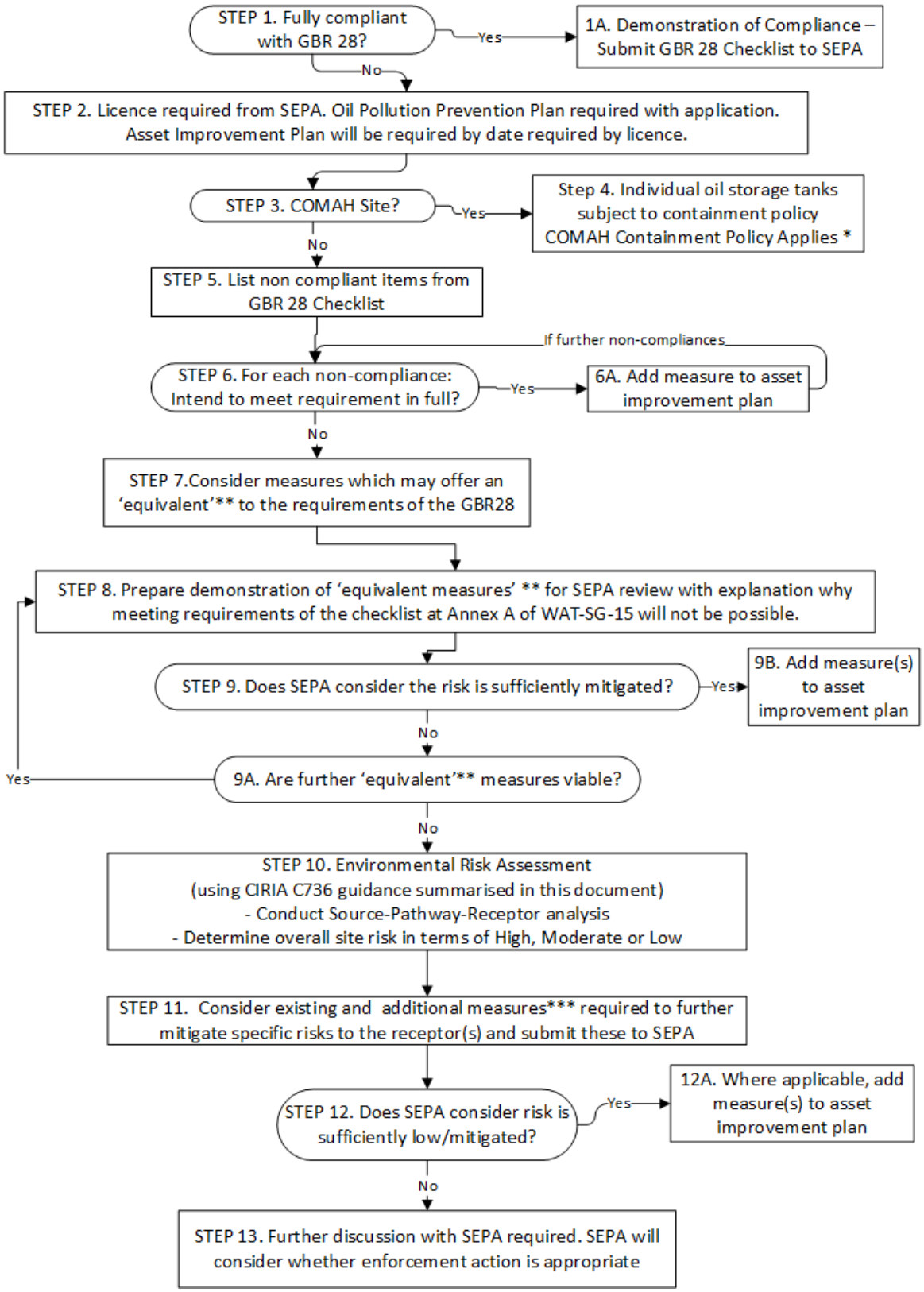
The provisions of the Oil Storage Regulations[1] (OSR) were moved into an amendment of the Controlled Activities Regulations[2] (CAR) in 2017[3] as General Binding Rule 28 (GBR28). The specific exclusion of sites where there is an onward distribution of oil was not carried forward. Therefore these sites now require to comply with GBR28 or apply for a licence to store oil as a site for onward distribution. The licence will require the licence holder to produce an Asset Improvement Plan.

SEPA appreciate that many existing oil distribution depots have been in situ for many decades and have been out with the scope of the OSR, so some will require time for improvements to be retrofitted either meet GBR28 compliance or an agreed 'equivalent' or employ alternative measures to reduce the risk of oil pollution. There is a presumption against the sole reliance on primary containment and consideration must be given to the possibility of the retrofit of secondary/tertiary containment in some form.

This document provides guidance on the process and the site specific elements SEPA expects to be considered in Asset Improvement Plan proposals.

[1] Water Environment (Oil Storage) (Scotland) Regulations 2006
[2] Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended)
[3] Water Environment (Miscellaneous) (Scotland) Regulations 2017

2. Flowchart



* CAR licence refers to COMAH containment policy assessment and any improvements identified
** see Table 1 for examples
*** see Table 4 for examples
CIRIA C736 Containment Systems for the Prevention of Pollution

3. Asset Improvement Plan

An Asset Improvement Plan is a requirement of a CAR licence holder to ensure that a site is working towards GBR28 compliance, an agreed 'equivalent' or where this is not possible then alternative measures, applicable to the risk, agreed with SEPA.

Every depot site will be unique with varying potential pathways and receptors for pollution. Some sites may have space constraints or topographical difficulties complying fully with the rules. In these circumstances, SEPA will be open to look at accepting alternative arrangements which achieve similar risk reduction as full compliance with the GBR28.

Once an approach has been agreed between the licence holder and SEPA the licence will be varied to include the agreed timescales for the work, and/or agreed mitigation procedures to be applied. Should the ultimate goal be to get the site to the standards of the GBR28 then the licence can be surrendered when this is achieved.

3.1 Following the Flowchart

The process as outlined in the flowchart in Section 2 should be followed. The GBR28 checklist (Annex A of WAT-SG-15) should help with an initial gap analysis on what aspects on site will require improvements.

A plan to work towards full compliance with GBR28 should be considered first. Plans with timescales should be submitted to SEPA and the licence will be varied to reflect the plan. Timescales for the work can be negotiated with SEPA taking into account to a company's business plan.

If GBR28 compliance is not deemed to be possible then proposals for 'equivalent' measures should be put to SEPA (Step 8) with a justification for why meeting the requirements of the checklist at Annex A of WAT-SG-15 will not be possible.

Only in exceptional circumstances should a solution not be able to be found by the end of Step 9A in the process. Beyond Step 9A a detailed Risk Assessment will be required.

Table 1 Examples of 'Equivalent' Measures for consideration from Step 7

Measures	Further information
Storage of less inventory in tank(s), than it has capacity for, to meet secondary containment requirement	HSG176 Paragraph 135
Remote containment systems to fulfil containment requirement	CIRIA C736 Section 3.4
Combination of local and remote containment systems including repair of existing facilities	CIRIA C736 Sections 3.5 and 12
Earth banked containment	CIRIA C736 Section 8
Containment tanks	CIRIA C736 Section 9
Transfer systems	CIRIA C736 Section 10

3.1.1 Containment

A common reason for non-compliance with GBR28 is inadequate secondary containment. The GBR28 requires that the secondary containment system is at least 110% of the primary tank's storage capacity or if a shared bund then 110% of the largest tank's storage capacity or 25% of the total capacity of all of the tanks, whichever is greatest. The secondary containment's base and walls must also be impermeable to water and oil without any valves or openings for drainage.

The aim of the secondary containment system is to break the pathway to the receptor. If this can be achieved through alternative means of containment as outlined in CIRIA C736 then these may be considered as 'equivalent' to GBR28 and put forward to SEPA at Step 8.

CIRIA C736 (Section 2.1) explains that 'It is unlikely to be economic to provide the primary storage such that is it 100 per cent safe, i.e. it can be guaranteed not to permit the escape of inventory in every conceivable circumstance. No matter how much care is taken there is always a finite risk that, for example, a particular hazard has not been recognised, structural elements or materials do not behave as predicted or an error in the design or construction was made. Additional risks and uncertainties can be introduced throughout the service life of a primary containment system if it is poorly maintained, it is put to a different use not considered by the original design, or is modified or extended in an inappropriate manner.'

Therefore, SEPA has a presumption against the sole reliance on primary containment.

If after consideration of improvements to GBR28 compliance or an equivalent, it is then deemed primary containment alone is to be relied upon for the safe containment of oil, all of the risks in the aforementioned paragraph must be addressed with extra attention on the maintenance of the primary structure and ancillary equipment. These appropriate controls (alternative measures in Table 4) can be a workable alternative to GBR28 compliance with full justification to SEPA, with a thorough environmental risk assessment (Step 10 onwards), and under continued licensed control.

3.2 Environmental Risk Assessment (ERA)

The purpose of risk assessment is to ensure all measures that are put in place to manage or mitigate the risk are appropriate according to the inventory stored and the environmental setting.

This stage should only be reached if it is not possible to upgrade to GBR28 or 'equivalent'. The licence holder must justify this to SEPA.

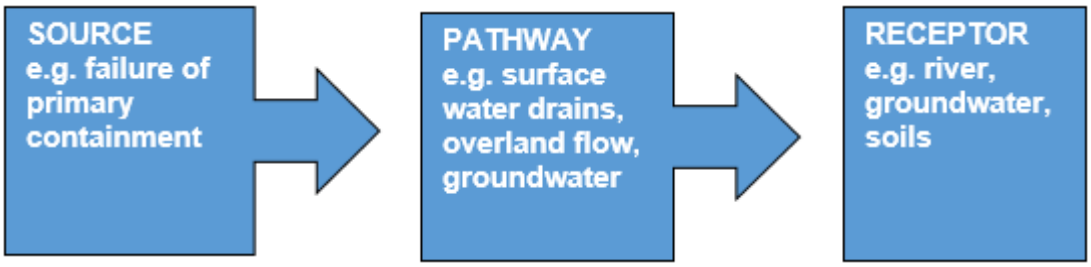
This section provides guidance on completing an assessment of the risks posed to the environment should there be a release of the inventory stored in the primary containment. The process is taken from CIRIA C736 which provides that the following relationship is considered appropriate in most circumstances.

- Low overall site risk - Class 1 – base level of integrity
- Moderate overall site risk - Class 2 – Intermediate level of integrity
- High overall site risk - Class 3 - the highest level of integrity

The process of an ERA involves the identification and evaluation of source – pathway – receptor linkages for different credible incident scenarios. This includes demonstrating an understanding of the hazards of the establishment, and the sensitivities of the environment.

Figure 1 Source – Pathway – Receptor

(see CIRIA C736 for further information)



3.2.1 Source

The source refers to:

- the inventory (oil)

It is important to establish the nature and quantity of this potential source. At a distribution depot the source will be the different types of oil stored on site. A range of characteristics should be taken in to account when assessing the inventory including:

- physical properties (e.g. density and viscosity)
- chemical and biochemical properties
- ecotoxicology properties
- bioaccumulation, biomagnification or persistence potential

- contaminated firewater

SOURCE RATING
In terms of toxicity all fuel oils are highly toxic to aquatic organisms so should attract a HIGH rating. Other oils i.e. fish oil could be considered as MODERATE.

3.2.2 Pathway

Pathways are the means by which a hazardous substance would reach a receptor. Pathways can include:

- overland flow following the topography of the land
- pipes, sewers, drains or other underground features that could lead to a receptor
- permeable subsoils and strata underlying a site that could provide a pathway to groundwater or to a watercourse

The time it would take for the inventory to reach the receptor is important. The quicker this occurs the less time there is to contain the inventory and less time to warn others who may be affected i.e. sewage treatment plant operators. The time it takes to reach the receptor will depend on the characteristics of the inventory on its journey along the pathway. The time taken to reach a receptor can affect the mitigation which will be effective.

Proximity of receptors

It is important to consider the proximity of all of the possible receptors (see section 3.2.3). Then an assessment of any credible pathways to these receptors. Potential pathways for overland flow will be determined by local topography and to an extent the permeability of near surface soils. Where permeable soils are present the interaction with groundwater should be considered, which in itself is both a pathway and receptor. Permeable substrata can convey inventory over large distances where they can affect ground and surface water resources.

Sewer, culverts and drains all have the potential to convey inventory rapidly away from a site and release them into the environment many kilometres from the site boundary. Even where the sewers, culverts and drains are sealed, the bedding and surround may act as a pathway for rapid off site migration.

Site layout and drainage

The layout of the buildings, oil storage, roadways, hardstanding and other features, and the surface finish and permeability of the surface over which the oil may flow in the event of an escape must all be considered.

The following features will represent a risk which needs to be identified and assessed:

- Hardstanding around the primary containment sloping towards a surface receptor

- Primary containment installations surrounded by flat or slightly slopping permeable ground permitting infiltration to groundwater
- Surface water drains
- On-site effluent drainage systems that provide pathways to trade effluent outfalls, to sewers, or to on or off site sewage treatment
- The presence of below-ground features such as services, ducts, pipelines, filled ground, tunnels, tanks or sumps
- Other man-made pathways such as old mine workings, storm drains gullies, culverted watercourses and land drains located close to the source or a potential pathway

Rainwater soakaways are a common feature on many sites. The presence of a soakaway must be investigated as a possible pathway if contaminated in an incident. There use must be carefully assessed.

The topography of the site and the permeability of the ground will have an effect on the transport of the inventory to surface waters and infiltration to groundwater. On large sites there may be a considerable variation in landform, soil type and geology across the site, which will influence runoff and infiltration. Geotechnical and hydrogeological surveys should be carried out where the ground conditions are unknown. This is particularly important if the ground is to be used as part of a containment solution i.e. earth embankment bunds and lagoons.

PATHWAY RATING
HIGH, MODERATE or LOW rating can be given to the pathway(s). If a leak detection system is present and could prevent pollution reaching a receptor then this can be taken into account when rating the pathway hazard.

3.2.3 Receptor

A receptor includes humans, animals, fish, plants and biota, watercourses, groundwater and soils that would be affected (directly or indirectly) by the escape of the inventory.

A receptor could also be a downstream process such as a wastewater treatment works or a drinking water source.

You can *Add Map Data Layers* to Scotland's environment map to help identify possible receptors. Relevant map data layers are:

- Drinking Water Protected Areas (Ground)
- Groundwater classification Groundwater
- Local Nature Reserves
- Loch Classification
- Main river and coastal catchments
- Marine Protected Areas

- National Nature Reserves (Scotland)
- River Classifications
- Scottish Wetland Inventory
- Sites of Special Scientific Interest (SSSI)
- Special Area of Conservation (Scotland) (SAC)
- Special Protection Areas Scotland (SPAs)
- Water Regulation Zones
- Wetlands of International Importance (Ramsar)

RECEPTOR RATING
- Nationally designated sites (SSSIs/SPAs/SACs) and drinking water sources are likely to be HIGH
- Locally designated sites, any surface water or groundwater bodies are likely to be MODERATE
- Non designated land sites are likely to be LOW

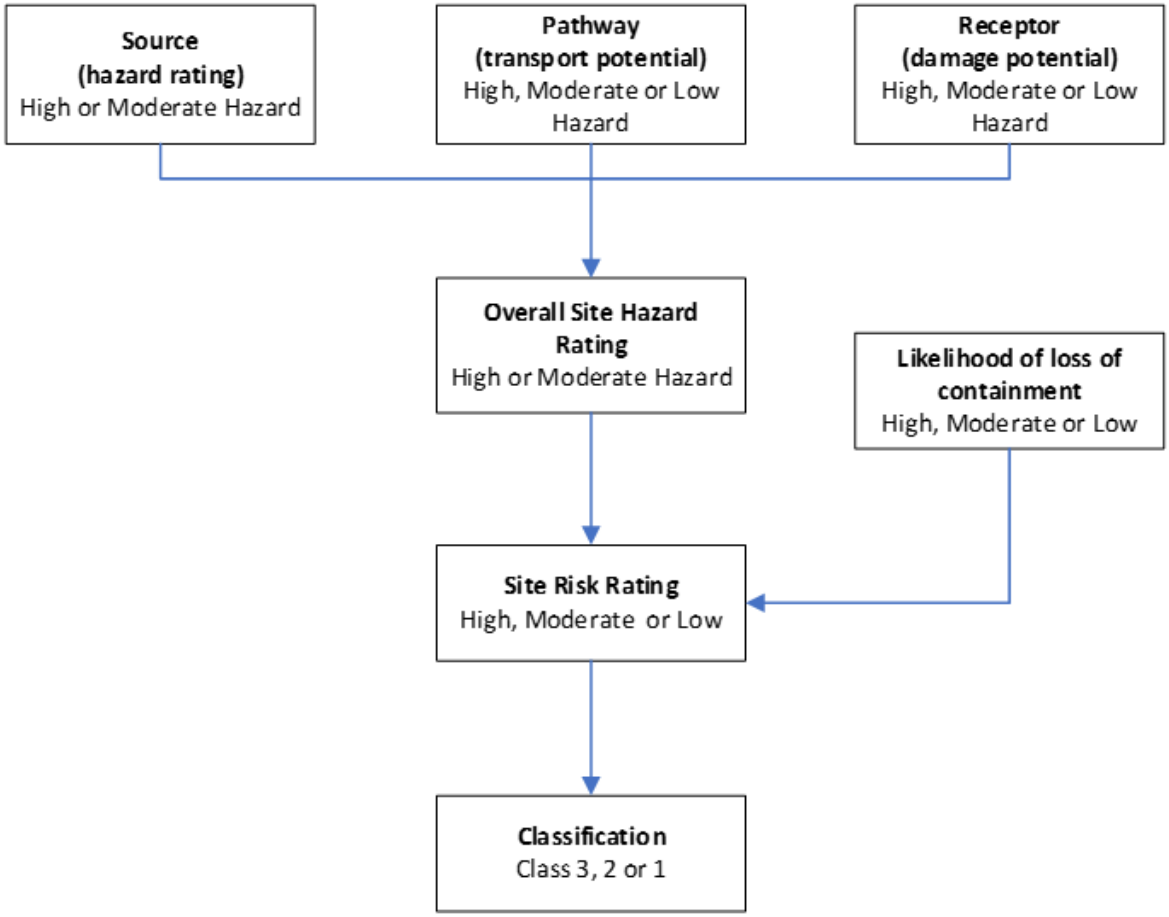
The above information is from CIRIA C736 Section 2.4.

For information, SEPA Environmental Event categories can be found in the Annex. This shows that a relatively small amount of oil can cause a significant pollution event.

3.2.4 Overall Site Hazard Rating

The source, pathway and receptor ratings are combined to obtain an overall site hazard rating of high, moderate or low.

Figure 2



Assessing the combined effects has to be a judgement based on knowledge, experience and the degree of confidence in the information available.

It is likely to be necessary to consider multiple source, pathway and receptor scenarios. For example, there may be one pathway to groundwater and another to surface water, each of which needs to be considered separately. Similarly it may be necessary to consider a number of receptors, since it may not be clear initially which if these is the most environmentally sensitive.

The overall site hazard rating adopted should represent the highest of the individual scenarios considered. **Fuel oil storage will therefore always result in a High rating**. However, the value of this exercise is to highlight where the risks are in the pathways and receptors so that proposed mitigation measures can be shown to be effective in cutting the risk.

This is different to the approach outlined in the CIRIA C736 which we have found to be inconsistent because it details, in its text, that the highest rating should be applied but then suggests lower ratings in the associated table.

Table 2 Calculating Overall Site Hazard Rating

Source (hazard rating) Has to be H for fuel oils (fish/vegetable oils could be considered as M)	**Pathway (transport potential)** May be H, M or L	**Receptor (damage potential)** May be H, M or L
Possible combinations of ratings	**Suggested consequent overall site hazard rating**	
HHH or HMM	High	
HML or HLM	High	
HLL	High	
H = High rating; M = Moderate rating; L = Low rating		

3.2.5 Site risk rating - taking into account likelihood

The preceding section is concerned with hazard assessment. The next element is to assess the risk considering the events that may lead to the release of inventory from the primary containment and the likelihood that this may occur by:

- Identifying all of the events that are capable of causing loss of containment
- Assessing the likelihood of occurrence of each event

Potential failures and reasons for failure include:

- Operational failures, such as failure of plant, or human failure by operators
- Shortfalls in design – lack of alarms and fail-safe devices
- Structural failure – materials, components, detailing, corrosion or when exposed to heat and flame
- Abuse – inappropriate change of use or other misuse
- Impact, e.g. from a vehicle
- Vandalism, terrorism, force majeure etc.
- Flood, fire or explosion
- Geological factors, subsidence etc.
- Aging or deteriorating assets/sub components

Further information on the techniques for assessing likelihood of events or failures can be found in section 2.5 of CIRIA C736. Where company or plant specific failure data is not available, reference to the data provided in the COMAH Competent Authority guidance may be useful (see the reference section).

The combination of overall site hazard rating and likelihood of loss of containment provides a site risk rating.

Table 3 Calculating Site Risk Rating

Overall Site Hazard Rating (H (possibly M if not fuel oil – depending on pathway and receptor ratings) + Likelihood of Loss of Containment Rating (H, M or L)	
Possible Combination of Ratings	**Subsequent Consequent Site Risk Rating**
HH or HM or MH	High
MM or HL or LH	Moderate
LL or ML or LM	Low

The site risk rating can then be used to assess the appropriate containment type and appropriate alternative measures as detailed in Table 4.

The purpose of the ERA is to ensure that the appropriate class of containment is being worked towards. From CIRIA C736:

- Low overall site risk – Class 1 – base level of integrity
- Moderate overall site risk – Class 2 – Intermediate level of integrity
- High overall site risk – Class 3 – the highest level of integrity

See table 6.2 of CIRIA C736 (page 83) for key design recommendations for each class of conatainment and class requirements are also referred to throughout CIRIA C736.

Table 4 Examples of Alternative Measures for consideration from Step 11

Measures	Further information
Completion of a comprehensive base line survey then rectifying identified issues	CIRIA C736 Sections 5.4, 5.5, 5.6 and 5.7
Primary tank inspection protocol to EEMUA 159 - appropriate to grade of tank	EEMUA 159 Section 5; and HSG176, Paragraphs 221-235
Regular maintenance and inspection regime	CIRIA C736 Section 5.2; and EEMUA 231 A guide to periodic examination and testing
Outlet drainage isolation systems	Various products available to detect oil in drainage systems; PPG3 information on interceptors
High Level Alarms (HLA) and High High Level Alarms (HHLA) within an agreed safety percentage tested regularly	HSG176 Paragraphs 135-137 and EEMUA 191
Hose pressure testing	GS4; and EEMUA 159 Section 15
Stock management systems	Various products/sensors available for this
Assessment of life expectancy of components	EEMUA 159 Section 17
Identification of sacrificial areas for temporary containment	CIRIA C736 Section 11
Drainage pipe and channel system integrity	CIRIA C736 Section 5.5.4

As CIRIA C736 (Section 2.5) highlights 'Combining ratings for hazard and frequency [likelihood] of loss of containment as described previously calls for skill, experience and judgement if sensible and useful conclusions are to be drawn.'

This is a judgement exercise and it is up to the licence holder to present a case for SEPA to assess. Further guidance documents which may be of use in making a case for a proposal can be found in the references section.

Annex A: SEPA Environmental Event Categories

	Category 1 - Major		Category 2 - Significant		Category 3 - Minor		Category 4 - Others	
Media	**Water**	**Air, Land**	**Water**	**Air, Land**	**Water**	**Air, Land**	**Water**	**Air, Land**
Length of Watercourse/Area Impacted	Environmental damage to the ecosystem over a length greater than 1 km or an area greater than 1 km2.		Environmental damage to the ecosystem over a length less than 1 km or an area less than 1 km2.		Localised and limited environmental damage to the ecosystem.		All other events which are likely to be seen by SEPA as pollution events.	
Environmental Impact	Fish kill in excess of 100 and/or; Contamination >10 x EQS	Widespread & long-term harm to the environment Substantial harm to human health	Fish kill between 10 - 100 and/or; Contamination >2 x EQS	Long-term but localised harm to the environment or widespread but short-term harm to the environment; minor or no harm to human health;	Fish kill less than 10 and/or; Contamination >EQS	Short-term and localised harm to the environment; no harm to human health;	Inability to locate or substantiate reported event; Minor impairment of STW process having no impact. Licensable activity occurring without an authorisation, but not causing pollution.	Inability to locate or substantiate reported event;

Amenity Impact	Extensive visible pollution or littering of watercourse and/or; Any loss or closure of a designated Bathing/Shellfish Water or Drinking Water source.	Substantial impairment of amenity for a prolonged period	Significant visible pollution or littering of watercourse and/or; Significant reduction in amenity value i.e. Urgent notification of downstream abstractors	substantial impairment of amenity for a short period or lesser impairment of amenity for a prolonged period;	Minor visible pollution or littering of watercourse and/or; Reduction in amenity value i.e. Routine (non-urgent) notification of downstream abstractors.	minor impairment of amenity for a short period or not at all	No visible evidence of pollution and; No amenity impact.	No evidence of impairment of amenity
Economic Impact	Extensive damage to and/or closure of agricultural or other commercial activities.	Extensive damage to and/or closure of commercial activities	Significant damage to agricultural or other commercial activities.	Significant damage to commercial activities.				

References

Useful references to help draw up the Oil Pollution Prevention Plan

- All Measures Necessary – Environmental Aspects Apr 2016, COMAH (sepa.org.uk)
- C736: Containment Systems for the Prevention of Pollution CIRIA (ciria.org)
- Containment of Bulk Hazardous Liquids at COMAH Establishments 1999, COMAH (comah.org)
- EEMUA 159: Above Ground Flat Bottomed Storage Tanks: A guide to inspection, maintenance and repair (eemua.org)
- EEMUA 191: Alarm Systems – A guide to design, management and procurement (eemua.org)
- EEMUA 231: The mechanical integrity of plant containing hazardous substances – a guide to periodic examination and testing (eemua.org)
- Environmental Risk Tolerability for COMAH Establishments CDOIF (sepa.org.uk)
- GS4: Safety requirements for pressure testing 2012 (hse.gov.uk)
- HSG176: Storage of flammable liquids in tanks 2nd Edition (hse.gov.uk)
- Model Code of Safe Practice Part 2: Design, construction and operation of petroleum distribution installations 4th Edition (energyinst.org/)
- PPG3: Use and design of oil separators in surface water drainage systems (netregs.org.uk)
- Safety and environmental standards for fuel storage sites PSLG Final Report, (hse.gov.uk), includes:
  - Part 2 Protecting against loss of primary containment using high integrity systems
  - Part 3: Engineering against escalation of loss of primary containment
- Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) NetRegs (netregs.org.uk)
- Water Environment (Miscellaneous) (Scotland) Regulations 2017 NetRegs (netregs.org.uk)
- Water Environment (Oil Storage) (Scotland) Regulations 2006
- WAT-SG-15: Oil storage at sites where there is an onward distribution (sepa.org.uk)

- End of Document -