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# Regulatory Method WAT-RM-13 Microbial Discharges

July 2024

## Update Summary

| Version | Description |
| --- | --- |
| v1.0 | First issue for Water Use reference using approved content from the following documents: Microbiological\_discharges.doc |
| v1.1 | Table Summary added plus minor text revisions |
| v1.2 | Minor text revisions to clarify requirements for sewer overflows |
| v2.0 | New base template applied, links to docs revised for new SEPA website, Nov 2008 |
| v3.0 | Expired CMS links reviewed and updated. |
| v4/v4.1 | Updated to reflect interim position following new Bathing and Shellfish legislation and subsequent policy change: Stds revised, Shellfish ‘Protected Areas’, 'Other Water Users' procedure (Detail clarified in 4.1) |
| v4.2 | Minor change to Table 1 and bullet 1 in s4.2, website links revised |
| v5.0 | Modified to take account of new bathing water approach. Other small amendments to bring it up to date. Removed section on other water users until this is further reviewed |
| v5.1 | Alteration of section 4.1.1 and table 1 and removal of figure 1 as the bathing water zones are now available as a GIS layer. |
| v5.2 | Corrected error in Table 4 with regards to the location the standard is to be met for direct discharges. |
| v6.0 | Simplified and streamed some of the text.  Reworded and updated legislation section and included as an annex.  Clarified the approach for existing discharges near shellfish waters.  Clarified the approach to the protection of classified harvesting areas.  Removed the introduction text in the scope section as the content is replicated elsewhere.  The section on existing discharges has been updated to include reference to shellfish waters.  Altered section on registration level discharges to shellfish waters to reference zones in which enhanced treatment is required and detailed the approach to discharges near classified shellfish harvesting areas.  For licence level discharges near shellfish waters we have revised the standard to be achieved in water to 5 E.coli/100ml as a geometric mean to align with the latest science.  The combined sewer overflows section has been deleted as the content is now in RM07. RM07 is referenced.  Removed some of the section on licence limits as this was repeated elsewhere.  Updated previous table 4 and split into two tables. |
| v7.0 | Changed the registration/licence threshold to align with the CAR Practical Guide. Simplified the approach for registration level discharges to bathing waters to require the same level of treatment to both the inner and outer zones. Simplified text on registration level discharges. Removed the summary in Annex 3 as this was no longer required. |

# Purpose and scope

This guidance sets out the process for deciding whether microbiological treatment is required for new and existing sewage discharges to or impinging on, “identified waters”. In this context “identified waters” means:

* bathing waters
* shellfish water protected areas and
* classified shellfish harvesting areas.

The activity should also be undertaken in accordance with the relevant guidance:

* For registration level discharges see our registration guidance.
* For licence level discharges, see our guidance on How to apply for a licence to discharge sewage effluent.
* [WAT-RM-07: Regulation of Sewer Overflow](https://www.sepa.org.uk/regulations/water/pollution-control/pollution-control-guidance/)s

The guidance does not apply to discharges to soakaway.

Appendix 1 summarises the legislative background.

# Existing discharges

For existing discharges to, or impinging on, identified waters:

* if there is no evidence of an environmental impact, an application to authorise an existing unauthorised sewage discharge should be granted based on the status quo.
* Where an existing authorised or unauthorised discharge is contributing to a failure to achieve the required microbial standards[[1]](#footnote-2), SEPA will require connection to sewer, discharge to soakaway or an upgrade in the treatment within a specified timescale so that the discharge meets the relevant microbial standards.
* No action to address microbial impacts is normally required where an existing authorised discharge is not contributing to a failure to achieve the required microbial standards and there is compliance with the conditions of authorisation.

Existing discharges of ≤100 p.e. are contributing to the failure to achieve the required microbial standards where:

* The discharge is within the zones set out in [section 3.1](#_3.1_Registration_level) and
* The bathing water is failing to meet the sufficient standard or is at risk of deterioration (see Appendix 2); or a shellfish water harvesting area is not meeting class A (see Appendix 1); and
* SEPA has evidence, as set out in the and Bathing Water Improvement Plan or Shellfish Water Improvement Plan, that the failure is in part due to diffuse small scale sewage discharges i.e. microbial source tracking shows a human source and there are small sewage discharges into, or close to, the designated zones. The required treatment standard for discharges to or impinging on identified waters ≤100p.e. is set out in [Section 3.1](#_3.1_Registration_level). For larger discharges, a site-specific assessment is required.

# New or modified discharges

Discharges made directly to, or impinging on, identified waters are to be avoided where possible. For licence level discharges, SEPA will require the discharger to demonstrate that alternative discharge options have been considered before pursuing a direct discharge (e.g. connection to sewer, or relocation of outfall).

Where a discharge to, or impinging on, identified waters is unavoidable, SEPA will require all new or modified discharges to meet the criteria detailed in the sections below.

A discharge can be considered modified when the effluent disposal characteristics have changed in a way that will result in:

* A change in discharge regime leading to an increased load or volume.
* A change in discharge location or end of pipe geometry
* Any change to the discharge that leads to an alteration in the dilution or dispersion pattern.

## 3.1 Registration level discharges

For discharges to bathing and shellfish water zones the sewage effluent must be treated to reduce the bacteria. This is incorporated into SEPA’s sewage registration determination process.

### What are bathing and shellfish water zones?

The term "bathing and shellfish water zones” means:

* Bathing waters
* Inner and Outer bathing water zones. The zones are normally a buffer of 1500m as measured along the coast and/or up the river[[2]](#footnote-3).
* Shellfish water protected areas.
* Zones around shellfish water protected areas. The zones around the protected areas are watercourses that drain into the protected area up to 1500m inland.
* Classified harvesting areas where the harvesting is focused. Harvesting is focused where harvesting is for: common mussels, pacific oyster, common cockles, carpet clams, pullet carpet shell, surf clams[[3]](#footnote-4).
* Classified harvesting area zones. This is a zone as measured 1500m along the coast and/or up the river from classified harvesting areas where harvesting is focused.

### What treatment is required for a discharge to these zones?

The sewage must be treated by a system designed to meet no more than 500 *Escherichia coli* per 100 millilitres of sewage effluent and 200 intestinal enterococci per 100 millilitres of sewage effluent.

A package treatment plant/septic tank installed in conjunction with a proprietary filtration system using bio-fibrous media (eg coir or peat-free substitutes) is considered sufficient treatment to meet this standard.

Once a small amount of dilution is taken into account, this treatment should meet:

* bathing water standards
* standards for good and excellent shellfish water protected area classification; and
* Food Standards Scotland Class A.

## 3.2 Licence level discharges >10 domestic properties or 50 p.e. but ≤ 100 p.e

Where these discharges are to, or impinge on, an identified water, SEPA will either accept:

* The treatment set out in [Section 3.1](#_3.1_Registration_level), or
* The applicant must demonstrate compliance with standards in the receiving water as detailed under [Section 3.3 Licence level discharges >100 p.e](#_3.3_Licence_level).

For these discharges SEPA will not normally require numerical modelling to demonstrate compliance with initial dilution requirements and microbiological standards unless the site is particularly sensitive to such discharges (e.g. a discharge to a shallow enclosed bay) or there is low confidence that the standards can be achieved. [WAT-SG-11](https://www.sepa.org.uk/regulations/water/pollution-control/pollution-control-guidance/) provides further information.

## 3.3 Licence level discharges >100 p.e.

SEPA expects dischargers to undertake modelling of the impact of discharge. The level of modelling should be proportionate to the environmental risk. Depending on the location of the discharge, this can take account of initial dilution requirements. Before submitting an application, advice from SEPA should be sought.

Guidance on modelling requirements is available in [WAT-RM-28: Modelling for Water Use Activities](http://stir-app-qpl01/QPulseDocumentService/Documents.svc/documents/active/attachment?number=WAT-RM-28) and [WAT-SG-11: Modelling Coastal and Transitional Discharges](http://stir-app-qpl01/QPulseDocumentService/Documents.svc/documents/active/attachment?number=WAT-SG-11). Further information on the relevant microbiological standards to be achieved for bathing waters is provided in Appendix 2.

The section below sets out requirements for discharges to or impinging on the identified water. The microbial requirement for these discharges is also summarised in Tables 1 and 2.

In the section below, what constitutes as “impinging” needs to be decided on a site-specific basis. This could be by a simple conceptual model supported by simple calculations.

### 3.3.1 Discharges to or impinging on bathing waters

* The discharge must be modelled to demonstrate compliance with sufficient standard as a minimum as detailed in Appendix 2.
* These standards must be achieved at end of pipe for direct discharges.
* The discharge must meet the required initial dilution criteria to reduce to acceptable levels both the visibility of slicks and the occurrence of smell nuisance.

### 3.3.2 Discharges to or impinging on shellfish water protected areas

For discharge directly to a shellfish water protected area or watercourses draining into the protected area:

* The discharge must be modelled to demonstrate compliance with 5 E.coli/100ml as a geometric mean[[4]](#footnote-5), at the mixing zone edge. This will protect the shellfish water protected area for future harvesting and will prevent deterioration of the shellfish water protected area. Any dilution in a watercourse can be taken into account.
* The discharge must meet the required initial dilution criteria to reduce to acceptable levels both the visibility of density slicks and the occurrence of smell nuisance.

For discharge to coastal and transitional waters impinging on a shellfish water protected area or watercourses draining into this area:

* The discharge must be modelled to demonstrate compliance with 5 E.coli/100ml as a geometric mean3 at the protected area. In achieving this standard, account for dilution in any watercourse, the coastal and transitional water outside the protected area and in a zone equivalent to the allowed mixing zones in the protected area can be made.
* The discharge must meet the required initial dilution criteria to reduce to acceptable levels both the visibility of density slicks and the occurrence of smell nuisance.

**3.3.3 Discharges to or impinging on classified shellfish harvesting areas**

For discharges directly into classified shellfish harvesting areas, to coastal and transitional waters and impinging on of a classified shellfish harvesting area or watercourses draining into these areas:

* The discharge must be modelled to show that a standard of 5 E.coli/100ml as a geometric mean3 is met at the classified harvesting area. 5 E.coli/100ml as a geometric mean is the water concentration that is needed to meet class A standard.
* Dilution within the mixing zone may be taken into account where the discharge is outside of a classified shellfish harvesting area.
* The discharge must meet the required initial dilution criteria to reduce to acceptable levels both the visibility of density slicks and the occurrence of smell nuisance. However, initial dilution cannot be used as a method of meeting required microbiological standards for direct discharges to classified harvesting arras; these standards must be achieved at end of pipe for direct discharges.
* In determining the impact account can be taken as to the degree of impact on the classified shellfish harvesting area. Where harvesting is dispersed the impact is likely to be low.

# Sewer overflows

There is a presumption against combined sewer overflow and emergency overflow discharges to or impinging on identified waters. SEPA will require the discharger to demonstrate that alternative discharge location options (e.g. relocation of outfall out with the identified water) have been considered before pursuing a direct discharge.

Further guidance on intermittent discharges can be found in [WAT-RM-07: Regulation of Sewer Overflows.](http://stir-app-qpl01/QPulseDocumentService/Documents.svc/documents/active/attachment?number=WAT-RM-07)

## 4.1 Emergency overflows

Where a discharge is unavoidable, SEPA will require the applicant to provide storage to minimise the risk of the discharge. The UWWTR Guidance Note advises a minimum storage capacity equivalent to 1-2 hours storage at 3DWF (3PG + I + 3E). See also [WAT-RM-07: Regulation of Sewer Overflows.](http://stir-app-qpl01/QPulseDocumentService/Documents.svc/documents/active/attachment?number=WAT-RM-07)

However, the storage capacity needed at a site will depend on remedial measures provided by the applicant (e.g. standby pump, stand-by power generator etc) and response times to emergencies. Greater storage times may be required depending on these factors and the risk to the receiving water.

## 4.2 Combined sewer overflows

Information on combined sewer overflows is available in WAT-RM-07.

# Licence standards

SEPA will impose numerical standards on intestinal enterococci or *Escherichia coli* concentrations, or both, (or any other indicator or pathogenic micro-organism which may be relevant to a specific situation) where bacteriological treatment is required to achieve the standard. Section 3 details the objectives to meet to derive a licence limit.

SEPA has a general presumption against discharge of chlorinated organic effluents due to the presence of chlorine and its reaction by-products. However, SEPA recognises that chlorination of sewage effluents to achieve specified bacteriological standards in the bathing waters may be required as a short-term measure pending completion of capital works or for experimental purposes. For discharges to Shellfish Waters, SEPA has a general presumption against use of chemical forms of disinfection (with the exception of hydrogen peroxide). WAT-SG-41 provides some further details.

## 5.1 General guidance for continuous discharges

Licence limits for continuous discharges shall be two-tier, i.e. a lower tier set for 95 percentile compliance and an upper tier set as an absolute limit, and shall be set for intestinal enterococci (IE), or for *Escherichia coli* (EC), or for both. The lower tier limit should therefore be set at the model discharge output needed to meet the required standards in the identified water. Given the nature of the discharge and likely variability in the effluent the upper tier should then be set as 10 times the lower tier; this is in line with SEPA practice applied to other discharge parameters. Thus, for a licence where the lower tier is set at 185 intestinal enterococci/100ml, the upper tier would be 1850 intestinal enterococci/100ml.

Where an automated process is used to achieve compliance with a microbiological licence condition then telemetry must be installed, as a licence condition, to warn the operator of failure of the relevant equipment.

SEPA normally requires bathing season compliance for discharges to designated bathing waters and annual compliance for discharges to Shellfish Waters.

# Appendix 1: Legislative background

Both shellfish water protected areas and bathing waters are protected areas under The Water Environment and Water Services (Scotland) Act 2003.

## A.1 Bathing Waters

The Bathing Waters (Scotland) Regulations 2008 require Scottish Ministers to designate bathing waters. These are areas where bathing is traditionally practised by a large number of bathers and where bathing is not prohibited. Scottish Ministers determine the length of the bathing season. It normally runs from June 1st to September 15th. These waters are monitored by SEPA.

The Bathing Waters (Scotland) Regulations 2008 requires SEPA to exercise its relevant functions to ensure that bathing waters are classified as sufficient as a minimum. The regulation set out the standards for excellent, good and sufficient bathing waters as measured by *Escherichia coli* (*E.coli*) and Intestinal enterococci (IE).

## A.2 Shellfish Waters

The Water Environment and Water Services (Scotland) Act 2003 requires the designation of shellfish water protected areas.

The [Water Environment (Shellfish Water Protected Areas: Designation) (Scotland) Order 2016](http://www.gov.scot/Topics/Environment/Water/15561/ShellfishWaters) identifies Scotland’s Shellfish Water Protected Areas (SWPAs).

The Water Environment (Shellfish Water Protected Areas: Environmental Objectives etc.) (Scotland) Regulations 2013 sets out the objectives which should be met in relation to shellfish water protected areas. This is to prevent deterioration and protect and improve each Shellfish Water Protected Area with the aim of achieving good shellfish water quality. There is a similar requirement in regulation 5 of [The Water Environment (Shellfish Water Protected Areas: Objectives and Classification etc.) (Solway Tweed) Directions 2021](https://www.gov.scot/publications/the-water-environment-shellfish-water-protected-areas-objectives-and-classification-etc--solway-tweed-directions-2021/).

The Scotland River Basin District (Quality of Shellfish Water Protected Areas) (Scotland) Directions 2021 sets outs microbiological standards for:

* Good: ≤4600 most probable number of E.coli per 100g of shellfish flesh and intervalvular liquid as a 90-percentile; and
* Excellent, ≤230 as most probable number of E.coli per 100g of shellfish flesh and intervalvular liquid as a 90-percentile levels.

Separately, classified shellfish harvesting area(s) are designated and classified by Food Standards Scotland (FSS). FSS are required to monitor E.coli in shellfish to determine the level of treatment required prior to shellfish going for human consumption. Class A, equates, in part, to 80% of samples ≤230 E.coli/100g of flesh and intervalvular liquid. SEPA needs to take account of the impact on these water users when authorising discharges. Many of these classified shellfish harvesting areas are much smaller than the shellfish water protected area and some of these classified shellfish harvesting areas are not within shellfish water protected areas.

The River Basin Management Plan for Scotland, 2021 to 2027 states that SEPA’s aim is to target efforts within SWPAs, in consultation with the sector, to focus on prioritised Shellfish Production Areas that require improvements to help secure a consistent FSS ‘A’ class.

# Appendix 2: Bathing Water standards[[5]](#footnote-6)

**Table 1: Microbiological standards for classification of inland waters**

| **Parameter** | **Excellent** | **Good** | **Sufficient** |
| --- | --- | --- | --- |
| Intestinal enterococci | 200/100ml as a  95%ile | 400/100 ml as a  95%ile | 330/100 ml as a  90%ile |
| Escherichia coli | 500/100ml as a  95%ile | 1000/100 ml as a  95%ile | 900/100 ml as a  90%ile |

**Table 2: Microbiological standards for classification of coastal and transitional waters**

| **Parameter** | **Excellent** | **Good** | **Sufficient** |
| --- | --- | --- | --- |
| Intestinal enterococci | 100/100ml as a  95%ile | 200/100 ml as a  95%ile | 185/100 ml as a  90%ile |
| Escherichia coli | 250/100ml as a  95%ile | 500/100 ml as a  95%ile | 500/100 ml as a  90%ile |

## A2.1 Modelling standards for Bathing Waters

For those standards assessed for classification at a 90%ile they should be modelled for achievement at the 94%ile and likewise for those standards requiring 95%ile compliance these should be modelled to achieve the standard at a 97.5%ile to ensure the required level of confidence.

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1. For existing discharges to or near shellfish waters, the microbial standards referred to applies to the protection of shellfish harvesting areas within shellfish water protected areas to help secure a consistent FSS ‘A’ class. [↑](#footnote-ref-2)
2. The zone can be extended where bacteria die-off may not have sufficiently taken place and must be detailed in the bathing water improvement plan. [↑](#footnote-ref-3)
3. As small sewage discharges are likely to have a localised impact, it is the intensity of shellfish production which determines the likely economic impact. Where the harvesting is dispersed over a large area, the risk to classified shellfish harvesting areas from small discharges (≤100 p.e) is small. [↑](#footnote-ref-4)
4. This is our operational standard to protect shellfish to class A standard. [Faecal-contamination-challenges-for-the-water-environment.odt (live.com)](https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fassets.publishing.service.gov.uk%2Fgovernment%2Fuploads%2Fsystem%2Fuploads%2Fattachment_data%2Ffile%2F1027483%2FFaecal-contamination-challenges-for-the-water-environment.odt&wdOrigin=BROWSELINK) [↑](#footnote-ref-5)
5. From The Bathing Waters (Scotland) Regulations 2008 [↑](#footnote-ref-6)