

UK TECHNICAL ADVISORY GROUP ON THE WATER FRAMEWORK DIRECTIVE

Supplementary Guidance to WG 2.7 Guidance on Monitoring

Operational Monitoring in Transitional and Coastal Waters

This Guidance Paper is a working draft defined by the UKTAG. It documents the principles to be adopted by agencies responsible for implementing the Water Framework Directive (WFD) in the UK. This method will evolve as it is tested, with this working draft being amended accordingly.			
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Operational monitoring will be undertaken in water bodies identified as ‘at risk’ or ‘probably at risk’ of not achieving good status (i.e. 1a and 1b water bodies). Along with any surveillance monitoring, operational monitoring will be used to establish water body status and assess any changes in status due to programmes of measures.

Only those quality elements applicable to monitoring the significant pressures in 1a and 1b water bodies will be monitored (see MTT document *Quality Elements Sensitive to Pressures*).

1. Location of Operational Monitoring Sites

In determining where operational monitoring sites should be located there are two main considerations to take into account; the location of specific pressures and their zones of effect and the habitats occurring in the water body in relation to the pressures. To assist consideration of pressures they can be divided into four groups:

1.1 Spatially specific, licensed or managed activities with a definable zone of impact

This will take place in relation to specific licensed activities with identified Allowable Zones of Effect (AZE) e.g. 100m circumference AZE around a sewage outfall. This monitoring will be used to determine whether the licence conditions are achieving good water status. Such activities include sewage and industrial discharges, aggregate extraction, disposal of dredged material and capital and maintenance dredging.

The number of monitoring stations required to fulfil this part of the operational monitoring programme should be relatively easily defined. For instance existing sampling programmes specify the nature of discharge sampling as follows:

- Dangerous substances directive (DSD) waters sampling is undertaken 100m upstream and downstream of the discharge point
- Urban wastewater treatment directive (UWWTD) sampling, at qualifying discharges, is undertaken at four points around the discharge

1.2 Spatially specific activities with a diffuse/general impact

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The types of pressure considered appropriate to this monitoring element include engineering modifications such as barrages, weirs and sluices, which although having a fixed location impact on the overall hydro-morphology of the system. Monitoring sites for these pressures would not have to be linked to the location of the activity, but could be located less specifically. Such monitoring would be informed by a knowledge of the hydrography of the water body and the distribution of habitats and their associated sensitivity to the specific pressure.

1.3 Spatial activities with diffuse/general impact (as for 1.2), but additional impacts relating to habitat extent and habitat loss

The types of pressure considered appropriate to this monitoring element include engineering modifications such as land-claim and shoreline protection which are similar to those in 1.2, but would also include impacts relating to habitat extent and habitat loss. Monitoring points should be positioned with reference to the location of the pressure, focussing on hydro-morphological parameters linked to abundance of biological quality elements.

Monitoring should focus on biologically significant changes to the freshwater flow regime and the direction and speed of dominant currents; and the depth variation, structure and substrate of the water body. Appropriate biological sampling targeted at the extent of specific habitats would be considered as part of the ecological classification e.g. spatial extent of angiosperms (seagrass and saltmarsh) or of a particular EUNIS (European Nature Information System) habitat type.

1.4 Pressures with a diffuse impact affecting whole water body

This monitoring will take place in relation to pressures with a diffuse impact possibly affecting the whole water body (e.g. seabed trawling, TBT). Monitoring sites for these pressures should be located less specifically to represent the general status within a water body. It is possible that this type of diffuse/ general monitoring should take place at a number of random locations across a water body. This sampling will attempt to monitor at locations that integrate the various pressures affecting TraC water bodies.

To identify sampling locations it is suggested that the water body is divided into 1km² boxes and that appropriate boxes in which to sample are selected using a random identifier. The number of locations required to fulfil this part of operational monitoring may vary across water bodies and the boxes to be included may vary according to their predominant habitat (e.g. intertidal versus offshore).

2. Case Studies

Two case studies are described below, one coastal (SEPA, Scotland) and one estuarine (Environment Agency, England).

2.1 Operational Monitoring in a Coastal Water Body: Irvine Bay

The Irvine Bay water body is located in the Firth of Clyde and is approximately 80km² (see Figure 1). It is considered to be at risk of not achieving good status due to sewage and industrial discharges introducing nutrients, priority substances and organic enrichment. In addition nutrient and microbiological components are introduced via the Garnock and Irvine estuaries, which are affected by diffuse urban

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and agricultural inputs. The water body contains identified Bathing Waters which routinely fail both mandatory and guideline standards.

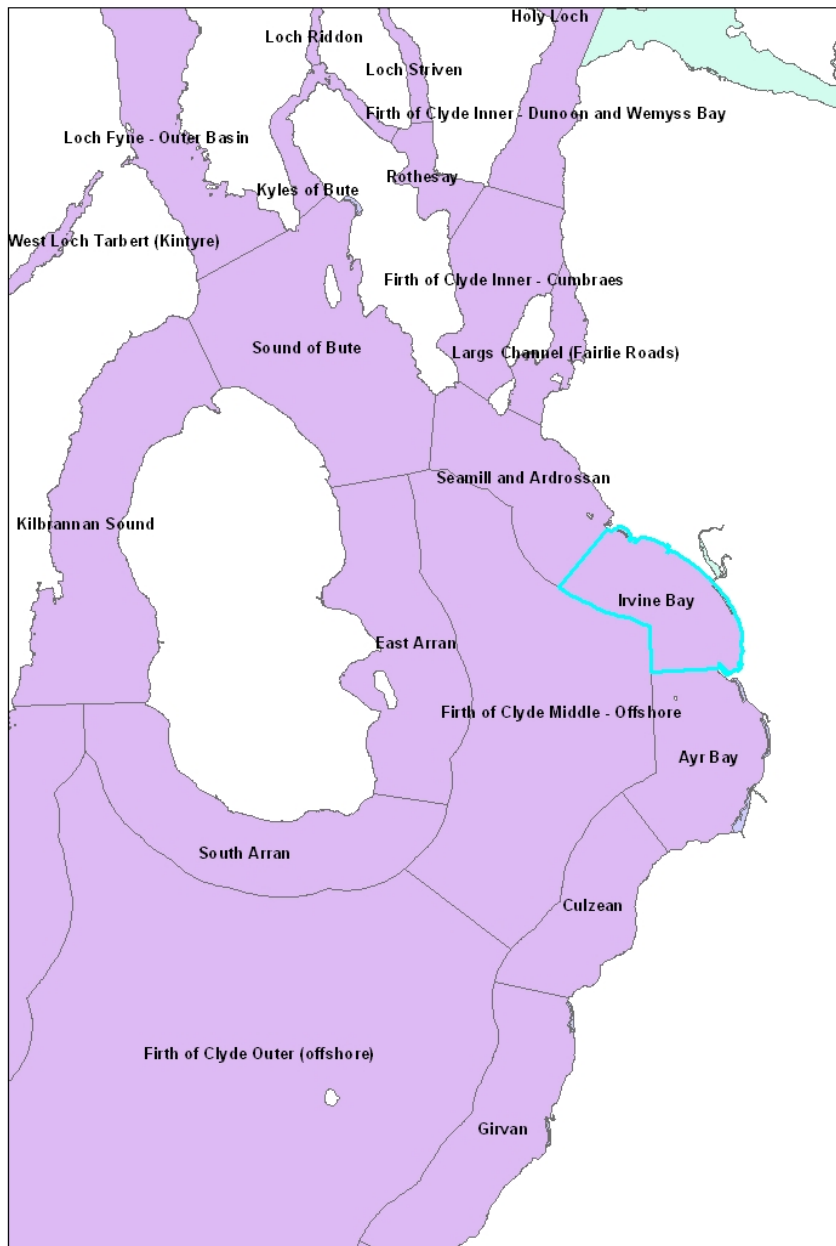


Figure 1: The Firth of Clyde and Irvine Bay Coastal Water Body

As suggested in Section 1.4 the coastal area has been divided into 1km² boxes to allow random sampling locations to be identified. A more detailed map of Irvine Bay is shown in Figure 2, which shows the water body divided into 1km² boxes and the main discharges into the water body. In addition to the point source pressures there may be a level of fishing activity across this water body as well as diffuse effects from the Garnock and Irvine estuaries. Engineering modifications include two harbour developments at the headlands at either end of the water body and shoreline protection along parts of the upper shore.

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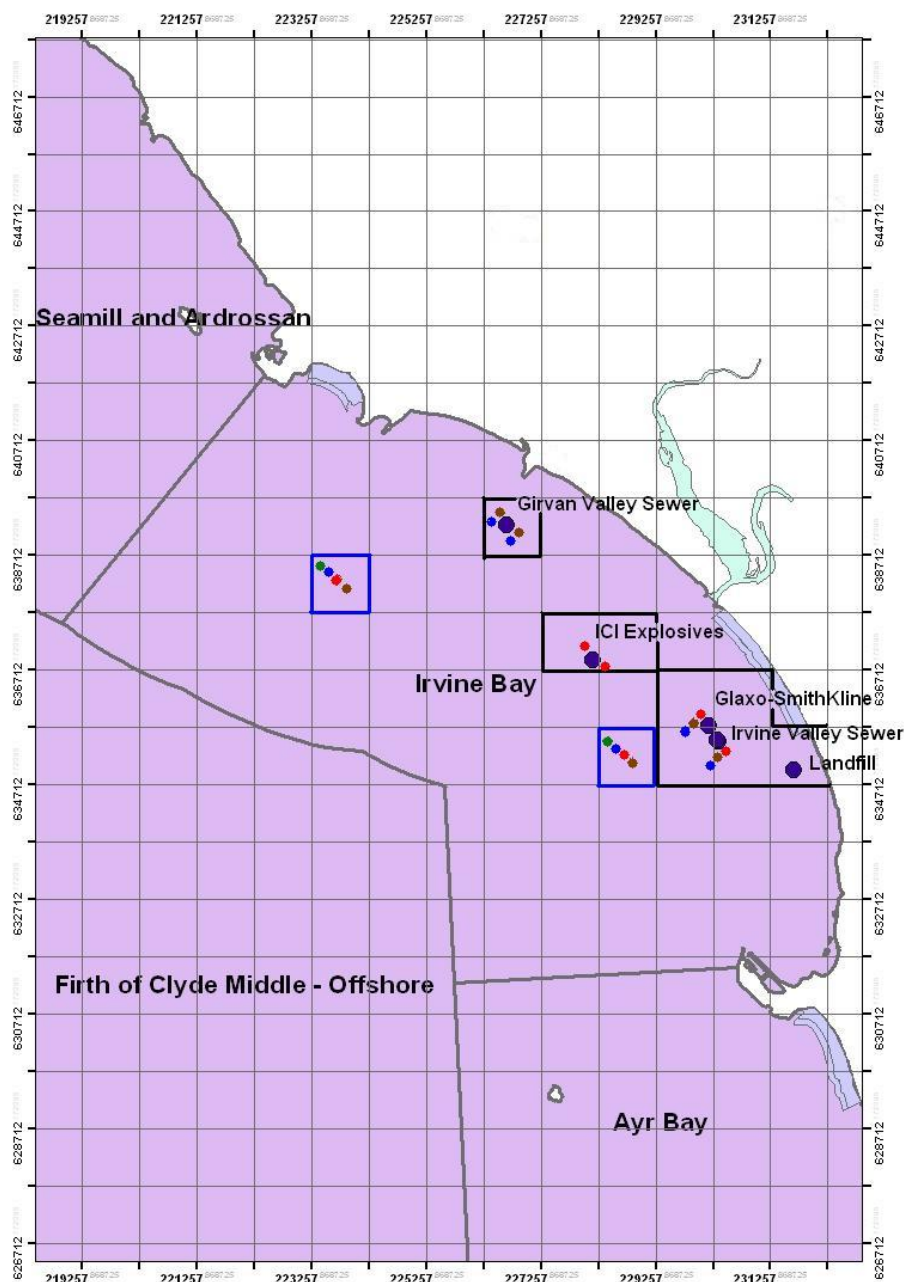


Figure 2: Operational Monitoring in Irvine Bay

{Key: large blue circle = discharge point; small circle = quality element sampling point (green = plants, blue = physico-chem, red = priority substances, brown = benthic) light blue areas along shoreline are EC bathing beaches}

Monitoring around the various point source discharges will take place within the 1km² boxes that surround the discharge points and most likely at specified AZE distances. These areas, outlined in black, will be excluded from the random selection of locations for assessing the general status of the water body. Monitoring locations would be informed by knowledge of the distribution of suitable habitats to which the appropriate pressure sensitive classification tool could be applied. The number of sites and the degree of replication will be specific to the classification tool being used and will be described in further guidance. An increase in the number of sites and / or replicates may be necessary in the first instance where the distribution of habitats in the area is poorly understood.

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The blue boxes shown in Figure 2 are possible locations selected for general status assessment of the water body. In this instance two random locations are shown. Again, monitoring locations would be informed by knowledge of the distribution of suitable habitats to which the appropriate pressure sensitive classification tool could be applied. In the case of water column parameters due to the nature of modern continuous flow sampling methods, physico-chemical monitoring (e.g. nutrients) or biological monitoring (e.g. chlorophyll) may take place in continuous transects across relevant water bodies rather than at limited discrete locations.

2.2 Operational Monitoring in a Transitional Water Body: Poole Harbour

Poole Harbour is located in the Southwest Region of England and is approximately 33km² (Figure 3) and has extensive intertidal areas including saltmarshes and seagrass beds. Poole Harbour is considered to be at risk from nutrients and probably at risk from point source ammonia and hazardous substances, navigational dredging, shoreline defences, shellfishing and alien species. In addition the water dependent SPA and SAC were also considered to be at risk from a range of pressures.

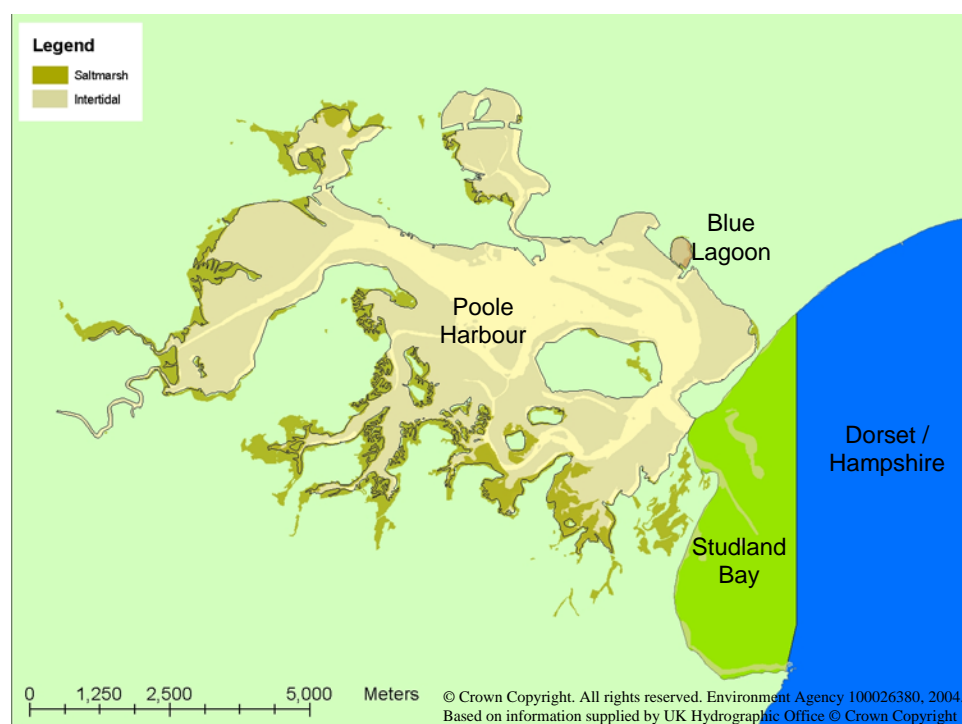


Figure 3 Poole Harbour Transitional Water Body

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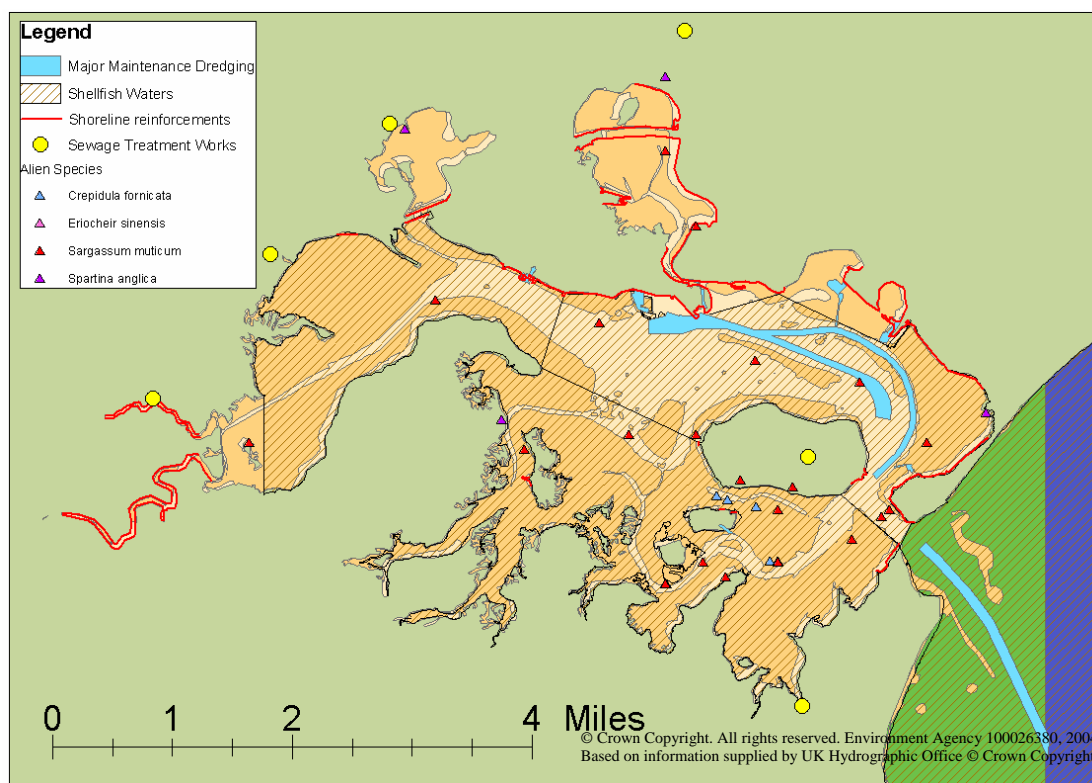


Figure 4 Poole Harbour pressure map

The distribution of pressures within Poole Harbour is complex and is illustrated in Figure 4.

Point Sources

It would be expected that not all the discharges would be monitored and some consideration would be needed to determine the most significant discharge and its likely AZE out-with GES would be expected to be achieved for those elements sensitive to the pressure e.g. benthic invertebrates. For the remaining discharges, knowing the level of pressure comparative to the monitored discharge, a degree of judgement would be needed as to the likely AZE and consideration of the expected cumulative impact that all discharges in the water body would have on the ecology spatially (particularly the benthic habitats). As with Irvine Bay in the SEPA example above, monitoring locations would be informed by knowledge of the distribution of suitable habitats to which the appropriate pressure sensitive classification tool could be applied. Additional sites / replicates may be necessary in the first instance to characterise the extent of the habitats appropriate for monitoring.

Physical Pressures

The AZE of the shoreline defences and maintenance dredging would need to be defined and the extent of particular habitats measured (e.g. the extent of saltmarshes). Depending on agreed thresholds for cumulative impacts as to what constitutes a significant impact spatially, Poole Harbour may be designated as a HMWB (Heavily Modified Water Body) as a result of these physical pressures. In addition the shellfishing activity would need to be assessed and, since the location of the beds and level of fishing activity are known, sampling could be undertaken outside the AZE. The spatial impact of the shellfishing activity would also need to be

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considered alongside other physical pressures for cumulative impacts adding to the potential for designation as a HMWB.

Nutrients

Poole Harbour is a designated Sensitive Area under the Urban Waste Water and Nitrates Directives with inputs from both point and diffuse sources. The same sampling strategy adopted for Irvine Bay Coastal Water would not be adopted in a Transitional Water body since sampling would need to be stratified along the salinity gradient with sufficient representative sites to reflect the size of the water body and the prevailing salinity regime. In the case of Poole Harbour, a transect of 3-5 sites would be sufficient to characterise the water column nutrient and phytoplankton community. In addition Poole Harbour has extensive seagrass beds which are considered to be sensitive to nutrients and would also need to be assessed.

Alien Species

No specific targeted monitoring would be undertaken for alien species that are, or may be present in UK waters. This approach would need to be reviewed on a case by case basis.