

SOUTH WESTERN RIVER BASIN DISTRICT

**Municipal & Industrial Regulation (discharges)
POMS Study
Progress Update in support of the SWMI Report – June 2007**



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RATIONALE FOR THE STUDY

The fundamental objective of the Water Framework Directive (WFD) aims at maintaining 'high status' of waters where it exists, preventing any deterioration in the existing status of waters and achieving at least 'good status' by 2015.

Annex V of the Directive describes the quality elements that must be used for the classification of ecological status/potential for all surface water categories. The Directive sub-divides these quality elements into the following 3 groups:

1. biological elements
2. hydro-morphological elements supporting the biological elements
3. chemical and physio-chemical elements supporting the biological elements

Point source pressures subject to municipal and industrial regulation (MIR) have been identified across many member states as a potential risk to water bodies in achieving their WFD status objectives.

The Irish Article 5 analysis for point source pressures determined the risk to water bodies of the following point source discharges:

1. Urban Waste Water Treatment Plants (population equivalent (PE) >500)
2. Storm Overflows from urban areas with population equivalent (PE) >2000
3. Integrated Prevention and Pollution Control (IP(P)C) Industries (licensed by EPA)
4. Other Industries (Licensed by Local Authorities)
5. Water Treatment Plant Discharges
6. Other Point Sources (e.g. Landfills)

The point source assessment was undertaken by identifying the location and impact potential of point sources. Where monitoring data was available for a discharge (i.e. for treatment plants or industrial discharges), the risk category of the receiving water bodies was dependant on the compliance of the most recent sampling data with license limits. If exceedance of any statutory limit was recorded, water bodies were placed in the 'at risk' or 'probably at risk' categories (depending on data confidence). Conversely, where all samples complied with consent limits, water bodies were placed in the probably not at risk or not at risk categories, again depending on confidence in the data.

Within Ireland's Article 5 report point source pressures accounted for placing 583 or 13.1% of river water bodies at risk or probably at risk and 23 or 10.6% of lake water bodies at risk or probably at risk. While the Article 5 Initial characterisation gave us an understanding of the extent of risk to water bodies attributed to point source pressures, further work was needed to determine the actual impact of these point source pressures on the quality of receiving waters. The amount of dilution available is an important factor: a discharge from a small village into a large river may pose no threat to water quality, whereas a discharge from a larger town may cause significant quality deterioration in the receiving waters if the level of treatment isn't adequate.

The SWRBD was assigned a National task to assess the impact of significant pressures which result from municipal activities and industrial regulation. The significant point sources within the scope of the study include:

1. Urban Waste Water Treatment Plants (UWWTPs)(population equivalent (pe) >500)
2. Untreated urban discharges (population equivalent (pe) >500)
3. Integrated Prevention and Pollution Control (IP(P)C) Industries (licensed by EPA)
4. Section 4 discharges for other Industries (Licensed by Local Authorities under Water Pollution Act)

Storm overflows from urban areas are being further assessed in the Urban Pressures study being undertaken by the Eastern River Basin District (ERBD)

OBJECTIVES

The objectives of the specific tasks in relation to industrial and municipal regulated activities are summarised as follows:

- Determine magnitude of the pressure on water quality resulting from point source discharges from municipal and industrial activities on a national basis
- Further characterise water bodies to an appropriate risk category nationally as a result of point source pressures
- Identify the Significant Water Management Issues.
- Devise measures for water bodies at risk from point source pressures of failing to achieve Good Status or maintain High Status.

APPROACH / METHODOLOGY

The Municipal and Industrial Regulations Study is being progressed under the following tasks:

1. Data review and Data Collection
2. Report on Measurement Equipment at UWWTPs
3. Development of Methodology for Impact Assessment
4. Apply Impact Assessment Nationally
5. Establishment of SIMCAT Model
6. Monitoring and Verification of Model
7. Input into Significant Water Management Issues Report.

The following paragraphs provide more information on what work is required for each of these separate tasks

Task 1: Data Review and Data Collection

This task involved collation of all the National datasets required in order to develop a methodology for impact assessment of point sources and apply that methodology nationally. The datasets could broadly be categorised into pressure datasets and impact datasets. The main pressure datasets included the point source datasets municipal waste water discharges, IP(P)C discharges to surface waters and Local Authority Section 4 licensed discharges. These datasets had been gathered by the various RBDs during initial characterisation. Further work had to be done in supplementing these datasets for the purposes of assessing the magnitude of existing and future discharge loads at point sources such as:

- Addressing data gaps in locations and national grid references of point sources used during initial characterisation
- Collation of monitoring data nationally for each type of discharge
- Collation of discharge flow volumes nationally

- Population projection data at agglomerations greater than 300 p.e. to assist in calculating the future discharge loads by 2015.

The main impact datasets to be collated included

- Receiving water background concentration data – both biological and physio-chemical
- Receiving water flows and flow estimates at point source discharge
- Acceptable environmental quality standards (EQS) in surface waters. These are the acceptable quality parameters or background concentrations in order to achieve or maintain 'good status' in our water bodies.

Task 2: Report on Measurement Equipment at UWWTPS

A number of data gaps were identified and highlighted as the projects terms of reference was being established. One such data gap was the availability of flow and monitoring data at some Municipal WWTSPS. Only 33% of the plants in the 2003 Local Authority Urban Wastewater returns to the EPA provided average daily flow records. To address this data gap a questionnaire was issued to each sanitary authority and a position paper on flow monitoring and sampling facilities at UWWTPs was produced. Recommendations were made as to how to address this data gap. By addressing the data gaps the recommendations would also provide a set of measures needed to assist in achieving or maintaining good status in our water bodies.

Task 3: Development of Methodology for Impact Assessment

The methodology being developed is based on determining the magnitude of the pressure of point source discharge pollution load and assessing the impact this load has on the receiving waters.

There are a number of elements in determining the magnitude of the point source discharge pollution load. For UWWTPs the load is calculated by the discharge volumes and discharge monitoring data provided in the UWWTP Local Authority returns to the EPA. Where discharge volumes are not known the load is calculated using the plant operational p.e.(population equivalent) . For IP(P)Cs and Section 4s the load is calculated based on the license discharge volume and parameter consents. Increasing populations and development pressures also increase the magnitude of the point source pressure. The SWRBD is developing a methodology to apply the consequences of population growth to point source pressures. A demographics expert has been employed to determine appropriate increases in population growth by 2015 at each agglomeration with a population greater than 300 at present.

Further characterisation of the pollution load at UWWTPs will also be provided by carrying out a monitoring programme at a number of UWWTPs. The objective of this monitoring programme is to determine the concentration of certain ubiquitous substances in treated effluent and sludge and assess their impact to the chemical and ecological status of the water bodies. The study also includes a number of plants that accept leachate from landfills. The results from this study are being forwarded to the National Dangerous Substances Study Group to add to their National inventory.

To assess the impact of the resultant pollution loads on the receiving waters a number of criteria have been developed as follows:

1. Is the point source discharging to a 'sensitive' water? i.e.
 - a. Upstream of a drinking water abstraction point
 - b. In a Nutrient Sensitive Water under the Urban Waste Water Regulations
 - c. In a high quality status site
 - d. In a Special Area of Conservation (SACs) or Special Protection Areas (SPAs)
 - e. In a *Margaritifera* (pearl water mussel) zone

2. Does the point source discharge have an impact on receiving water biological quality?
 - a. By showing a deterioration in biological water quality from nearest upstream to nearest downstream biological monitoring points within 3 km of discharge point.
 - b. By showing a deterioration in biological water quality from nearest upstream to nearest downstream biological monitoring points at any distance
 - c. Where downstream biological Q value is less than 4
 - d. Where there is a historical deterioration in downstream Q values

3. What is the available dilution/assimilative capacity of the receiving water under existing conditions?
 - a. Is it less than 25?
 - b. Adequate assimilative capacity for Biological Oxygen Demand (B.O.D.)?
 - c. Adequate assimilative capacity for Phosphorus (P)?
 - d. Adequate assimilative capacity for Nitrogen (N)?

4. What is the available dilution/assimilative capacity of the receiving water under future conditions (2015)?
 - a. Is it less than 25?
 - b. Adequate assimilative capacity for B.O.D.?
 - c. Adequate assimilative capacity for P?
 - d. Adequate assimilative capacity for N?

5. What is the existing capacity of the treatment plant
 - a. Design capacity versus operational capacity under existing conditions?
 - b. Design capacity versus operational capacity under future conditions (2015)?
 - c. Is plant monitoring compliant? Any other Performance Indicators.
 - d. Is plant subject to immediate investment under Water Services Investment Programme (WSIP)?

Task 4: Apply The Impact Assessment Nationally

A national matrix of point source discharges to surface waters is being developed. From the above criteria a scoring system is being applied to each point source discharge. This will result in the point source discharges being prioritised in terms of their greatest risk to the chemical and ecological status of the water bodies they are discharging to – a revision of the national point source risk assessment. This priority list can then be used to target plants for the Department of Environment Heritage and Local Government's (DEHLG) Water Services Investment Programme and ensure optimum value for money for these particular measures regarding receiving water quality and compliance with the Water Framework Directive. The matrix will also enable us to identify where the hot spots lie with regard to point source discharges and the programmes of measures for point source discharges can be developed accordingly.

In another project being undertaken by the SWRBD the Dangerous Substances Usage POMs Study, The National risk assessment is being revised for industrial point source discharges (IP(P)C and Section 4 discharges) in relation to Dangerous Substances.

Task 5: Establishment of SIMCAT Model

SIMCAT was developed for the Environmental Agency and is widely used in water quality planning. The model is used by regulatory authorities to determine the impact of point source discharges in carrying out their licensing functions. The model is currently employed by the Environment Agency in England and Wales and a number of regional councils in the UK. The EA are currently investigating the possibility of using SIMCAT as a national management tool to meet with the requirements of the Water Framework Directive. The aim of the EA is to produce a set of national SIMCAT river models to cover both England and Wales. SIMCAT is a stochastic model and therefore relies on statistics to generate predictive assessments. The more statistics used to generate the input data the more likely the result will be representative of the actual conditions. Typically three years of fortnightly monitoring results is recommended to derive input data for the model.

The SIMCAT pilot project is the development of a SIMCAT model for the entire SWRBD catchment to determine the impact of point source discharges. Simulations will be run to determine the possibility that SIMCAT can be utilised with limited input data to produce reasonable estimates of impacts. If this is shown to be the case it may prove worthwhile to develop further models for the other River Basin Districts (RBDs) using existing available data. SIMCAT could then be used as a useful planning tool to determine the locations of future discharge points and to control the emissions from existing discharge points.

Task 6: Monitoring and Verification of Model

The development of the SIMCAT model is undergoing a number of phases in order to bring it to a level where it can be used as a water quality planning tool. The first phase was an extensive data gathering exercise of input data from the SWRBD. The model then has to undergo a data checking and calibration phase before sample scenarios can be run to test the validity of the model.

Task 7: Input into Significant Water Management Issues Report

The study will identify the significant water management issues (SWMI) with respect to point source discharges. These issues will then be highlighted in the SWMI report. The issues can be added to or commented on during a six month public consultation period subsequent to the publication of the SWMI report on 22nd June. The Issues identified together with the public feedback will form the basis for deriving the programmes of measures to address municipal and industrial regulation in the Draft River Basin Management Plan (RBMP).

PROGRESS TO DATE

A Steering Group was set up to facilitate the completion of the MIR study within the Republic of Ireland. Steering Group members consist of representatives from the Department of Environment, Heritage and Local Government, the Environmental Protection Agency, representatives from Cork County Council, Kerry County Council, North Tipperary County Council, Waterford County Council and Cork City Council.

Task 1: Data Review and Data Collection

This task is substantially complete. However in order to complete the study one or two key National datasets are outstanding. Work is still being progressed on the National flow estimation methodology. It is expected to be completed by late July/early August. This dataset is critical to our impact assessment methodology. We have obtained 95%ile flow data for the water bodies at most of the WWTP points and IP(P)C points at this stage and will work with this until such time as the complete national flow estimation dataset is available. The proposed Environmental Quality Standards for General Components in Surface Waters in Ireland is not yet complete. However we have received a draft version (June 07) and will work with this until the final version is available later on this year. In relation to Section 4 discharge volumes and consent data there are significant data gaps here in the information provided from Local Authorities. This will be reported on and passed over to the Dangerous Substance Usage Group for consideration in their study. There is also a significant data gap in relation to capacity/design P.E. of UWWTPs. for agglomerations less than 2000 P.E.

Task 2: Report on Measurement Equipment at UWWTPS

This report was completed in February 2007. A large data gap has been identified due to the deficit in flow monitoring and sampling equipment at UWWTPs. The report has been passed onto the National POMS Co-Ordination Group for further consideration. The conclusions and recommendations from the report albeit subject to comments from the WFD National POMS Co-ordination Group and WFD National Technical Co-Ordination Group will be carried forward to form a basis for some of the proposed measures in Municipal and Industrial Regulations.

Task 3: Development of Methodology for Impact Assessment

The methodology being developed is based on determining the magnitude of the pressure of point source discharge pollution load and assessing the impact this load has on the receiving waters.

The magnitude of the point source pressures or pollution loads have been calculated for all municipal WWTP discharges and IP(P)C discharges to surface waters under existing conditions for some of the key parameters. Because of the large data gap in relation to Section 4 discharge volumes and monitoring data, it is not possible to calculate the magnitude of pressure here in many instances. However generally speaking the Section 4 s are the least significant of the three pressures. The population projections are complete for about two thirds of the country and future pollution loads at point source pressures have been calculated in these areas.

The chemical and ecological monitoring study on UWWTPS has been split into 2 phases. Phase one is complete and the results and conclusions have been circulated to the MIR Steering Group and Dangerous Substances Screening Group for their consideration. From Phase one a number of substances ubiquitous in effluent and sludge have been identified and their potential impact to the ecology of the receiving water assessed. A couple of plants accepting leachate from landfills were also included in the study and their list of substances was increased accordingly. It is hoped that the results in Phase 2 of the study will verify the Phase one results and a definitive list of ubiquitous substances can be established for treated UWWTP effluent (with and without leachate) and sludge.

To assess the impact of the resultant pollution loads on the receiving waters, based on the criteria that were developed for this purpose :

1. Maps and registers have been created of all point source discharges
 - a. Upstream of a drinking water abstraction point
 - b. In a Nutrient Sensitive Water under the Urban Waste Water Regulations
 - c. In a high quality status site
 - d. In a Special Area of Conservation (SACs) or Special Protection Areas (SPAs)
 - e. In a *Margaritifera* (pearl water mussel) zone
2. A biological assessment has been carried out on point source discharges
 - a. Showing a deterioration in biological water quality from nearest upstream to nearest downstream biological monitoring points within 3 km of discharge point.
 - b. Showing a deterioration in biological water quality from nearest upstream to nearest downstream biological monitoring points at any distance
 - c. Where downstream biological Q value is less than 4
 - d. Where there is a historical deterioration in downstream Q values
3. Draft assimilative capacity methodologies for dilutions, B.O.D., P and N have been applied under existing conditions. The assimilative capacity methodology needs to be finalised and the National flow estimation dataset needs to be obtained to complete this element.
4. Draft assimilative capacity methodologies for dilutions, B.O.D., P and N have been applied under future conditions. The population projections and assimilative capacity methodology need to be finalised, and the National flow estimation dataset needs to be obtained to complete this element.
5. The capacity of the treatment plant has been obtained where available and all plants have been checked for compliance under the Urban Waste Water Directive Regulations to assess their performance. The plants have also been cross-checked under the water services investment programme.

Task 4: Apply The Impact Assessment Nationally

The national matrix of point source discharges to surface waters has been developed. It is subject to the above tasks being complete before the risk assessment to surface waters can be re-run Nationally .

Task 5: Establishment of SIMCAT Model

The SIMCAT model for the SWRBD has been established at this stage subject to verification below.

Task 6: Monitoring and Verification of Model

The model is currently undergoing the data checking and calibration phase. A number of more recently available datasets have been added to the model. This should increase the accuracy of assimilating existing conditions. Gaps in receiving water flow data for some of the periphery catchments will be provided as soon as the National dataset becomes available. Alternative flow estimation techniques are being used at present.

Task 7: Input into Significant Water Management Issues Report

This task is now complete.

EARLY INDICATIONS OF RESULTS / CONCLUSIONS

At this stage a substantial number significant water management issues and subsequent basic and supplementary measures have been identified in relation to Municipal and Industrial Regulation.

The report on flow monitoring and sampling facilities at UWWTPs and the Phase 1 report on the chemical and ecological monitoring programme at UWWTPs can assist the DEHLG and EPA in finalising the National Licensing system for the operation of Local Authority Waste Water Discharges.