

Environment and Heritage Service

Regulation of Water Service Discharges Report 2006

A report by the Water Management Unit



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EXECUTIVE SUMMARY

This is the fifth report published by Environment and Heritage Service (EHS) detailing the compliance of Water Service discharges with relevant European and EHS discharge standards. The report presents the trends in compliance with standards between 2001 and 2006 and provides details of the 2006 annual compliance.

Compliance was assessed against numeric standards set for discharges from 287 Waste Water Treatment Works (WWTW) serving a population equivalent (PE) greater than 250, and against descriptive standards for 22 coastal WWTWs and numeric standards for 28 Water Treatment Works (WTW).

Compliance has also been assessed against the requirements of the Urban Waste Water Treatment (UWWT) Regulations (Northern Ireland) 1995 for the 77 WWTWs that were required to meet numeric standards under the Regulations in 2006.

Details of progress with capital works schemes are also presented in the report.

Compliance of WWTWs with EHS Standards

Table 1 summarises compliance with EHS Registered Standards on the public register for the period 2001 to 2006.

Table 1: Summary of Compliance with WWTWs Registered Discharge Standards

| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|------|------|------|------|------|------|
| Number of WWTWs on the Public Register | 268 | 270 | 274 | 276 | 279 | 287 |
| Percentage of discharges complying with numeric standards | 54% | 66% | 67% | 77% | 80% | 88% |
| Percentage of discharges complying with descriptive standards | 100% | 100% | 100% | 100% | 100% | 32% |
| Overall compliance with discharge standards | 58% | 69% | 70% | 80% | 82% | 84% |

The overall compliance with Registered Standards has continued to increase throughout the 6 year period and can be attributed to the operation of a consistent regulation system by EHS, the commissioning of a number of new WWTWs and to continuing improvement schemes carried out by Water Service. However, there was a significant drop in compliance with the descriptive standards in 2006 because a number of the coastal works were not providing the level of treatment that EHS considered necessary to meet the water quality objectives.

Figure 1. Newtownbreda WWTW

Compliance with UWWT Regulations

The compliance of WWTW effluent discharges with the UWWT Regulations is shown in **Table 2**.

In 2006, 77 works were identified as requiring to meet numeric standards under the Regulations. This was an increase on previous years arising from the requirement that from 31 December 2005 works with PE between 2000 and 10,000 discharging to fresh or estuarine waters, and between 10,000 and 15,000 discharging to coastal waters, were required to meet numeric standards.

As can be seen in **Table 2**, compliance increased from 2001 to 2003 and then dropped in 2004 as a result of sampling difficulties within Water Service. Since 2005, compliance has improved again and although the number of compliant works being reported increased in 2006, most of these works either already had the required level of treatment or have been recently upgraded and 77% compliance was achieved.

Table 2: Summary of Compliance for all UWWT Regulation WWTWs

| Percentage Compliance | | | | | |
|-----------------------|------|------|------|------|------|
| 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
| 35% | 46% | 60% | 43% | 62% | 77% |

In 2006, 16 Water Service works serving a PE greater than 10,000 discharging to Sensitive Areas (Eutrophic) required more stringent treatment, and their percentage compliance is set out in **Table 3**. The marked improvement in compliance since 2004 was due largely to better performance by Water Service in meeting the sampling requirements of the Regulations. The works with PE greater than 10,000 affecting areas identified as Sensitive in the 2005 review will not require more stringent

treatment to be applied until 2013. The works at Newtownbreda, Dunmurry and New Holland were already considered to be impacting indirectly on Inner Belfast Lough and will require nutrient removal to be operational by the end of 2008.

Table 3: Summary of Compliance for WWTWs Discharging to Sensitive Areas

| Percentage Compliance | | | | | |
|-----------------------|------|------|------|------|------|
| 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
| 60% | 60% | 79% | 29% | 75% | 81% |

Since 31 December 2005, the UWWT Regulations required appropriate treatment for the smaller WWTWs with PE less than 2000 discharging to fresh and estuarine water and those with PE less than 10,000 discharging to coastal waters.

These requirements are reflected in the numeric standards issued by EHS for works serving populations greater than 250 discharging to fresh and estuarine waters.

No specific monitoring regime for appropriate treatment is required under the UWWT Regulations.

Future WWTWs Compliance

The UWWT Regulations require all WWTWs in Northern Ireland to provide levels of treatment that will adequately protect the waterways to which they discharge. To meet this requirement, EHS has determined environmental needs standards (ENS) for all WWTWs, and these standards have been recorded in the public register.

The reform of Water Service to become a government owned company, Northern Ireland Water Limited (NIW), on 1 April 2007, means that Water Order Consents instead of Registered Standards were issued for all NIW discharges from that date. In a number of cases the ENS already applies. However, where capital works schemes have yet to be carried out, the ENS will be applied on the completion date stated in the Consent. These conditions have been written into the Consents, and failure to comply with them will lead to appropriate enforcement action.

There are approximately 900 WWTWs with PE less than 250 in Northern Ireland, the majority of which have a descriptive standard since 2007, outlining the level of treatment and maintenance requirements. Assessment of the treatment that is appropriate at each works is ongoing.

Sewerage Systems

EHS and Water Service have carried out a number of assessments on sewer systems to identify and improve unsatisfactory discharges from Combined Sewer Overflows (CSOs) and pumping station emergency overflows (EOs) which are adversely affecting the environment.

Figure 2. Governors Bridge CSO



By 1 April 2007, 7 sewerage system upgrades had been completed with construction under way at a further 9. Formal agreement has been reached on the upgrading requirements of another 21 systems, and EHS has identified the environmental issues for a further 31 schemes.

Compliance of WTWs with EHS Standards

The treatment of drinking water generates effluents that are discharged to nearby waterways. EHS determines discharge standards for these effluents to protect the quality of the receiving water.

Table 4 details the compliance of WTW effluents with their EHS Registered Standards for the years 2001 to 2006. Compliance has fluctuated between 38% and 50% over this time period and at 38% in 2006 is at its lowest over the 6 year period. The compliance problems are related to exceedances of the numeric standards within the consents and to sampling difficulties caused by the intermittent nature of the discharges.

Table 4: Summary of WTW Compliance 2001- 2006

| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|--|------|------|------|------|------|------|
| Number of WTW discharges monitored | 27 | 26 | 27 | 30 | 28 | 31 |
| Percentage of WTW discharges complying | 48% | 50% | 44% | 40% | 43% | 38% |

SECTION 1

REGULATORY SYSTEM



Regulatory System

Although Water Service discharges in 2006 were not subject to control under the Water (Northern Ireland) Order 1999, discharges from WWTWs above 250 PE and WTWs were subject to control through 'Registered Standards' by administrative arrangement. These Registered Standards set out the conditions relating to the quality and quantity of effluent that could be discharged to the water environment and include the requirements of relevant European Directives, such as the Urban Waste Water Treatment Directive (UWWTD), implemented by Urban Waste Water Treatment Regulations (Northern Ireland) 1995 (UWWT Regulations). Compliance with Registered Standards is reported annually.

This system was employed as Water Service in 2006 was part of central government and subject to 'crown immunity'. Enforcement was therefore limited to EHS issuing 'advisory letters' detailing the nature of the non-compliance and requesting an explanation and a remedial action plan from Water Service.

Information on the Registered Standards is maintained on a Public Register which was created to allow public access to information on performance against the standards and to allow for public accountability. The register for Water Service Registered Standards contains information on:

- the discharge conditions set by EHS to meet local environmental needs
- separate discharge conditions to meet the requirements of the UWWT Regulations
- EHS advisory letters and Water Service correspondence

Registered Standards

There are three main types of Registered Standard depending upon the nature of the discharge and the conditions that are considered appropriate:

- a) numeric,
- b) non-numeric, and
- c) descriptive.

A numeric Registered Standard sets numeric limits to control individual parameters and enables a quantitative assessment of compliance to be calculated. For EHS standards, the parameters required to be controlled are biochemical oxygen demand (BOD), suspended solids (SS) and ammonia (NH₄). In some cases, nutrient standards are included to limit the discharge of phosphorus and/or nitrogen.

Numeric Registered Standards for WWTWs use 95-percentile and upper-tier standards for BOD, SS and NH₄. Compliance with the 95-percentile is assessed using the 'look-up' table set out in the UWWT Regulations. The lookup table allows a greater number of samples to be non-complaint than the strict 95%ile in order to provide 95% confidence that the consent

condition has not been met. The overall compliance for the WWTW defaults to that of the parameter showing the worse compliance.

Upper-tier standards have been set where the numeric standards specified in the UWWT Regulations applied (for works greater than 10,000 PE discharging to coastal waters and works greater than 250 PE discharging to fresh and estuarine waters) or where there is limited dilution available in the receiving waterway. This is set as an absolute standard which must not be exceeded at any time. A single exceedance of an upper-tier standard at any time during the year results in the works being non-compliant for the whole of that year.

Numeric standards have been set for all new or substantially modified WWTWs at the design stage to determine the level of treatment needed and the quality required of the effluent. In determining the appropriate standard for rivers and streams, account is taken of the flow in the receiving water and discharge flow. This is usually based on the dry weather flow (DWF) at the inlet of the works, (i.e. the flow received by the works during prolonged dry weather conditions), and the low flow in the river (i.e. the flow that is exceeded 95 percent of the time). This information is entered into a simple statistical model to derive the standards that provide the required level of protection for the receiving water.

The standards derived from this procedure take into account not only the water quality targets set by EHS for the receiving waterway but also the requirements of any relevant European Directives. For coastal discharges, some form of dispersion modelling is often required to determine suitable standards. The standards in both cases represent the “environmental needs” which is the standard that EHS considers necessary to protect the receiving waterway from adverse effects of the discharge. Fisheries Conservancy Board, the Loughs Agency and EHS’s Natural Heritage Directorate were consulted about the proposed standards being issued to Water Service.

Toxic metals and certain organic chemicals that may be components of an industrial effluent are subject to absolute concentration and/or load limits within the Registered Standard. These substances must be regulated before being accepted into the sewer by Water Service through trade discharge Consents, Directions and Agreements under the Water and Sewerage Services (Northern Ireland) Order 1973 Part V. EHS progressively reviews standards for dangerous substances in Water Service discharges as information on their presence in effluent discharges is made available.

The effluent discharges (continuous or intermittent) from WTWs supplying potable water are considered as process effluents similar to those from industry. Such discharges are required to comply with a 99-percentile standard for parameters such as suspended solids, aluminium, iron and chlorine.

Interim numeric Registered Standards are applied as a temporary measure where major capital works are being carried out at an existing works and there may be a risk of non-compliance with the existing standard for a period of time. Such interim Registered Standards are time banded and issued before work commences. Applications for interim standards are considered on a case by case basis. As a rule, the conditions in the interim

standard are the minimum necessary for Water Service (or their contractor) to carry out the work. Where an interim standard could lead to non-compliance with a relevant water quality objective or European Directive the request is likely to be refused.

Urban Waste Water Treatment Directive (UWWTD) Standards

The UWWT Directive sets out minimum standards for the discharge of treated effluent from WWTWs. The Directive was transposed into legislation in Northern Ireland in March 1995 by the Urban Waste Water Treatment Regulations (NI) 1995, now replaced by the Urban Waste Water Treatment Regulations (NI) 2007, which are implemented and regulated by EHS. The Regulations have already led to the cessation of the disposal of sewage sludge to sea at the end of 1998.

The Regulations require that all significant discharges of sewage are treated, whether the discharge is to inland surface water, groundwater, estuaries or coastal waters.

Significant discharges are defined as discharges from WWTWs serving communities with the following PE:

- WWTWs with a PE greater than 2000 discharging to freshwaters or estuaries
- WWTWs with a PE greater than 10,000 discharging to coastal waters

The standards depend on the size of the population served and on whether the receiving waters are defined as 'normal' within the terms of the Directive or classified as 'sensitive' or 'less sensitive'. No 'less sensitive' areas are identified in Northern Ireland.

In most cases secondary treatment is considered appropriate for discharges to freshwaters, estuaries and coastal waters as specified in the Directive for 'normal' waters.

The implementation dates set out in the Directive are as follows:

- Discharge to sensitive waters from works with PE greater than 10,000 must have more stringent treatment by 31 December 1998
- Discharge to normal waters from works with PE greater than 15,000 must have secondary treatment by 31 December 2000
- Discharge to inland and estuarine waters from WWTWs serving between 2,000 and 15,000 PE require secondary treatment by 31 December 2005
- Discharge to coastal waters from WWTWs serving between 10,000 and 15,000 PE require secondary treatment by 31 December 2005
- All other discharges should have 'appropriate' treatment as defined by individual Member States by 31 December 2005

The UWWT Directive sets 95-percentile standards and upper-tier standards

for BOD and Chemical Oxygen Demand (COD), and these are set out in the UWWT Regulations. The 95-percentile standard can be applied as a numerical limit (25mg/l O₂ BOD) or a minimum percentage reduction figure (the BOD of the effluent must be at least 70% less than the BOD of the influent).

The minimum percentage reduction to be achieved for BOD and COD are laid down in Part 1 of Schedule 3 of the Regulations (see **Table 5**) and are to be met 95 per cent of the time as judged by the look-up table. Where a discharge does not comply with the percentage reduction criteria, it will be assessed using the appropriate 95 percentile limit values.

Table 5: UWWT Regulations standard

| Parameter | 95-Percentile Limit | Average Limit | Upper-Tier Limit | Percentage Reduction |
|---------------------------------|-------------------------|--------------------------|-------------------------|----------------------|
| Biochemical Oxygen Demand (BOD) | 25 mg/l O ₂ | | 50 mg/l O ₂ | 70-90% |
| Chemical Oxygen Demand (COD) | 125 mg/l O ₂ | | 250 mg/l O ₂ | 75% |
| Total Phosphorus | | 2 mg/l P _# | | 80% |
| Total Nitrogen | | 10-15mg/l N _§ | | 70-80% |

#1mg/l limit applies to works with PE greater than 100,000 in Sensitive Areas

§10mg/l limit applies to works with PE greater than 100,000 in Sensitive Areas

WWTWs with PE greater than 10,000 discharging into waters which are identified as 'Sensitive' under Part 1 of Schedule 1 of the Regulations are subject to more stringent treatment, such as nutrient or bacteriological reduction. The more stringent treatment applied depends on the criteria for identification of the area as sensitive, i.e. whether the area has been identified as eutrophic, or there are increased levels of nitrate in the drinking water supply source, or there is a failure to comply with other Directives, such as the Shellfish and Bathing Water Directives.

Sensitive area reviews are required every four years. Two catchments were originally designated sensitive in 1994, three in 2001 and 11 additional areas in 2005.

More stringent treatment is required within 7 years of the Sensitive Area identification for those larger (greater than 10,000 PE) works which discharge within these areas (**Table 6**).

Table 6: WWTWs greater than 10,000 PE discharging into Sensitive Areas

| Catchment | Qualifying works | More stringent Treatment Requirement | Implementation Date |
|---------------------------|---|--------------------------------------|---------------------|
| Lough Erne | Enniskillen | P | 31/12/1998 |
| Lough Neagh | Antrim Armagh Ballyclare Ballymena Ballynacor Banbridge Bullay's Hill Cookstown Magherafelt Moynashel Seagoe Tandragee Tullagharley | P | 31/12/1998 |
| Inner Belfast Lough | Belfast Carrickfergus Kinnegar* Newtownabbey | N | 20/12/2004 |
| Tidal River Lagan | Newtownbreda Dunmurry New Holland | N and P | 20/12/2008 |
| Quoile Pondage | Downpatrick | N and P | 20/12/2008 |
| Foyle | Omagh | P | 28/07/2013 |
| Roe | Limavady | P | 28/07/2013 |
| Lower Bann | Glenstall Ballybrakes | P | 28/07/2013 |
| Strangford Lough (North) | Ballyrickard | N | 28/07/2013 |
| Newcastle bathing water | Newcastle | Additional Treatment | 28/07/2013 |
| Ardmillan shellfish water | Ballyrickard | Additional Treatment | 28/07/2013 |

* private finance initiative works

Non-numeric Registered Standards

As well as standards for treatment works discharges, the UWWT Regulations also set requirements for collection systems, more commonly known as sewerage systems. The regulations require that collection systems for WWTWs be provided by the same compliance dates as the WWTWs, and that they be designed, constructed and maintained in accordance with best technical knowledge not entailing excessive costs.

Guidance on the requirements of the Regulations and compliance with them are set out in the Guidance Note to the UWWT Regulations published by EHS in August 1999.

Most collection systems are 'combined' in that they deal with rainwater run-off as well as domestic and industrial wastewater. Such systems are fitted with combined sewer overflows (CSOs) that allow excess storm sewage to discharge direct to waterways during storm events that would otherwise risk damaging the sewer system and any ancillary equipment and result in out-of-sewer flooding which might damage property. Such discharges are intermittent and, when subject to good engineering design and providing they discharge into waters with adequate dilution, do not normally harm the environment.

Intermittent sewage discharges from CSOs or emergency overflows (EOs) on sewerage systems are granted non-numeric Registered Standards. Such standards set out the design settings or operating conditions that determine when a discharge is allowed to take place and the controls to be applied to it, such as screening, storage, stand-by generators and pump-out connection for tankers. Where such discharges have a significant impact on water quality (e.g. a bathing water), a limit on the number of spills per year may be required. In the case of EOs, EHS requires telemetry to be installed at all new pumping stations where environmental problems have been identified.

The determination of Registered Standards for CSOs and EOs takes account of the requirements of the Guidance Notes to the Regulations and the recommendations of the Urban Pollution Management (UPM) Manual. This manual sets out an agreed approach to the control of wet weather discharges developed jointly by the United Kingdom environmental regulators and the water industry. Both Water Service and EHS have agreed to employ the assessment procedures set out in the UPM manual in examining the environmental impact and design of sewer systems containing CSOs.

A very limited number of Registered Standards existed for CSOs and EOs in 2006. However these overflows have since April 2007 been included within sewer system Consents.

Descriptive Registered Standards for WWTWs

In 2006 descriptive Registered Standards have been applied to small WWTWs, (i.e. those works less than 10,000 PE discharging to coastal waters) where the environmental impact is limited and there is no significant amount of trade effluent received at the works. The Registered Standard

sets out operational and maintenance requirements for the works in accordance with good practice.

Approximately 900 small works (i.e. with PE less than 250 discharging to fresh and estuarine waters) have been consented under the Water Order by April 2007.

A descriptive Registered Standard may also be applied as an interim measure where major capital works are being carried out at an existing works. Such interim Registered Standards are time banded and their conditions agreed in writing before work commences.

Monitoring and Assessment of Compliance

Numeric Registered Standards

Compliance with numeric Registered Standards is assessed using "spot" samples taken by Water Service according to an agreed sampling programme issued in advance of the compliance year. Water Service is required to forward the results of these samples to EHS for assessment within 3 weeks of the end of the month in which compliance is to be assessed.

Water Service is informed at regular intervals of non-compliance by the issue of advisory letters. An advisory letter is issued when a parameter has reached or exceeded the maximum number of exceedances allowed for the 95-percentile standard and/or where there was an extreme exceedance of the standard.

The advisory letter sets out the significance of the exceedances, the works compliance, and/or whether there was an extreme exceedance. When a works does not comply with a standard, an explanation is sought and Water Service is required to take action to avoid future non-compliance and to inform EHS of the action being taken to address the issue.

All correspondence relating to these regulatory functions is placed on the Public Register. Where the remedial action requires significant modifications or capital works, it may take some time to be carried out. In other cases, interim measures may be employed until the long-term solution is provided.

To assess compliance each parameter is considered separately and the parameter with the worst compliance is used to record the overall 12-month performance at the end of the year. In assessing compliance, the application of the Normal Operating Conditions (NOC) clause is taken into consideration. This clause allows programmed samples to be discounted from the compliance assessment on the grounds that they are not representative of the performance of the works, due to the works not operating normally at the time of sampling as a result of unforeseen circumstances, such as extreme weather conditions or a power failure.

Urban Waste Water Treatment Directive Standards

The Regulations require that 24-hour composite samples be taken to monitor numeric compliance with the UWWT Directive requirements. A composite sample is the combination of a series of equal volumes of individual samples of the discharge, taken at hourly intervals over a 24-hour period into one sample. This is normally carried out by an automatic sampler that preserves and retains the integrity of any samples collected.

Where Water Service wishes to use the percentage reduction standard for assessing compliance, a composite sample of the sewage entering the works, as well as one of the effluent, is required.

The UWWT Directive, as previously described, lays down 95-percentile and upper-tier standards for BOD and COD as set out in **Table 5**. In determining compliance with the UWWT Regulations, 95-percentile compliance with the percentage reduction criteria is assessed, before compliance with the 95-percentile numeric standard and the upper-tier standard.

Only when the sampling results show that the required percentage reduction has not been achieved or it is not possible to determine the degree of reduction due to lack of influent data, is compliance assessed with the 95-percentile limit value and the upper-tier standard.

Compliance with the 95-percentile numeric standard is assessed in a similar way to the normal 95-percentile Registered Standard except that composite samples are used. In assessing compliance, each parameter is looked at separately, and the overall compliance is based on that of the parameter with the worst performance.

For works that have a PE greater than 10,000 discharging into waterways that are identified as Sensitive to eutrophication, nutrient reduction is required. This may be a reduction in the level discharged of total phosphorus or total nitrogen, or both, depending on the nutrient that needs to be controlled (usually phosphorus in freshwaters and nitrogen in saline waters). Compliance with the relevant standards in **Table 5** are also assessed on 24-hour composite sample results. As these standards are annual averages, it is often not possible to demonstrate non-compliance until the year is complete.

For a works to be non-compliant with the numeric standards specified in the UWWT Regulations it must:

- Fail to comply with the upper-tier standard and the percentage reduction standard in the same sample for BOD or COD at least once in the year.

(If percentage reduction cannot be assessed, non-compliance is by exceedance of the upper-tier standard alone.)

- Exceed the 95-percentile limit standard and the percentage reduction standard in the same sample for BOD or COD on more than the permitted number occasions in the year. (That is more than twice for 12 samples and more than three times for 24 samples)

- Be non-compliant with the annual average total phosphorus and/or total nitrogen standard and the annual average percentage reduction (where nutrient standards are applicable).
- Not have met the sampling requirements of the Regulations relating to the number of samples for the size of the works or the provision of composite samples.

Failure of just one of the above bullet point scenarios constitutes an overall failure of the WWTW.

WTW numeric standards

Compliance is assessed as a 99-percentile which is interpreted as one allowed exceedance of a parameter in the Registered Standard in 12 samples taken over a 12-month period. A second exceedance of any parameter results in the discharge failing to comply with the Registered Standard.

Non-Numeric Registered Standards for Intermittent Discharges

These do not normally require monitoring, unless the discharge is to an environmentally sensitive area or it is demonstrated that the discharge is causing a water quality problem. Where required by the Registered Standard, Water Service is required to keep records of the frequency and the volume of spills from CSOs or EOs for a period of at least 10 years. These records are to be provided to EHS on request. Water Service may also be required to provide information on the design settings and the performance of overflows to assist in identifying satisfactory and unsatisfactory overflows.

In certain situations Water Service may be required to provide waste water flow data upstream and downstream of a CSO to demonstrate that it is operating the correct overflow setting. The performance of sewerage systems is reviewed following the procedures set out in Annex 8 of the Guidance Notes to the Regulations. In addition, EHS may carry out detailed studies of the effects of intermittent discharges on the receiving water using biological and chemical monitoring, combined with a visual examination of the operation of CSOs under dry weather as well as storm conditions. The performance of any screening arrangements should also be checked in the case of overflows at WWTWs where the storm tanks operate in combination with a CSO at the inlet to the works. Currently, only a small number of non-numeric standards have been issued for CSOs.

In the case of pumping stations with EOs, records of the maintenance carried out must be retained. This includes information on the operation of the pumps, the telemetry system and, where appropriate, the standby generator.

Compliance with a non-numeric Registered Standard is assessed with regard to the flow settings, the frequency of spills and/or the requirement for the retention of solids. In addition, a discharge may be considered unsatisfactory using the criteria set out in the Guidance Notes to the Regulations.

Descriptive Registered Standards for WWTWs

Monitoring of descriptive Registered Standards at WWTWs involves inspection of the works to check for satisfactory operation and that there is no adverse environmental impact, as well as examination of maintenance records provided by Water Service. Where a discharge is considered to be polluting, EHS may implement a sampling programme to verify, and to determine the extent of the impact. The data obtained and any other relevant environmental information is used to seek action to improve the discharge or to assess the need for a numeric Registered Standard.

Flow Regulation

The flows received and discharged by a WWTW are regulated by the Registered Standard, using the registered dry weather flow (DWF) and the maximum flow to full treatment for the works (the 'pass forward flow'). Other flow settings may also be checked on occasions, i.e. the flow at which storm water is diverted to storm tanks. If the total volume of effluent discharged in any one day exceeds the registered 'pass forward flow', this would result in non-compliance of the discharge. Also, if the daily average flow measured under dry weather flow conditions exceeded the registered DWF, the works would be considered as non-compliant.

For future reports, compliance with the flow requirements will be assessed using the flow records supplied by Water Service. These records may be verified on occasions by flow measuring exercises carried out by EHS.

At WTWs, the registered maximum flow rate and the maximum volume discharge per day are regulated. Registered Standards also set out the requirements for flow measuring and the maintenance of flow measuring equipment.

The flow records must be held by Water Service for at least 24 months and made available to EHS on request. Flow records from WTW are assessed against the maximum allowable rate of flow. Any exceedance of these registered flow limits would be considered to constitute non-compliance.

At WWTWs it may be necessary to confirm the flow at which a CSO begins to operate, as required by the Registered Standard. Normally this is carried out through spot checks during inspection visits to confirm flow compliance with the Registered Standard. At larger works (greater than 5000 PE), or where the overflow is likely to have a significant impact on receiving waters, it may be necessary to check using continuous flow recording data.

SECTION 2

WASTE WATER TREATMENT WORKS



Compliance 2006

In 2006 Water Service discharges were not subject to control under the Water Order (Northern Ireland) 1999. However, they were, by administrative arrangement, regulated by conditions similar to those that would apply under that legislation.

The standards and conditions for each discharge were set out in Registered Standards as described in **Section 1** of this report, and details of compliance with the standards can be viewed on the Public Register (available at the EHS Water Management Unit, 17 Antrim Road, Lisburn) which contains information on all WWTWs.

This section provides a summary of compliance with Registered Standards during 2006 for 287 WWTWs serving a PE greater than 250 and 22 coastal WWTWs with descriptive standards, and also identifies compliance trends since 2001. These works serve more than 98% of the sewered NI population, and compliance for the period 2001 to 2006 is summarised in **Table 7** and presented in **Figure 4**.

Information on the 2005-2006 assessment of appropriate treatment for those WWTWs less than 250 pe has also been included.

Details of compliance with the requirements of the UWWT Regulations are treated separately and described in **Section 3**.

As can be seen from **Table 7** and **Figure 4**, the overall compliance figures demonstrate an increasing trend in compliance from 58% in 2001 to 84% in 2006.

This sustained improvement in compliance with EHS standards can be attributed to the commissioning of a number of new WWTWs and to improvement schemes carried out by Water Service as a result of tighter regulation.

However there was a fall in compliance with the descriptive consents from 100% over the last few years to 32% in 2006. This was a result of EHS determining that 7 of these coastal works did not have the appropriate treatment in place.

Table 7: WWTWs Registered Discharge Standard Compliance for WWTWs with a PE greater than 249

| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|------------|------------|------------|------------|------------|------------|
| Number of WWTW discharges on the Public Register | 268 | 270 | 274 | 276 | 279 | 287 |
| Number of discharges with numeric standards | 247 | 249 | 254 | 256 | 259 | 265 |
| Number of discharges complying with numeric standards | 134 | 165 | 171 | 197 | 207 | 234 |
| Percentage of discharges complying with numeric standards | 54% | 66% | 67% | 77% | 80% | 88% |
| Number of discharges with descriptive standards | 21 | 21 | 20 | 20 | 20 | 22 |
| Number of discharges complying with descriptive standards | 21 | 21 | 20 | 20 | 20 | 7 |
| Percentage of discharges complying with descriptive standards | 100% | 100% | 100% | 100% | 100% | 32% |
| Total number of compliant WWTWs | 155 | 186 | 191 | 217 | 227 | 241 |
| Overall Compliance with discharge standards | 58% | 69% | 70% | 80% | 82% | 84% |

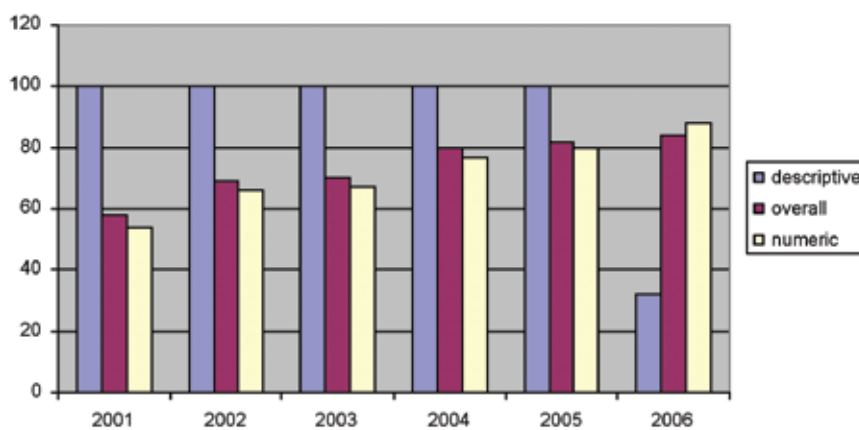
Information on the WWTWs that were non-compliant with their numeric discharge standards in 2006 is tabulated in **Appendix A**.

Specific details on the performance of non-compliant works and information on improvements, updated to the end of August 2007, can be found in **Appendix B**.

Figure 3: Filter beds at Clough WWTW



Figure 4: Summary of WWTW Compliance 2001-2006



Priority Pollutants (Dangerous Substances) and other Standards

In 2006, Aghanloo 2 was the only WWTW that had standards set for 'priority pollutant' parameters. Table 8 summarises compliance with these standards in 2006.

Table 8: Priority Pollutant Compliance in 2006

| Standard Compliance * | | | | | |
|-----------------------|-----------------------|---------------------|-------------------|---------------------|-------------------|
| Name of WWTW | Soluble Chromium mg/l | Soluble Copper mg/l | Soluble Lead mg/l | Soluble Nickel mg/l | Soluble Zinc mg/l |
| Aghanloo 2 | X | X | | | X |

* Standards are set as absolute emission limits, i.e. must be met for all samples. (X - Non-compliant parameter)

Monitoring

Compliance with the standards set by EHS is assessed using monitoring data provided by Water Service in accordance with an agreed sampling programme. The Water Service Laboratories carrying out the analysis are accredited under the United Kingdom Accreditation Service (UKAS) and samples are analysed for all the parameters included in the Registered Standards. EHS determines compliance based on the results generated by this self-monitoring regime. EHS periodically carries out audit checks on the processing of samples taken and the analytical procedures employed to ensure consistent and acceptable performance.

Flow Data and Measurement

Consents for WWTW effluents are based on the flow discharged and the dilution available in the receiving water. It is therefore important that the flow discharged is monitored in addition to the effluent quality to ensure that works operate within their design capacity so that the appropriate level of treatment is provided and receiving waters are adequately protected.

Flow monitoring is a key aspect of the regulatory process, and considerable investment is required to produce reliable and consistent flow measurement at WWTWs. Such investment should ensure compliance with regulatory standards, assist in the management of the treatment process and allow planning for sustainable development.

In 2006, Water Service provided flow measurement data for 39 WWTWs. This is an improvement on the previous year. A full years measurements has not been provided for most WWTWs, and the data recorded has been of varying quality, sometimes because work to upgrade the WWTWs interfered with the operation of the flow recording equipment. NIW is working to improve flow measurement facilities at WWTWs across Northern Ireland. **Appendix C** lists the works for which flow measurement data was provided in 2006.

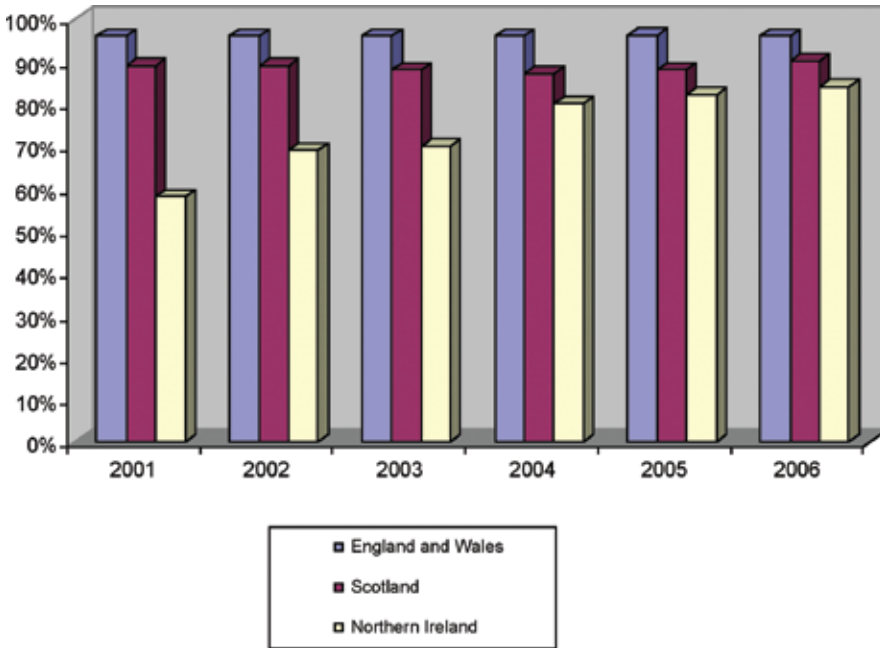
Figure 5: Moygashel Inlet Channel and Flume



United Kingdom Compliance

Figure 6 shows compliance trends for WWTWs in England and Wales, Scotland and Northern Ireland. As can be seen, there has been a steady increase in compliance in Northern Ireland from 2001 to 2006. This has been as a result of capital schemes and works improvements carried out by Water Service throughout this period.

Figure 6: WWTW Compliance in the United Kingdom (UK) 2001-2006



WWTWs with Population Equivalents less than 250

EHS has inspected 850 small WWTWs to determine the appropriate level of treatment necessary to meet the local water quality objectives.

Figure 7: Rotating Biological Contactor (RBC) at Rock WWTW



These WWTWs have been issued with descriptive consent standards in 2007 detailing the level of treatment and maintenance required to ensure good performance and effluent quality. Details of the consent conditions are available by viewing the Public Register at EHS, Water Management Unit, Lisburn.

Although sampling will not be required to assess compliance with these descriptive standards, all the small works will be inspected by EHS during 2007 to determine their compliance.

SECTION 3

COMPLIANCE WITH THE URBAN WASTE WATER TREATMENT DIRECTIVE IN 2006

Urban Waste Water Treatment Regulations

As discussed in **Section 1**, the Urban Waste Water Treatment (UWWT) Regulations (Northern Ireland) 1995 implement the requirements of UWWT Directive after (91/271/EEC) in 2006. This section of the report summarises compliance with these Regulations in Northern Ireland.

Compliance with the requirements of Article 15 of the Directive is reported through the Department of the Environment Food and Rural Affairs (DEFRA) as part of the UK submission to the European Commission. DEFRA also publishes a 'situation' report under Article 16 of the Directive. The last report, 'Sewage Treatment in the UK,' was published in March 2002.

In 2006 there was an increase from 34 to 77 in the number of qualifying works, that were required to comply with the numeric standards in the Regulations. This increase is a result of the requirement under Article 4 of the UWWT Directive for secondary treatment for all discharges between 10,000 and 15,000 PE and for discharges between 2000 and 10,000 PE to fresh and estuarine waters by 31 December 2005. Some 77% of the works complied with the numeric standards in the Regulations and are listed in **Table 11**.

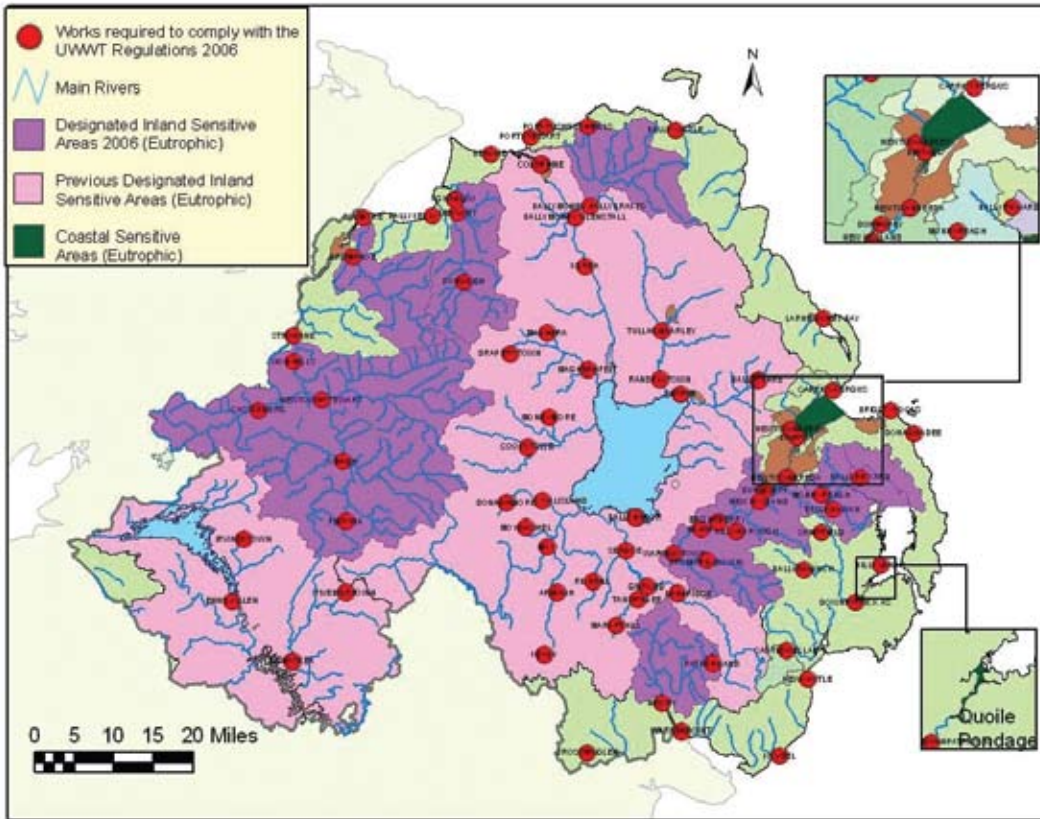
In addition to those that had to meet the numeric standards the remainder of the works were required to provide appropriate treatment, i.e. treatment (as described in Article 5 (7) (a) of the Directive) that meets the relevant water quality objectives and the requirement of other Community Directives. No monitoring of these smaller works is required reflecting the reduced potential environmental risk from them.

In 2006, 16 Water Service works discharging into areas identified as sensitive under the UWWT Directive had to provide more stringent treatment. Compliance achieved for these works was 81%. Those works identified in the 2005 review as discharging into Sensitive Areas will be required to comply by 2013, unless they have been previously considered as indirectly impacting on an earlier identified Sensitive Area such as the WWTWs at Newtownbreda, Dunmurry and New Holland.

Further details of this review are available on the EHS website, available on line at:
www.ehsni.gov.uk. [Last Accessed 14.11.2007]

Works above 10,000 PE discharging into Sensitive Areas must have more stringent treatment. More stringent treatment may involve nutrient reduction, such as the removal of phosphorus and/or nitrogen, before discharge, or in some cases may involve a substantial reduction in the bacterial content of the effluent discharge. The Water Framework Directive (WFD) programme of measures may in the future require more stringent treatment at some of the smaller works.

Figure 8: Map of WWTWs that were Required to Comply with the Numeric Standards in the UWWT Regulations in 2006



Based upon Ordnance Survey of Northern Ireland's data with the permission of the Controller of Her Majesty's Stationery Office, © Crown copyright and database rights EMOU206.2. © Environment and Heritage Service 2006.

UWWT Regulations Performance Results for 2006

Table 9 shows compliance of the qualifying WWTWs that were required to comply with the numeric standards in the UWWT Regulations for the period 2001-2006. In general the trend in compliance has been one of improvement, except for a decline in 2004 attributable to an internal Water Service reorganisation which resulted in non-compliance with the sampling requirements of the Regulations. The increase in compliance to 77% can be attributed to the addition of a number of works that already had the required treatment and the completion of a number of Water Service capital works schemes.

Compliance for discharges to sensitive areas now stands at 81%. (Table 10).

Table 9: Compliance for all UWWT Regulation WWTWs 2001-2006

| YEAR | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|-----------------------|------|------|------|------|------|------|
| Number of discharges | 37 | 35 | 35 | 35 | 34 | 77 |
| Percentage compliance | 35% | 46% | 60% | 43% | 62% | 77% |

Table 10: Compliance for UWWT Regulation WWTWs Discharging to Sensitive Areas 2001-2006

| YEAR | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|-----------------------|------|------|------|------|------|------|
| Number of discharges | 15 | 14 | 14 | 14 | 16 | 16 |
| Percentage compliance | 60% | 60% | 79% | 29% | 75% | 81% |

Table 11: WWTWs Compliant with the UWWT Regulations in 2006

| | |
|--------------------------|-----------------------|
| Antrim | Hillsborough |
| Aghanloo | Keady |
| Armagh | Kilkeel |
| Ballyclare | Killyleagh |
| Ballygowan | Kilrea |
| Ballykelly | Limavady |
| Ballymoney (Ballybrakes) | Maghaberry |
| Ballynacor | Maghera (Londonderry) |
| Ballynahinch | Magherafelt |
| Ballyrickard | Markethill |
| Banbridge | Moira |
| Belfast | Moneymore |
| Bullay's Hill | Moneyreagh |
| Bushmills | Moygashel |
| Castledearg | New Holland |
| Castlewellan | Newry |
| Coalisland | Newtownbreda |
| Cookstown | Newtownstewart |
| Crossmaglen | Omagh |
| Culmore | Randalstown |
| Donaghmore | Rathfriland |
| Downpatrick | Richhill |
| Dromore (Down) | Saintfield |
| Drumahoe | Seagoe |
| Dungiven | Sion Mills |
| Dunmurry | Strabane |
| Enniskillen | Tullaghgarely |
| Fintona | Warringstown |
| Fivemiletown | Warrenpoint |
| Gilford | |

Reasons for Non-Compliance

A number of the works did not have the required level of treatment in place as of 1 January 2006. These are listed below:

- Ballycastle
- Briggs Rock
- Carrickfergus
- Donaghadee
- Larne Sandy Bay
- Newtownabbey
- Portrush
- Portstewart

However, secondary treatment was in place at Larne by February 2006 and at Carrickfergus and Newtownabbey by July 2006.


Ballycastle was identified as a qualifying works (with a PE greater than 10,000) for the first time in 2006 as a result of a recent Water Service flow survey carried out during the annual fair at Ballycastle. A capital works project is due to commence in 2008 to provide the required level of treatment.

Since April 2007 the North Coast Works has been completed to serve Portrush, Coleraine and Portstewart, and the Public Private Partnership (PPP) scheme for the new North Down and Ards WWTW (serving Bangor, Donaghadee and Millisle) is due for completion by December 2007.

Table 12: WWTWs Non-Compliant with the Standards of the UWWT Regulations in 2006

| Name of Works | Failing Parameter | | | | | | |
|------------------------|---------------------------|-------------------------|----------------------------|--------------------------|------------------------|------------------------|---------------------|
| | BOD 95%ile Limit (25mg/l) | BOD Upper Tier (50mg/l) | COD 95%ile Limit (125mg/l) | COD Upper Tier (250mg/l) | Total P Annual Average | Total N Annual Average | Insufficient Sample |
| *Ballycastle | | | | | | | x |
| Ballymoney (Glenstall) | X | X | | | | | |
| Benone | X | X | | | | | |
| *Briggs Rock | X | X | | | | | |
| *Carrickfergus | | | | | | X | X |
| Coleraine | X | | | | | | |
| *Donaghadee | | | | | | | X |
| Draperstown | X | | | | | | |
| Irvinestown | X | X | X | X | | | |
| *Larne Sandy Bay | | | | | | | X |
| Lisnaskea | | X | | X | | | |
| Moy | X | X | | | | | |
| Newcastle | | X | | | | | |
| *Newtownabbey | X | X | | | | X | X |
| *Portrush | X | X | | | | | X |
| *Portstewart | X | X | | | | | X |
| Aghanloo 2 | X | X | | | | | |
| Tandragee | | X | | X | | | |

* The required level of treatment was not in place as of 1 January 2006

 Standard does not apply

X indicates failure to comply with the standard

P Phosphorus

N Nitrogen

SECTION 4

COLLECTION SYSTEMS



WASTE WATER COLLECTION SYSTEMS

Introduction

In order to collect the waste water from domestic premises or industry and convey it to a waste water treatment works for treatment a network of pipes and pumping stations is required, commonly known as a sewer system.

The UWWTD specifically requires the provision of such networks, termed 'collection systems', for towns and cities where the PE is greater than 2000 unless, there would be no environmental benefit or the costs would be excessive when other appropriate systems can be used.

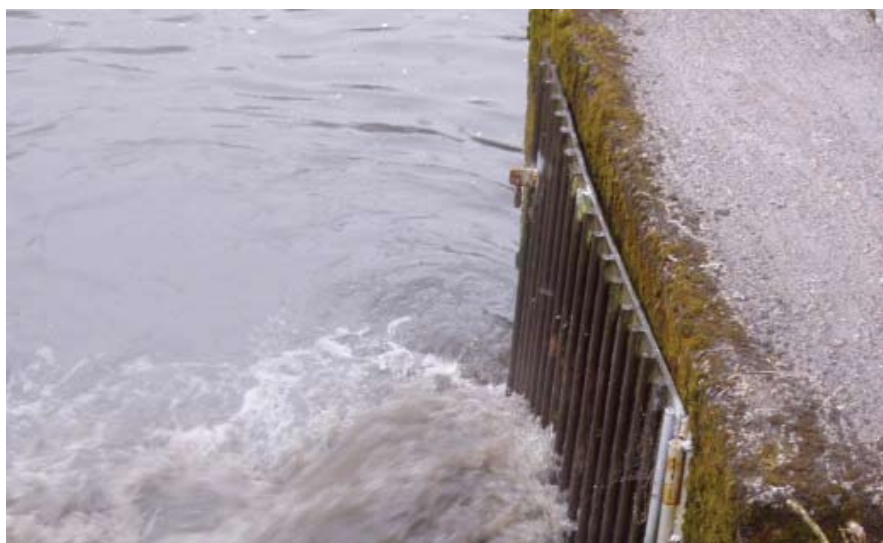
In stating the need for the provision of collection systems the Directive also requires the design, construction and maintenance of such systems to take into account the following:

- the volume and characteristics of the waste water
- the prevention of leaks, and
- the reduction of pollution of receiving waters by storm water overflows

The last requirement acknowledges that under storm conditions a collection system may not have the capacity to accommodate all the flow received into it, particularly under heavy rainfall. Some of the contents of the collection system may therefore be allowed to overflow to a waterway, but steps must be taken to control the amount of overflow to limit the pollution of the receiving water. Such overflows are a common feature of traditional collections systems where the sewer network had to accommodate both rainfall runoff from urban areas and foul sewage.

This type of system is known as a 'combined sewer system' and is very common in the UK. Where there is an overflow in the system to relieve the hydraulic pressure under storm conditions and to prevent damage to the sewerage network, the overflow is known as a 'Combined Sewer Overflow' (CSO).

Figure 9: Huguenodrive CSO



In addition to CSO overflows in the sewer system, pumping stations used to convey waste water around obstacles on the way to the WWTW often have an 'Emergency Overflow' (EO). The EO is designed to protect the pumping station from damage under extreme storm conditions or in the event of a mechanical or electrical failure outside the control of the operator.

EHS has developed guidance on the controls to be applied to these assets when designing collection systems, in order to limit the effect of discharges from them. EHS has also produced a procedure to assess the current performance of the system and to identify the need for improvements.

The Assessment Process

The assessment of collection systems has two main strands:

- (a) assessment of the hydraulic performance
- (b) assessment of the impact on the receiving water

The first strand requires an evaluation of the volume of wastewater that the system can carry forward for treatment at a number of locations throughout the collection system and an indication of the volume that is likely to be spilt at CSOs during storm conditions.

This assessment is carried out by constructing a mathematical model of the collection system representing the network of pipes and their hydraulic characteristics, the CSOs and their performance, and the flows passed forward or pumped forward by pumping stations. This model is calibrated against real life performance data to ensure a realistic representation of the system's behaviour. Using rainfall records covering at least a year, and usually ten years, the amount of run-off that is expected to enter the system from the catchment area for each storm event is modelled. This is used to determine the resulting flows at key locations within the system.

From this information the computer model predicts where overflows are likely to take place and how much is likely to be spilt. This modelling information together with a plan of the sewer network constitutes a Drainage Area Plan (DAP) and allows EHS to identify those overflows that pose the greatest risk to the environment.

The second strand of the assessment entails a field inspection of the impact of overflows from the collection system on the receiving waters, taking account of the amenity use of the receiving water and its dilution capacity. This environmental assessment also collates any available monitoring data on the water quality of the receiving water and ascertains whether there is a history of problems and complaints. The result of the environmental assessment is to identify those overflows that are unsatisfactory and to prioritize them for improvement.

The outcome of the environmental assessment is used together with the DAP to establish where the discharges from the collection system pose the greatest threat to water quality and to decide what improvements need to be made. In large complex catchments where there are numerous overflow discharges that interact with one another and affect different

receiving waters with various water quality objectives, there may be a need to model the impact on the receiving waters as part of an Urban Pollution Management (UPM) study.

Urban Pollution Management is a procedure developed by the UK water industry regulators in conjunction with the Foundation of Water Research to facilitate the management of wastewater discharges from sewers and sewage treatment systems under wet weather conditions, so that the requirements of the receiving water are met in a cost effective way.

The procedure and the methodologies associated with it are contained in the UPM Manual published in October 1998. The procedure adopts a holistic approach in setting the required performance standards for CSOs under wet weather conditions, taking account of the interaction between CSOs and other discharges such as those from waste water treatment works.

The information from the assessments is employed by EHS to establish a Statement of Need (SoN) for improvements to the system. This SoN is provided to Water Service (Northern Ireland Water from April 2007) to enable them to develop solutions in consultation with EHS.

The preferred solution arising from the consultation is progressed by EHS issuing a letter of formal agreement to NIW. The formal agreement allows NIW to draw up detailed construction plans and to prepare an implementation programme. It is at this stage that the conditions of any discharges are finalised and NIW apply for the Consents needed to operate the proposed system. The implementation program forms part of the existing sewer system Consent until the upgrade has been completed and fully consented.

Progress in 2006 to March 2007

Due to the transfer of Water Service and its assets to a Government owned company on 1 April 2007, this report summarises the progress that has been made up to 31 March 2007.

By the end of March 2007:

- The upgrading of 7 sewerage systems had been completed, with construction ongoing in a further 9 areas
- Formal agreements on solutions have been issued for 21 schemes
- A statement of need has been provided by EHS for 31 sewerage systems
- A DAP has been completed for 25 drainage areas
- A DAP is being developed for 4 drainage areas
- 14 drainage areas are awaiting the production of a DAP

In addition, significant progress has been made in providing telemetry at pumping stations to alert operational staff to problems and to allow action to be taken promptly.

The progress that has been made and the areas addressed are shown in **Appendix D**.

Planned Future Work

Full UPM studies are awaited for the Lisburn and Omagh areas in order to establish the needs of those areas, they are expected to be available in 2007. The final report on the East Belfast UPM study is also expected in 2007.

An assessment of the performance of a number of completed systems will be carried out in 2008, namely Newry, Helens Bay, Cushendall, Cushendun and Glenarm.

The environmental impact in those areas where DAPs are due in future will be assessed in 2007/2008.

Further Issues

The work on sewer systems has progressed steadily since it began in the mid-nineties, and the process of assessment to enable solutions to be developed has been refined over time. There is now a substantial amount of information available on collection systems and their performance, which has helped the Departments to make much more informed decisions on improvements and where to target expenditure. Funding for sewerage network improvements has still been a limiting factor for Water Service in taking schemes forward, but investment has increased in recent years.

The creation of Northern Ireland Water in April 2007 has resulted in a more formal and rigorous approach to the development and monitoring of improvement programmes. Water Order Consents granted to NIW for overflows on sewer systems will require the preparation of implementation programmes for the delivery of any necessary improvements.

These programmes will need to be included in the asset management planning (AMP) procedure to obtain funding on an established priority basis and should result in a more systematic approach to sewer network upgrading. However, it will be some years before all sewer systems are considered by EHS to fully meet their requirements, enabling water quality targets to be met.

SECTION 5

WATER TREATMENT WORKS



Water Treatment Works

The treatment of water at Water Treatment Works (WTWs) for public supply as drinking water generates effluents that are often discharged to nearby waterways. EHS determines discharge standards for Water Service WTW effluents to protect the receiving water by ensuring that compliance with Environmental Quality Standards (EQS) set for those waters is not put at risk.

Section 1 of this report describes the regulatory system in place and how discharge standards are set.

Figure 10: Seagahan Reservoir



Compliance assessments were carried out on 28 WTWs (31 discharges) in 2006. The samples were collected by Water Service staff to an agreed self monitoring programme and the data sent to EHS to calculate compliance.

The 12 works which were compliant with their Registered Standard conditions are listed below in **Table 13**.

Table 13: Compliant WTWs in 2006

| | |
|--------------------|----------------------|
| Ballintemple | Glenhordial |
| Ballysallagh Upper | Killyhevlin |
| Carmony | Killylane |
| Clay Lake | Lough Fea |
| Creightons Green | Mourne Silent valley |
| Dungonnell | Seagahan |

The compliance assessment was calculated against 12 datasets over the period January –December 2006. However, compliance of both Ballintemple and Mourne Silent Valley was based on 4 samples received as both works were out of service since mid-2006.

In 2006, 19 discharges from 17 WTWs were noncompliant with their consent conditions. The reasons for non-compliance were either exceedances of parameters in the Consent or insufficient data was provided to EHS, or both. The non-compliance details can be seen in **Table 14**.

Table 14: WTWs Non-Compliant with their Discharge Standards in 2006

| Name of Works | SS | Al | Al (Sol) | Fe | Fe (Sol) | Cl | BOD | pH | Insufficient Samples |
|-------------------------|----|----|----------|----|----------|----|-----|----|----------------------|
| Altmore | | | | | | | | | X |
| Altnahinch | | X | | | | | | X | |
| Ballinrees | X | X | | X | | | | | |
| Ballymaconaghy | | | | | | X | | | X |
| Belleek | | X | | | | | | | X |
| Carran Hill | X | X | | | | | | | X |
| Castor Bay Lagoon | X | | | | | X | | | X |
| Castor Bay Sandwasher | X | | | | | X | | | X |
| Caugh Hill | | X | | | | | | | X |
| Conlig | X | | | | | X | | | |
| Derg | X | X | | X | | | | | X |
| Dorisland | | | | | | X | | | |
| Dunore Point Settlement | X | | | | | X | X | | |
| Dunore Point Sludge | | | | | | X | | | |
| Forked Bridge Backwash | X | | | | | X | | | |
| Forked Bridge Sandwash | X | | | | | X | X | X | |
| Lough Bradan | | X | | | | | | X | X |
| Lough Cowey | X | X | | | | | | | |
| Lough Macrory | | X | | | | X | | | |

- Standard does not apply
- Al Aluminium
- Fe Iron
- Sol Soluble

The 38% compliance of WTW discharges for 2006 is the lowest achieved over the last six years. **Table 15** summarises the compliance since 2001.

Table 15: Summary of WTW Compliance 2001-2006

| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|------|------|------|------|------|------|
| Number of WTW discharges monitored | 27 | 26 | 27 | 30 | 28 | 31 |
| Percentage of WTW discharges complying | 48% | 50% | 44% | 40% | 43% | 38% |

Compliance in **Table 15** fluctuates between 38% and 50% between 2001 and 2006, with the highest compliance of 50% being achieved in 2002. The reduced compliance between 2003 and 2006 is in part attributable to inadequacies within the Water Service sampling and reporting arrangements. However, the parameters in the Registered Standards have also been exceeded in a number of cases.

Due to the intermittent nature of discharges from WTWs, there will continue to be difficulties in adhering to a planned sampling programme.

SECTION 6

CURRENT AND FUTURE PERFORMANCE



Current and Future Performance

The Water and Sewerage Services (Northern Ireland) Order 2006 ('the Order') was made on 14 December 2006 enabling reform of the water industry in Northern Ireland. Reform of the water industry transferred responsibility for the delivery of water and sewerage services on 1 April 2007 to a government owned company known as Northern Ireland Water (NIW).

The Order updates and expands the functions of the Department of the Environment as the environmental regulator, and amends the Water (Northern Ireland) Order 1999 ('the Water Order') to bring it partly into line with similar legislation in Great Britain.

One of the principal objectives of water reform is to introduce the water and sewerage undertaker to the normal regulatory regime provided by the Water Order. From 1 April 2007, NIW required Consents for all discharges to the water environment in the same way as any other individual or industrial sector. NIW no longer has 'crown Immunity' and is subject to enforcement action, in accordance with the EHS Enforcement and Prosecution Policy for Environmental Protection, in respect of any offence committed under the Water Order.

The Consents issued to NIW replace the system of Registered Discharge Standards which were set to protect water quality and meet the requirements of EU Directives and which are held on a public register by EHS.

EHS has been engaged in the prioritisation process that has led to the NIW capital investment programme for the period 2007 – 2010. This programme will have a major effect on the levels of future compliance, and EHS will monitor progress on its delivery.

Investment in WWTWs

Over the three year period 2007/08 to 2009/10, NIW plans to invest some £270 million in upgrading WWTWs to ensure compliance with EC Directive standards. The new North Coast WWTW has recently been commissioned. This £45 million project will enable NIW to ensure that the compliance standards are met at Portrush, Portstewart and Coleraine. In addition, new works have recently been commissioned at Fintona, Kinallen, Carrickfergus, Loughguile and Dundrum. **Appendix B** shows the status at a number of works as of August 2007.

In addition, NIW has pursued the use of Public Private Partnerships (PPP) investment to complement conventionally funded programmes. PPP programmes for waste water and sludge treatment, with a Capital Value of £122 million, are being taken forward.

The dates given are as follows

- North Down / Ards Works – January 2008
- Richhill Works – July 2008
- Armagh Works – November 2008
- Ballyrickard Works – January 2009
- Ballynacor Works – February 2009
- Ballynacor Sludge – June 2009
- Duncrue Sludge – June 2009

Sewerage Systems

NIW maintains more than 14,000 km of sewers, including CSOs and pumping stations. In order to address shortfalls in the network, a Drainage Area Study (DAS) is undertaken for each collecting system. The DAS is used to generate a plan (DAP) to be executed through the Capital Works Programme. Some 108 Drainage Area Studies are to be undertaken of which, to date, 72 have been completed, 21 are in progress and those remaining will be completed to meet the requirements of a future implementation programme. Included in this programme is the ongoing Belfast Sewer Project, a £127 million contract to upgrade the Victorian sewerage network in the city. (**Appendix D** shows the status of the sewerage system upgrades as of March 2007.)

Future WTW Compliance

It is expected that further improvements in the quality of effluent discharges from WTWs will be achieved as these are upgraded to meet the requirements of the various EC Directives which apply to drinking water. To achieve this, NIW plans to spend some £190 million on its WTWs and distribution systems in the 3-year period 2007/08 to 2009/10.

New treatment plants, such as the Mourne Works at Drumaroad, Carran Hill WTW, near Crossmaglen, and Fofanny WTW, beside Fofanny Dam in the Mourne area, are ensuring steady progress towards full compliance with EC Directive standards. Upgrading of WTWs continues, with improvements on going at Clay Lake WTW, and at Seagahan WTW, where work has been programmed to commence in late 2007.

In addition, Northern Ireland Water has pursued the use of PPP investment to complement conventionally funded programmes.

PPP programmes for water treatment, with a Capital Value of £110 million, are being taken forward (see list below).

The dates given are as follows

- Moyola Works – July 2008
- Ballinrees Works – September 2008
- Castor Bay Works – September 2008
- Limavady Link Main – September 2008
- Ballymoney Link Main – September 2008
- Forked Bridge Link Main – September 2008
- Dunore Point Works – October 2008

APPENDICES



Appendix A

Summary of WWTWs that did not meet their Registered Standard in 2006

| NAME OF WORKS | REGISTERED DISCHARGE STANDARD COMPLIANCE 2006 | | | | | | |
|---------------------------|---|-----|-----------------------|-----|--------------|-----|-----------------------|
| | BIOCHEMICAL OXYGEN DEMAND mg/l | | SUSPENDED SOLIDS mg/l | | AMMONIA mg/l | | TOTAL PHOSPHORUS mg/l |
| | 95% ile | U/T | 95% ile | U/T | 95% ile | U/T | Annual Average |
| BALLYCASTLE** | | | | | | | |
| BALLYMONEY GLENSTALL | X | X | X | | | | |
| BRIGGS ROCK** | | | | | | | |
| BUSH | X | | X | | X | | |
| CARRICKFERGUS | X | X | X | | | | |
| CARROWDORE | | | X | | | | |
| COLERAINE | X | | | | | | |
| CORKEY | | | | | X | | |
| DONAGHADEE** | | | | | | | |
| DOWNPATRICK | | X | | X | | | |
| DRUMAVALLEY | X | | X | | | | |
| HAMILTONSBAWN | X | | | | X | | |
| LARNE SANDYBAY** | | | | | | | |
| LISBARNET | | | X | | X | | |
| LISNASKEA | | X | | | | | |
| MAGHERA (CO. LONDONDERRY) | X | | | | | | |
| MONEYMORE | X | | | | | | |
| MOYGASHEL | | | X | | X | X | X |

Appendix A

Summary of WWTWs that did not meet their Registered Standard in 2006

| NAME OF WORKS | REGISTERED DISCHARGE STANDARD COMPLIANCE 2006 | | | | | | |
|---------------|---|-----|-----------------------|-----|--------------|-----|-----------------------|
| | BIOCHEMICAL OXYGEN DEMAND mg/l | | SUSPENDED SOLIDS mg/l | | AMMONIA mg/l | | TOTAL PHOSPHORUS mg/l |
| | 95% ile | U/T | 95% ile | U/T | 95% ile | U/T | Annual Average |
| NEWTOWNABBEY | X | X | X | | | | |
| POMEROY | | | | | X | | |
| PORTRUSH** | | | | | | | |
| PORTSTEWART** | | | | | | | |
| POUNDBURN | X | | | | X | | |
| RAHOLP | X | | | | | | |
| SAINTFIELD | X | | | | | | |
| SAVELBEG | X | | X | | | | |
| AGHANLOO 2 | X | | | | | | |
| STONEYFORD | | | | | X | | |
| STRAID | | | | | X | | |
| STRANGFORD** | | | | | | | |
| TANDRAGEE | X | X | X | X | | | |

**Insufficient data provided to assess compliance and required level of treatment not provided

Key:

X non-compliance with standard

Standard does not apply

95% ile 95-percentile standard

U/T Upper tier standard

Appendix B

Capital Works Programme (CWP) Information and Reasons for Non-Compliance of WWTWs

| WWTW Name | Details |
|----------------------|---|
| BALLYCASTLE | No data received and this works fails in 2006 to have the level of treatment required under the UWWTD. A capital project is currently planned for commencement in early 2008. |
| BALLYMONEY GLENSTALL | The new WWTW at Glenstall is in service and undergoing final testing. |
| BRIGGS ROCK | No data received. The new North Down and Ards WWTW is operational and undergoing commissioning since August 2007. |
| BUSH | The existing works is currently unable to consistently meet the discharge standards. The provision of enhanced treatment to improve works performance is planned to commence in November 2007 and be brought into operation by Spring 2008. |
| CARRICKFERGUS | Secondary treatment has now been provided from 31 July 2006. |
| COLERAINE | Coleraine works has been decommissioned with all flows being pumped to the new North Coast Works. |
| CARROWDORE | There have been ongoing problems at this works resulting in carryover of fine solids in the effluent. Adjustments are being made to the treatment process to overcome this problem. |
| CORKEY | The works did not have the capacity to treat the incoming load and has now been decommissioned. The sewage is being pumped to the new Loughguile WWTW. |

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| DONAGHADEE | No data received. The new North Down and Ards WWTW is operational and undergoing commissioning since August 2007. |
| DOWNPATRICK | A project to construct a new WWTW is expected to commence in Summer 2008. Tenders have been received and are currently being assessed. Completion planned for Autumn 2010. |
| DRUMAVALLEY | The treatment process consisting of a septic tank is not capable of achieving the effluent standard. The works will be decommissioned and the sewage pumped to Benone when the new works is completed there. |
| HAMILTONSBAWN | A project to construct a new works on the existing site is planned to commence in early 2008. |
| LARNE (SANDY BAY) | Full flows into the new WWTW have been receiving secondary treatment since February 2006. |
| LISBARNET | The works does not have the capacity to treat the incoming load and is in the CWP for replacement or improvements in 2007-2008. |
| LISNASKEA | BOD exceedances were mainly due to mechanical failures at the works. Recently the balancing tank has been fitted with a sludge sensor and automated system to control the settling period. |
| MAGHERA | This works is subject to illegal discharges of oil. |
| MONEYMORE | Design work has commenced and it is proposed to commence construction of an upgraded WWTW in 2008/09. |

| | |
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| MOYGASHEL | <p>The total phosphorus failure resulted from damage to and blockage of the chemical dosing pipe. This has been repaired. The ammonia exceedances were due to disposal of landfill leachate to the works, this volume has been reduced since 1 May 2007.</p> |
| NEWTOWNABBEY | <p>Newtownabbey is serviced by Whitehouse WWTW which was upgraded with secondary treatment in 2006. Ballyclare WWTW also services part of the Newtownabbey catchment, and a new works effectively providing tertiary treatment was completed in 2005.</p> |
| POMEROY | <p>A new works has been constructed and is in service with final testing being completed prior to handover to NIW Operations (November 2007).</p> |
| PORTRUSH | <p>In 2006 the Portrush plant consisted of a screened outfall and failed the UWWTR standard. It has now been decommissioned and sewage treated at the new North Antrim works in 2007.</p> |
| PORTSTEWART | <p>In 2006 the Portstewart plant consisted of a screened outfall and failed the UWWTR standard. It has now been decommissioned and sewage treated at the new North Coast works since April 2007.</p> |
| POUNDBURN | <p>Effluent from Poundburn will be pumped to a new WWTW at Annahilt as part of a project to commence in the 2007/08 financial year.</p> |
| RAHOLP | <p>The works is subject to infiltration. Interim measures to improve flow balancing are due to commence in April 2008. The works is in the CWP for improvements or decommissioning and pumping to Downpatrick in 2007-2008.</p> |

| | |
|------------|---|
| AGHNALOO 2 | This works receives trade effluent that needs to be more strictly regulated to ensure compliance. |
| SAINTFIELD | This works is significantly overloaded and treatment capacity was not sufficient to achieve compliance. Chemical treatment is to be installed to improve effluent quality. Construction of a new works is planned to commence in Spring 2008. |
| SAVELBEG | This works has been taken out of operation and flows have been diverted to the Newry network. |
| STONEYFORD | A review of the need and options is currently under way. |
| STRAID | The works did not have the capacity to treat the incoming load and has now been decommissioned with the wastewater being pumped to the new Ballyclare WWTW. |
| STRANGFORD | Upgrading of this works is currently well advanced. It is planned that the works will be operational by December 2007 with full completion and acceptance of flows from Kilclief by April 2008. |
| TANDRAGEE | The old works did not have the capacity to treat the incoming load in 2006. A new WWTW was brought into service in March 2007. |

Appendix C

WWTWs for which flow data was provided in 2006

| WWTW | Inlet | *FFT/Effluent | Other | Number of Days Flow Data Provided |
|---------------|-------|---------------|-------|-----------------------------------|
| Aghagallon | Inlet | | | 289 |
| Aghalee | Inlet | | | 269 |
| Ballybrakes | Inlet | | | 361 |
| Ballyclare | Inlet | | | 359 |
| Ballynacor | Inlet | | | 363 |
| Ballynahinch | Inlet | | | 361 |
| Banbridge | Inlet | | | 362 |
| Belfast | Inlet | FFT | | 363 |
| Bullays Hill | | Outlet | | 363 |
| Carrickfergus | | FFT | | 277 |
| Coleraine | Inlet | | | 362 |
| Culmore | | FFT | | 331 |
| Downpatrick | Inlet | | | 359 |
| Dromore | Inlet | | | 363 |
| Dundrum | Inlet | | | 282 |
| Dungiven | | | | 364 |
| Dunmurry | Inlet | | | 363 |
| Enniskillen | | FFT | | 363 |
| Glenstall | | | | 360 |
| Greenisland | Inlet | FFT | | 365 |
| Greyabbey | Inlet | | | 140 |
| Kilkeel | Inlet | | | 360 |
| Killyneese | Inlet | FFT | | 361 |

| | | | | |
|--------------|-------|----------|----------------|-----|
| Kircubbin | Inlet | | | 269 |
| Larne | Inlet | | | 91 |
| Limavady | Inlet | | | 352 |
| Lisnaskea | | FFT | | 363 |
| Maghera | | | | 125 |
| Milltown | Inlet | Outlet | Second Channel | 359 |
| Moira | Inlet | | | 363 |
| Moneyreagh | | Permeate | Storm | 155 |
| New Holland | | | | 365 |
| Newry | Inlet | | | 363 |
| Newtownbreda | Inlet | FFT | | 365 |
| Omagh | | FFT | | 365 |
| Seagoe | | outlet | | 341 |
| Tandragee | Inlet | | | 189 |
| Tullagherley | Inlet | FFT | | 363 |
| Whitehouse | Inlet | FFT | | 350 |

* Flow to Full Treatment

Appendix D

Status of Sewerage System Upgrades - March 2007

| Construction Complete | Construction Ongoing | Agreement Reached in Principle on Drainage Area Study | Statement of Need Issued | Drainage Area Study Ongoing | Due in Future |
|--|---|---|---|--|--|
| Cushendall Cushendun Glenarm Helen's Bay Larne Newry Portstewart | Ballyclare Ballymoney Banbridge West Belfast Downpatrick Enniskillen Milltown (Antrim) Portrush Rostrevor | Ballywalter Cloghy Cookstown Draperstown Dundrum Dunmurry Greyabbey Hillsborough Kircubbin Limavady Londonderry Lurgan Maghera Magheralin Millisle Moira Newcastle Portadown/ Craigavon Strabane Tandragee Whitehead | Annalong Ardglass Armagh Ballycastle Ballymena Ballyhalbert Bangor Bessbrook Carrickfergus Castledawson Castledearg Castlewellan Coalisland Coleraine Donaghadee Dromore Gilford Kilkeel Lisburn Maghaberry Magherafelt Markethill New Buildings Newtownstewart Moneymore Portaferry Portavogie Portglenone Sion Mills Rathfriland Richhill Seahill Waringstown | Articlave Ballycarry Ballyrickard Ballystrudder Bellaghy Bushmills Castlerock Crossmaglen Dungannon East Belfast Garvagh Glenavy Greencastle Greenisland Keady Kilrea Newtownbreda Omagh Portballintrae Randalstown Upper Falls Warrenpoint Whitehouse | Annahilt Ballygowan Ballykelly Ballynahinch Crossgar Dungiven Eglinton Fintona Fivemiletown Greysteel Irvinestown Killyleagh Lisnaskea Saintfield |

Glossary

| | |
|-------------------------------------|---|
| Ammonia/Ammonium (NH ₄) | A chemical found in water often as a result of pollution by sewage effluents. High levels adversely affect fish. |
| Biochemical Oxygen Demand (BOD) | A measure of polluting potential – BOD is a measure of the amount of oxygen required by bacteria or algae to break down the organic biodegradable material in sewage or effluent. |
| Combined Sewer Overflow (CSO) | Channels which act as sewers during normal flow conditions. Under high flow conditions, such as during or after storms, these channels can either direct increased flows to storm-water storage tanks to prevent sewage treatment works being overloaded or allow storm waste water to flow into surface waters. |
| Discharge Standard | A standard issued by EHS to permit discharge of effluent to a water body. The standards lay down conditions to minimise effects on the receiving water. Registered standards usually specify the location of the discharge and the total volume of effluent permitted, together with the appropriate quality conditions, such as the effluent's biochemical oxygen demand. Where relevant, they may also include suspended solids, ammonia, metals or certain toxic substances. |
| Effluent | Discharge from a sewage or water treatment works. |
| Eutrophic | Describes waters which have been affected by eutropication. |
| Eutrophication | Enrichment of waters through the presence of nutrients, especially nitrogen and/or phosphorus compounds, causing accelerated growth of algae and higher forms of plant life to produce an undesirable disturbance to the balance of organisms present in the water and to the quality of the water concerned. |
| mg/l | Milligrams per litre – a measure of the concentration of a substance in liquid. |
| Outfall | Sewage discharge point - the structure or pipe that conveys the effluent to the receiving water for discharge. |
| Percentile Limit | A numeric limit that must be achieved or bettered for at least some stated percentage of the time over a specified assessment period. A 95-percentile limit must be met for at least 95 percent of a specified time period, for example, 1 year. |
| Population Equivalent (PE) | A measure of the organic biodegradable load, where a population equivalent (1 PE) is equal to a biochemical oxygen demand of 60g of oxygen per day. |
| Preliminary Treatment | The most basic treatment that sewage can receive, employing screening to remove visible solids and grit removal. |

| | |
|---|--|
| Primary Treatment | Treatment of sewage by physical and/or chemical processes involving the settlement of suspended solids, or other processes in which the biochemical oxygen demand of the incoming sewage is reduced by at least 20% before discharge, and the total suspended solids content of the incoming sewage is reduced by at least 50%. |
| Public Register | Record of consents and analysis of effluents and waters available for inspection by any member of the public. The Register can be viewed at 17 Antrim Road, Lisburn. |
| Receiving Water | Body of water receiving effluent. |
| Secondary Treatment | A higher level of treatment (than provided by primary treatment) of sewage by a method generally involving a biological process followed by clarification or other process, in which the UWWT Directive's treatment standards for biochemical oxygen demand, chemical oxygen demand and suspended solids are respected. Secondary treatment is the normal requirement for discharges under the UWWT Regulations. |
| Sewage Treatment Works/ Waste Water Treatment Works | Plant where sewage/waste water is received for treatment. |
| Sewage (or Urban Waste Water) | Generally a mixture of domestic waste water (from toilets, baths, sinks and washing machines), with industrial waste water and/or surface run-off. |
| Sewerage or a sewage collection system | A system of pipes and ducting which collects and transports sewage. |
| Suspended Solids | Solid matter, including food waste, faeces, condoms and sanitary items found in sewage that can be removed by settlement. |
| Tertiary or "more stringent" treatment | A further level of treatment to secondary, involving the removal of specific polluting matter, such as nutrients (nitrogen and/or phosphorus), micro-organisms or toxic substances. |
| Treatment Levels | Sewage is treated to various levels, namely, preliminary, primary, secondary and tertiary. Each level of treatment following preliminary treatment builds on the previous treatment level. |
| UKAS | United Kingdom Accreditation Service. An accreditation body that ensures that quality standards are met for both analysis and measurement. |
| Upper Tier Standard | An absolute limit, generally a multiple of the 95-percentile limit, that may be included with the 95-percentile limit in the discharge standard for WWTWs. |
| Water Treatment Works (WTW) | Plant where a natural water source is treated to provide water for domestic consumption. |

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Environment & Heritage Service
Klondyke Building
Cromac Avenue
Gasworks Business Park
Belfast
BT7 2JA
Tel: 0845 302 0008

www.ehsni.gov.uk

EHS Incident Hotline - 0800 80 70 60

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