

# **Northern Ireland Water Ltd**

Annual Information Return 2011

To the

Northern Ireland Authority for Utility Regulation



## **Public Domain Version**

**Part 4 of 10 containing:**

**Sewage explanatory factors - commentaries for tables 17a-g**

**Reporter's Submission**

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Table 17a – Sewerage Sub-Area Explanatory Factors

## Commentary by REPORTER

**1. Background**

This table collects information on companies' sewerage services (both costs and explanatory factors) to enable NIAUR to update their sewerage services models.

**2. Key Findings**

- Estimates of both resident and of non-resident population are broadly consistent to those reported previously.
- NI Water has still not been able to disaggregate the data in this table into sub-areas, although work is continuing to take place to allow this to occur in the future. The Company believes that with the further implementation of cost to serve project the data in this table will improve for AIR12.

**3. Audit Approach**

The audit consisted of an interview with the data owners to discuss the method and data used to generate this table. Cross-checks were made against source data.

**4. Audit Findings****4.1 Resident and non-resident population (lines 1 and 2)**

The resident population (line 1) has been calculated based on the following formula:

- Resident population = Table 13 line 10 (total connected population) – non-resident population

We have checked this calculation and confirm the resultant estimate is accurately reported in the Company's table and commentary. The resident population estimate has increased slightly by 0.4%.

The estimate of non-resident population (line 2) is based on NI Tourist Board statistics. The Company provided a detailed explanation of the approach adopted to provide this estimate (which is also replicated in their commentary for Table 17a). We have followed the methodology laid out by the Company in their commentaries and believe the approach taken is reasonable. We do however note that the Company has not applied the 'two thirds occupancy rule for four months of the year rule' in deriving the number of visitor nights.

A slight increase in the reported non resident population estimate is noted and the Company presented supplementary evidence to indicate tourism figures had increased. However, without fully understanding the basis of the third party reports used it is difficult to verify fully the basis of the calculation and the resulting trends.

To reflect this, the Company has assigned a low confidence grade (C3) to this line.

#### **4.2 Volume of sewerage collected (Line 3)**

The total volume returned to sewer should be the sum of Table 14 Lines 3, 4, 5 and 6 which equates to 328.19. However the reported figure is 308.01 suggesting that NI Water has not included trade effluent.

#### **4.3 Total connected properties (Line 4)**

The number of total connected properties is calculated based on the total number of connected properties (household and non-households) and is inclusive of voids. We have checked the Company's calculation and confirm their approach is consistent to the data presented in Table 13.

The Company have made an adjustment to account for site meters and this is discussed in more fully in our commentary to Table 13 (and Table 7).

#### **4.4 Area of sewerage district (Lines 5 – 6)**

NI Water has still not been able to disaggregate the data in this table into sub-areas, although work is taking place to be able to allow this to be done.

The length of sewer is only the length of main sewers. NI Water is also responsible for most lateral sewers, unlike other water companies in England and Wales. However as most of these lateral sewers are not mapped, their length is not known. A project is being undertaken to estimate the length of public laterals, however lateral lengths have not been included in the AIR11 data.

#### **4.5 Sewerage costs (Lines 7-11)**

It should be noted that the financial data contained in this table has simply been transposed from appropriate lines in table 22. No allocations have been made across different sewerage sub areas for AIR11. The Company advised last year that it may be able to report data across sub areas for AIR11. However this has not been the case. Progress on the cost to serve project has been slower than expected. Although the Company has started to phase in the cost to serve project, it was felt that there was insufficient data for it to be used for AIR11.

It expects to be able to provide some type of split based on the cost to serve project for AIR12. Comment on the basis of the costs in the total column is provided in our commentary to table 22.

### **5. Confidence Grades**

The Company has assigned a confidence grade of C3 to the estimate of resident population (this was previously reported as C4 to align with Table 13 line 10). As the updated grade maintains consistency with the '3' grading now assigned in table 13

line 10, we believe this change is appropriate.

The Company has also assigned a confidence grade of C3 to the estimate of non-resident population. Given that the estimate made is based on various surveys and third party reports we would expect some uncertainty in the reported estimate. We therefore concur with the Company's rationale.

The Company assigned a confidence grade of C3 to the total connected properties.

A B2 confidence grade has been applied to line 5 which is appropriate.

The Company has assigned a confidence grade of B3 to the total length of the sewer. This is consistent with Table 16 and we believe it is appropriate.

No confidence grades are required for financial data.

## **6. Consistency Checks**

- Total volume of sewerage in Table 17a Line 3 equals the figure in Table 14 Line 7. However Table 14 Line 7 is incorrect and this should be 328.19. Please see section 4.2 above for details
- Total length of sewer in Table 17a Line 6 equals the total length of sewer in Table 16 Line 14. However Table 16 Line 14 is incorrect and this should be 14,957.27. Please see Table 16 commentary for details.
- Direct costs in table 17a (line 7, column 9) equals direct costs in table 22 (line 9, column 1).
- Power costs in table 17a (line 8, column 9) equals power costs in table 22 (line 2, column 1).
- Service charges in table 17a (line 9, column 9) equals service charges in table 22 (line 7, column 1).
- General and support costs in table 17a (line 10, column 9) equals general and support costs in table 22 (line 10, column 1).
- Functional expenditure in table 17a (line 11, column 9) equals functional expenditure in table 22 (line 11, column 1).

**Date:** 29 July 2011  
**Prepared by:** HMS

**Table 17b – Sewage Treatment Works – Large Works Information Database****Commentary by REPORTER****1. Background**

The purpose of this table is to allow NIAUR to update the econometric modelling of large sewage treatment works (WwTWs).

**2. Key Findings**

- The data is based on the asset performance spreadsheet
- As required by reporting guidelines the Population Equivalent include domestic and trade source effluent but exclude tourist contribution
- The Company has identified 14 large works, each of which has its own location code to enable the identification of related costs;
- Only 1 power meter exists at each site. Where a treatment works provides both sewerage and sludge treatment facilities the costs are split on the basis of the judgement of operational staff;
- The Company has used the same approach to reporting general and support costs as compared to AIR10.

**3. Audit Approach**

The responsibility for completing table 17b is shared among various line owners. We audited each data owner. The audits consisted of interviews to discuss methodology, and cross check the results against the original sources of data.

**4. Audit Findings****4.1 Works Information**

The data utilised to populate lines 1 to 8 of table 17b is contained within the asset performance spreadsheet. The information relating to final effluent compliance, which is used to populate this spreadsheet is taken from Water Order Consents. These are based on 95%ile compliance and issued by Northern Ireland Environment Agency.

The general data contained in the asset performance spreadsheet is interrogated to ascertain the number of facilities treating loads in excess of 1500Kg BOD/day. Fourteen works have been identified which correlates with that reported in AIR10. With the exception of Larne which has a population of 27,767 all other facilities are at least 27% higher than the threshold. An exercise to determine whether any facilities in Band 5 has the potential to move to Band 6 revealed that similar to AIR10 four works had a PE in excess of 20,000 with Enniskillen having a PE exceeding 24,000.

The Asset Performance team has allocated works treatment classification as defined by NIAUR. A random check was carried out and Dunmurry WwTW was selected for review. This facility has secondary activated sludge process followed by Tertiary treatment micro-strainers and was correctly recorded as an A1 Process.

Consents associated with the fourteen band 6 works have both BOD and Suspended Solids conditions. Consequently any works which also includes an ammoniacal nitrogen requirement has associated BOD and SS parameters. To provide appropriate treatment, tighter ammonical nitrogens have similar tighter BOD and Suspended Solids requirements .i.e.

Works	BOD (mg/l)	Suspended Solids (mg/l)	AmmNitrogen (mg/l)
Dunmurry	10	25	2.5
Ballymena	15	25	3

Sampling frequency is agreed with Northern Ireland Environment Agency and is based on the Population Equivalent derived by Asset Management Section. The NIEA do not carry out routine sampling, and rely on Northern Ireland Water analytical reports. NIEA assess compliance on this analytical data on a calendar year basis.

Checks are made to ensure that data aligns with those in other sections of Table 17 and associated information and analytical data is signed off by the head of function.

Most of the data for this table is based on the asset performance spreadsheet which we have reviewed in detail for Table 15. Discharge consent information has then been applied by the Environmental Regulation team to filter the outputs for the requirements of Table 17b.

The general data on all WwTWs in the spreadsheet is filtered to obtain those in the required size category. Seventeen works have been identified, however three of those works (Ballynacor, Bullay's Hill and Armagh) are operated under the PPP concession and have been removed as required for the reporting, leaving a total of fourteen. We confirm that this matches the figure in Table 17c Line 6.

The PE's are those derived by the asset performance team and include domestic and trade sources effluent, but exclude tourist PE's as required by the reporting guidelines.

Consent information is entered into the spreadsheet by the environmental regulation team using the appropriate water order consents from the NIEA. Works treatment classification is as defined by NIAUR and is allocated to each works in the spreadsheet by the asset performance team.

## 4.2 Costs NI Water

The Company has identified 14 large works which meet the criteria to be reported in Band 6. Each of these works has its own location code. This enables the company to extract costs direct from the general ledger system. This compares with a total of 17 large works that were identified during AIR10. The difference relates to the three PPP sites, Ballinacor, Armagh and Bullays Hill.

### Line 9 - Direct Costs

The total value in direct costs is consistent with the value in table 17f for direct costs for large NI Water works.

Direct costs include Contractors (531X), Materials (541X), Chemicals (548X) and Direct Labour (611X and 612X – Wages Overheads).

All operational staff are required to complete timesheets. Labour costs can be queried on the basis of account codes and location codes to attribute labour costs by site.

As the Company notes in its commentary, the phased introduction of the cost to serve project has resulted in all labour costs and overheads being charged to sewage treatment, whilst for AIR10 a portion would have been allocated to sludge and hence would not have been reported in this table. This effectively means the direct labour costs are inflated and highlights a shortcoming in the way the current cost to serve system is implemented, which needs to be corrected for future years to enable accurate reporting.

The Company believe that as the Cost to Serve project is 'bedded in' these types of issues will be identified and resolved.

A single meter measures power at each site. It is not possible to directly separate power costs for sewage treatment from power costs for sludge processing. The field managers have estimated the split of power use on a site-by-site basis and the estimated power costs for sludge processing are not included. The cost of terminal pumping is also not included in the direct costs, except for the three sites identified in the next paragraph.

There is currently one meter at Duncrue Street, which measures power to both the Belfast WwTW and the incinerator, nevertheless the Company is in the process of installing a new separate meter to allow for power costs to be reported by incinerator (sludge) and sewage treatment. The estimated power costs of the incinerator have been excluded from line 10. Where possible, terminal pumping station costs are excluded from line 10. Three WwTWs (Ballymena, Newry and Omagh) have their terminal pumping stations on site, and it is therefore not possible to separate these costs from line 10.

In terms of cost fluctuations, direct costs have reduced by £1.5 million. The reduction is partly due to the transfer of sites away from NI Water.

The Company has further identified an overall cost saving in this table of £1.3 million. This is attributed to improved rates from a new power contract.

#### **Line 10 – Power Costs**

Power costs are measured at each site by a single meter. As such, the costs by site can be extracted directly from the oracle system. In order to split costs between sewerage and sludge treatment the company relies on operational judgement by the field managers on a site by site basis, based on their knowledge of the processes and likely power consumption. The Company provided a list of the splits used by the different sites with sewage and sludge facilities.

As mentioned above, there is currently a single meter at Duncrue Street, which measures power to both the Belfast WwTW and the incinerator. For AIR10, the power costs were split 60% to the STW and 40% to the incinerator. For AIR11 the company has used a 48%:52% split which is based on kilowatt usage during the year. NIWS intends to install a separate meter on the incinerator so that these costs can be more accurately captured. For AIR12 NIWS expects to be able to report these costs in more detail.

#### **Line 11 – Service Charges**

NI Water does not currently pay any service charges.

#### **Line 12 – General and Support Costs**

These are allocated to each individual WwTW in proportion to the direct costs. As the company advises in its commentary the total value from table 22 line 10 was used as the starting point to report this data. This was then split across all WWTWs based on Costed Wages Charge (611X) and Wages Overheads (612X). The data for direct labour costs was extracted from the company general ledger system which records operational costs on a timesheet basis.

Data for qualifying works was then reported in the relevant cells for this table. We believe the approach is appropriate for the purposes of reporting the data in the absence of directly allocation of costs.

#### **Line 13 – Functional Expenditure**

Functional expenditure is calculated as the sum of line 9 and 12.

#### **Line 14 – Estimated Terminal Pumping Costs**

Terminal pumping station costs only include power costs, as these are the only costs that are able to be separately identified. For three WwTWs, identified earlier, the terminal pumping stations are on site and therefore included in the site power costs. The Company has not reported any costs for this line.

#### **Line 15 – Estimated Sludge Costs**

Sludge treatment costs are generally captured separately in the financial system, with the exception of power costs for sludge treatment, which are estimated as described in the previous paragraphs. The sludge treatment costs include any on-site treatment. Most of Northern Ireland's sludge is processed centrally, typically by incineration. Any off-site processing costs are included in table 17g. The Company has reported zero in these rows as sludge costs can be identified separately and are not included in the lines above.



**6. Assumptions**

Assumptions have been made by the field managers regarding the split of power usage to sewage treatment and sludge treatment, as discussed above. This is a reasonable approach in the absence of more appropriate data.

**7. Confidence Grades**

Confidence grades of C5 have been applied to the population equivalent data. This is consistent with the grades applied to similar data in Table 15 Lines 6 and 7 by the asset performance team, and given the degree of estimation applied to the data we support these grades.

All other grades for the consent standards (Lines 3 – 7) and treatment classification (Line 8) are A1. This is factual, well documented information and we support this grade for these lines.

No confidence grades are required for financial data.

**8. Consistency Checks**

The direct cost in this table is consistent with the total direct costs in table 17f for large sewage treatment works operated by NI Water.

**Date:** 29 July 2011  
**Prepared by:** HMS

Table 17c – Sewage Treatment Works - Numbers

## Commentary by REPORTER

## 1. Background

The purpose of this table is to classify each company's sewage treatment works by size and by method of treatment.

## 2. Key Findings

- There are no significant issues to report on for this table.

## 3. Audit Approach

The audit consisted of an interview with the line owners to discuss the methodology and review the master spreadsheet that has been used as an input to this table.

## 4. Audit Findings

## 4.1 General

The basis for the information to complete this table is the asset performance master spreadsheet, managed by the asset performance team in NI Water. The construction and content of this spreadsheet is described in detail in the commentary for Table 15.

The total number of WwTWs operated by NI Water, as detailed in Table 17c line 7 is the total of all works in this table i.e. 1045 (1051- 6 No PPP works) which includes 4 screened outfalls and 13 unscreened outfalls.

The number of WwTWs in Table 15 line 8 is reported as 1028 (1045 – (4 +13)) as the screened and unscreened outfalls are not included in this line total.

The general data on all WwTWs in the Company's spreadsheet is filtered to obtain those in the required size category. These are as defined by the regulator as follows:

Banding	Loading kgBOD/day	PE
Size band 1	<15	0 – 250
Size band 2	15 – 30	250 – 500
Size band 3	30 – 120	500 – 2000
Size band 4	120 – 600	2000 – 10000
Size band 5	600 – 1500	10000 – 25000
Size band 6	1500 +	25000 +

The population equivalents are those derived by the asset performance team and include domestic and trade sources effluent, but exclude tourist population equivalents as required by the reporting guidelines.

Consent information is entered into the spreadsheet by the environmental regulation team using the appropriate water order consents from the NIEA.

Works treatment classification is as defined by NIAUR and is allocated to each works in the spreadsheet by the asset performance team.

#### **4.2 NIW Data**

The data used to populate this table has been extracted from a master spreadsheet populated and updated by the Asset Performance Team. To track changes and maintain the process as live as possible, the Asset Performance team monitor and update by liaising with various sections i.e. Operational Technical Support, Environment Regulation, Engineering and Procurement and the Rural Wastewater Investment Programme.

The procedure is initiated by the Operations Technical Support section highlighting operational issues requiring resolution via Engineering and Procurement. Environmental Regulation section dovetails to provide details on any new consent applications and or consent reviews, changes.

To maintain live records, the Asset Performance Team liaises with Consultants carrying out upgrades to small sewage treatment works. The Asset Performance section is the only section authorised to change Population Equivalent Figures.

Despite increased utilisation of flow and load surveys, the majority of Population Equivalent figures are derived using theoretical data. For AIR12 additional flow and load surveys are planned which should increase the confidence of data sets. Wastewater Treatment facilities serving less than 250 Population Equivalent have been largely derived from desk top house counts from MapInfo and an assumed occupancy of three per household.

The Asset Performance team collates all information into the central spreadsheet from which Band Size for each WwTW can be assessed and any changes highlighted. The size banding of each works is added manually. For AIR12, we consider this process should be automated, for the avoidance of any misrepresentation.

The information on this spreadsheet is cross checked with NI Water's Corporate Asset Register.

The Asset Management Section (AMS) has co-ordinated information from PPP for the population of 'Table 17c – total' table, and the associated commentary. – See Separate PPP commentary for this section.

It should be noted that the banding of each WwTW is based on the latest Populations Equivalents (PEs) minus tourist PEs (i.e. hotels and caravan parks only, as information does not exist on the proportion of PE to commuters).

Since AIR10, PEs for 136 WwTWs have been updated.

Since AIR10, eight WwTWs have been converted to transfer pumping stations, with influent from the associated catchments pumped to larger works. An additional two septic tanks have been decommissioned, one sea Outfall has been converted to primary treatment and three sites changed to private ownership as they serve only one property, resulting in an overall decrease of 13 WwTWs (1064 down to 1051). These figures are inclusive of the six PPP Works.

The total number of WwTWs operated by NI Water, as detailed in Table 17c line 7 is the total of all works in this table i.e. 1045 (1051- 6 No PPP works) which includes four screened outfalls and 13 unscreened outfalls.

The number of WwTWs in Table 15 line 8 is reported as 1028 (1045 – (4 +13)) as the screened and unscreened outfalls are not included in this line total.

The total number of WwTWs within NI Water's Corporate Asset Register is 1046, as it has counted Ballyhalbert WwTW twice as the works is located on two different sites.

#### **4.3 PPP Data**

##### **Lines 1 to 6**

There are six sewage treatment works operating under two separate contracts. The Omega Contract operated by Glen Water accounts for five works at North Down Ards, Armagh, Richill, Ballyrickard and Ballynacor. Coastal Clearwater operate the sixth facility at Kinnegar

All the PPP facilities provide secondary treatment and sample and monitor cumulative flows of the incoming influent on a regular (at worst weekly) basis as per contract requirements. Kinnegar is sampled on a daily basis from a 24 hour composite sampler. The load information was used to determine the appropriate size band classification. The information provided was checked with table 15 data and correlated.

Each of the WwTWs operated by a PPP Contractor has been classified by size and by method of treatment as per definitions in the guidance notes: Table 17c (size bands) are determined from sewage loads receiving treatment and treatment category as detailed in the Table 17b guidance.

The variance between AIR10 and AIR11 is detailed below. As shown, the only change from AIR10 relates to Armagh STW. The movement from size band 6 to 5 reflects a significant reduction in PE (30717 to 17350) and resultant reduction in the average daily BOD Load from 1843 Kg/d to 1041 Kg/d, which is less than the 1500 kg/d BOD required for Band 6. We queried the reason for the substantial decrease in loading and PE, and there was no apparent reason as the sampling protocol was consistent and the derived figures calculated in the same manner as previously. For AIR12, we recommend that any significant variances i.e. greater than 15% should be investigated.

The tabulated details below highlight any size band change and provide a works by works description of treatment provided.

Works	Size Band		Treatment Process	Category
	AIR 10	AIR11		
North Down WWTW	6	6	Secondary activated sludge process with disinfection	TA2
Armagh WWTW	6	5	Secondary activated sludge process with nutrient removal	TA2
Richhill WWTW	4	4	Secondary activated sludge process with drum filters	TA1
Ballyrickard WWTW	6	6	Secondary activated sludge process with disinfection	TA2
Ballynacor WWTW	6	6	Secondary activated sludge process with nutrient removal	TA2
Kinnegar WWTW	6	6	Secondary Activated	Secondary Activated

#### Line 8

Zero return and no change from AIR10

#### Line 9

The change in Armagh from Size Band 6 to Size Band 5 has resulted in it being reclassified as a Small Works. Given it has an ammonia consent, it therefore results in a change in Line 9 from one works (Richill) in AIR10 to two works (Armagh & Richill) in AIR11.

### 6. Assumptions

There are no other assumptions made by the Company in the compilation of this table.

### 7. Confidence Grades

No confidence grades are required for this table.

### 8. Consistency Checks

Discrepancies between Table 15 line 8 and Table 17 Line 7 have been explained in above commentary.

**Date:** 29 July 2011  
**Prepared by:** HMS

Table 17d – Sewage Treatment Works - Loads

**Commentary by REPORTER****1. Background**

The purpose of this table is to collect information on the sewage loads received by the various types and sizes of treatment works in each company. The data collected is used to inform NIAUR's assessment of the Company relative operating efficiency.

**2. Key Findings**

- There are no significant issues to report on for this table.
- We suggest that NI Water consider comparing the results from the ongoing programme of flow and load surveys against the previous assumptions for each site to determine if there is a statistically significant difference which should be extrapolated into the larger population of WwTW sites.

**3. Audit Approach**

The audit consisted of an interview with the line owners to discuss the methodology and review the master spreadsheet that has been used as an input to this table.

**4. Audit Findings****4.1 General**

Most of the data for this table is based on the asset performance spreadsheet which was reviewed in detail for Table 15. Discharge consent information has then been applied by the environmental regulation team.

Loads at each NI Water works have been calculated from the associated population equivalents using the assumed factor of 60g BOD per person per day.

PPP works loadings are calculated from more accurate operational data. Kinnegar WwTW is sampled daily for influent BOD by a 24 hour composite sample. Flow to full treatment is also measured and the loading can then be accurately calculated. The other five PPP works are sampled weekly and the load calculated in a similar manner.

**4.2 NI Water Data****Lines 1 to 9**

The data used to populate this table has been extracted from a master spreadsheet populated and updated by the Asset Performance Team. To track changes and maintain the process as live as possible, the Asset Performance team monitor and update by liaising with various sections i.e. Operational Technical Support, Environment Regulation, Engineering and Procurement and the Rural Wastewater

Investment Programme. Trade Effluent information is obtained from NI Water's Trade Effluent Section. The COD:BOD conversion factor was not utilised as BOD is analysed as part of the Trade Effluent analysis suite.

Loads at each NI Water works with a PE greater than 250 are calculated from population figures using the 60g BOD per person per day. Those less than 250 are derived largely from a desk-top house count from Map-Extreme and an assumed household occupancy rate of three.

The master spreadsheet has been developed to populate Table 17c. The Population Equivalents utilised in AIR11 now includes a small number of sites where flow and load surveys have been carried out, providing greater confidence in the data than previously. Although this is an improvement on AIR10, the limited number of flow and load surveys does not provide sufficient data to improve this year's confidence grade of C3. As more surveys are scheduled, the proportionality will increase resulting in fewer PE estimates and an improvement in confidence grade. We suggest that NI Water consider comparing the results from the ongoing programme of flow and load surveys against the previous assumptions for each site to determine if there is a statistically significant difference which should be extrapolated into the larger population of WwTW sites.

Overall the total loading for NI Water Works has decreased from 112,140 Kg BOD/d in AIR10 to 108,714 Kg BOD/d in AIR11. This reduction can be explained by a 3% reduction in trade effluent load, as reported in Table 15, and less reliance on estimated data. The Ammoniacal loading for works having NH<sub>3</sub> Consents greater than 5mg/l has reduced and those having more stringent NH<sub>3</sub> Consents increased. This can be explained by the number of works having NH<sub>3</sub> Consents greater than 5mg/l decreasing by two from AIR10 to 46 in AIR11, and those having more stringent NH<sub>3</sub> Consents increasing by six in number to 48 in AIR11.

#### **4.3 PPP Data**

##### **Lines 1 to 6**

There are six sewage treatment works operating under two separate contracts. The Omega Contract operated by Glen Water account for five works; at North Down Ards, Armagh, Richhill, Ballyrickard and Ballynacor. Coastal Clearwater operates the sixth facility at Kinnegar

All the PPP facilities provide secondary treatment and sample and monitor cumulative flows of the incoming influent on a regular (at worst weekly) basis as per contract requirements. Kinnegar is sampled on a daily basis from a 24 hour composite sampler. The load information was used to determine the appropriate size band classification. The information provided was checked with table 15 data and correlated.

We found that there was one change from that reported in AIR10, relating to Armagh WwTW. Armagh WwTW is now classed as a Size Band 5 works as its average daily BOD load for AIR11 has reduced from 1843 kg/d to 1041 kg/d, and is now less than 1500 kg/d BOD and thus in the Band 5 range. We queried the reason for the

substantial decrease in loading, and there was no apparent reason as the sampling protocol was consistent and the derived figures calculated in the same manner as previously. For AIR12, we recommend that any significant variances i.e. greater than 15% should be investigated

There are no other changes to the PPP sewage works treatment categories

Although the total load treated by the PPP facilities has reduced from 22,206 kg BOD/d in AIR10 to 20,264 kg BOD/d in AIR11, the overall proportion of PPP treatment in relation to total NI Water treatment has increased in percentage terms from 16.5% to 18.6%.

#### Line 8

There is no variance from AIR10 registering a zero return

#### Line 9

The change in Armagh from Size Band 6 to Size Band 5 has resulted in it being reclassified as a Small Works. Given it has an ammonia consent, it therefore results in a change in Line 9 from one works (Richhill) in AIR10 to two works (Armagh & Richhill) in AIR 11.

### 5. Company Methodology

The basis of the information used to complete this table is the asset performance master spreadsheet, managed by the asset performance team in NI Water. The construction and content of this spreadsheet is described in detail in the commentary for Table 15.

The general data on all WwTWs in the spreadsheet is filtered to obtain those in the required size category. These are defined by the regulator as follows:

Banding	Loading kgBOD/day	PE
Size band 1	<15	0 – 250
Size band 2	15 – 30	250 – 500
Size band 3	30 – 120	500 – 2000
Size band 4	120 – 600	2000 – 10000
Size band 5	600 – 1500	10000 – 25000
Size band 6	1500 +	25000 +

The population equivalents for each works are derived by the asset performance team and include domestic and trade source effluent, but exclude tourist population equivalents as required by the reporting guidelines.

Consent information is entered into the spreadsheet by the environmental regulation team using the appropriate water order consents from the NIEA.



Works treatment classification is as defined by NIAUR and is allocated to each works in the spreadsheet by the Asset Performance Team.

Works loadings are calculated for each treatment works based on 60g BOD per person per day and then summed by the spreadsheet for each size band as defined above.

PPP works loading data is obtained from the operators and is calculated by direct measurement of influent BOD concentration and works flow measurement, giving a more accurate assessment of works loading.

## **6. Assumptions**

A loading rate of 60g/c/day has been assumed in accordance with the NIAUR guidance.

Assumptions for background data, such as population are documented in our commentary to table 17c.

## **7. Confidence Grades**

All confidence grades for NIW information are indicated as C3. These are consistent with the grades for the equivalent information given in Table 15 and reflect the degree of estimation of population equivalents used to develop the information.

Confidence grades for the equivalent PPP information are higher, at B3 throughout. This reflects the greater degree of direct and frequent measurement of loads used at these sites to obtain the reported data.

We support the confidence grades given for both sets of data.

**Date:** 29 July 2011  
**Prepared by:** HMS

**Table 17f – Sewage Treatment Works - Costs****Commentary by REPORTER****1. Background**

The purpose of this table is to collect background information on the costs of different types and sizes of sewage treatment works. The data collected is used to inform NIAUR's assessment of the Company's relative operating efficiency. The overall approach remains unchanged from last year. Some variation in power exists. This is due to a combination of reduced contract rates and some works moving to the PPP contractors responsibility.

**2. Key Findings**

- Costs have been assigned to individual WwTWs of size band 1 to 4 based on population equivalents. In the absence of better data we believe this approach is appropriate.

**3. Audit Approach**

The audit consisted of an interview with the table owner to discuss the methodology and review the source data extracted from the financial system.

**4. Audit Findings****4.1 NI Water Only**

Data is extracted from the Company general ledger system. Not all data exists at the level of detail required to populate this table. Where this is the case, apportionments have been made based on management judgement and analysis. We discuss these apportionments in more detail below.

Direct costs include Power (521X), Contractors (531X), Materials (541X), Chemicals (548X) and Direct Labour (611X and 612X – Wages Overheads).

The Company advised that its ability to report data against each of the lines in this table will be greatly improved with the incorporation of the business improvement programme. We note that although this was expected to be implemented for reporting during AIR11, progress on the development of this reporting tool has been slower than expected. The Company advised that it expects to be able to report at least some data based on actual costs for works in size bands for AIR12 based on the business improvement programme.

The Company provided appropriate supporting information consisting of reports extracted from the Company Oracle system.

NI Water has circa 1,100 individual treatment works related to sewerage and sewerage and sludge treatment.

**Lines 1-4 – Direct Costs of Sewerage Treatment Works in Bands**

The Company advised that Cole Island has moved from bands 5 to 4. The approach the Company has used this year follows on from that adopted last year. It relies on a review of the location code. Large works are flagged with a 'W' location code and all direct costs associated to single WwTWs can be identified. Smaller works are identified with a 'X' location code. The X code is used to consolidate costs for a number of smaller works in a specific geographical area. In total circa 1,100 works exist, which are coded to 100 individual codes. WwTWs in bands 5 and 6 can be identified separately from the 'W' codes. In order to report data in bands 1-4 the Company has used data on population equivalents for the group of works coded under the 'X' codes in order to split the costs. We believe this approach is acceptable in the absence of more direct information and is likely to result in data that is reflective of the actual position.

We note that operational staffs are required to complete timesheets and hence allocation of their time to cost centres should be straightforward. These costs have been allocated across all six size bands.

In reporting the direct costs, the Company extracted data from the general ledger, related specifically to direct costs. As a result no apportionment (apart from that noted above) was required to split direct and general and support costs.

Each site has only one power meter. In order to assess the power cost element specific to sewerage where a treatment works provides both sewage treatment and sludge treatment the Company has used the assessment of operational staff. In the absence of more detailed information we believe this approach is appropriate.

A further apportionment was required for data relating to the Belfast WwTW and incinerator. This is because these operations share a common meter. An operational judgement of a 42:58 split was used in this instance to isolate power costs related to sewage treatment. This compares with a split of 60:40 last year. We challenged the Company as to the reasons for the variance. The Company advised that this variance reflected actual workloads undertaken in the year.

Due to the cost to serve project being gradually phased in and still having some issues with correct implementation, some direct labour costs that should have been coded to sludge have been coded to sewage treatment. It is not possible to estimate the extent of materiality of this coding problem.

**Lines 5-6 – Direct Costs of Sewerage Treatment Works in Bands**

Costs for works within size bands 5-6 are individually coded within the Company general ledger system. As a result these costs were extracted directly from the ledger system. A judgement on power costs is used as described above to split power costs where the works provides more than just sewage treatment services.

The remainder of the allocation is as described above.

**Line 7 – Total Direct Costs Sewage Treatment Works**

This is a summation of data in lines 1-6. We note the total is consistent with table 22, column 2 line 9.

**Line 8 – Sludge Treatment and Disposal Costs**

The Company has not reported costs under this line.

**Line 9 – Sewage Treatment: Direct Costs**

This is the same value as the total direct costs for all sewerage treatment works as reported in line 7 above. We note the total is consistent with table 22, column 2 line 9.

The data contained in this line seems to be a duplicate of the data in line 7.

**Line 10 – Sewage Treatment: Power Costs**

Power costs exclude power costs for sludge treatment and terminal pumping (where it has been possible to separate terminal pumping power costs).

Although power costs can be identified by individual site, due to time constraints, the Company has simply taken the total power cost value and pro-rated this on the basis of direct costs. The Company appreciates that the process could be refined and actual costs could be reported. It advised that it will address this for AIR12. Although, it should be noted the Company advised the same for AIR11. We do believe however that the reported power costs will be correlated to direct costs within treatment works.

**Line 11 – Service Charges**

NI Water advised that it does not currently pay any service charges.

**Line 12 – Sewerage Treatment – General and Support**

The Company has apportioned the total general and support costs on the basis of direct costs. We note the total here is consistent with table 22 line 10 column 2. In the absence of direct data we believe this method is appropriate and will provide data that is broadly reflective of the actual position. Further comment on general and support costs is provided in our commentary to table 22.

**4.2 PPP Only Costs**

It should be noted that the PPP only costs for works related only to power costs. These are obtained from interrogation of the Company oracle database by means of location codes.

The fluctuation in power costs related to better rates being obtained for power. For more information on this please see our commentary to table 22.

NI Water confirmed that all the PPP works are all now fully operational and have been for the entirety of the 2010/11 report year.

**Column 2 Treatment Category – Activated Sludge**

These costs are related to the [                    x                    ] contract. The power costs for [   x   ] form part of the Concessionaire's payment to the operating company. The Concessionaire is not required to provide these costs to NI Water and hence these costs are not reported.

**Column 4 - Line 4 - Direct costs of STWs in size band 4, Tertiary**

These costs relate to [   x   ], and amount to power costs related to this site.

**Column 5 - Line 5 - Direct costs of STWs in size band 5, Tertiary**

These costs relate to [   x   ], and amount to power costs related to this site.

**Column 5 - Line 6 - Direct costs of STWs in size band 6, Tertiary**

There are three PPP works in this category. These are:

- North Down;
- Ballyrickard; and,
- Ballinacor

The costs all relate to power costs and are obtained by interrogation of location costs from the Company oracle system.

**Line 8 – 11**

The only costs reported here relate to the power costs already reported in lines 1-6 above.

**Line 12 – General and Support Costs**

The total support costs reported by NI Water for these contracts are a combination of staffing costs and consultancy expenditure. Consultancy expenditure is extracted from the general ledger and can be attributed directly to a particular contract.

Time costs are based on a pro-rata approach. Seven staff are employed in order to manage the PPP contracts. Their costs are obtained from the payroll system.

The costs reported for each line relate to time costs of staff working on the contracts and an assessment of the portion of their time spent on each type of contract. The total general and support costs for the management of sites is calculated at £205k. This is a substantial drop from the value last year which was slightly more than £1 million. The Company attributes the reduction to the reduced expenditure on consultancy support now many of the sites are operational.

In total NI Water has seven sites, five of which are sewerage. The value reported here relates to the five sites that are sewerage sites. It is calculated as 5/7 of the total value. The resulting [ x ] is then further split with 1 site reported as an A1 site and 4 sites reported as A2. Costs in the activated sludge column relate to the Kinnegar site and are based on directly attributable costs for that site.

We believe that in the absence of more accurate data the Company approach is appropriate.

## 8. Consistency Checks

- Total direct costs in line 7 (column 11) equal total direct costs for sewage treatment in table 22, line 9 (column 2).
- Power costs in line 10 (column 11) equal power costs for sewage treatment in table 22, line 2 (column 2).
- There is no variation in the total Service charges in line 11 (column 11) and service charges for sewage treatment in table 22, line 7 (column 2).
- General and support costs in line 12 (column 11) equal general and support expenditure for sewage treatment in table 22, line 10 (column 2).
- Total direct costs for NIW works in size band 6 in line 6 (column 11) equal the sum of direct costs in table 17b. There is no table 17b equivalent for the PPP only sites.

Date: 29 July 2011  
Prepared by: HMS

**Table 17g – Sludge Treatment and Disposal Information****Commentary by REPORTER****1. Background**

The purpose of this table is to collect information about sewage sludge disposal routes, and the costs of sludge treatment and disposal associated with each of these routes.

This information is used to update the modelling of sewerage services to enable the assessment of comparative operating efficiency of Company's sewerage services.

**2. Key Findings**

- The costing data is extracted from the Company general ledger system. Some assumptions are required to apportion costs between categories. We believe these are appropriate in the absence of more relevant data.

**3. Audit Approach**

The audit consisted of an interview with the table owners to discuss the methodology and review the source data extracted from the financial system.

**4. Audit Findings****4.1 Resident Population and sludge volume**

The sludge treatment and disposal system is a centralised system; all sludge is transported to the newly constructed PPP incinerator for disposal.

The Company has reported all sludge as disposed of to PPP with 0.6ttds to land fill. The landfill figure represents the grit and screenings element of the sludge disposal which under the reporting requirements should be reported in this table.

In line with the Reporting Requirements resident population has been reported in line 1, The amount of sewage sludge produced, and reported in line 2 will be based on the greater 'connected population' so there is a disconnect between these two figures but they have been reported correctly.

**4.2 Costs**

The cost data has been downloaded from the financial system for collation and input into this table. The financial system coding generally allows the costs to be captured for each of the categories in this table.

**Line 3 – Sludge Treatment Direct Costs****Incineration**

The Company had previously reported costs under incineration. It advised however that the incineration facility at Belfast WwTW has now been transferred to the PPP contractor. As a result the Company reports no costs under this heading for AIR11.

**Other**

These costs relate to sludge treatment and waste water treatment works. These costs can be identified separately from activity code 621. The Company has extracted the relevant direct costs for this line from the general ledger. We do note some issues with the 'Cost to Serve' project may result in these costs being reported artificially low for AIR11.

Where a treatment works provides both sewage and sludge treatment it is necessary to apportion the power costs as only one meter exists per site. These apportionments are based on professional judgement of the field managers responsible for each works. An element of judgement is therefore involved. However in the absence of more accurate information we believe this is an appropriate method to report these costs.

**Line 4 – Sludge Disposal Direct Costs**

Previously, Sludge disposal included 'Farmland Advance', 'Incineration', 'Landfill', 'Land Reclamation' and 'Other' and data for each of these activities was extracted from the oracle accounting system. However, the majority of sludge disposal now occurs by means of PPP. We challenged the Company as to why this is the case. If the main difference between the two years is that PPP now manages the incinerator, why are the other categories of sludge disposal are no longer used? The Company advised that it now sends as much sludge as can be handled by the PPP contractor and does not concern itself with how this is then disposed by the contractor. There is a small element of sludge disposal by landfill that the Company continues to use. These are in effect costs related to grit and screening and are based on an estimate of volumes disposed through the CO18 contract.

**Line 5 – Sludge Treatment and Disposal Direct Costs**

This is a calculated line.

**Line 6 – Sludge Treatment and Disposal Direct Costs**

Power costs are allocated in a consistent way with line 4, sludge disposal, direct costs. Effectively all power costs relate to smaller sludge treatment works operated by the Company, which are combined sewage and sludge treatment works. The apportionment of power costs to these sites is discussed above.

**Line 8 – Sludge Treatment and Disposal, General and Support Expenditure**

The data is simply extracted from table 22, NI Water only column 3 line 10 and apportioned across this table on the basis of direct labour costs.



**5. Company Methodology**

Resident population served is consistent with the total resident population taken from Table 13 line 10, less the non-resident population. The figure is consistent with the value given in Table 17a line 1.

The Company would appear to have a well controlled management system for controlling sludge movements both as liquid and cake through use of a GPS logging system. Further improvements are planned with the introduction of weighbridges at each site. The amount of sludge produced is calculated based on sewage sludge disposal data produced by Area Sludge Officers. The data originates from reconciled dockets upon which the contractors are paid.

During last year's audit a recommendation to improve accuracy was suggested for the calculation method of the conversion of wet tonnes to dry solids. It was suggested to use actual recorded % dry solids at each site within the calculations rather than a global average. The Company took on this suggestion and have used monthly % dry solid figures for each site to calculate the total for AIR11.

The sludge resulting from septic tanks is included in the total as the sludge volumes are calculated on tonnes leaving the facilities not effluent arriving. In previous years an adjustment has been made for septic tanks to remove this volume but this has been reviewed following the audit and the volume has been left in.

The cost data has been downloaded from the financial system for collation and input into this table. The financial system coding generally allows the costs to be captured for each of the categories in this table.

**6. Confidence Grades**

No confidence grades are required for data in the financial lines.

**7. Consistency Checks**

- Line 1 Column 10 does not equal to a sum of Line 1 columns 1 to 9. This should be 1439.5
- The amount of sewage sludge disposed of in Table 17g Line 2 Column 10 equals the total sewage sludge disposed of in Table 15 Line 16.
- Sludge treatment and disposal: direct costs in Table 17g Line 5 Column 10 are equal to the total direct costs for sludge treatment and disposal in Table 22 Line 9 Column 3 for NI Water.
- Sludge treatment and disposal: power costs in Table 17g Line 6 Column 10 equals power costs for sludge treatment and disposal in Table 22 Line 2 Column 3 for NI Water.
- Sludge treatment and disposal: Service charges in Table 17g Line 7 Column 10 equals service charges for sludge treatment and disposal in Table 22 Line 7 Column 3.
- Sludge treatment and disposal: general and support expenditure in Table 17g (Line 8, Column 10) equals general and support expenditure for sludge treatment and disposal in Table 22 (Line 10 Column 3).

- Sludge treatment and disposal: functional expenditure in Table 17g Line 9 Column 10 equals general and support expenditure for sludge treatment and disposal in Table 22 (Line 11 Column 3).

**Date:** 29 July 2011  
**Prepared by:** HMS