


Northern Ireland Water Ltd Annual Information Return 2012

Part 4 of 10 containing:
Sewage Explanatory Factors - commentaries for tables 17a-g

Public Domain Submission
3 December 2012

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

- NI Water adopted different methodologies calculating total connected property number from AIR11 to AIR12.
- 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.

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 1.0%, which is a result of estimates of the connected population in Table 13 offset by a small reduction in the non resident population.

The estimate of non-resident population (line 2) is based on the Department of Enterprise, Trade and Investment (DETINI) statistics which is a change from previous years where NI Tourist Board data was used. However, we understand the questionnaire on which the data is based is similar in format so the impact upon the reported numbers should be minimised. The exception to this is the exclusion of visits from the Republic of Ireland which the Company must now make separate allowance for by using Central Statistics Office (CSO) data. We have reviewed this adjustment, and whilst some extrapolation is required to derive 2011 data, we believe the approach reasonable as in the context of the overall population reported the effect is relatively minor.

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 as documented here. 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 decrease in the reported non resident population estimate is noted and the Company presented supplementary evidence to indicate tourism figures had decreased. However, like for like comparisons are difficult given the amendments to the methodology required this year.

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 319.98. Although this line is 320.0, the difference is immaterial.

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; however this is not consistent to the methodology adopted in AIR11.

	AIR11 Used in AIR11	AIR11 Using AIR12 methodology	AIR12
Unmeasured household	593,458	593,458	596,699
Household sewerage only	6	6	6
Measure household (Test meter)	1,427	1,427	875
Measured household	16,768	16,768	20,406
Household (Site meter)	471	471	513
Unmeasured non household	18,223	18,223	16,823
Non household sewerage only	21	21	19
Measure non household	25,115	25,115	25,472
Measured non household – not charged (Test meter)	3,057		
Trade effluent	96		
Unmeasured non household – not charged	622		
Total connected properties at year end	659,264	655,489	660,813

By using AIR12 methodology, AIR11 figure should be 655,489. Although different methodologies were adopted from AIR11 to AIR12, the difference between using AIR11 or AIR12 methodologies is 0.6% and we believe this is immaterial. This is discussed more fully in our commentary to Table 13 (and Table 7).

4.4 Area of sewerage district (Lines 5 – 6)

NI Water is still not able to disaggregate the data in this table into sub-areas. The reported total is unchanged from last year as expected.

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.

The total length of sewer reported has increased by just over 1% from last year.

4.5 Sewerage costs (Lines 7-11)

The Company has advised that the approach is unchanged since AIR08. The data contained has not been split by region due to limitations in the reporting system. 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 AIR12. The Company advised last year that it may be able to report data across sub areas for AIR12. 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 AIR12.

It expects to be able to provide some type of split based on the cost to serve project for AIR13. Comment on the basis of the costs in the total column is provided in our commentary to table 22.

5. Confidence Grades

To reflect the uncertainty in the estimates made the Company has assigned a confidence grade of C3 to both lines 1 and 2. Whilst we have not undertaken any statistical analysis, we believe this to be reasonable as data is arrived at from third party sources.

The Company assigned a confidence grade of A2 to the total connected properties. However we believe that this should be C3 as par Undertaking A. This is discussed fully in our commentary to Table 7.

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 (320.0MI/d) equals the figure in Table 14 Line 7. Table 14 Line 7 is 319.98 and the difference is immaterial.
- Total length of sewer in Table 17a Line 6 equals the total length of sewer in Table 16 Line 14.
- 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: 25 July 2012

Prepared by: HMS

Table 17b – Sewage Treatment Works – Large Works Information**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.
- The Company has identified 15 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 AIR11.

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 PE's used to categorise works size for this table are the PE's derived by Asset Management Section (performance team) for the reported year loading information.

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. Fifteen works have been identified which is one more than reported in AIR11. The additional works included is Enniskillen which has an assumed PE of 25490.

With the exception of Larne which has a population of 27,767 and Enniskillen all other facilities are significantly higher than the threshold. An exercise to determine whether any facilities in Band 5 have the potential to move to Band 6 revealed that three works (Ballymoney, Banbridge, Strabane) have a PE in excess of 20,000 which indicates they are close to the large works threshold.

The Asset Performance team has allocated works treatment classification as defined by NIAUR. We saw evidence of challenge by the line owner to query whether works classification was correct and this has resulted in amendments being made to the table (Newtownbreda was subsequently revised from TA1 to TA2).

Consents associated with the fifteen 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 ammoniacal nitrogens have similar tighter BOD and Suspended Solids requirements. For example:

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

Checks are made by NI Water 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.

We confirm PPP data has been correctly excluded from the reported data.

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. We reviewed a small number of consents and confirm for the work reviewed these were translated into the table correctly.

4.2 Costs NI Water

The Company has identified 15 large works which meet the criteria to be reported in Band 6, this is an increase of 1 from the previous year. This is because the PE has changed for Enniskillen compared to last year. There were 17 large works identified during AIR10. The difference relates to the three PPP sites, Ballinacor, Armagh and Bullays Hill.

Line 9 - Direct Costs

The total value in total 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.

We note that the cost to serve project has allowed NI Water to continue to refine its categorisation of costs particularly between sewerage and sludge assets, and will allow NI Water to report costs at site level. This is because when allocating costs NI Water staff have to select whether any cost relates to sewage or sludge. We challenged NI Water to advise whether any particular inventory could be used for both sewerage and sludge treatment. An example may be chemicals. NI Water advised that although this is unlikely to occur, where it does the costs would be in general coded to sewerage.

We challenged NI Water to advise whether any portion of works classed as sewage treatment could also have an element that is sludge treatment. NI Water advised most of the large works will have an element of cost that is specific to sludge treatment.

The Company advised us last year that due the phased introduction of the project, all labour costs and overheads were being charged to sewerage 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 were inflated for 2011. We were expecting this trend to have reversed for AIR12, however we note that total costs are actually up by 6.5%. Part of this may be explained by the additional works. However, even after removing this works, total direct costs are greater than the previous year. We have challenged NI Water to advise why this is the case. The Company advised that it is not anticipated that this would necessarily reverse in AIR12.

Total direct costs include power costs. The cost of terminal pumping is also not included in the direct costs. The only cost that is reported for terminal pumping costs separately is Ballymena. It is not clear where the remainder of the terminal pumping costs are included. We challenged NI Water in relation to this. NI Water advised that Ballymena is the only terminal pumping station where the costs can be separately identified.

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 estimated power costs for sludge processing are not included. We challenged NI Water to advise whether this judgement is revised annually. The Company advised that the judgement is revised annually and hence the data reflects the most current information. In previous years we have reviewed the list of splits used by the different sites with sewerage and sludge facilities.

As mentioned previously, there is currently a single meter at Duncrue Street, which measures power to both the Belfast WwTW and the incinerator. This is the same

process as that followed for AIR11. For AIR 11 NIW used a 48%:52% split, which was an estimate of the kilowatt usage between the services during the year. For AIR12 the company has used a 36%:64% split. We challenged NI Water in relation to the change in split for AIR12. The Company advised that this was due to an additional incinerator coming online during the year. The estimated power costs for the incinerator have been excluded from the power costs reported.

NI Water advised last year that it was in the process of installing a new power meter to allow the direct recording of sludge costs. We challenged why this has not been installed. The Company advised that data is now being received splitting power at the Duncrue site, however this has only been happening for about the past 6 months.

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). 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 some reason NI Water has only reported costs for Ballymena for AIR12. This seems to be change in approach from previous years. We challenged the reasons for this revised approach. NI Water advised that in AIR12 the costs for Ballymena have been shown separately for the first time. Ballymena is the only terminal pumping station where the costs can be separately identified.

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 are generally identifiable 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

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: 25 July 2012

Prepared by: HMS

Table 17c – Sewage Treatment Works - Numbers**Commentary by REPORTER****1. Background**

The purpose of this table is to classify each of the 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**

Lines 1 to 9

The methodology to populate this table has been similar to that employed in AIR11. Data is extracted from a master spreadsheet, populated and updated by the Asset Performance Team. To track changes and maintain the process the Asset Performance team monitor and update this tool 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 Asset Performance Team meeting Operations and Operations Technical Support staff on a regular basis. These meetings highlight operational issues requiring resolution via Engineering and Procurement. Environmental Regulation section dovetails to provide details on any new consent applications and or consent review 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, due to concerns regarding data (as described in commentary of table 15), the majority of PE figures are derived from desk top theoretical data. For AIR12 the information provided by additional flow and load surveys had been planned to increase the confidence of data sets but the concerns raised have hampered this. Wastewater treatment facilities serving less than 250 PE have been largely derived from desk top house counts MapInfo and on an assumed occupancy of 3 people per household.

The Asset Performance team collates all information into the central spreadsheet from which band size for each WwTW assessed and any changes highlighted. Our previous report indicated that in AIR11 banding was initiated by manual input and to avoid misrepresentation this should be automated. This has now been incorporated and checked as part of work on AIR12. The information on this spreadsheet is also cross checked with NI Water's Corporate Asset Register.

The Asset Management Section 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.

4.2 NI Water Data

It should be noted that the banding of the WwTW's is based on the latest PE's minus tourist PE's.

Since AIR11, PE's for 134 WwTW's have been updated.

In the Report Year, 6 WwTW's have been converted to transfer pumping stations with influent from the associated catchments pumped to larger works. Flows from Gosheden catchment which previously were treated onsite now gravitate to another wastewater facility. 4 other WwTW's have been decommissioned and 2 new WwTW treatment facilities have been commissioned resulting in an overall decrease of 9 WwTW.

The total number of WwTW's operated by NI Water and as detailed in Table 17c line 7 is the total of all works i.e. 1036 (1042- 6 PPP works) which includes 3 screened outfalls and 10 unscreened outfalls.

The number of WwTW's in Table 15 line 8 is reported as 1023 as the screened and unscreened outfalls are as per the guidance not included in this line total.

Previous reports recommended that the difference in the total population used to calculate the size bands and the population given in Table 13 Line 10 should be investigated and consideration given to a harmonised approach. Residential PE for most of the NI Water data has been derived from GIS pointer data and that inaccuracies do exist in that some residential properties are labelled as commercial or industrial, and visa-versa.

The table below shows the AIR12 comparison between the two figures.

Total Residential Population used to Calculate Table 17C for AIR12	1,209,756
Total Population connected to the sewerage system based on Table 13 Line 10	1,472,568
Difference	262,812

As can be seen there is a difference of 262,812. Table 17c information does not include the residential population within PPP catchments. An exercise carried out in February 2012 established a theoretical desktop PE for the PPP sites of 246,786.

When this is added to the 17c figure (1,209,756) the total is 1,456,542 which is 16,116, approximately 1% less than the figure reported in Table 13.

4.3 PPP Data

Lines 1 to 6

As previously reported there are 6 WwTW's operating under two separate contracts. The Omega Contract operated by Glen Water (accounting for five works at North Down Ards, Armagh, Richill, Ballyrickard and Ballynacor) and 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. We understand sampling at Kinnegar occurs daily from a 24 hour composite sampler. The information provided specific to PPP was checked with Table 15 line 8 data and correlated. The PPP facilities have no treatment works within Bands 1 to 4.

Each of the WwTW's 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 detailed in the Table 17b guidance.

The variance between AIR11 and AIR12 Return is as tabulated below. There are no band changes from the previous submitted AIR11. Although the loading has increased to 1404 kg/BOD/day at Armagh WwTW, this is still less than trigger 1500 kg/d and therefore banding grade remains as last year at 5. For AIR12 it was recommended that any significant variances i.e. greater than 15% should be investigated. The treatment facilities at Richhill and Armagh have loadings outside this arbitrary percentage variance. Investigations indicate there to be no specific reason for these increases as flow monitors are calibrated regularly and analytical analysis and sampling are carried out by accredited bodies. Similar to Table 17d commentary, the sampling protocol was consistent and the derived figures thereafter calculated in the same manner as previously.

The tabulated details highlights loading and percentage changes and provides a works by works description of treatment provided.

Name of Treatment Works	Average Daily BOD load (Kg/d)		% change	Resultant Size Band	Treatment process	Treatment category
	AIR12	AIR11				
North Down WWTW	3902	4380	-10.9	6	Secondary activated sludge process with disinfection.	TA2
Armagh WWTW	1404	1041	+34.8	5	Secondary activated sludge process with nutrient removal.	TA2
Richhill WWTW	157	130	+20.7	4	Secondary activated sludge process with drum filters	TA1
Ballyrickard WWTW	1632	1775	-8	6	Secondary activated sludge process with disinfection	TA2
Ballynacor WWTW	9465	8552	+10.7	6	Secondary activated sludge process with nutrient removal.	TA2
Kinnegar WWTW	4846	4386	+10.5	6	Secondary Activated	Secondary Activated

Line 8

Zero return and no change from AIR11.

Line 9

There is no change from AIR11 as Armagh and Richhill WWTW are classified as small works (size band 4 and 5), both have ammonia consent of 2mg/l, therefore they must be accounted for in line 9 – Small works with ammonia consent ≤ 5 mg/l.

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 in the numbers of works and PE's reported in Table 17c and the rest of the Return are highlighted above.

Date: 25 July 2012

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 NI Water's relative operating efficiency.

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**

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

The data 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 having a population equivalent greater than 250 are calculated from population figures using the 60g BOD per person per day. Those

less than 250 being derived largely from desk-top house count information from Map-Extreme and broad brush occupancy rate of 3.

The master spreadsheet has been developed to populate these tables. The population equivalents utilised in AIR12 include only two sites where flow and load surveys have been carried out. It was envisaged that greater emphasis on flow and load surveys would have resulted in improved confidence grades than those in AIR11. However due to issues, reported in Table 15, concerning robustness of data, only two flow and load surveys have been approved. Although this is an improvement, the limited numbers of flow and load surveys does not provide sufficient data to improve on this year's confidence grade of C3. NI Water's Flow and Load Survey Group has been formed to assess data. It is envisaged that due to the diversity of experience within the group (experience is drawn from process, operational, engineering and procurement and asset performance backgrounds) sound decisions should be made regarding the adoption of the flow and load survey outputs, resulting in less estimation of population equivalents and an improvement in confidence grades.

Overall the total loading for NI Water works only has decreased marginally from 108,714 Kg BOD/d in AIR11 to 108,230 Kg BOD/d in AIR12. The net reduction of 0.44%, with the exception of band 2 which remained neutral, is spread across all other size bands. Bands 5 and 4 indicate the largest reductions of 5.9% and 2.4% respectively.

The ammoniacal loading for works having NH₃ Consents greater than 5mg/l has decreased and those having more stringent NH₃ Consents increased. This is explained by the works having more stringent standard increasing by 5 from 49 to 54 and works with a more relaxed ammoniacal standard of between 5 to 10mg/l reducing by three from 46 to 43. Variations in both categories are due to a combination of trade PE being updated, a review of PE by consultants working on behalf of NI Water or the treatment works falling into this category due to a change in consent.

The AIR11 Reporter's report suggested that NI Water considers 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.

The Reporter also recommended in AIR11 that where there were load variances greater than 15% that these should be investigated. Investigations revealed that in AIR12 eighteen works fell into this category. We established the reasons for this as being that either a flow and load survey was carried out and survey adopted, or PE had been updated following review by design consultants or Trade Effluent information had been updated. It should be noted that 97% (6319 PE) of the total variance of a PE of 6512 was attributable to a reduction in PE.

Significant changes likely to occur in the short to medium term will align with rationalisation of Wastewater Treatment works and include 3 standalone treatment facilities being closed and pumped to larger treatment facilities.

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, Richhill, Ballyrickard and Ballynacor. Coastal Clearwater operates the sixth facility at Kinnegar. Loadings for Omega Works equates to 6060.99 tonnes/annum and Kinnegar 1773.46 tonnes/annum.

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 contractual 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.

There are no band changes from the previous AIR11 submission. At Armagh WwTW although the loading has increased to 1404kg/BOD /day it is still less than the threshold of 1500 kg/d and therefore the banding grade remains as last year, at 5. For AIR12 it was recommended that any significant variances i.e. greater than 15%, should be investigated. The treatment facilities at Richhill and Armagh have loadings outside this arbitrary percentage variance i.e. an increase of 20.7% at Richhill and 34.8% at Armagh. Investigations indicate there to be no specific reason for these increases as flow monitors are calibrated regularly and analytical analysis and sampling are carried out by accredited bodies.

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

The total load treated by the PPP facilities has increased from 20,264 KgBOD/d in AIR11 to 21,406 Kg/BOD/d in AIR12. In relation to the total NI Water Treatment PPP load reduced in percentage terms from 18.6% to 16.5% (akin to AIR10, where PPP load treated was 16.5% of the total).

Line 8

There is no variance from AIR11, registering a zero return.

Line 9

There is no change from AIR11 as Armagh and Richhill WWTW are classified as small works (size band 4 and 5), both have ammonia consent of 2mg/l. The loading has increased from 1,171 kg/BOD/day for AIR11 to 1,561 kg/BOD/day an overall increase of 33.3%. Richhill has increased by 20.7% and Armagh by 34.8%.

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 – 2,000
Size band 4	120 – 600	2,000 – 10,000
Size band 5	600 – 1,500	10,000 – 25,000
Size band 6	1,500 +	25,000 +

The population equivalents for each works are derived by the asset performance team and include domestic and trade source effluents, 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 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/person/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/person/day has been assumed, as required.

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

7. Confidence Grades

All confidence grades for NI Water 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: 25 July 2012

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.

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. It should be noted that the cost to serve project is seeking to disaggregate all costs down to location level. Although this has occurred for Power, other costs for the smaller works have not yet been incorporated into the cost to serve process.

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 did advise last year that it expects to be able to report at least some data based on actual costs for works in size bands 1- 4 for AIR12 based on the business improvement programme. However this has not been the case.

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

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

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

The Company advised that there has been some minor movement between bands 4 and 5. 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 assigned to 100 individual 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 staff are required to complete timesheets and hence the 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 sewage treatment, where a works provides both sewage treatment and sludge treatment, the Company has used the assessment of operational staff. These are updated annually so the assessment used by the Company reflects the current assessments on usage. 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. This is the same process as that followed for AIR11. For AIR 11 NI Water used a 48%:52% split, which was an estimate of the kilowatt usage between the services during the year. For AIR12 the Company has used a 36%:64% split. We challenged NI Water in relation to the change in split for AIR12. NI Water advised that this was due to an additional incinerator coming online during the year. The estimated power costs for the incinerator have been excluded from the power costs reported.

Last year NI Water advised that 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 would have been coded to sewage treatment. We understand that this issue has been resolved for AIR12. We note that this is evident in the reduced costs reported for AIR12 compared to AIR11.

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, on the basis that it has excluded all such costs from the data reported. We challenged NI Water about whether costs related to sludge treatment and disposal are fully removed from data in this table. NI Water advised that these costs are not included in Line 7 and therefore this line is zero. We will review how completely such costs are being removed from this table during our review for AIR13.

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. 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. The reporting requirements could usefully be expanded to identify the expected differences between these two lines.

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, the Company has not done this analysis. Rather it has 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. Although we believe reported power costs will be correlated to direct costs within treatment works we believe that NI Water should undertake a more complete analysis of power costs to ensure the data is as accurate as possible. As noted previously where a works has a sludge element, power costs are estimated based on the judgement of field managers. NI Water advised that although more than 1,000 separate works exist only a small number, 20 to 30 on have a sludge treatment element, hence the related power costs are small.

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 relate only to power costs and general and support. These are obtained from interrogation of the Company's Oracle database by means of location codes.

Since the end of the fixed price agreement, NI Water has been able to get better costs for power compared to those under the fixed price agreement.

Column 2 Treatment Category – Activated Sludge

Kinnegar WWTW contract falls under this category. The power costs for Kinnegar 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 Richhill, and amount to power costs related to this site.

Column 4 - 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's Oracle system.

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

These costs relate to Armagh, and amount to power costs related to this site.

Line 7 – Total Direct Costs of STWs all sizes

This is a calculated line.

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 contacts 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 utilised to varying degrees in the management of the PPP contracts. These 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 cost for the management of the sites is calculated at £194k. This is broadly the same as the £205k reported in 2011.

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 £118k 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 NI Water 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: 25 July 2012
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 PPP incinerator for disposal.

The Company has reported all sludge as disposed of to PPP with 0.7ttds 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 no linkage between these two figures, but they have been reported as required.

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 AIR12.

Other

These costs relate to sludge treatment and wastewater 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 have resulted in these costs being reported artificially low for AIR11. For AIR12, the costs have shown an increase of 27% in nominal terms compared to 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 the 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

The majority of sludge disposal occurs by means of PPP. 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 screenings 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

This 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 and recently installed weighbridges. 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.

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 equals the sum of Line 1 columns 1 to 9 within a rounding error of 0.1.
- 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 15.
- 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).

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