Northern Ireland Water Ltd
Annual Information Return 2013

Part 4 of 9 containing:
Sewage Explanatory Factors - commentaries for tables 17a-g

Public Domain Submission
23 October 2013

Halcrow

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

- There are no significant issues to report.

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 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 confirm 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 reported in line 2.

To confirm the reconciliation within the AIR submission the Company was able to demonstrate the consistency with Table 13 Line 10 and the approach adopted for the population lines reported in Table 2. We confirmed that total population reported in Table 13 includes non resident population and therefore the approach to calculate resident population in line 1 by deducting the non resident population from the total population is appropriate. However, we understand that for AIR12 Table 13 did not include non-resident population but the same methodology was adopt meaning that Line 1 in AIR12 was understated in line with the estimate of non-resident population (c. 18k or 1% of the total population).

The methodology to populate both lines has been revised for AIR13 due to the availability and format of the third party reports NI Water relies on to derive the population estimates reported. Given the reliance upon third party data and the methodology required to calculate the population estimates confidence in the data is consider low (NI Water has assigned a confidence grade of C3). Whilst we have not undertaken any exercises to verify this grade, we concur that weaknesses recognised by NI Water in their commentary is likely to reduce confidence.

To demonstrate trend information and ensure consistency, NI Water has helpfully provided a retrospective data for 2012 and 2011 and total population continues to

show an increasing trend. However, care should be taken in interpreting previously reported data so that this retrospective analysis is considered in any resulting year-on-year comparisons made.

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 318.69, which equals to this line.

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. Please see the table below for the detail.

Property category	AIR13
Unmeasured household	566,915
Household sewerage only	6
Measure household (Test meter)	294
Measured household	21,115
Household (Site meter)	432
Household unmeasured not charged	1
Unmeasured non household	8,916
Measure non household	23,151
Voids	44,384
Total connected properties at year end	**665,214**

The number of sewerage only NHH customer (19 properties) should be included in this line. Although the difference is immaterial, the total number should be 665,233.

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 area of the sewerage district given in Line 5 is the area of Northern Ireland excluding the area of major lakes. The area is the same as that given last year.

The length of sewer in Line 6 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 although a recent exercise has estimated the total length of lateral sewers at 2,155km. This length is not included in the total length given in Line 6.

The total length of sewer reported has increased from 15,090km to 15,254km, an increase of just over 1% from last year. Part of this increase is due to improved data capture on the GIS system resulting from the ADAI project to identify missing infrastructure.

4.5 Sewerage costs (Lines 7-11)

The Company 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 AIR13. The Company advised last year that it may be able to report data across sub areas for AIR13. However this has not been the case. We note that this follows a similar expectation in AIR12. This data is expected to come from the cost to serve project.

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 AIR13. NI Water is hopeful that for AIR 14 it will be able to provide some type of split between areas on the cost to serve project. Comment on the basis of the costs in the total column is provided in our commentary to Table 22.

5. Confidence Grades

A C3 confidence grade has been applied to Lines 1 and 2 which is appropriate. This is unchanged from last year.

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. This is unchanged from last year.

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.
- 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: 29 July 2013
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.
- 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 reported in AIR12.

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 the same as was reported in AIR12.

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.

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.

The Reporter requested that NI Water amends their commentary to indicate which, if any, of the Band 6 treatment works have been upgraded during the year.

4.2 Costs NI Water

The Company has identified 15 large works which meet the criteria to be reported in Band 6, this is the same number as last year.

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. Cost for large works is easily identifiable because each large works has a separate finance location code.

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 now allows NI Water to report costs at site level. This is because when allocating costs the staff have to select whether any cost relates to sewage or sludge. We challenged NI Water to advise whether any particular expenditure could be used for both sewerage and sludge treatment. An example may be operational materials. They advised that, where it does occur 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. They advised most of the large works will have an element of cost that is specific to sludge treatment.

Direct costs have increased by £0.9 million or 15% compared to 2011/12. This is a large variance. The Company advised that of these £0.2 million is due to the inclusion of the environmental regulatory charges which in previous years was being

reported in General and Support costs. The VER scheme is continuing to be operated as part of a longer term reduction in base costs. In the short term however the effect is to increase costs. In this instance costs have increased by £0.3 million. The other main driver of costs is power. This has increased by £0.5 million. This is due to a change in tariffs, an increase in electricity costs more generally and a change in the allocation of the split for power costs for Belfast WwTW. The split is between the Belfast WwTW and the incinerators, with the WwTW costs being reported in this table. Costs were split at 36:64 for 2012 whist they are now split at 42:58 for AIR13.

Total direct costs include power costs in the Company submission. The cost of terminal pumping is not included in the direct costs. The only cost that is reported for terminal pumping costs separately is Ballymena. We challenged NI Water in relation to why other costs have not been included. 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. We challenged NI Water if these percentages were reviewed for AIR13. The Company advised that in fact these percentages were reviewed and this judgement is revised annually and hence the data reflects the most current information.

As mentioned previously, there is currently a single meter at Duncrue Street, which measures power to both the Belfast WwTW and the incinerators. This is the same as AIR12. For AIR12 NI Water used a 36%:64% split, which was an estimate of the kilowatt usage between the sites during the year. For AIR13 they have used a 42%:58% split. NI Water confirms that no incinerator costs are reported in this table.

They also advised there is still no way to capture these costs directly.

Line 11 – Service Charges
Previously NI Water included these charges within the general and support category. For AIR13 these have been stripped out at the request of the regulator. They report a total of £0.2m of direct costs included in Band 6 for 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 direct allocation of costs.

There has been a relatively minor increase of £0.1 million in these 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. NI Water advised that in AIR12 the costs for Ballymena had 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: 29 July 2013
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.

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 methodology to populate this table is similar to that employed in AIR12.

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, Environmental 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, of the 33 carried out during the year, only 8 have been adopted. As we describe in our commentary for Table 17d, the majority of surveys were not utilised due to concerns regarding data, with the majority of PE figures derived from desk top theoretical data. For AIR13 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 an assumed occupancy of 3 people per household.

The Asset Performance team collates all information onto the central spreadsheet from which band size for each WwTW is assessed and any changes highlighted. As reported in AIR12, to avoid the risk of transcription error, this has been automated. 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 WwTWs is based on the latest PEs minus tourist PEs. Since AIR12, PEs for 132 WwTWs have been updated.

In AIR13 there is a net decrease of 8 Treatment facilities from AIR12, summarised as follows:

Changes to Treatment facilities	Number
Rationalised and pumped or gravity fed to larger facility	6
Decommissioned	2
Re-designated as private	4
Adopted from 3rd party ownership	2
Commissioned	2
Total Decrease	8

The total number of WwTWs operated by NI Water and detailed in Table 17c Line 7, is 1028 (1034 - 6 PPP works), which includes 2 screened outfalls and 8 unscreened outfalls.

The number of WwTWs in Table 15 Line 8 is reported as 1018 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 AIR13 comparison between the two figures and those reported in AIR12.

	Comparison	
	AIR13	AIR12
Total Residential Population used to Calculate Table 17C for AIR13	1,245,347	1,209,756
Total Population connected to the sewerage system based on Table 13 Line 10	1,512,024	1,472,568
Difference	266,677	262,812

As can be seen there is a difference of 266,677. However the Table 17c information does not include the residential population within PPP catchments. An exercise was carried out during February 2012 to establish a theoretical desktop PE for the PPP sites. The non-residential component of these PEs have been subtracted from the AIR13 PPP PEs (based on the reported PPP BOD Load and divided by 60g/head/day).

Name of WwTWs	Equivalent Population (From PPP Section)	Non-Residential PE held against PPP Catchments (Includes Non-Residential, Trade, Schools, Large water Consumers)	Residential Population (Based on PPP Equivalent Population)
North Down	71433	9410	62023
Armagh	20867	5244	15623
Richhill	3267	239	3028
Newtownards (Ballyrickard)	29883	10845	19038
Ballynacor	102467	52095	50372
Kinnegar	73219	32153	41066
Total	301136	109986	191,150

As can be seen the residential population for the PPP sites is estimated to be 191,150. If this is added to the Table 17c figure (1,245,347) then the total is 1,436,497 which is 75,527 less than the figure held in Table 13.

For the first time the figure included in Table 13 Line 10 includes both residential population and tourist population. Therefore if the AIR13 tourist population for both NI Water sites (33,942 PE) and PPP sites (1964 PE) is included this gives a revised figure of 1,472,403 which is 39,621 PE less than the figure held in Table 13, approximately 2.6% less.

It should be noted that the Residential PE for most of the NIW WwTWs has been derived from GIS pointer data and that inaccuracies do exist with the latter in that some residential properties are labelled as commercial or industrial, and visa-versa.

Lines 8-9

The ammonia consents of the Small WwTWs were abstracted from a spreadsheet of standards obtained from the Environmental Regulation Team.

Changes to Lines 8 and 9 of this table, from AIR12 to present are summarised below.

In AIR13 there is one additional works at Annaghhugh which has an NH_3 consent in the range 5 to 10mg/l. There was no net increase or decrease in Line 9 for sites having NH_3 consents of 5mg/l or less, as Mullans was added and Bready removed.

Line	AIR12	AIR13	Variance	Comment
8	43	44	1	1 new site- Annaghhugh
9	54	54	0	1 new site- Mullans (Antrim) 1 site removed – Bready

4.3 PPP Data

Lines 1 to 6

As previously reported, there are 6 WwTWs 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 3.

The variance between AIR12 and AIR13 is as tabulated below. There are no band changes from AIR12. At Armagh WwTW although the banding grade remains as last year, at 5, the loading has decreased to 1252 kg/BOD/day.

In AIR12 we recommended that any significant variances, greater than 15% should be investigated. The treatment facilities at Richhill and Ballynacor have loadings outside this arbitrary percentage variance. Richhill registered a 24.8% increase and Ballynacor a 35% decrease. Investigations at these sites indicated there to be no specific reason for these variances as flow monitors are calibrated regularly and analytical analysis and sampling are carried out by accredited bodies. Ballynacor's loading of 6148 kg/BOD/d is considered to reflect catchment characteristics as the AIR12 loading of 9465 kg/ BOD/day exceeds design of 8076 kg/ BOD/day.

There is no rational explanation for the previous year's higher than average figure. AIR13 reflects a return to normality Overall AIR13 recorded a 15.6% decrease from AIR12.

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	Ave Daily BOD load (kg/d)		% variance	Resultant size band	Treatment process	Resultant treatment category
	AIR12	AIR13				
North Down	3902	4286	9.8	6	Secondary activated sludge process with disinfection	TA2
Armagh	1404	1252	-10.8	5	Secondary activated sludge process with nutrient removal	TA2
Rich hill	157	196	24.8	4	Secondary activated sludge process with drum filters	TA1
Ballyrickard	1632	1793	9.9	6	Secondary activated sludge process with disinfection	TA2
Ballynacor	9465	6148	-35.0	6	Secondary activated sludge process with nutrient removal	TA2
Kinnegar	4846	4393	-9.3	6	Secondary activated	Secondary activated
Total	21406	18068	-15.6			

Line 8
Zero return and no change from AIR12.

Line 9
There is no change from AIR12 as Armagh and Richhill WwTWs 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 <=5mg/l.

6. Assumptions

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

7. Confidence Grades

Not applicable.

8. Consistency Checks

Discrepancies in the numbers of works and PEs reported in Table 17c and the rest of the Return are highlighted above.

Date: 29 July 2013
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.

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 loads reported in this table are the sums of the loads received by each WwTW or outfall in each particular category, hence they include the proportion of PE allocated to hotels, and caravan and tent pitches, ie. the non-resident population.

There were 1,036 WwTWs reported in Table 17d for AIR12. There has been an overall net reduction of 8 in the number of WwTWs being reported from AIR12 to AIR13, as detailed below.

Changes to Treatment facilities	Number
Rationalised and pumped to larger facility	5
Rationalised and gravity fed to larger facility	1
Decommissioned	2
Re-designated as private	4
Adopted from 3rd party ownership	2
Commissioned	2
Total Decrease	8

Trade effluent information was obtained from NI Water's Trade Effluent Section, for each individual consented trader, which enabled easy conversion to PEs. The COD: BOD conversion factor of 2:1 was not used as more accurate flow based information was available to the Trade Effluent Section.

Discharge from hospitals, nursing homes and clinics are no longer considered as Trade Effluent. For the majority of hospitals 5% of discharges have been included due to discharges from x-ray departments and bathing pools. The exceptions are [x] where following ongoing surveys it was found that flows from these hospitals equated to 7% and 32.6%, respectively. Similarly the PEs for the hospitals has been factored up to 100% of their total discharge to give a more accurate figure of load discharging to the sewerage network.

The AIR12 return reported for the first time on the strength of the supernatant liquors (Trade Effluent) discharging to Belfast WwTW for treatment. As a result the AIR13 population equivalent has reduced from 88,095 to 64,422.

Despite an ongoing flow and load survey at Belfast WwTW the information varied significantly, and could not be validated, due to spikes and spurious readings, and as such a theoretical PE of 354,507 was agreed for AIR12. Further surveys coupled with validation and approval by WRc has resulted in a PE of 365,000 for AIR13.

During the AIR13 period, 33 flow and load surveys were carried out, however, only 8 were adopted.

Treatment Works	Adopted Actual PE Output from F&L Survey	AIR12 Actual PE (Based on a Desktop Study)	% Difference (-ve indicates AIR12 PE is higher)
Banbridge	22380	22680	-1.34
Belfast	365000	354507	2.87
Dromore (Down)	7355	7493	-1.88
Dungannon	78942	52319	33.72
Irvinestown	2669	3207	-20.16
Moneyreagh	2380	2274	4.45
Rathfriland	3977	3455	13.13
Tandragee	13659	11074	18.93
		Average % Difference	6.22

The 8 Flow & Load PEs adopted for AIR13 are on average 6.22% higher than the previous AIR12 Desktop PEs. However Dungannon is 33% higher than the previous desktop PE. The reason for the Dungannon WwTW disparity is that 67% of the load discharging to the treatment facility is trade effluent. Flow & Load Surveys enable shock loads to be calculated which is not possible in a desktop PE. Dungannon has a unique catchment within NI Water having such a high trade loading. If Dungannon was discounted the average variance reduces to 2.29%.

Presently the sample group is too small to justify extrapolating the differences into the larger population of WwTW sites. Adoption of additional Flow & Load Surveys may make this viable.

Of the remaining 25 Flow & Load Surveys carried out during AIR13, 21 were carried out on works having a PE of less than 2000. For these sites the desktop (theoretical) PE was adopted in all cases, mainly as a consequence of the inability of the flow measurement devices to record low flows being received at the WwTWs. Despite this, Flow & Load Surveys are still beneficial at WwTWs under 2000PE by highlighting anomalies such as high infiltration or rogue trade discharges.

The remaining 4 surveys were discounted for reasons such as the positioning of the meter in relation to overflows, high rainfall during the flow and load survey and short duration of the survey.

The reporter recommended in AIR11 that the variances in load greater than 15% should be investigated. Thirty-two sites were outside these parameters as tabulated.

Name	CAR ID	AIR12 PE	AIR13 PE	Difference* *(-ve indicates AIR12 figure larger)	Comments
Acton	S02111	96	75	21	A population appraisal was carried out at this site and following an APT review this was adopted for AIR13
Aghanloo	S02989	552	697	-145	A population appraisal was carried out at this site and following an APT review this was adopted for AIR13
Annacloy	S00292	383	492	-109	A population appraisal was carried out at this site and following an APT review this was adopted for AIR13
Ballycarry	S00267	1754	2116	-362	Pe Updated with AIR13 Trade Information
Ballyhalbert Victoria	S05412	2719	5834	-3115	Portavogie WwTWs is now a pumpaway to Ballyhalbert Victoria
Ballystrudder Retention Tank	S00264	1193	5729	-4536	It was confirmed that Whitehead now pumps to this WwTWs

Name	CAR ID	AIR12 PE	AIR13 PE	Difference* *(-ve indicates AIR12 figure larger)	Comments
Donaghmore	S02840	1622	2000	-378	Population appraisal was carried out at this site and following an APT review, including update with latest AIR13 Trade Information, this was adopted for AIR13
Dorsy	S02267	39	59	-20	A population appraisal was carried out at this site and following an APT review this was adopted for AIR13
Dungannon	S02850	52319	78942	-26623	A Flow & Load was carried out at this site and following an APT review this was adopted for AIR13
Fivemiletown	S03113	2659	2163	496	PE updated with AIR13 Trade Information
Forkhill	S02270	708	1746	-1038	It was confirmed that Mullaghbane (Forkhill) now pumps to this site
Garrison	S03115	896	701	195	An on-site count was carried out by APT and adopted for AIR13
Garvetagh	S03117	81	66	15	A population appraisal was carried out at this site and following an APT review this was adopted for AIR13
Gortscreagan	S03127	82	68	13	Population appraisal was carried out at this site and following an APT review this was adopted for AIR13
Greyabbey	S00214	1223	1036	187	Population appraisal was carried out at this site and following an APT review this was adopted for AIR13
Irvinestown	S03137	3207	2669	538	Flow & Load was carried out at this site and following an APT review this was adopted for AIR13
Killinchy	S00252	2922	5811	-2889	PE updated with latest AIR13 Trade Information
Kilskeery	S03148	91	60	31	Population appraisal was carried out at this site and following an APT review this was adopted for AIR13
Kircubbin	S04881	1698	1361	337	Population Report was carried out by McAdam Design Consultants in 2013 and this was amended with the latest occupancy rates and adopted for AIR13.
Leitrim (New)	S02705	118	150	-32	Population appraisal was carried out at this site and following an APT review this was adopted for AIR13

Name	CAR ID	AIR12 PE	AIR13 PE	Difference* *(-ve indicates AIR12 figure larger)	Comments
Maghaberry	S02412	7513	4225	3288	Population appraisal was carried out at this site and following an APT review this was adopted for AIR13
Moss-side	S01194	421	509	-88	Population appraisal was carried out at this site and following an APT review this was adopted for AIR13
Mountain View Drumintee	S02278	70	113	-43	Population appraisal was carried out at this site and following an APT review this was adopted for AIR13
Mounthill	S01465	136	243	-107	Population appraisal was carried out at this site and following an APT review this was adopted for AIR13
Pomeroy	S01593	1193	979	214	Population appraisal was carried out at this site and following an APT review this was adopted for AIR13
Procklis	S01450	73	92	-20	Population appraisal was carried out at this site and following an APT review this was adopted for AIR13
Rathfriland	S02713	3455	3977	-522	Flow & Load was carried out at this site and following an APT review this was adopted for AIR13
Rathlin Retention Tank	S00902	150	117	33	A population appraisal was carried out at this site and following an APT review this was adopted for AIR13
Springfield	S03222	83	61	22	Population appraisal was carried out at this site and following an APT review this was adopted for AIR13
Tandragee	S02174	11074	13659	-2585	Flow & Load was carried out at this site and following an APT review this was adopted for AIR13
Tully Road Headworks	S03975	2158	3226	-1068	It was confirmed that Glenam now pumps to this WwTWs
Tullyroan	S02600	52	61	-9	PE Updated with latest AIR13 Trade Information

*(-ve indicates the AIR12 figure is larger)

Line 7
The difference between AIR13 and AIR12 for the total load entering WwTWs is as shown in Table 17d Line 7 Column 11.

Total Load Received at WWTWs for AIR12 -	108230.3
Total Load Received at WWTWs for AIR 13 -	110445.9
Total Difference -	-2215.6

The change in PE equates to an increase in load of 2215.56kg BOD/day (i.e. 36926 x 0.06 for 60g/hd/day) from AIR12 to AIR13.

Line 8 -9
Changes to Lines 8 and 9 of this table, from AIR12 to present are summarised below. In AIR13 there is one additional work at Annaghhugh which has an NH_3 consent in the range 5 to 10mg/l and no net increase or decrease in Line 9 for sites having NH_3 consents of 5mg/l or less.

The change in Line 8 PE equates to a reduction in load of 83.34kg/d (i.e. 1389 x 0.06 for 60g/hd/day) from AIR12 to AIR13, for Line 8.

Total Load rec'd by small WWTWs with NH3 consents (5-10mg/l) for AIR12-	5859.1
Total Load rec'd by small WWTWs with NH3 consents (5-10mg/l) for AIR13-	5775.7
Total Difference -	83.4

The change in Line 9 PE equates to an increase in load of 146.52 kg/d (i.e. 2442 x 0.06 for 60g/hd/day) from AIR12 to AIR13.

Total Load rec'd by small WWTWs with NH3 consents (0-5mg/l) for AIR12-	12650.1
Total Load rec'd by small WWTWs with NH3 consents (0-5mg/l) for AIR13-	12796.6
Total Difference -	-146.5

4.3 PPP Data

Lines 1 to 6
There are 6 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 13675 kg/BOD/day Kinnegar 4393 kg/BOD/day. This equates to a respective decrease of 17.6% and 9.6% and an overall decrease of 15.8%.

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 other changes to the PPP sewage works treatment categories.

In relation to the total NI Water Treatment PPP load reduced in percentage terms from 16.5% for AIR12 to 14% in AIR13.

Line 8
There is no variance from AIR12, registering a zero return.

Line 9
There is no change from AIR12 as Armagh and Richhill WWTW are classified as small works (size bands 5 and 4); both have ammonia consent of 2mg/l. The loading has decreased from 1561 kg/BOD/day for AIR12 to 1448 kg/BOD/day an overall decrease of 7.2%.

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

A confidence grade of B3 reported for loads being treated at PPP facilities, in our opinion, does not reflect the sampling and flow regimes utilised to ascertain loads. Frequent sampling, although containing an inherent margin of inaccuracy for each sample, should over the period of a year, even out to produce a total value with a good confidence grade. Consequently as discussed the confidence grades as undernoted will be adjusted in the final submission to B2.

Table 17d PPP only				
A	**SMALL WORKS**		NIW	HMS
1	Load received size band 1			
2	Load received size band 2			
3	Load received band 3			
4	Load received size band 4		B3	B2
5	Load received size band 5		B3	B2
B	**LARGE WORKS**			
6	Load received size band 6		B3	B2
7	Total loads rec'd (daily average all size bands)		B3	B2

Date: 29 July 2013
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

- NI Water is increasingly relying on the cost to serve project to assign all costs for this table. It estimates that around 80% of costs are directly attributable based on the cost to serve project, whilst the remainder are allocated on the basis of population equivalents. In future years the cost to serve project is likely to be able to allocate more than 80% of costs directly, though it is believed there will always be a residual cost value that is allocated on a different basis.

3. Audit Approach

The audit consisted of an interview with the table owner to discuss the method 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 Cost Reallocations 611X (this includes direct labours costs and & overhead charges. A key change from previous years is that service charges which in previous years were reported in General and Support costs are now reported in service charges.

The Company advised that its ability to report data against each of the lines has been greatly improved with the addition of the cost to serve project. NI Water believes that about 80% of costs can now be directly allocated to Waste Water Treatment Works (WwTWs).

The Company expects that the cost to serve project will continue to allow NI Water to improve the cost allocations for future years.

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 sludge treatment.

The improved allocation of costs has resulted in some minor variations specifically due to the improved cost allocation method.

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

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 WwTW 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. 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 where the cost to serve project is not able to allocate costs directly. We believe this approach is acceptable and in general improving and is likely to result in data that is reflective of the actual position. We note that the cost to serve project is increasingly allowing NI Water to report costs at site level.

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 data extracted 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 where a treatment 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 AIR12, whereby, NI Water used a 36%:64% split, which was an estimate of the kilowatt usage between the sites during the year. For AIR13 the Company has used a 42%:58% split. We challenged NI Water in relation to the change in split for AIR13. NI Water advised that this was due to different volumes between incineration and WwTW. The estimated power costs for the incinerator have been excluded from the power costs reported.

Issues with cost to serve in previous years, where some direct labour costs that were related to sludge were being coded to sewage treatment, have now been resolved.

Costs are reported to have increased by £0.6 million. This is largely attributed to the improved cost allocation method.

Lines 5-6 – Direct Costs of Sewage 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. This is the same as the approach used to split costs between works in bands 1-4. The costs have decreased by £0.1 million for works in size band five and increased by circa £0.9 million for works in size band six. The increase in band six works is again partly attributed to better allocation of costs. In addition there has been an increase in power costs (£0.5 million) and an increase in the VER (voluntary redundancy scheme) (£0.3 million). A further element of costs that was previously reported in general and support is £0.2million of direct costs in Band 6 for service charges and hence in direct costs.

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 confirmed that this is the case.

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

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).

In previous years the company has pro-rated power costs on the basis of direct costs. However for AIR13 NI Water has taken the costing information at individual site level from the EAM report. This then provides the full cost at individual WwTWs. This provides a better split than in previous years.

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.

Overall power costs have increased by £0.9 million. This is due to both a rise in energy tariffs and a revised split for allocating costs at the Belfast WwTW based on volumes processed during AIR13. We challenged NI Water about what it was doing

to minimise the impact of increasing tariffs. They advised that it was looking to mitigate the impact of future increases in electricity costs by purchasing electricity in advance. It was not clear which exact strategy they would follow in order to mitigate the overall costs although NI Water did advise they were consulting with experts in this area. We further challenged NI Water about any scope for electricity generation and potentially selling this to the electricity providers as a way to manage future increases in costs. NI Water however felt that this was outside its scope, as it did not consider itself to be an electricity generator, rather it considered itself as a water supplier. This seems to be a narrow focus and we would expect one option for managing future increases in electricity and power costs to be to explore the potential for generation within NI Water.

Line 11 – Service Charges
NI Water has reported £0.76 million of service charges for AIR13. It reported these in general and support costs previously but now it is reported as a separate cost under this line.

Line 12 – Sewage 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 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.

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's Oracle system.

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. There 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.

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: 29 July 2013
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 method and review the source data extracted from the financial system.

4. Audit Findings

4.1 Resident Population and sludge volume

In line with the Reporting Requirements, for Line1 the resident population is consistent with the total resident population taken from Table 13 Line 10 less the non-resident population.

The amount of sewage sludge produced and reported in Line 2 is based on the greater 'connected population'. The sludge produced relates to Table 15 Lines 15 and 16 NIW only with the balance 0.8ttds being the estimated quantity of screenings and grit disposed of to landfill.

The sludge treatment and disposal system is a centralised system; all sludge is transported to the PPP incinerator for disposal. The Company has reported for AIR13 that sludge production for NIW only equates to 32ttds. The total comprises 31.3ttds passed to PPP and 0.8ttds disposed of to landfill.

To relate the sludge production to the reported resident population a mass balance equation calculates the proportionality which is recorded in Line 1

4.2 Costs

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

Line 3 – Sludge Treatment Direct Costs

Incineration
The Company had previously reported costs under incineration (Prior to AIR12). However prior to AIR12, the incineration facility at Belfast WwTW was transferred to the PPP contractor. As a result the Company reported no costs under this heading from AIR12 onwards.

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 understand that issues with the cost to serve project have now been resolved.

There has been an overall increase in costs between AIR12 and AIR13 of £0.4 million. The Company attributes £0.2 million of these to an improved allocation from the cost to serve project. A further £0.2 million is attributed to the inclusion of service charges as direct costs whilst previously these costs were reported as general and support costs.

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
The majority of sludge disposal occurs by means of PPP. There has been a minor (non material) variation in these costs.

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 Power 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 7 – Sludge Treatment and Disposal Service Charges
Historically NI Water did not report any costs under this row however, due to a change in the regulatory requirements in AIR13, Regulatory costs which were previously reported under General & Support are included in this line, £0.2 million. PPC (Pollution Prevention Control) Permits are included as Sludge Treatment.

Line 8 – Sludge Treatment and Disposal, General and Support Expenditure
The data is simply extracted from Table 22 NIW only Column 3 Line 10 and apportioned across this table on the basis of direct labour costs. The overall approach is the same as that used for AIR12. However, the cost to server system has resulted in a more accurate split of labour costs between sludge and sewerage treatment.

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.

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

The confidence grades for Lines 1 and 2 have not changed from AIR12. We believe that they are still appropriate for these lines.

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 does not equal power costs for sludge treatment and disposal in Table 22 Line 2 Column 3 for NI Water. Rounding up the costs in table 17g would provide a total figure in table 22 of 1.383 rather than 1.382 as currently being reported. Although the variance is minor it is not clear why it exists;

- 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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