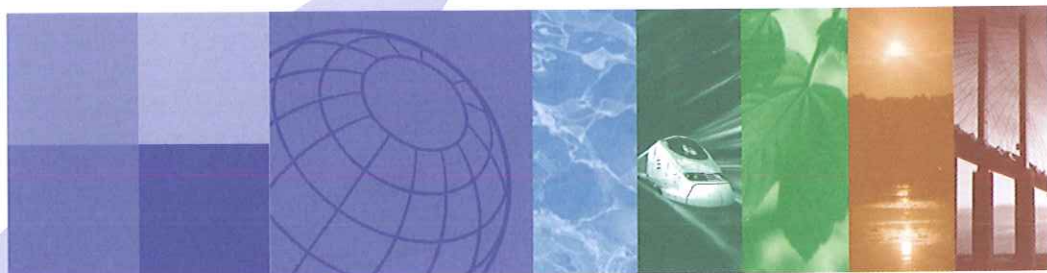


Northern Ireland Water Ltd

Annual Information Return 2009

To the

Northern Ireland Authority for Utility Regulation



Public Domain Version

Part 4 of 7 containing:

Sewage explanatory factors - commentaries for tables 17a-g

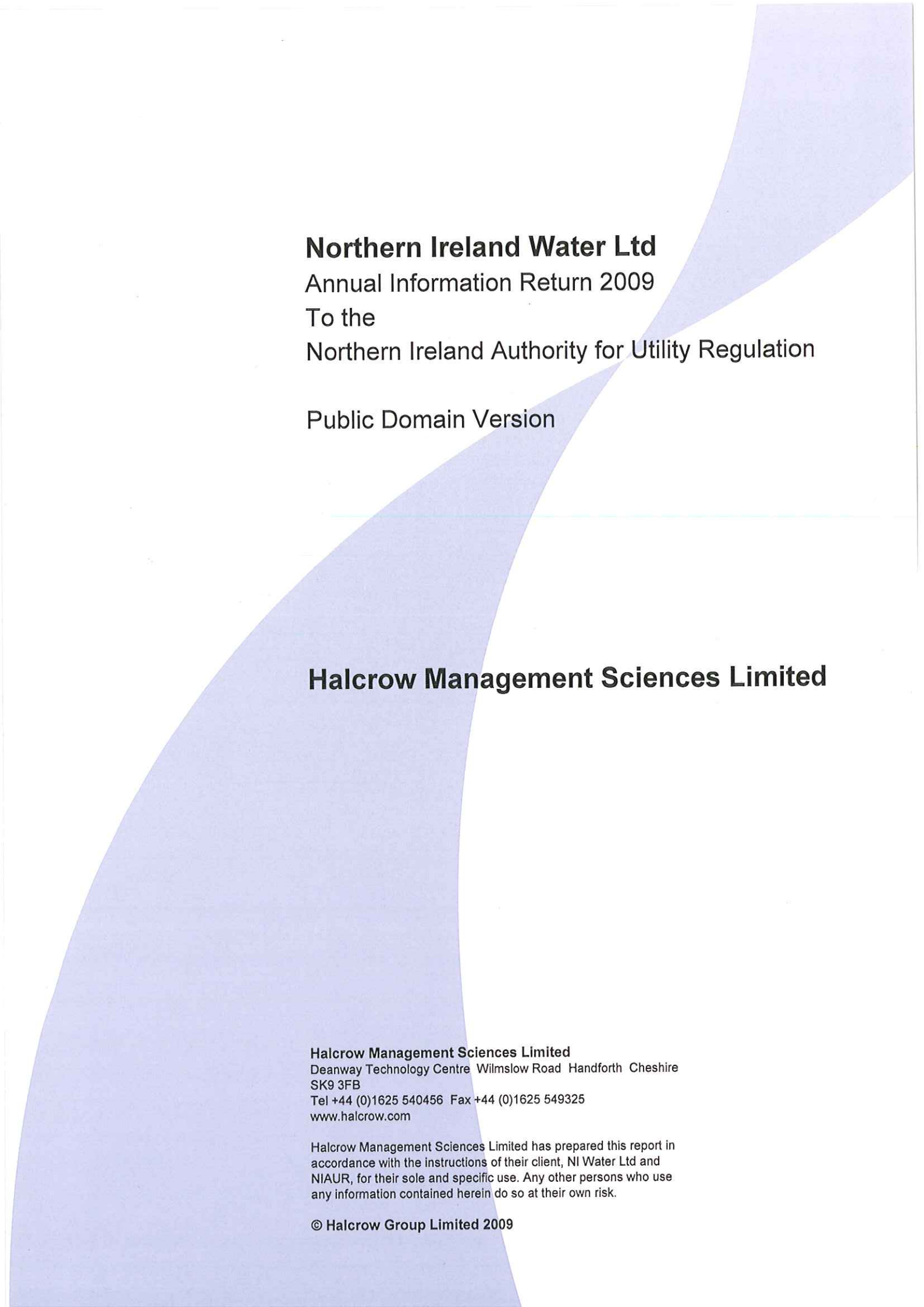
Reporter's Submission

By

CWJ Turner

Halcrow Management Sciences Ltd

Halcrow



Northern Ireland Water Ltd

Annual Information Return 2009

To the

Northern Ireland Authority for Utility Regulation

Public Domain Version

Halcrow Management Sciences Limited

Halcrow Management Sciences Limited

Deanway Technology Centre Wilmslow Road Handforth Cheshire
SK9 3FB

Tel +44 (0)1625 540456 Fax +44 (0)1625 549325

www.halcrow.com

Halcrow Management Sciences Limited has prepared this report in accordance with the instructions of their client, NI Water Ltd and NIAUR, for their sole and specific use. Any other persons who use any information contained herein do so at their own risk.

© Halcrow Group Limited 2009

Northern Ireland Water Ltd – AIR2009 Submission

This is the public domain version of the Reporter's submission for AIR2009.

Items mark (x) have been excised as they are considered commercially confidential or of sensitive nature.

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 Issues

- NI Water has still not been able to disaggregate the data in this table into sub-areas, although work is taking place to be able to allow this to be done for AIR10.
- The methodology that has been used to derive the population for this table differs from that which has been used for tables 17b-f to derive loads and size bands, and the corresponding population differs significantly.

3. Audit Approach

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

4. Audit Findings**4.1 General**

NI Water has not been able to present the data in sub-areas for AIR09 due to insufficient information being available. The Company is still in the process of deciding how to split the region into sub-areas. However we believe that the Company is probably closer to being able to report on a sub-area basis given that:

- costs are allocated to all size band 5-6 treatment works on an individual basis
- populations (resident and non-resident) have been estimated for each treatment works in preparing tables 17b-f
- the area and length of sewer in each sub-area could be calculated from GIS once the geographic boundaries of the sub-areas are defined

Costs to the size band 1 to 4 STWs could be pro-rated on some basis, such as population equivalent. Volume of sewage collected and connected properties could be pro-rated based on population equivalent.

Therefore, provided the sub-area boundaries can be defined to coincide with drainage area boundaries (i.e. so that a STW catchment does not fall into two sub-areas), it should be possible to assign each STW to a sub-area, and therefore calculate the population, cost, volume of sewage etc for each sub-area by summing those for the relevant STWs.

The master spreadsheet that has been developed for tables 17b-f would be a good starting point for collating this information.

4.2 Sewerage Sub-Areas General

Total non-resident population equivalent has been calculated based on the Northern Ireland Tourist Board's preliminary tourist forecast for the 2008 calendar year. This has then been subtracted from the total connected population in table 13 line 10 to give the total resident population.

This resident population estimate differs quite significantly from the resident population that has been used for tables 17b-f, which has been derived using a different methodology. The non-resident population has also been calculated using a different methodology, although the results are similar (30,600 in table 17a vs 31,617 in tables 17b-f). A consistent methodology should be established for calculating resident and non-resident population across all of these tables.

4.3 Sewerage Data

The length of sewer is only the length of main sewers. NI Water is also responsible for most lateral sewers, unlike other water companies in England and Wales. However as most of these lateral sewers are not mapped, their length is not known. A project is being undertaken shortly to estimate the length of public laterals and this should be completed prior to AIR10. The length of lateral sewers should be included in the Company's commentary for AIR10.

4.4 Costs

Terminal pumping station costs have now been identified and are excluded from the costs in this table.

As a result of increased electricity and oil prices, power costs have increased since AIR08.

The split between direct costs and general and support costs has changed as the company has now allocated more of its costs to direct costs in line with recommendations made in the AIR08 reporter's commentary, however we believe that this may have been taken too far in the other direction now (i.e. too many costs allocated to direct costs and not enough allocated to general and support costs). This is based on discussions with the line owner and a review of responsibility codes and service activity where it was established that the costs of the financial team and some of the administration team are allocated to direct costs. This appears to be inconsistent with the definition of general and support costs in the table 22 guidance, where it states that administration and financial costs are considered to be general and support costs.

5. Company Methodology

5.1 Sewerage Sub-Areas General

Resident and non-resident population (lines 1 and 2)

Non-resident population has been taken Northern Ireland Tourist Board preliminary visitor tourist forecast for 2008, and divided by 366 (the number of days in 2008) to calculate the equivalent non-resident population.

The resident population has been calculated based on the following formula:

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

We are unclear as to how the non-resident population contributing to table 13 line 10 was calculated and we are currently challenging the company on this. We understand from talking to the table 17a line owner that there was no co-ordination between the table 13 and table 17a owners in this regard and it is therefore possible that a different estimate of non-resident population has been calculated for table 13. This would mean that the resident and non-resident populations used in table 17a would be inconsistent with that contributing to table 13 line 10 (although their sum would be consistent with table 13). We note that a different method was used to calculate non-resident population for tables 17b-d, which gave a slightly different estimate of non-resident population. This is discussed further in our commentary to table 17c.

Volume of sewage collected (line 3)

The total volume of sewage collected is taken from table 14 line 7.

Total connected properties (line 4)

The number of total connected properties is calculated based on the following formula:

Total connected properties = table 13 line 5 (households bill sewerage) + table 13 line 8 (non-households billed sewerage) + table 13 line 9 (void properties)

Area of sewage district (line 5)

The area has been measured in GIS and is the area of the whole of Northern Ireland, excluding major bodies of water. It therefore includes smaller areas that are not sewered such as parks or areas of forest.

5.2 Sewerage Data

The total length of sewer is measured in GIS at the end of the reporting period and only includes main sewers. It does not include laterals, which NI Water is responsible for, but which are generally not mapped. Mapped public laterals are not included.

5.3 Costs

Cost data has been taken from table 22. Methodologies are described under table 22.

- Line 7 (direct costs) = table 22 line 9, column 1 (NI Water only)
- Line 8 (power costs) = table 22 line 2, column 1 (NI Water only)
- Line 9 (service charges) = table 22 line 7, column 1 (NI Water only)
- Line 10 (general and support) = table 22 line 10, column 1 (NI Water only)
- Line 11 (functional expenditure) = line 7 + line 10

6. Assumptions

No major assumptions have been made specifically for this table. There are some underlying assumptions in the information that has been brought in from other tables (e.g. population, wastewater volume) but these are discussed in the commentaries for those tables.

7. Confidence Grades

The Company has assigned a confidence grade of C4 to the estimate of resident population. This is consistent with table 13 line 10 and we believe it is appropriate. However we note that the estimate of resident population carried out for tables 17b-f is approximately 25% greater than that in 17a, so we consider that the accuracy is right on the edge of the C4 band.

The Company initially assigned a confidence grade of B2 to the estimate of non-resident population. We recommend a confidence grade of C3 for the following reasons. The preliminary visitor tourist forecast is carried out by the Northern Ireland Tourist Board based on limited data (specifically the Northern Ireland passenger survey and the survey of overseas travellers from January to August and statistics on visitors from the Republic of Ireland from January to June). The data is therefore based on extrapolation of data from part of the year, and is also based on extrapolation of survey data, which by its nature will be a sample of the whole tourist population. For this reason we believe that a reliability band of C is appropriate. The Company has assigned an accuracy band of 2, based on the fact that the 2007 final visitor tourist forecast was 5% higher than the preliminary visitor forecast. The calculations that have been used to arrive at this number are incorrect, and the final visitor tourist forecast was actually 5.5% higher than the preliminary forecast, calculated as $10,486,000/9,935,000 - 1$. I.e. the final forecast of 10,486,000 was 105.5% of the preliminary forecast of 9,935,000. This in itself puts the accuracy out of the “2” band, however this calculation only answers the question, “what is the difference between the preliminary tourist forecast and final tourist forecast?”. There is a second, and perhaps more important, question that should be asked and that is, “how accurately does the final tourist forecast reflect the actual number of tourists that visited Northern Ireland?”. Given that the tourist forecast is based on various surveys and other statistics it would be expected to have some uncertainty inherent in it.

Therefore we believe that an accuracy band of “3” is more appropriate. The Company has agreed to change this confidence grade.

The company has assigned a confidence grade of B4 to the volume of sewage, consistent with table 14 line 7.

The Company has assigned a confidence grade of A2 to total connected properties. This is inconsistent with the confidence grades (C3) assigned to the property data in table 13, from which this data is derived. Therefore we recommend that a confidence grade of C3 is used for line 4.

The Company has assigned a confidence grade of B2 to the area of the sewerage district. We believe that this 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.

8. Consistency Checks

- The volume of sewage collected in table 17a, line 3 equals the volume of sewage in table 14, line 7.
- Line 6 does not consist with table 16 line 14. We believe that this is because table 16 line 11 is a mistake.
- 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: 10 August 2009

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 (STWs).

2. Key Findings

- Sludge treatment costs and terminal pumping costs have been able to be identified and reported this year, an improvement on AIR08

3. Audit Approach

The responsibility for completing table 17b is shared among 4 line owners, each of whom was audited. The audits consisted of interviews to discuss methodology, and cross check the results against the original sources of data.

4. Audit Findings**4.1 General**

There are 18 large (size band 6) sewage treatment works that are the direct responsibility of NI Water and a further 2 that are run by PPPs.

The Company has identified one site (Bullay's Hill), where the ammonia consent is set so tight (5mg/L) that achieving the ammonia limit would lead to a lower BOD than the consented value (30mg/L).

All large STWs have both BOD and SS numerical consents.

4.2 NI Water Only

This year it has been possible to separate the costs for terminal pumping stations and sludge treatment, resulting in improved data in the cost section of the table. There are still a few terminal pumping stations whose costs have not been able to be attributed to a particular treatment works and these are still the subject of investigation, however on the whole most of these costs have been captured. Sludge treatment costs have been able to be captured by improved coding by field managers and operations staff.

Power costs are measured at each site by a single meter, so these costs are split between sewage treatment and sludge treatment by the field managers on a site by site basis, based on their knowledge of the processes and likely power consumption.

There is currently a single meter at Duncrue Street, which measures power to both the Belfast STW and the incinerator. For AIR09, the power costs have been split 60% to the STW and 40% to the incinerator, however it is planned to install a separate meter on the incinerator so that these costs can be more accurately captured. This should provide a better estimate for AIR10, although some of the year will still have to be apportioned.

The split between direct costs and general and support costs has changed as the company has now allocated more of its costs to direct costs in line with recommendations made in the AIR08 reporter's commentary, however we believe that this may have been taken too far in the other direction now (i.e. too many costs allocated to direct costs and not enough allocated to general and support costs). This is based on discussions with the line owner where it was established that the costs of the financial team and some of the administration team are allocated to direct costs. This appears to be inconsistent with the definition of general and support costs in the table 22 guidance, where it states that administration and financial costs are considered to be general and support costs.

4.3 PPP Only

The population equivalent of the total load received at the PPP STWs is calculated based on the measured load received at the treatment works divided by 60 grams per capita per day. This results in a population that is approximately 30% lower than the known connected population, which suggests that the value of 60g/c/d required by the guidance is high. This makes it difficult to compare the population equivalents from the PPP sites with the NI Water sites, as the NI Water sites have been calculated in the opposite direction – i.e. the populations have been estimated and the loads have been calculated assuming 60g/c/day. While both are valid methodologies and are appropriate in each case, it is something that readers must be made aware of when comparing data.

[X]

[X]

5. Company Methodology

5.1 Works Size (NI Water Only)

A large master spreadsheet has been developed that has been used as the basis for tables 17b-f. This spreadsheet lists every STW in Northern Ireland and tabulates key data for

each works, which is used to calculate the size band of each STW. Details of the methodology used to calculate the size band are presented in the commentary to table 17c. Based on these size bands, those STWs of size band 6 are identified and entered into table 17b. The population equivalent for each STW is taken from the master spreadsheet.

5.2 Effluent Consent Standard (NI Water Only)

Effluent consent conditions are taken from the master spreadsheet, which in turn is populated from the Laboratory Information Management System (LIMS), which holds the current consent conditions for each STW.

Where there is no numerical consent for a particular parameter at a particular STW, the cell in table 17b is left blank. COD consent values are based on the urban wastewater treatment directive.

5.3 Treatment Category (NI Water Only)

Treatment categories are assigned to each STW based on information in the Corporate Asset Register and discussions with Engineering & Procurement, Tactical Asset Management and the Environmental Regulation Team. The Asset Performance Team (the line owners) also meet regularly with these teams throughout the year, who make them aware of process changes that occur as a result of upgrades.

5.4 Costs (NI Water Only)

Costs are allocated directly to each works through location codes in the financial system, and large works can therefore be extracted for each STW by running the appropriate reports from the financial system.

Direct costs include Power (521X), Contractors (531X), Materials (541X), Chemicals (548X) and Direct Labour (611X and 612X – Wages Overheads). A single meter measures power at each site and it is not possible to directly separate power costs for sewage treatment from power costs for sludge processing. However the field managers have estimated the split of power use on a site-by-site basis and the estimated power costs for sludge processing are not included in the direct costs in line 8. The cost of terminal pumping is also not included in the direct costs, except for the three sites identified in the next paragraph. NI Water has also reallocated some overhead costs to direct costs in response to a recommendation from the AIR08 reporter. These costs are agreed by the finance business partners in each directorate (this is discussed further in the table 22 commentary).

Power costs are recorded for each site in the financial system. As discussed above, sludge treatment power costs have been removed from the costs in line 10 on a site-by-site basis based on estimated usage by the field managers. There is currently one meter at [X], which measures power to both the Belfast STW and the incinerator. The usage has been split between the STW and the incinerator 60:40 based on the judgement of the

field manager/power team. A second meter may be installed in 2009 that will allow these costs to be separated more accurately for AIR10. The estimated power costs of the incinerator have been excluded from line 10. Where possible, terminal pumping station costs are excluded from line 10. Three STWs (Ballymena, Newry and Omagh) have their terminal pumping stations on site, and it is therefore not possible to separate these costs from line 10.

NI Water does not currently pay any service charges.

General and support costs include Costed Wages Charge (611X) and Wages Overheads (612X). These are allocated to each individual STW in proportion to the direct costs.

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

Terminal pumping station costs only include power costs, as these are the only costs that are able to be separately identified. For three STWs, identified earlier, the terminal pumping stations are on site and therefore included in the site power 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 at the centralised facilities are not included in table 17b, but are included in table 17g.

5.5 Works Size (PPP Only)

There are two treatment works that have been included in AIR09 for PPPs; they are Kinnegar and North Down.

Both have population equivalents that are greater than 25,000, and are therefore both included in table 17b.

The influent load at each site is measured and submitted daily to NI Water by the PPP and collated in a spreadsheet. This information is cross-checked by NI Water against data that is logged on a continuous basis through SCADA as it forms the basis for payments to the PPP.

Using this information, an average daily load is calculated for each site, and the population equivalent is calculated by dividing this load by 60g/c/day, as required by the NIAUR guidance. The split between resident and non-resident population and trade effluent is not known, so non-resident population can not be excluded from the population equivalent for the purpose of size band calculation. However both STWs are significantly larger than 25,000 PE, therefore this will not affect the size band classification.

5.6 Effluent Consent Standard (PPP Only)

Effluent consent conditions are taken from the Laboratory Information Management System (LIMS), which holds the current consent conditions for each STW.

5.7 Treatment Category (PPP Only)

The treatment category is assigned based on knowledge of the treatment process at each site.

5.8 [X]

[X]

[X]

[X]

[X]

[X]

[X]

[X]

6. Assumptions

There are number of assumptions made in the calculation of population equivalent and size bands, which are described in the commentary to table 17c.

Assumptions have been made by the field managers regarding the split of power usage to sewage treatment and sludge treatment, as discussed under methodology.

7. Confidence Grades

The Company has allocated confidence grades of C5 to the population equivalent for each STW (NI Water Only). While a confidence grade of C4 has generally been used for population estimates elsewhere in the annual information return, we believe that a grade of C5 is appropriate at an individual STW level, reflecting a slightly lower accuracy on a catchment by catchment basis.

The Company has allocated confidence grades of A2 to the population equivalent for the PPP STWs, because it is calculated based on measured loads and the loading rate of 60g/c/day as specified by NIAUR. We support this confidence grade, however we do note that these population equivalents are not directly comparable to those for NI Water only sites as it appears that the value of 60g/c/day required by NIAUR is high as discussed under audit findings. We do not believe that it is appropriate to incorporate uncertainty in this loading rate into the confidence grade, given that it is specified by NIAUR.

The Company has allocated confidence grades of A1 to the consent conditions, which is appropriate.

8. Consistency Checks

- The total number of large STWs and their corresponding category in this table is consistent with table 17c, line 6.
- The direct cost in this table is consistent with the total direct costs in table 17f.

Date: 30 August 2009

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

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

2. Key Issues

- The resident population estimates that have been used to calculate loads, and therefore size band classification, differs from that used for table 13 line 10 and results in a resident population approximately 25% higher than the resident population component of table 13 line 10. This may be largely due to the inclusion of population in offices and schools in this total. The reasons for the difference between the population in table 13 line 10 and the total population in the master spreadsheet used to calculate size bands should be investigated and consideration given to a harmonisation of approach across the tables in future returns.
- The non-resident population estimates have been calculated using a different methodology to table 17a, although they result in similar numbers. We would like to see this reviewed and a consistent methodology adopted for all of these tables. It does not make sense to have this information calculated by different people in different ways for various tables.
- We are concerned that on a district scale there is double counting of population as a result of counting residential population and commercial population – i.e. people are being counted at both their homes and their workplaces. At an individual STW level, the inclusion of commercial population would have a varying effect from catchment to catchment (i.e. some catchments would see a net influx of commuters and other catchments would see a net efflux), as we would expect significant cross-catchment commuting within Northern Ireland, however at a district scale, the inclusion of commercial population will introduce a positive bias (i.e. overestimate the loads).

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

The AIR08 auditor expressed concerns that there may be some double counting of works because they can be known by several different names (sometimes they are referred to by the street they are on, as well as by the location/area). We clarified this with the table owner and can confirm that all STWs are uniquely identified. Each STW

has a unique Corporate Asset Register (CAR) number and this is used in the master spreadsheet to identify each STW. The textual name is only used as a secondary reference for ease of use.

We have some concerns over the population data that has been used to calculate equivalent population, loads and STW size bands. The population data has been generated independently of that for table 13, line 10 and appears to result in a significantly higher estimate of total resident population (approximately 25% higher) than that in table 13. The population estimates for table 17c have been calculated at a treatment works catchment level based on an extensive desktop study that has been carried out for this return. At all but the smallest works, resident population has been calculated by counting the number of properties in each catchment and applying 2001 census occupancy rates from the relevant council ward. At the smallest works, an occupancy rate of 3 has been assumed. While the methodology appears to be sound, it seems to be over-estimating total population when compared with that derived for table 13 line 10. We are currently challenging the company on the methodology used for table 13 line 10.

We can confirm that non-resident (tourist) population has not been included when calculating the size bands of treatment works, however commercial population (offices and schools) has been included when calculating the size bands of treatment works.

We can confirm that a rate of 60g/c/day has been used to convert trade effluent loads to population equivalent.

We found that in calculating the loads to each STW, the Company has allowed for population in commercial/office buildings at a rate of 60g/c/day. This may result in double-counting population at a district level as a result of people being counted both at home and at work. While we appreciate that for some STWs (i.e. those serving commercial centres), the contribution to load from commercial premises may be significant, and that cross-catchment commuting (and even commuting between Northern Ireland and The Republic of Ireland) will be impossible to quantify with any degree of accuracy, we are concerned that the inclusion of commercial population in the population estimates is introducing a positive bias to the total population, which may inflate some of the size bands reported in table 17c, and which will inflate the total loads reported in table 17d.

This should be reviewed in subsequent returns and if it is decided to continue to include commercial population, this should be made explicit in the Company's commentary, along with a statement in the commentary to table 17d as to the total contribution to calculated load from commercial premises.

The total number of STWs reported in table 17c (NI Water only) is 1076, a net reduction of 8 from AIR08, which is made up of:

- 5 treatment works rationalised to larger works

- 3 treatment works converted to pumping stations (that now pump to the North Down PPP STW)
- 1 treatment works that has been decommissioned
- 1 treatment works found to be owned by the Northern Ireland Housing Executive
- 2 treatment works which have been identified during the year, that have not been included in previous returns

These treatment works are all identified in the Company's commentary.

The total number of STWs reported in table 17c (PPP only) is 2, a net increase of 1 from AIR08, which is the North Down STW.

Of the 1076 treatment works, 46 have ammonia consents between 5 and 10mg/L and 35 have ammonia consents less than 5mg/L.

This is an increase of 1 to the number of STWs with ammonia consent between 5 and 10mg/L consisting of:

- 5 new consents
- 1 consent that was less than 5mg/L that is now 5-10mg/L
- 1 STW that was considered to be a large STW in AIR08
- (-)3 consents now less than 5mg/L
- (-)2 consents now greater than 10mg/L
- (-)1 STW now a pumpaway

It is an increase of 10 to the number of STWs with ammonia consents less than 5mg/L consisting of:

- 3 consents that were greater than 5mg/L that are now less than 5mg/L
- 7 new consents
- 1 STW that was considered to be a large STW in AIR08
- (-)1 STW that now has a consent of 5-10mg/L

Neither of the PPP sites has an ammonia consent.

5. Company Methodology

5.1 NI Water Only

The base data that is used to calculate the inputs to this table (and the other tables in the 17 series) is kept in a master spreadsheet that lists every STW in Northern Ireland. For each STW, resident population, commercial population, school population, non-resident (tourist) population, trade effluent loads, treatment category and consent conditions are recorded and a series of count functions counts the relevant treatment works in order to populate the cells in table 17c.

Resident population has been updated based on an extensive desktop review. This was largely the result of a study carried out by [X], although this did not cover all of the catchments, so additional work carried out by NI Water staff. The study helped to define the catchment boundaries and applied 2001 census occupancy rates from the relevant council wards to current property counts from MapExtreme. For very small catchments (less than 250 population equivalent), an occupancy of 3 was assumed.

The tourist population has been calculated in accordance with the NI Water Appraisal Guidance notes as follows:

- Available tent/caravan sites times 3
- 30% of the total available hotel beds

This methodology differs slightly from the NIAUR guidance, which recommends assuming two thirds occupation for four months of the year (equivalent to 22% of beds compared with 30%). It also differs from the methodology that has been used for table 17a, which calculated tourist population based on tourist board estimates. Tourist population is not included in the calculation to allocate size bands, but is included in the calculation of loads (table 17d).

Commercial population (i.e. offices) is calculated using GIS pointer data.

Population at schools has been calculated using numbers from the Education and Library Board's website.

Trade effluent loads are provided by the Trade Effluents section. Equivalent population of the trade effluents is calculated by dividing by 60g/c/day.

The equivalent population for each STW is then summed (excluding tourist population) and used to assign a size band category in accordance with the thresholds defined in the NIAUR guidance.

The number of treatment works in each size band/treatment category classification is then summed through a series of functions within the spreadsheet.

The master spreadsheet was established as a result of an audit for EHS (now NIEA) and each treatment works was assigned to a treatment category at this time based on information from various sources. The Asset Performance Team (APT) (responsible for maintaining the spreadsheet) has established close links with the Tactical Asset Management Team, Engineering & Procurement and the Environmental Regulation Team through regular meetings. These teams are aware that the APT needs to be informed of any updates such as process changes (that would change the treatment classification), new works and decommissioned works, so that the spreadsheet can be kept live. The information in the spreadsheet is also cross-checked against the information held in the Corporate Asset Register.

Consent conditions are extracted from the Laboratory Information Management System (LIMS), which keeps up-to-date, as well as historic, consent conditions.

5.2 PPP Only

Refer to the commentary for table 17b for the methodology for deriving population equivalent for the PPP works, as both of these works are large (size band 6).

5.3 Total

The “total” table is simply calculated as the sum of the “NI Water only” and “PPP only” values for each size band/treatment category classification.

6. Assumptions

An occupancy rate of 3 has generally been assumed for STWs with population equivalent less than 250.

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

Tourist population has been calculated as:

- Available tent/caravan sites times 3
- 30% of the total available hotel beds

7. Confidence Grades

No confidence grades are required for this table.

8. Consistency Checks

- The total number of STWs in table 15 is 1056. The number of STWs in table 17c is 1076 (1078 including PPP). The difference between these lines is the number of screened outfalls (7 No.) and unscreened outfalls (13No.) which are excluded from table 15 in accordance with the guidance.

- The total number of large STWs in table 17c is 18 (20 including PPP). There are 18 STWs listed in table 17b (NI Water) and 2 PPP STWs.
- Where works have been included in table 17c, the corresponding costs and loads have been included in tables 17f and 17d respectively.

Date: 10 August 2009

Table 17d – Sewage Treatment Works - Loads**Commentary by REPORTER****1. Background**

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

2. Key Findings

- Total loads may be over-estimated due to the inclusion of loads from offices/commercial premises at a rate of 60g/c/day – loads from people that would have already been counted in the residential population – see commentary on table 17c for more detail. The Company notes that it is important to make an allowance for commuting populations at an individual STW level due to the large extent of commuting in Northern Ireland, however if this is the case, we believe that this allowance should be made in both the positive and negative direction at the STW level, not just the positive direction. The Company asserts that there will be a sizeable proportion of people whose homes are served by septic tank who commute into sewered areas, however the sludge calculations behind table 17g estimate that only 5% of sludge volume comes from septic tanks. While we agree that there will be discrepancies due to commuting populations at the STW level, the data presented in table 17b-f is generally aggregated into much larger groups, where the population (and therefore loads) will be overestimated. The only exception to this is table 17b where the large STWs are presented individually, however even the loads at these will be overestimated because by adding commercial/school populations to resident population, the implicit assumption is that all of the commercial/school population commutes in from outside the catchment, which will not be the case for the large STWs. While we understand the reasons for the methodology that the company has adopted, at an aggregated level it is overestimating population and loads, and users of the data should take this into consideration when making comparisons with other water companies.

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

The load to large treatment works (size band 6) contributes approximately 68% of the total load collected by NI Water STWs, or approximately 70% if the PPP sites are included.

The load to sea outfalls (preliminary treatment, screened or unscreened) contributes approximately 2% of the total load collected by NI Water STWs.

5. Company Methodology

The base data that is used to calculate the inputs to this table (and the other tables in the 17 series) is kept in a master spreadsheet that lists every STW in Northern Ireland. A more detailed description of the origins of this data is provided in our commentary to table 17c.

The equivalent population for each STW (including non-resident population) is multiplied by 60g/c/day to derive the loads delivered to each STW that is the responsibility of NI Water. These are then summed for all STWs in each combination of size band and treatment category to generate the numbers presented in table 17d (NI Water only).

For the PPP sites, the contract requires reporting of daily loads, which NI Water is able to check against SCADA records. Further details are provided in our commentary to table 17b.

The “total” table is simply the calculated as the sum of the “NI Water only” and “PPP only” values for each size band/treatment category classification.

6. Assumptions

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

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

7. Confidence Grades

The Company has assigned a confidence grade of C3 to the loads received by NI Water STWs. We are concerned that the population data (used directly to calculate loads through the factor of 60g/c/day) may not be very accurate, given that total residential population used for table 17d is approximately 25% higher than the residential population component of table 13 line 10. Further, we have concerns that loads may be being double counted by adding residential population and commercial (office) population. While we recognise that a large effort has gone into updating population data, until the population can be reconciled with that given in table 13 line 10 and table 17a, we recommend a confidence grade of C4. The Company concurred with our view.

The Company has assigned a confidence grade of A2 to the loads received by PPP STWs. As these loads are measured at the inlet to the treatment works, we believe this is appropriate.

The company has not assigned a confidence grade to the “total” table, but these should be C4, given that the loads from NI Water sites contribute 100% of the load to size bands 1-5 and a significant proportion of the load to size band 6.

8. Consistency Checks

- The total load receiving primary treatment in table 17d is 1035 kg/day. The total load receiving primary treatment in table 15 is 377.8 tonnes/year (which equals 1035kg/day).
- The total load receiving secondary and tertiary treatment in table 17d is 123,354kg/day (NI Water sites only) or 132481kg/day (NI Water and PPP sites). The total load receiving at least secondary treatment in table 15 is 45,024 tonnes/year (NI Water sites only), (which equals 123,354 kg/day).
- The total load receiving preliminary treatment in table 17d is 1296kg/day. The total load receiving preliminary treatment in table 15 is 473.2 tonnes/year (which equals 1,296kg/day).
- Where loads have been included in table 17d, the corresponding costs and number of STWs have been included in tables 17f and 17c respectively.

Date: 10 August 2009

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.

2. Key Issues

- Costs have not been able to be assigned to individual STWs of size band 1 to 4 because costs are not individually recorded against these smaller STWs. We recommend that the costs are assigned to these treatment works on some basis (such as in proportion to equivalent population) and that any assumptions are made clear in the commentary for AIR10.

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**

We were provided with print outs of the reports that were run from the financial system and can confirm that the information in table 17f is consistent with those reports.

Because costs are not recorded against individual treatment works for the smaller treatment works (size bands 1 to 4), the Company has reported the total direct costs for these works in a single cell, and has not split them up into the various size bands and treatment categories. The costs for these smaller treatment works are coded to a number of location codes based on geographic areas, and each location code may include several treatment works of varying size and type.

It is not realistic to expect the costs for these smaller STWs to be captured and recorded against each individual site and it is unlikely that these could be captured particularly accurately, given that it would rely on field managers and other staff to break their time and costs up against a large number of sites. Other water companies do not record costs to individual treatment works for the smaller treatment works. However, it should be possible to distribute the direct costs among these treatment works on some clearly defined and documented basis, given that the Asset Performance Team (APT) maintains a list of all STWs that includes their size band and treatment category. A simple way to do this would be in proportion to population equivalent, which is also held in the APT's spreadsheet. However this would have some limitations, given that sea outfalls are likely

to be less expensive to run for a given population than full treatment works. A more robust, but more involved, approach might be to determine manning levels for each works based on discussions with the field managers and operations staff. This might not be individualised to each treatment works, but may be more generalised, e.g. primary treatment plants size band 1 = x man-days per year, secondary treatment plants size band 1 = x man days per year, etc. Alternatively, the costs to each location code could be divided amongst each contributing STW for that code in proportions identified by the field managers based on their knowledge of the sites.

Because the costs have not been broken down for the smaller treatment works, it is not possible to calculate the total cost for each treatment category.

Large (size band 6) treatment works account for approximately 41% of the direct cost, although they account for 68% of the load. This is to be expected, as the smaller treatment works will be less efficient to run on a £/load basis.

The direct costs for treatment works of size band 5 do not include Coalisland STW, because it was size band 4 in AIR08, and had not been set up as a separate location code in the financial system. A new location code has been added, and this will be able to be reported in AIR10. The costs for this STW are included in the size band 1-4 costs.

There is no need for adjustments for sludge treatment and disposal costs as these have already been excluded from line 7.

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

As has been noted in the commentary to other tables (e.g. 17b) the Company has moved some of its costs from general and support expenditure into direct costs on the recommendation of the AIR08 reporter. However we believe that there are now some costs that have been moved that should still be a part of general and support expenditure in accordance with the table 22 guidance, such as administration support and finance section costs. This will not impact on functional expenditure, but it will impact on the split between direct costs and general and support costs.

4.2 [X]

[X]

5. Company Methodology

5.1 NI Water Only

Costs are allocated directly to each works that is size band 5 or 6 through location codes in the financial system, and can therefore be extracted for each STW by running the

appropriate reports from the financial system. A report is then run for total direct costs, and the direct costs for treatment works of size bands 1 to 4 is calculated as:

- direct costs (size band 1-4) = total direct costs – sum of direct costs (size band 5) – sum of direct costs (size band 6)

Direct costs include Power (521X), Contractors (531X), Materials (541X), Chemicals (548X) and Direct Labour (611X and 612X – Wages Overheads). A single meter measures power at each site and it is not possible to directly separate power costs for sewage treatment from power costs for sludge processing. However the field managers have estimated the split of power use on a site-by-site basis and the estimated power costs for sludge processing are not included in the direct costs in line 8. The cost of terminal pumping is also not included in the direct costs, except for a few sites where it has not been possible to separate these costs due to the terminal pumping station being located on the STW site. NI Water has also reallocated some overhead costs to direct costs in response to a recommendation from the AIR08 reporter. These costs are agreed by the finance business partners in each directorate (this is discussed further in the table 22 commentary).

Power costs are recorded for each site in the financial system. As discussed above, sludge treatment power costs have been removed from the costs in line 10 on a site-by-site basis based on estimated usage by the field managers. There is currently one meter at Duncrue Street, which measures power to both the Belfast STW and the incinerator. The usage has been split between the STW and the incinerator 60:40 based on the judgement of the field manager/power team. A second meter may be installed in 2009 that will allow these costs to be separated more accurately for AIR10. The estimated power costs of the incinerator have been excluded from line 10. Where possible, terminal pumping station costs are excluded from line 10.

NI Water does not currently pay any service charges.

General and support costs include Costed Wages Charge (611X) and Wages Overheads (612X). These are allocated to each individual STW in proportion to the direct costs.

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

5.2 [X]

[X]

5.3 Total

The “total” table is simply the calculated as the sum of the “NI Water only” and “PPP only” values for each size band/treatment category classification.

6. Assumptions

It is assumed that 60% of the power consumed at the Duncrue St meter is for the Belfast STW, with the remaining 40% consumed by the incinerator.

Further assumptions can be made that would allow apportionment of the direct costs among the size band 1 to 4 STWs. These should be included in the AIR10 commentary.

7. Confidence Grades

Confidence grades are not required for this table.

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).
- Service charges in line 11 (column 11) equal 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 works in size band 6 in line 6 (column 11) equal the sum of direct costs in table 17b.

Date: 10 August 2009

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

- No material issues to report

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. We also reviewed the spreadsheets used to collate the sludge information and derive the inputs for this table.

4. Audit Findings

The sludge treatment and disposal system is a centralised system with the intention being that under normal operating conditions, most sludge would be incinerated, however NI Water has had problems with the operation of the incinerator this year, resulting in approximately 12% of sludge being sent to land reclamation, which is an expensive route. This will still be the case for some of AIR10, but should not continue beyond AIR10.

Because the sludge system is centralised, sludge from a given Sewage (STW) is not necessarily disposed of by a particular route - it may be disposed of by several different routes, which may change throughout the year, and it is not possible to trace the destination of sludge from a given plant to a given route. For this reason, it is not possible to allocate the resident population from each STW to a particular sludge route, so instead the population has been allocated in proportion to the weight of sludge sent to each route. This general methodology is appropriate, however the line definition specifies resident population, whereas the total connected population has been used (table 13 line 10). The resident population is tabulated in table 17a, line 1, and should be used as the basis for calculating residential population served in table 17g. This will reduce the values in line 1 of table 17g by approximately 2%.

Disposal to farmland (conventional) was decommissioned during the year, so there has only been a small amount of sludge disposed of via this route at the beginning of the year, and this route is not expected to be used in subsequent years.

Disposal to farmland (advanced) commenced during the year.

As discussed above, disposal to land reclamation has had to be used because of operational problems with the incinerator.

Disposal to “other” consists of disposal to forestry and willows.

We can confirm that disposal of grit and screenings has been included in the figures for disposal to landfill.

We can confirm that sludge from unregulated septic tanks has been estimated and deducted from the total sludge to each route in proportion with the weight of sludge to each route. Sludge from septic tanks accounts for approximately 5% of sludge.

NI Water does not have any sludge digestion, so there will be no gas production to be accounted for.

NI Water does not have any significant sludge storage facilities because fresher sludge is easier to incinerate, so in a given year, the assumption that the amount of sludge treated and disposed are equal is valid.

It is not possible to provide meaningful comparison of costs between AIR08 and AIR09 because the methodology for deriving both sludge volumes and costs has evolved, including in AIR09:

- exclusion of septic tank sludge
- improved coding of costs within financial system
- inclusion of power costs for sludge treatment

Further improvements are planned for next year, including:

- loggers for receiving septic tank loads (currently the loads are estimated)
- separate power meter installed on incinerator

However the company notes that the disposal costs have increased significantly since last year due to increased contractors’ rates and changes in NIEA legislation resulting in more expensive disposal routes (e.g. from farmland conventional to farmland advanced). The need to dispose some sludge to land reclamation has also increased costs.

Because the sludge system is centralised, any power costs and other direct costs involved with treating sludge at the STW site can not be allocated to a particular disposal route, and therefore have been assigned to the “other” column in lines 3 and 5. This means that this column includes these costs, as well as the costs of disposal to forestry/willows.

The company has completed the population and amount of sewage sludge produced for PPP sites, but is not required to complete the cost section of the PPP table.

5. Company Methodology

Resident population served is assigned to each disposal route in proportion to the weight of sludge produced. The total resident population is taken from table 13 line 10, however this is the total connected population including non-resident population. The total resident population is given in table 17a line 1 and should be used to generate line 1 of this table.

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 base data includes wet sludge weights and laboratory tests of dry solids contents at the various sludge processing plants. Based on averages of the test data, the following dry solids contents have been assumed:

- liquid imports to Belfast – 2.7%
- cake imports to Belfast – 23.98%
- North Down – 6.5%
- Kinnegar cake – 27.45%

This data is compiled for each sludge disposal route by each area manager and is combined to calculate the amount of sludge produced in total for each route.

Some of the sludge from the incinerator has been transferred to other locations and not incinerated. This has been accounted for within the spreadsheet.

The sludge resulting from septic tanks is estimated based on the known number of septic tanks that have been emptied, and assuming 3m³ per septic tank with a dry solids content of 2.5%. This sludge originating from septic tanks is then deducted from the sludge delivered to each route in proportion to the sludge disposed of by that route.

The cost data has been downloaded from the financial system for collation and input into this table. The financial system coding allows the costs to be captured for each of the categories in this table, except that sludge treatment (including power consumption) that takes place prior to reaching the sludge facility (i.e. sludge treatment on the STW site) can not be allocated to a particular route and must be allocated to lines 3 and 5, column 8 (“other”).

All costs for farmland disposal have been assigned to farmland (advanced) because the costs for farmland (conventional) were negligible (approximately £1,000), as this route was decommissioned early in the year.

6. Assumptions

It is assumed that the resident population served is proportional to the amount of sewage sludge produced.

A dry solids content of 30% has been assumed for grit and screenings.

An average volume of 3m³ and a solids content of 2.5% have been assumed for each septic tank emptied.

7. Confidence Grades

A confidence grade of C4 has been allocated to line 1. This is consistent with table 13 line 10 and table 17a line 1 and we agree that it is appropriate.

A confidence grade of B2 has been assigned to line 2, except for a confidence grade of A1 to the zero values (farmland untreated and composted), and B3 to the incinerator. Given that the incinerator contributes approximately half of the total in column 8, we recommend a confidence grade of B3 for the total, not B2 as originally assigned by the company. The Company has agreed to change the confidence grade for the total value to B3.

8. Consistency Checks

- The amount of sewage sludge disposed of in Table 17g (Line 2, Column 9) equals the total sewage sludge disposed of in Table 15 (Line 16).
- Sludge treatment and disposal: direct costs in Table 17g (Line 5, Column 9) are equal to the total direct costs for sludge treatment and disposal in Table 22 (Line 9 Column 3).
- Sludge treatment and disposal: power costs in Table 17g (Line 6, Column 9) equals power costs for sludge treatment and disposal in Table 22 (Line 2, Column 3).
- Sludge treatment and disposal: Service charges in Table 17g (Line 7, Column 9) 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 9) 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 9) equals general and support expenditure for sludge treatment and disposal in Table 22 (Line 11, Column 3).

Date: 10 August 2009