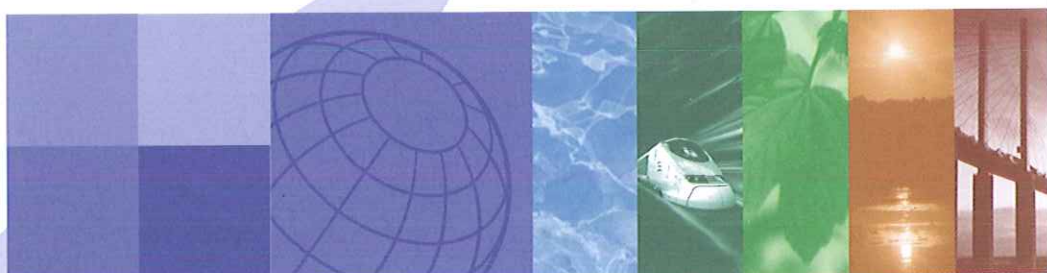


Northern Ireland Water Ltd

Annual Information Return 2009

To the

Northern Ireland Authority for Utility Regulation



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Part 3 of 7 containing:

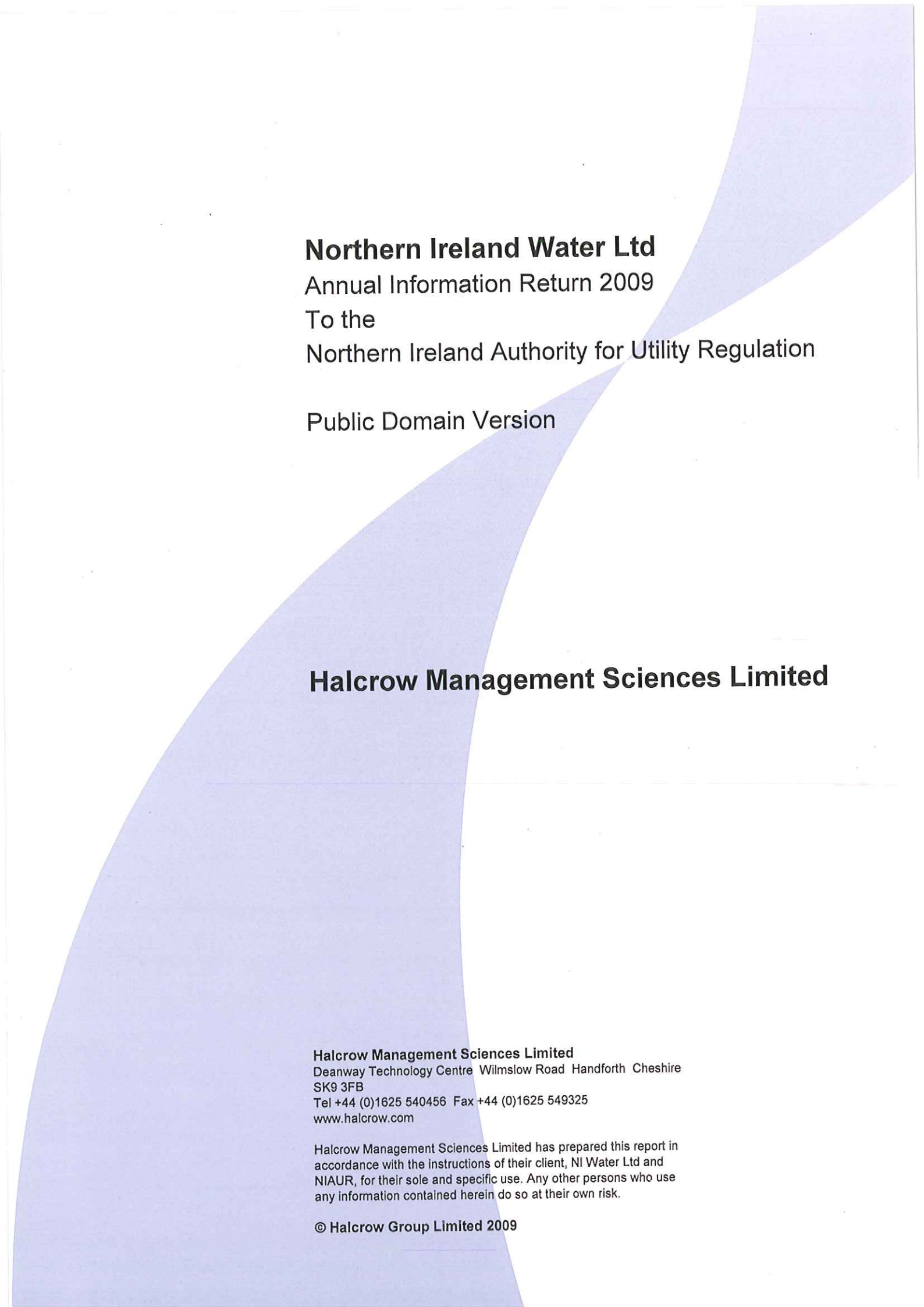
Non-financial measures - commentaries for tables 7 to 16b

Reporter's Submission

By

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Halcrow Management Sciences Ltd**

Halcrow



Northern Ireland Water Ltd

Annual Information Return 2009

To the

Northern Ireland Authority for Utility Regulation

Public Domain Version

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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.

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Northern Ireland Water Ltd – AIR2009 Submission

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

Table 7 – Non financial measures – Water properties and population**Commentary by REPORTER****1 Background**

This table reports on the properties connected during the year, billing information and average report year population estimates.

2 Key Findings

- There are several key changes from AIR08 that have had an impact on the count of properties, billing and population information.
- We note that despite deferral of charging for water and sewerage services for household customers, these are still defined as ‘billed’ due to the subsidy by DRD.
- We also note that in April 2008 the Company extended water charging to include unmeasured non-households in addition to measured non-households.
- The Company reports that for AIR08, farms had been classified and reported as ‘billed’ households. Based on the NIAUR guidelines, this has been updated to include farms within billed non-households
- A problem with the new connection application form led to approximately 10% of new connections had been classified as “unknown”. The Company has made an assumption and split these between household and non-household on a pro-rata basis.
- The Company has continued its Non-Household Metering Programme which has included surveying all unmeasured non household properties to determine if a meter could be installed on the premises. This has led to a significant decrease in the number of unmeasured non-household properties. These reductions were reflected as increases in measured non-households and site metered properties.
- The Company noted in AIR08 that it had an apparently high percentage of voids (32%). Surveys carried out as part of the non-household metering programme were also used to assess voids. The Company found that the total number of void non-household unmeasured properties was around half of that reported in AIR08.
- The Company has 11,500 ‘test’ meters which have also been investigated as part of these surveys. Of these, 7024 have been investigated and 1993 test meters are actually non-domestic measured meters and can therefore be billed retrospectively to April 2007. The Company has subtracted these from the test meter account but this has not yet been updated on Rapid. For the purposes of AIR09, these have been subtracted manually and added to the non-households billed measured water category. The Company reports that this methodology will be updated for AIR10.
- NI Water has also been investigating those meters where multiple properties are charged through a single meter, to ensure these meters are not double counted.

- NIAUR has requested NI Water to assign confidence grades to the population data reported in Table 7 of AIR09. We do not consider this to be a reasonable request or to provide any discernable value to the Utility Regulator, as the data has been primarily sourced from the NISRA website.

3 Audit Approach

The audit consisted of an interview with the NI Water system holder to discuss the methodology and data that has been used to populate this table as well as plans for improving the data in future years.

4 Audit Findings

4.1 General

The Company reports that it is moving to a new system for determining the information required in this table. For AIR09, the key source of information for the new connections and property data is the customer billing database, RapidXtra. This is an automated system where customer information is updated through customer contact. The Company reports that data on property counts and classifications are reported monthly and reconciled with other data collection activities, such as the metering programme. During our audit, the Company explained the calculations used this year and the impact on numbers for AIR10. We are satisfied with the Company's approach and the move to the new automated system.

While the Company move from the old system to the new automated one there are a number of adjustments carried out to the data, due to the activities described above. The Company has calculated its line entries from the available data as the average of the April 2008 and April 2009 numbers.

4.2 Properties

Line 1 – Household properties connected during the year

This line reports the number of new household properties added within the Company's area of supply during the report year, previously not connected for water supply. We note an increase of 763 in the number household properties connected from 2007-08. This figure is taken directly from the Company's electronic system Rapid.

Line 2 – Non-household properties connected during the year

This line contains the number of new non-household properties added within the company's area of supply during the report year, previously not connected for water supply. We note that the number of non-household properties has approximately halved from that reported in 2007-08. This figure is taken directly from the Company's electronic system Rapid.

The Company informed us at our audits that the new connection application form was updated during the year but has resulted in approximately 10% of new connections being classified as “unknown”. The Company has made an assumption regarding the split between household and non-household on a pro-rata basis. We queried this with the Company and as to whether the application form had now been replaced. The Company responded that they are seeking to properly classify these properties and have indeed replaced the form.

4.3 Billing

Line 3 – Households billed unmeasured water

We note a small increase of 11,109 in the number of households billed for unmeasured water within the supply area since 2007-08. This line is calculated as the average of occupied domestic unmeasured plus the occupied test meters plus the measured households.

Line 4 – Households billed measured water (external meter)

We note that the company has changed its definition of households with respect to farm customers. Therefore we note that this number is now reported as zero and these properties are included in the definition of billed non-households. The number of billed measured households was 30,398 in 2007-08. Even though NI Water has been installing meters on all new household connections since April 2008, as explained above, customers are not being charged on a measured basis, so the property is still being reported as unmeasured. Depending on the basis for charging when domestic billing is introduced, these customers can be activated as measured household if required.

Line 5 – Households billed measured water (not external meter)

The number of billed measured households is again reported as zero. This remains unchanged from AIR08 as the Company do not install internal meters on household customers.

Line 6 – Households billed water

We note that the average number of households billed for water within the water supply area has decreased by 19,289 since 2007-08, which is largely related to re-classification of farm customers. This is a calculated line, the sum of lines 3, 4 and 5.

Line 7 – Household properties (water supply area)

We note that the number of household properties connected in the Company’s water supply area has decreased by 26,896 since 2007-08. This decrease is again related to the re-classification of farm customers to non-household. The Company calculated this

number as the average of gross domestic, subtracting those customers who are connected for sewerage only.

Line 8 – Non-households billed unmeasured water

We note that the number of non-households billed for unmeasured water within the supply area has decreased by 822 since 2007-08. The Company reports that it has continued the application of its universal non-domestic metering policy, surveying all unmeasured non household properties to determine if a meter could be installed. This work has resulted in a decrease in the number of unmeasured non-household properties during the year.

For this number, the Company have used an adjusted method based on the transition to an automated system. The number is the sum of the occupied non-domestic unmeasured customers, plus the occupied non-domestic test meters plus the unmeasured customers who are not charged plus the 3750 non void properties, then subtracting the 1993 test meters which are now to be billed.

Line 9 – Non-households billed measured water

We note that the number of non-households billed for measured water within the supply area has increased by 35,593 since 2007-08. As discussed above, this increase corresponds to the re-classification of farm properties from billed households to billed non-households and the significant increase in the number of meters fitted to non-household customers through 2008-09.

This line is calculated by the Company as the average of occupied measured non-domestic customers plus the occupied non-domestic site meters plus the 1993 test meters which are now to be billed.

Line 10 – Non-households billed water

We note that the number of non-households billed for water within the supply area has increased by 34,771 since 2007-08. This is a calculated line and is the sum of lines 8 and 9.

Line 11 – Non-household properties (water supply area)

We note that the average number of connected non-household properties within the water supply area, including void properties, has increased by 32,733 since 2007-08. As discussed above, the increase is a result of the re-classification of farm properties. Similarly to line 7, this number is calculated as the average of gross non-domestic, subtracting those customers who are connected for sewerage only.

Line 12 – Void properties

We note that the number of properties within the supply area, which are connected to the distribution system but do not receive a charge, as there are no occupants (void properties) has decreased by 7,198 since 2007-08. NI Water was concerned with the apparently high % of voids in this category. This large decrease is as a result of significant effort by the Company to assess if the property was occupied or void. The Company has calculated this line for AIR09 as the sum of domestic and non-domestic voids, subtracting those 3,750 properties which are now known to be occupied.

4.4 Population

Total population is derived from 2006 based population projections obtained from the Northern Ireland Statistics and Research Agency (NISRA), which are provided for the year ending 30th June. However, NI Water report a mid year average population for Table 7. For AIR09, NI Water has extrapolated between the June 2007 and June 2008 estimate, in order to derive a September 2008 (mid year) estimate of 1,776,935.

The Company advised that the total population (line 17) is adjusted to account for the number of properties within the province without a water connection. For 2008/09, the NIHE, through its Housing Condition Survey (completed in 2006) forecast that there were 6,270 unconnected properties in NI, with an average occupancy rate of 0.291. The occupancy rate was also based on NIHE survey results (as described in the Company commentary) with the exception of the 151 unconnected properties, where NIHE described the occupancy to be 'other'. NI Water has assumed an occupancy rate of six for these properties. Based on the above, an unconnected population of 1,824 has been assumed for AIR09, which appears to be reasonable, resulting in a total population of 1,175,111.

Previously, NI Water has reported the domestic population of metered farms in Line 14 – measured household population, however, for AIR09 NI Water has reported a zero measured household population. Farm related population has now been included within the non-household population.

Non-household population is based on the population associated with measured farms and the population in communal residence. The communal population (26,455) is based on the NISRA 2001 Census estimate, whereas the farm population is derived from the number of metered farms (30,459) and the average NI occupancy rate (2.5).

The Company initially apportioned the total non-household population (102,603) between unmeasured (Line 15) and measured (Line16) on a pro-rata basis, consistent with the unmeasured: measured non-household property split reported in lines 8 and 9. We challenged this assumption as we would expect the total farm population to be included in measured non-household. As a result of this NI Water has recorded the total farm population (76,148) in line 16 and apportioned the communal population on a pro-rata basis as described above.

5 Confidence Grades

5.1 Properties

The Company has assigned a confidence grade of C3 to the property numbers reported in table 7. As discussed above, the Company reports that it is moving to a new automated system for determining the information required in this table. For AIR09, the key source of information for the new connections and property data is the customer billing database, RapidXtra however there are a number of adjustments made to the calculations as a result of transition to the new system. We are satisfied with the Company's approach and the move to the new automated system.

These adjustments include:

- 'test' meters - of the 11,500 in total, 7024 have been investigated and 1993 test meters have been identified that should be attributed to the non-domestic measured category. The Company reports that these have been subtracted from the test meter account but have not yet been updated on Rapid. For the purposes of the Annual Information Reporting, these have been subtracted manually and added to the non-households billed measured water category.

5.2 Population

NIAUR has requested NI Water to assign confidence grades to the population data reported in Table 7 of AIR09. We do not consider this to be a reasonable request or to provide any discernable value to the Utility Regulator, as the data has been primarily sourced from the NISRA website. With the exception of a number of minor adjustments/ assumptions made by NI Water the reported data is public domain information and NI Water has no influence on the methodology adopted by NISRA.

However, the Company has made a reasonable attempt at assigning confidence grades to this data. Based on their understanding of the NISRA methodology and the degree to which NI Water has allocated the total population between customer types, we consider the confidence grades are probably appropriate.

We recommend that NIAUR reconsider their requirement for NI Water to report confidence grades against population data. NI Water has no real influence over the derivation of this information, and unless they commission their own annual population survey it will be difficult for NI Water to improve this methodology and thus confidence grades in the future.

6 Consistency Checks

The property numbers reported in this table are consistent with the rest of the submission.

According to the Reporting Requirements, lines 3, 8, 13-16 and 17 should be copied from the sum of table 10B(i) lines 24, 30, 23, 26, 29, 31 and 33 respectively. However the Company does not report table 10B(i) for AIR09. Therefore, these lines in table 7 could not check its consistency.

Date: 10 August 2009

Table 8 – Non financial measures – Water Metering**Commentary by REPORTER****1. Background**

Table 8 is designed to track activity installing meters against planned activity. It also typically provides summary information on the demand of household customers after having a meter installed. This table should only include reporting of meter installation on existing household properties

2. Key Findings

- NI Water reports that meters have been installed on all new properties and that it has made significant progress with metering of non-household customers. However, the latter are not reported in this table.
- NI Water clarified that the meters reported in the table relate to meter installed on new build properties. Whilst we believe that this is not in strict accordance with the Reporting Requirements, we acknowledge the potential for misinterpretation as installations take place after the initial connection has been made.
- Legislation changes and deferral of charging by the Northern Ireland Assembly in March in 2007, however, has had a significant impact on the Company's metering activity.
- Funding pressures have also slowed the level of non-household metering activity. The Company notes that it is required by law to install meters on all new connections, despite the fact that bills are not issued to household customers. Therefore the funding for metering is being directed here rather than to non-household customers where some returns would be possible.
- There are reporting issues associated with the external consultant used by the Company. The Company has used an estimated number of meters in its report of the number of new connections completed during the year due to the time lag between carrying out the activity and uploading this to its database.

3. Audit Approach

The audit consisted of an interview with the NIW system holder to discuss the methodology and data that has been used to populate this table as well as plans for improving the data in future years.

4. Audit Findings

The Company confirmed its metering policy:

- Household: includes installing meters on all new connections as per the

obligation associated with Article 81 of The Water and Sewerage Services (Northern Ireland) Order 2006.

Since AIR08, there has been a deferral of charging by the Northern Ireland Assembly (March 2007). This means that domestic customers do not receive bills and therefore there are significant changes to the metering activity planned in the WRS. The selective metering policy in the WRS included all new properties and household properties on change of ownership. Optant meters were available for household customers over 60 years of age. As bills are not issued, there is no economic justification for the Company to install meters in existing household premises, nor read the meters installed in new households.

- Non-household: metering of all non-household customers where possible.

Non-domestic customers still receive bills and therefore NIW has been proactively increasing its meter penetration across significant numbers of non-domestic premises where technically possible and within budget restrictions during the reporting year. The Company reports that it has metered all the large volume non-domestic customers in Northern Ireland and all have key account managers. The Company reports that progress has slowed in 2009-10 due to budget constraints although report that a bid for additional funding is being developed.

4.1 General

The Company has reported that records of new connections are maintained by the Operations Directorate and that once new connections are complete they are uploaded to the Customer Database and exported to the metering contractor.

We discussed the reliability of the data based on the systems from which the data has been collated with the Company at our audit. The data used for this table has not been extracted from the Company's database due to significant time lags between carrying out this activity and recording. Using recorded data, due to time lag, issues with the initial paper based systems and implementation of the new electronic system the reported number of household meters installed was significantly less than the number of new connections reported in Table 7 line 1.

Therefore, the number of meters installed was derived from estimates by the Company's contractor's records. NI Water provided a copy of the contractor's spreadsheet which contains a list of the new connections completed from April 08 to March 09. We note that this spreadsheet suggests a total of 11,445 meters installed, and the Company has estimated that of these, the number of domestic meters is 11,401.

We consider that the reliability of the data given is low but confirm that this relates to the new system and will be improved for the AIR10 reporting period.

5. Company Methodology

Line 1 – Selective meters – installed

This line represents the number of meters installed during the year at existing billed household properties at the order of the company. The Company has reported zero here.

Line 2 – Meter optants installed

The Company has again reported zero optant meters installed. This line represents the total number of meter options installed at existing household properties during the year. Again, as bills are not issued to the customer there is no financial incentive to install meters.

Line 3 – Meters installed – external meter with existing boundary box

This line represents the number of external household meters installed during the report year in an existing boundary box. NI Water has reported a significant increase here, from zero in 2007-08 to 11,401 in 2008-09. NI Water provided evidence to support this value but we noted that this sheet referred to new meters. We sought further clarification on whether these were meters installed on new build properties or were ‘new’ installations on existing unmeasured household properties. Whilst meters are installed on all new properties are required by law, the reporting guidelines requires meters installed on existing unmeasured properties.

NI Water clarified that the meters reported in the table relate to meter installed on new build properties. However, the Company explained that meters on these new properties are often installed after the connection has been made. As such where meters are installed within an existing boundary box these installations are reported line in line 3. Whilst we believe that this is not in strict accordance with the Reporting Requirements, we acknowledge the potential for misinterpretation. Further clarification within the guidance would assist in removing any ambiguity.

Line 4 – Meters installed – external meter without boundary box

This line represents the number of external household meters installed during the report year without an existing boundary box. NI Water has reported a significant decrease here, from 3,723 in 2007-08 to zero in 2008-09. We note that whilst all meters installed over the previous reporting period were external meters without boundary boxes, the Company now installs meters within existing boundary boxes.

Line 5 – Meters installed – internal meter

This line represents the number of internal household meters installed during the report year and is zero, as in 2007-08.

Line 6 – No. of meter installation requests outstanding for greater than three months

The number reported for this line is zero, as in 2007-08.

Line 7 – Average water billed – selective metered properties

As NI Water's customers are not billed the Company does not include numbers in this line, as in 2007-08.

Line 8 – Average water billed – optionally metered properties

As NI Water's customers are not billed the Company does not include numbers in this line, as in 2007-08.

6. Assumptions

The Company has assumed that the calculation carried out by the contractor provides sufficient information upon which to base their estimate. We confirm that this provides a better estimate than offered by the recorded data but note that we expect an improvement in reliability for AIR10.

7. Confidence Grades

The Company has assigned a confidence grade of C3 to the only number given in the table. We are satisfied with assignment of this grade. It has also assumed a confidence grade of A1 to the rows with a zero reported value.

8. Consistency Checks

The numbers reported in this table are not reported elsewhere.

Date: 10 August 2009

Table 9 – Water Quality**Commentary by REPORTER****1. Background**

This information (along with DWI reports) will be used to examine performance with quality standards, the outputs funded in price limits and the quality of the water received by customers.

2. Key Issues

- General improvement in water quality, although some apparent deterioration in recorded lead levels at customer taps.
- Significant improvement in overall OPI score, largely attributable to the completion of the 4 new ‘Alpha’ works.
- No new ‘Legal Instruments of Work’ or Authorised Departures for distribution input agreed this year.
- No reportable progress on plumbosolvency.

3. Audit Approach

The audit consisted of an interview with the NI Water system holder and a review of relevant documentation, system methodologies and data used to compile Table 9. Spreadsheets behind the table numbers were also examined to verify calculated line totals. The audit also included a review and comparison of the Company’s commentary and table data with last year’s submission.

4. Audit Findings**4.1 General**

There have been very few changes to methodologies or procedures this year and NI Water continue to utilise their DWI records as the primary source of data for Table 9. As the DWI requires calendar year reporting, the Company also continue to report Table 9 based on calendar year. This is considered acceptable in the reporting guidelines, but we note that it is not explicit in the Company’s commentary. For calculation purposes, the total average daily input applied to the 2008 calendar year is 628.07Ml/d. This appears reasonable given the equivalent 635Ml/d total for the financial year.

The Company reports a general improvement in water quality with improvements largely attributable to the bringing into service of 4 new PPP water treatment works this year.

For the purposes of this year’s reporting, the Company have maintained a distribution input at Forked Bridge WTW even though it was ‘mothballed’ during the year with flows

now being supplied via a new trunk main from Castor Bay WTW. NI Water confirmed that flows were not being double counted and acknowledge that the Forked Bridge site is effectively treated as a 'virtual' works as it still has a designated sampling point. Although causing apparent inconsistencies between data sets, our audit confirmed that this has no impact on the overall line totals and hence we have no real concerns over this approach.

The Company advised that there has been no consolidation of water supply zones (WSZs) this year.

4.2 New Legal Instruments of Work and Work Programmes

The Company confirmed that they have not agreed to fulfil any new 'Legal Instruments of Work' or Authorised Departures for distribution input this report year. All Authorised Departures in place were issued prior to this report year.

No new legal instruments relating to turbidity, *Cryptosporidium* or plumbosolvency have been agreed within year.

4.3 Water Treatment and Distribution Inputs (Lines 1-3)

Through questioning and checks made on the Company's breakdown of Undertakings and previous report years, the reported Line 1 total was confirmed as the correct summation of the volumes of distributed water affected for all legal instruments still in place on 31st December 2008. NI Water provide a full list of the contributing sites in their commentary. We can confirm that the volume from each WTWs has only been counted once regardless of the number of parameters, which is in accordance with the Reporting Requirements.

NI Water confirmed that no new Authorised Departures or Article 31s have been agreed this year. Of the 9 Authorised Departures in place at the start of the year, only 1 at Creighton's Green expired during the year. NI Water confirmed that works at the site were completed in 2007 with no further problems reported. Of the remaining 8 works, 7 relate to THMs and will largely be resolved by the completion this year of the new PPP 'Alpha' treatment works. A significant reduction is therefore expected next year as these Authorised Departures expire.

In all cases, we were satisfied that the Company appears to be taking timely and appropriate action to resolve the problems and that they are working in full co-operation with the DWI.

Our checks on the source data confirmed that Lough Cowey is excluded from the line total as it was not in service at the end of the calendar year. However, it was in service for approximately 10 months of the year with an average daily input of 2.46Ml/d. Given that the Authorised Departure was still in place at the year end, we challenged this approach. The Company provided correspondence with NIAUR that confirmed the exclusion of

the site on this basis. Whilst we therefore accept that the Company have complied with the clarified reporting requirements and the affected volume is relatively small, we are concerned that the generally accepted exclusion of sites taken out of service before year end could result in a significant proportion of the annual input volume being excluded from the line total. Consequently, the line total may not be a true representation of the annual average volume entering supply. We also believe that this is inconsistent with other companies reporting methods. However, we note that the Company ensure full transparency by providing relevant details of Lough Cowey in their commentary, including the out of service date and distribution input volume.

There were no new legal instruments received this year and hence there are no contributory sites to Line 2. The total is therefore correctly reported as zero.

The percentage total in Line 3 is based on comparison with actual flow data recorded at each WTW. We reviewed the calculation behind this total and can confirm that the workings appear correct and accurate.

4.4 Distribution Systems (Lines 4-5)

The totals in lines 4 and 5 are made up from the properties within WSZs affected by the 7 Authorised Departures relating to THMs applied to the distribution system and still in effect at year end. In accordance with the guidelines, properties within each WSZ are only counted once.

Whilst there is a slight change in the Line 4 total since last year, the Company confirmed that this is purely due to fluctuations in property numbers within affected WSZs rather than any direct changes or completion of work. The percentage totals in lines 4 and 5 are based on the number of properties in each WSZ.

Although listed in the table, NI Water confirmed the Hollywood zone is not included in the Line 4 total due to the relevant Authorised Departure having expired. Our checks confirmed that the total correctly excludes the Authorised Departures applied to distribution input at Altmore and Lough Cowey.

There were no new legal instruments received this year and hence there are no contributory zones to Line 5. The total is therefore correctly reported as zero.

We viewed the spreadsheet behind the line totals and can confirm that the totals for lines 4 and 5 have been correctly calculated from the number of properties within the affected WSZs.

4.5 Nitrates and Pesticides (Line 6)

NI Water initially included 4 sites in Line 6, including Dorisland and Camlough WTWs, where PAC has been installed to assist in pesticide removal. Our review highlighted that

no legal instruments were in place for these two sites and that whilst we agree that they should be referred to in the commentary, they did not need to be included in the line total. NI Water agreed to revise their table and commentary accordingly. This is the primary cause for significant reduction in line total from 42.46Ml/d last year to 11.84Ml/d.

NI Water confirmed that levels above target levels have only been recorded at Altmore this year. Recent improvements at Lough Braden have brought levels to within target levels since last year. However, as the Authorised Departure is still in place, it is correctly included.

The Company advised that PAC measures at Altmore are only temporary as the site is programmed for closure in the near future.

Line 6 is confirmed as being reported on the situation at calendar year end.

4.6 Plumbosolvency (Line 7)

As stated in their commentary, NI Water currently have a policy of Orthophosphoric acid dosing at its treatment works to control plumbosolvency in the distribution system. This affects almost all water entering supply with the exception of only 6 boreholes which are largely programmed for abandonment. In total 99% of water entering supply is currently dosed. Dosing levels are based on compliance with the lead target of 10µg/l, although regulation is currently based on a 25µg/l limit. The dosing programme is optimised annually based on compliance with the 10µg/l standard. This year, NI Water have reduced the amount of dosing at some sites from levels in 2008 where the Company believed some rationalisation could be applied. However, NI Water confirmed that they remain committed to working with the DWI towards achieving the future lead target of <10µg/l in all zones by 2013.

We discussed the overall performance of the dosing with NI Water who informed us that they had recorded some increased lead levels in samples taken at customer taps this year. We challenged whether the decreased dosing had led to an increase in lead levels. NI Water advised that whilst they hadn't fully identified the cause, they considered it unlikely to be directly related as the increased levels were sporadic across zones with the lead results based on a random sampling programme and significantly skewed from the norm. NI Water are currently investigating the possibility of some sample contamination. The Company took almost 3000 samples of which 468 were for regulatory reasons. However, NI Water also admitted that they have some localised areas which are not responding sufficiently well to the Orthophosphate dosing and hence they are looking into other ways to deal with these cases. To illustrate the Company's overall improvement in lead over the last few years and put the increase in perspective, a chart tracking percentage lead failures is presented in Figure 4.1 below.

This year, the Company has not reported changes to existing measures at any site and

hence the change in line total is purely due to fluctuations in average daily flow volumes. We reviewed the spreadsheet behind the line total and can confirm that the total is the correct summation of annual flow output volume from all WTWs with the exception of the 6 borehole sites where Orthophosphate dosing is not applied.

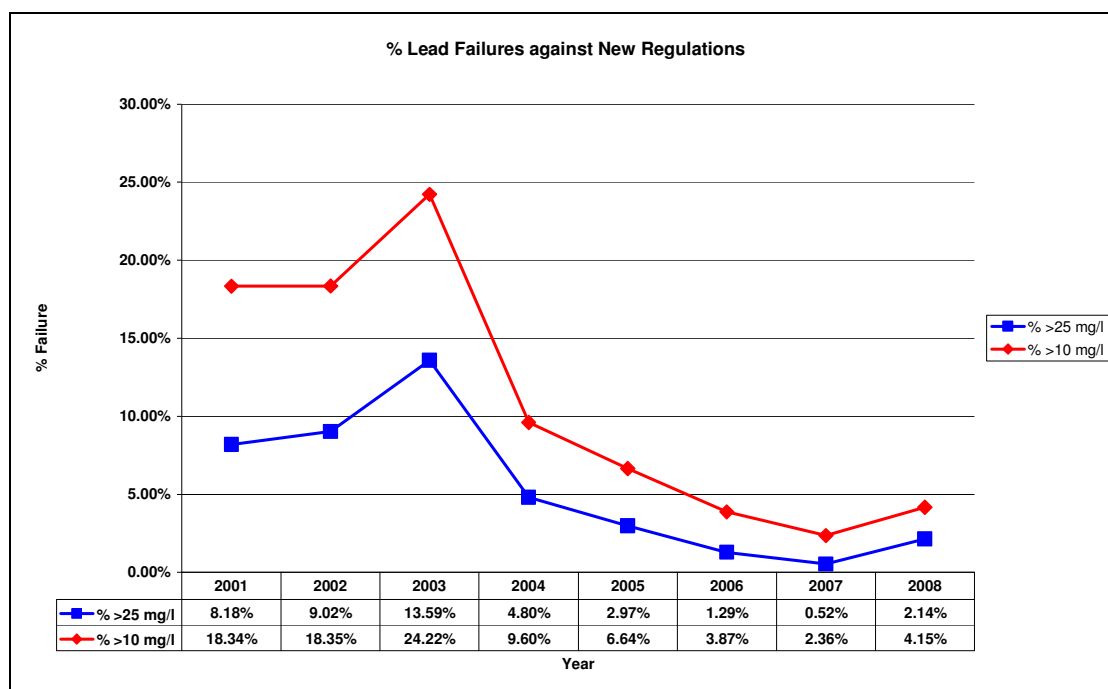


Figure 4.1 – Percentage lead failures

NI Water currently do not have a targeted lead replacement programme in place and replacements of lead communication pipes are done opportunistically through capital works and maintenance projects.

Line 7 is confirmed as being reported on the situation at calendar year end.

4.7 *Cryptosporidium* (Line 8)

Previously, NI Water included all distribution input where there was agreed with the DWI to be a need for a risk assessment in Line 8. In practice, this included all sites in the line total. This year, in line with the Reporting Requirements, and as no legal instruments relating to *Cryptosporidium* are actually in place at any site, the Company have amended their interpretation of the line and report a zero total. We agree with this interpretation, but would encourage the Company to continue to provide updates and details in its commentary.

The change therefore does not reflect any direct resolution of legal instruments. However, NI Water expect that the completion of the 'Alpha' projects will provide increased protection against *Cryptosporidium* risk.

There were no new legal instruments received this year. The Company confirmed that there are no Statements of Intent to include.

4.8 Other Parameters (Line 9)

There were no legal instruments in place not already included in Lines 6-8, and hence the line total is zero.

5. Company Methodology

The Company confirmed that there are no significant changes to their methodologies this year.

Following its adoption in 2007, the Company continues to use actual flow data records taken over the year to produce an average daily flow volume for each WTW for the calendar year. These totals are used to calculate the figures in lines 1, 2 and 3.

Contributing volume from each works is calculated from the average of the daily flow inputs throughout the calendar year. In line with recent clarification from NIAUR, the Company do not include sites which have been taken offline part-way through a year although they provide full details in their commentary to ensure transparency. We have questioned this approach (refer to Section 4.3) and would recommend adopting an annually averaged value for any site with active legal instruments still in place at year end.

The totals in Lines 4 and 5 relate to percentage properties in WSZs and so are based on estimates of total number of properties per WSZ from the Company's GIS systems. NI Water currently report a total of 846,100 properties.

6. Company Assumptions

The Company make the following key assumptions:

- For Lines 1-5 and 6-9, the average daily flow volumes from WTWs are reliant on the accuracy of flow measurement devices at each site.
- For Lines 4 and 5, the volume of water input to a zone is proportional to the number of properties in the zone. It is possible that large non-domestic users could affect this.
- A problem affecting part of a WSZ is deemed to affect it all.

7. Confidence Grades

The Company's confidence grades remain unchanged from last year, maintaining the policy of reporting A2 grades for all non-zero data and A1 for all zero entries. With no significant changes to the methodologies or data techniques and sources, the generally applied confidence grade of A2 is still considered reasonable given the potential for inaccuracies in estimating average flow and numbers of properties.

8. Consistency Checks

Following the initial audit, the Company provided additional data and clarification to confirm all issues raised within the audit. Cross checks were carried out against comparable data in Tables 11 and 11a to confirm consistency.

Date: 10 August 2009

Table 10 – Water Delivered**Commentary by REPORTER****1. Background**

The information in this table records the total volume of water delivered to measured and unmeasured households and non-households and the assumptions which companies have made in determining their overall water balance, including; per capita consumption, meter under-registration and unmeasured non-household use.

2. Key Findings

- We confirm that the Company has adopted the principles of NERA/UKWIR Demand Forecasting Methodology for estimating the components of the water balance.
- NI Water is part way through an ambitious two-year programme to improve the robustness of most components of the water balance. For AIR09, all components of the water balance have been subject to significant review, with a number of specific projects completed during the year to ensure the accuracy of specific components of the water balance.
- The Company has provided a detailed commentary on the water balance for AIR09, with significant detail on the many improvements to the water balance implemented during the year.
- During the year, NI Water undertook a major review of its domestic consumption monitor (PCC monitor) that was founded on a comprehensive survey of all properties contained within the PCC monitor – PCC subject to continuing improvement during the current year.
- NI Water has updated their estimated figure for Supply Pipe Leakage based on Company specific data. However, some of the component data differs to that seen in E&W and therefore, will be subject to further investigation.
- Company specific estimates of MUR have been derived for household (PCC Monitor) and non-household meters, although these are still influenced by industry figures.
- During the year NI Water undertook a comprehensive review of Distribution Input (DI) across the region. The review, whose purpose was to establish the accuracy of the DI figure produced by NI Water and rationalisation of the number of meters used, identified 23 Ml/d of DI, not previously included in the DI reporting.
- For AIR09, the pre-MLE estimate of distribution input (635.56 Ml/d) exceeded the sum of the components of the water balance by 30.47 Ml/d (4.79%), which is within the 5% threshold set by the Utility Regulator.

- NI Water has applied the ‘squared’ approach for the Maximum Likelihood Estimation (MLE) method, rather than the ‘linear’ approach previously applied.
- We identified that the changes to the parameters of the SOSI calculations, at Company level since AIR08, has resulted in a significant improvement in SOSI from -26 (AIR08) to 45 (AIR09) for the dry year average planned Levels of Service (LoS) conditions.

3. Audit Approach

We made two visits between year-end and AIR09 to NI Water, to carry out end of year aggregation audits for table 10. Our audits consisted of an interview with the system holders and a review of documentation, systems and data used to generate the water balance for AIR09.

We also met with the Company’s ‘Leakage Management Services’ consultants to review specific projects undertaken to improve the accuracy of individual components of the overall water balance.

4. Audit Findings

We confirm that the Company has adopted the principles of NERA/UKWIR Demand Forecasting Methodology for estimating the components of the water balance.

NI Water is part way through a comprehensive two-year programme to improve the robustness of most components of the water balance. For AIR09, all components of the water balance have been subject to significant review, with a number of specific projects completed during the year to ensure the accuracy of specific components of the water balance.

4.1 Overview of Water Balance

NI Water has reported an annual average leakage of 180.92 Ml/d at year-end, a perceived increase of some 24.4 Ml/d from that reported for AIR08.

As highlighted above, all components of the water balance have been subject to significant review during the year in order to confirm and/or improve the methodologies applied to derive the overall water balance. This review has resulted in a number of changes to the overall water balance, which has contributed to the overall increase in leakage reported during the year, the impact of which is summarised below.

In terms of the AIR09 water balance, we found that an adjustment had been applied to all components using the Maximum Likelihood Estimation (MLE) Method. For AIR09, the pre-MLE estimate of distribution input (635.56 Ml/d) exceeded the sum of the components of the water balance by 30.47 Ml/d (4.79%), which is within the 5% threshold set by the Utility Regulator.

When compared to AIR08, there have been a number of data movements which we have summarised in the table below, highlighting the reported variance for the year.

Component	AIR08			AIR09			Variance for the year (Ml/d)
	Initial Estimate (Ml/d)	Accuracy (%)	Final Estimate (Ml/d)	Initial Estimate (Ml/d)	Accuracy (%)	Final Estimate (Ml/d)	
Measured Household Consumption	14.01	10	14.76	0.00	10	0.00	-14.76
Measured Non-h'hold Consumption	118.36	10	124.68	131.37	10	134.05	+9.37
Unmeasured Household Consumption	291.07	10	306.61	297.34	10	311.07	+4.5
Unmeasured Non-h'hold Consumption	23.24	10	24.48	20.65	15	20.80	-3.7
SPL	45.14		45.14	49.44		49.44	+4.3
DSOU	4.39	25	4.97	4.70	25	4.72	-0.25
Water taken unbilled	24.32	25	27.57	29.73	25	30.58	+3.0
Top Down Leakage	184.19			201.21			+17.0
Distribution Input	614.45		614.45	635.56	2	632.71	+18.3
Bottom Up Leakage	152.45	5	156.52	170.74	15	180.92	+24.4
Water Balance Variance	31.74			30.74			

As demonstrated above, there has been significant movement amongst a number of the components of the water balance. We provide additional comment on the various components of the water balance and explanation for the above variances in Section 4.3 of our commentary below, however for convenience, we have summarised these below:

- The household element of consumption on metered farms has previously been included in 'Measured Household Consumption'. For AIR09 (following AIR08 Reporter recommendations), this consumption has been included in 'Measured Non-household Consumption'
- The confidence limit applied to 'Unmeasured Non-household Consumption' has been increased from 10% to 15% as a result increased uncertainty resulting from the identification of a number of previously unknown non-households during the year.
- Supply Pipe Leakage has been updated to reflect best practice methodology and latest available information.
- During the year NI Water undertook a comprehensive review of Distribution Input (DI) across the region. The review, whose purpose was to establish the accuracy of the DI figure produced by NI Water and rationalisation of the number of meters used, identified 23 Ml/d of DI not previously included in the

DI reporting.

- Desktop review of accuracy of DI meter accuracy undertaken by WRc, based on a series of allowances for manufacturer uncertainty, installation effects, meter age, telemetry and faulty meters etc, which when applied to each meter in turn and aggregated, derived an estimated DI confidence limit of 2.1%.
- The confidence limit applied to 'Bottom Up Leakage' has been increased from 5% to 15%, reflecting NI Water assessment of accuracy of MNF data.

In addition to the above, for AIR09, NI Water has applied the 'squared' approach for the Maximum Likelihood Estimation (MLE) method, rather than the 'linear' approach previously applied. We note that the 'squared' approach will tend to apply the larger adjustments to the larger more uncertain components. We tested the impact this change in approach had on total leakage, and as demonstrated below, when compared on a like for like basis, application of the 'linear' approach would result in a circa 2 Ml/d reduction in leakage.

Component	AIR09					
	Initial Estimate (Ml/d)	Accuracy (%)	Confidence Range (Linear)	Confidence Range (Squared)	Final Estimate (Linear)	Final Estimate (Squared)
Measured Household Consumption	0	10%	0	0	0	0
Measured Non-h'hold Consumption	131.37	10%	13.1	172.6	135.64	134.05
Unmeasured Household Consumption	297.34	10%	29	884.1	307.01	311.07
Unmeasured Non-h'hold Consumption	20.65	15%	3.1	9.6	21.66	20.8
SPL	49.44				49.44	49.44
DSOU	4.7	25%	1.2	1.4	5.08	4.72
Water taken unbilled	29.73	25%	7.4	55.2	32.15	30.58
Top Down Leakage	201.21				201.21	201.21
Distribution Input	635.56	2%	13.5	183.3	639.96	632.71
Bottom Up Leakage	170.74	15%	25.6	655.9	179.07	180.92
Water Balance Variance	30.74					

4.2 Water Delivered – Volumes

4.2.1 Measured Volumes

Line 1 represents the average volume of water delivered to households which is measured. As discussed in our summary report for Table 8, legislation changes and deferral of charging by the Northern Ireland Assembly in March in 2007 means that household customers are not issued with bills for water usage. Therefore no value is reported for billed measured households.

We note however that there is a reduction from AIR08, where billed measured household volume was reported as 14.76 Ml/d. This corresponds to a change, in order to comply with reporting requirements; the household element of farms has been re-classified from billed measured household to billed measured non-household. The Company reports that a corresponding adjustment has been made to the resident population in other lines of the table.

Line 2 – Billed measured non-household, corresponds to the average volume of water delivered to non-households which is measured. These volumes are determined from the Company's Customer Billing System RAPID and do not include test meter volumes, trade effluent volumes, free supplies or NI Water supplies.

We note that the reported value for water delivered to non-households has increased from 124.68 Ml/d to 134.05 Ml/d. As discussed above however, this now includes the household element of farm use which corresponded to 14.76 Ml/d in 2007-08. This would indicate that the measured water delivered to non-households actually decreased (5.39 Ml/d).

The number of measured non-households has increased by 35,593 households (as reported in Table 7), only 30,398 of which are farms. Therefore there are an additional 5,195 measured non-household properties, corresponding to the Company's program to target metering of non-households in 2008-09.

The numbers would indicate however that the non-household consumption has actually decreased, which is consistent with the decline in the industrial sector across the UK.

In terms of supply pipe leakage, the Company has not added an allowance for this as all measured non-households are externally metered and the billed consumption would already include it. In terms of meter under-registration, following a NI Water project completed during the year, a Company specific value of 8.10% has been added.

The Company reports that additional work to improve data quality includes further investigation of non-household test meters with a view to considering their future use, but all will be billed either as measured or unmeasured non-households.

The confidence limit of 10% on this component has not been changed and is considered

to be appropriate.

4.2.2 Unmeasured Volumes

NI Water has calculated the volume of water delivered to unmeasured household properties by applying its estimates of unmeasured population, the regional average per capita consumption (adjusted for MUR) and supply pipe leakage for unmeasured households. As we discuss in further detail below, the components used to derive unmeasured household volumes has been subject to significant review during the year, which has further improved the confidence of reported data.

NI Water has based the water delivered to unmeasured non-household properties on the actual consumption of comparable measured non-households, the number of connected unmeasured non-households (excluding voids) and MUR. To assess the consumption of unmeasured non-households, NI Water undertook an analysis of consumption at measured non-household properties and derived a weighted average consumption for property types matching unmeasured categories. Average consumption in each property category was then assessed, excluding the highest 10% and lowest 10% in each category (which excludes outliers from the analysis), and an average total consumption of 263m³/yr (720 l/pr/d) was derived. This estimate is then multiplied by the total number of connected unmeasured non-households (excluding voids) – 26,177 and adjusted for MUR (8.1%) to derive a total volume of 20.8 Ml/d. We consider this to be an appropriate means of deriving unmeasured non-household consumption.

4.3 Water Delivered Components

4.3.1 Unmeasured Water Delivered per Property

For AIR09, NI Water based the consumption of unmeasured non-households (UNHH) (Line 7) on the actual consumption of comparable measured non-households. We reviewed the analysis undertaken by the Company and note that the analysis which derived an estimated average UNHH consumption of 263 m³/yr (~720 l/pr/d) was based on 30,579 UNHH, of which 15,877 (52%) were classified as retail shops. MUR (~8.1%) was then added to derive the total estimated water delivered to UNHHs.

When compared to Table 7 Line 8 of AIR09, we note a slight 60 property discrepancy in the number of UNHH, where 30,519 properties were reported and a further 4,342 property discrepancy when compared to the 26,177 UNHH used to calculate the total volume. It appears that the number used does not include 4,204 test meters (whose consumption has been included in 'Water Taken Unbilled'. This would imply a total of 30,381 UNHH, suggesting that Table 7 Line 8 of AIR09 has subsequently been updated. Although the variances are negligible ($\pm 0.5\%$), this exposes an underlying issue with quality assurance, highlighting the need to develop processes to ensure amendments to data are cascaded across the AIR.

The estimated volume of water per unmeasured household (UHH) was based on estimates of unmeasured PCC, occupancy rate, SPL and the number of UHHs.

4.3.2 Unmeasured per capita consumption

In order to derive a Company specific estimate of the per capita consumption for unmeasured household properties, NI Water maintains a domestic consumption monitor, comprising 115 discrete areas (predominantly cul-de-sacs of similar property types). Although containing in excess of 5,600 properties, each area is relatively small, containing, on average 49 properties, with over half of the monitor areas containing fewer than 30 properties. The areas were designed to predominantly contain a different property type, such that a representative sample of detached, semi-detached, terraced and apartment style housing is included. This approach is in line with the UKWIR report '*Best Practice for Unmeasured Per Capita Consumption Monitors*' (1999) and is consistent with NIAUR's definitions for a B reliability grade.

During the year, NI Water undertook a major review of its domestic consumption monitor (PCC monitor) that was founded on a comprehensive survey of all properties contained within the PCC monitor. We found that the results of the survey have enabled NI Water to update the following base data, used to derive estimates of PCC, such as:

- a count of properties within the PCC monitor
- a count of property types within the PCC monitor
- a count of vacant properties within the PCC monitor
- an estimate of occupancy within each property
- usage of water using appliances at night
- usage of water saving devices.

The survey, which involved the distribution of household questionnaires to all properties located within the PCC monitor, and 'face to face' follow up, where necessary, resulted in an 85% response rate, which represents an excellent return for a survey of this type. For areas where there was less than 100% return of questionnaires then an estimate was made of the total population of the area based on property specific occupancy rates.

In summary, we found that the results of the survey had the following impact on the base data used to derive the unmeasured household PCC estimate for AIR09:

Prop Type	AIR08 (PCC monitor data)			AIR09 (post survey PCC monitor data – which includes estimates for non-survey respondents)		
	No. of props	Total Popl'n	Occ. Rate	No. of props	Total Popl'n	Occ. Rate
Detached	1583	4394	2.78	1640	4418	2.69
Semi Detached	1652	4576	2.77	1723	4439	2.58
Terraced	1719	4198	2.44	1625	3942	2.43
Apartments	346	622	1.80	319	446	1.40
Total	5300	13791	2.60	5307	13245	2.50

The updated occupancy rate for the PCC monitor of 2.50 is consistent with that quoted by NISRA in its latest population update, which further confirms the validity and value

of the work undertaken.

In addition to the survey work undertaken, and described above, NI Water has also sought to improve the mix of property types within its PCC monitor, to ensure the mix is representative of the overall property mix in Northern Ireland. As demonstrated in the table below, the PCC monitor has historically understated the proportion of detached properties and overstated the proportion of semi-detached properties. In order to redress this imbalance, we found that NI Water added 6 new areas during the year; hence the PCC estimate for AIR09 was based on 115 discrete areas.

Property Type	% of properties in PCC monitor	% of total properties in NI (NISRA)
Detached	30%	40%
Semi Detached	33%	23%
Terraced	30%	29%
Apartments	7%	8%
Total	100%	100%

As demonstrated in the summary above, further work is still required to ensure the PCC monitor areas contain a representative mix of property types. However, whilst increases in the number of areas used to derive unmeasured household PCC will further improve the accuracy of the derived estimate, we do not believe this would significantly impact on the overall estimate of PCC. In fact, the introduction of multi-regression technique to derive PCC (as described below) further reduces the importance of property mix within the PCC monitor, which will enable the Company to easily extend the PCC monitor in the future.

We also found that NI Water replaced 18 of the older PCC meters during the year, which we consider to be good operational practice. As the flows recorded on these meters underpin the overall water balance, it is important these meters are regularly checked, calibrated and if necessary replaced.

For AIR09, NI Water has reported a post-MLE estimate for unmeasured PCC of 158.97 l/h/d, which includes an adjustment for meter under-registration. Whilst this represents a 2.5% reduction on that reported for AIR08 (163l/h/d), the reported PCC is circa 5% higher than that reported by the WASCs in England and Wales (E&W), where an average unmeasured household PCC of 150.7l/h/d was reported for 2007/08.

We queried the nature of this variance and the Company indicated that this was due to the fact the historical level of water efficiency activities in NI was less than that implemented in a number of E&W companies. We do not believe the water efficiency initiatives implemented in recent years have had a significant impact on PCC, as evidenced by the relatively stable PCC reported in recent years. However, E&W has actively promoted a 'Free Meter Option' for a number of years, which has encouraged those smaller households with lower consumption to switch. As such, when compared on a like for like basis with NI Water, the E&W unmeasured PCC would be lower than

currently reported. However, it is interesting to note that unmeasured non-household PCC reported by NI Water is circa 4% lower than the E&W WASC average. We recommend that NI Water should investigate the balance between unmeasured household and non-household properties during the current year, particularly the allocation of Guest Houses and B&Bs.

As highlighted above, NI Water has based their estimate for unmeasured PCC on flow data into each of the 115 areas. Where the individual PCC for an individual area was reported to be either <50 l/h/d or >300 l/h/d, these areas were excluded from the analysis. For AIR09, 14 areas were excluded from the analysis, on this basis. In addition to this, where the average PCC was >200l/h/d for an individual area, logger data was interrogated to determine the presence of leakage and then adjusted as appropriate. Six such areas (S15, E19, W20, W16, N25 and N29) were reviewed and adjusted to take into account leakage for AIR09.

In order to determine an overall average PCC value for the Region, NI Water has employed a multi-regression analysis. Whilst this represents a slight change on the straight line average approach previously adopted by NI Water, we believe this to be an effective technique that reduces the need to separate out property types within each area, and should simplify the process of adjusting the size of their domestic consumption monitor in the future, as areas will no longer need to be limited to containing just one property type. For AIR09, an unmeasured household PCC of 141.35 l/h/d (pre-MLE) was calculated.

In order to verify the AIR09 estimate of PCC, and to test the integrity of the domestic consumption monitor, NI Water undertook a 'back calculation' of all PCC areas to compare the actual average daily consumption of each area, with the predicted consumption for each area, using the PCC for each property type. We reviewed the results of this analysis and confirm a reasonable reconciliation.

We queried the impact; the updated property and population data; and improved methodology has had on PCC for AIR09. We recognise that this is difficult to assess given the various interdependencies, however, NI Water assess that the implementation of improved validation of data, adjustment for leakage and use of multi-regression analysis has served to reduce the estimate of PCC for AIR09 from 146.78 to 141.35 l/hd/d.

It should be noted that whilst a sound approach has been adopted to derive an estimate for unmeasured household PCC, the updated monitor has only been in operation for part of the report year, with data predominantly collected over the winter months. As such, it is likely that there will be changes to the PCC in 2009/10 as this will be the first full year of robust data. It would then be expected that any future changes will be the result of actual changes in consumption and not methodology.

4.3.3 Supply Pipe Leakage

NI Water has re-assessed their supply pipe leakage using the latest best practice principles, described in UKWIR Report “Towards Best Practice for the Assessment of Supply Pipe Leakage”.

Application of the UKWIR methodology to a combination of NI Water specific data and UKWIR default values resulted in an estimate of 65.97 l/pr/d for unmeasured households and 32.98 l/pr/d for other customer types.

Whilst a sound approach has been adopted by the Company, based on best practice methodology, we found that NI Water’s estimates are in some cases, based on limited data and a number of fundamental assumptions, as summarised below.

- The current estimate for supply pipe leakage is based on limited data on the number of bursts, which is partially due to NI Water not having a free supply pipe repair policy (unlike E&W water companies).
- The number of supply pipe bursts is based on the assumption that 65% are reported and 35% are unreported. NI Water also has no record of reported supply pipe bursts if a leak notice is not issued, and it is assumed that 5% of the 65% will be subject to a leak notice. As the number of supply pipe bursts is estimated from the number of leak notices, the overall estimate is sensitive to these assumptions.
- We note that the average supply pipe leakage flow rate, which has been derived from company specific data during the derivation of the natural rate of rise of leakage used, is 1000 l/hr which is significantly higher than the default from the UKWIR study of 293 l/hr. Furthermore, a leak repair time of 42 days has been assumed for NI Water as opposed to a 13 day default from UKWIR. Application of this Company specific data (flow rate, burst frequency and flow duration) has facilitated a significantly higher estimate for unmeasured household supply pipe leakage (65.97 l/pr/d) than found at companies in E&W (40.8 l/pr/d).
- The average supply pipe length was derived from NI Water’s GIS to be 25.5m, which is more than double the typical length of 10m used by E&W water companies (and by NI Water in 2007/08). Northern Ireland has a significantly lower population density at 122/km² than England (246/km²), Scotland (168/km²) and Wales (140/km²) so it would be expected that the supply pipe length would be higher. This revised length has led to a 6 Ml/d increase in supply pipe leakage. An additional 2 Ml/d is due to the supply-pipe leakage from metered non-households being reported in supply pipe leakage (previously it had been included within measured consumption).
- The majority of the other components use the UKWIR defaults, adjusted to NI Water circumstances where appropriate, such as meter reading frequency and ALC survey frequency.

Based on the above, whilst a sound approach using the best available data has been adopted to derive the estimate of supply pipe leakage for unmeasured households, some of the assumptions that underpins the estimate (such as leak size and leak run time) differ from E&W. Changes to work practice should enable NI Water to respond more proactively to leaks of this nature over time.

The estimate for other property types was purely based on an assumed ratio of 2:1 (unmeasured SPL : measured SPL)

4.3.4 Meter Under Registration (MUR)

The estimates of MUR for NI Water's household (PCC Monitor) and non-household meter stock have previously been based on industry average estimates. For AIR09, NI Water commissioned three separate reviews by WRc and Himsley Meter Revenue Services to determine a Company specific estimate of MUR for NI Water's stock of household and non-household meters, respectively.

Household PCC Monitor MUR

As domestic households are not metered in NI, the household MUR review was based on the unmeasured household PCC monitor meters. We found that the 115 PCC monitor meters ranged in size from 25mm to 100mm, with circa 60% less than 5 years old. In order to derive an estimate for MUR, WRc initially assessed NI Water's meter stock against meter type specific deterioration curves, generated through WRc's CP360 collaborative research project. This generated an average estimate for MUR of 6.56%.

Whilst the meter types included in CP360 were the same as those used by NI Water for their PCC monitor, the CP360 study was focussed on non-household meters, and were thus subject to different consumption profiles to household meters. Therefore, in order to verify these results, a representative sample of 19 PCC monitor meters (circa 17%) were removed from service and bench tested for accuracy in order to derive individual error curves. These results were then compared to historic test data that WRc had available for the same types of meters. For the 19 meters tested an MUR range of 4.05% - 11.76% was derived. As the initial estimate of 6.56% was within the range identified above, NI Water has opted to use the initial estimate of 6.56% for AIR09.

Whilst the above estimate was reasonably determined and broadly based on actual NI Water meter stock, it is still derived from industry estimates. Considering the age and mix of the meters used, the estimate appears to be quite high when compared to E&W (circa 4%). We believe NI Water should place more emphasis on testing a larger sample of their own meter stock and directly use these results to derive a company specific estimate for MUR.

Non-household MUR

As part of a Proactive Meter Exchange Project, undertaken by [X], a parallel exercise was completed in order to derive a company specific estimate for non-household MUR. We found that a small, but representative sample of 205 non-household meters (out of circa

78000 meters) were tested for accuracy at five separate flow rates. As a result of this an overall estimate for NHH MUR of 8.1% was derived.

Whilst a robust process has been implemented to select and test the accuracy of the sample of meters, the sample size of meters tested was very small (circa 0.25%), and will need to be increased to improve confidence in the reported estimate for non-household MUR. Furthermore, the estimated MUR is heavily influenced by the number of seized meters or meters 'not registering' at low flow, which contributed 46% of the MUR.

We acknowledge that the current estimates of MUR are based on an interim assessment and note that NI Water intends to continue to test meters and further refine their estimates for a Company specific estimate of MUR.

4.3.5 Distribution System Operational Use

As was the case for AIR08, NI Water has undertaken a comprehensive assessment of DSOU for AIR09. The assessment, which involved deriving volumes of water used for eight separate operational activities, was based primarily on the recommendations of the UK Water Industry Report D, Appendix F and supplemented using NI Water specific information.

The volumes derived for AIR09, and the assumptions used, are summarised below:

Activity	Volume (Ml/d)	Basis of Assessment
Treatment Works – Sample Taps/Filters etc	1.13	Company Estimate
SR Cleaning	0.17	25% of capacity of each SR cleaned
Water Sampling	0.01	Operational Sampling Protocol based on samples taken during year – 34815
Chlorine Samplers	0.33	Ratio of HACH to SR (1.07) Flow rate of 0.01l/s
Repair Flushing	0.98	No. of Bursts – 3572 x Burst Volume (100m3)
New Houses	1.47	Est. 0.83 l/hd/d
Mains Renewal	0.44	2-4 x mains volume
Water Quality Compliance	0.17	Company Estimate
Total (pre-MLE)	4.70	

These components are largely unchanged since AIR08 and are not considered to materially impact on the leakage estimate.

4.3.6 Water Taken Unbilled

Water taken legally and illegally unbilled was based on a variety of different components, as summarised below:

	Activity	Volume (Ml/d)	Basis of Assessment
Legally Unbilled	Sewer Jetting	<0.01	Company Estimate
	Sewer Blockages	0.04	Company Estimate
	Standpipes	0.27	Company Estimate
	Council Usage	0.81	Company Estimate

	Activity	Volume (Ml/d)	Basis of Assessment
	Fire Fighting	0.33	UKWIR Report D – Appx F Number of fires from NIF&RS
	Hydrant Maintenance	0.14	Company Estimate
	WwTW Usage	8.94	Usage at metered sites extrapolated to all sites
	SPSs with screens	0.14	Usage at metered sites extrapolated to all sites
	WTW Usage	3.97	Company Estimate
	Tanker Usage	0.53	Company Estimate
	NI Water Depots & Offices	0.1	Company Estimate
	Unmetered Government Buildings	0.29	Company Estimate
	Free Supplies	0.02	Company Estimate
	Test Meter Consumption (4,204 UNHHs)	7.34	Actual consumption
	Zero Readings Assessment	2.17	16% of 4425 zero reading meters assessed to have consumption of 2.61m3/d
	Survey Unmeasured NHH	3.45	5900 NHH props identified and not on corporate systems. Consumption of 263m3/prop/d assumed
	Total (pre-MLE)	28.55	
Illegally Unbilled	Illegal Connections	0.28	Company Estimate
	Hydrant Vandalism	0.89	Company Estimate
	Total (pre-MLE)	1.18	

We found that the assessment of unbilled consumption is broadly consistent with that used for AIR08, although the Company has continued to work to ensure all components of unbilled consumption are identified, which has resulted in a number of additions.

For AIR09, NI Water has included 3.97 Ml/d consumption for water from the distribution system, consumed at NI Water WTW sites (consumption that was previously deducted from the DI); and also 3.45 Ml/d for a number of UNHH properties (circa 4,204) that were identified during a survey completed during the year, that were not on NI Water corporate systems.

NI Water has made significant effort during the year to obtain a better understanding of all unbilled consumption components and has derived a relatively robust list of sources of unbilled consumption. Although there is a level of uncertainty associated with the estimates of unbilled consumption (as is the case with most E&W companies), we do not consider this to be unreasonable for a relatively minor component of the overall leakage assessment.

We confirm however that it is NI Waters intention to ensure as much of the overall leakage assessment as possible is based on measured consumption.

4.3.7 Water Delivered (potable/non potable)

The total volume of potable water delivered is calculated as the sum of all measured and unmeasured consumption (Lines 3 and 6) and the total volume of unbilled water taken (Line 19).

NIW has 28 customers eligible for billing at non-standard rates; however, only 19 of these recorded consumption > 100,000m³ in 2008/09, and thus the 13.9 Ml/d reported in Line 22, reflects the consumption for these 19 customers.

4.3.8 Total Leakage

Total leakage is determined from both the top down (as described above) and bottom up leakage estimates

Bottom up leakage is calculated using a minimum night flow (MNF) methodology. NI Water has an extensive network of DMA's (~1,040 in total) covering 99% of the region, from which MNFs are obtained to assess DMA leakage.

As was the case for the top down leakage calculation, the bottom up methodology has been subject to significant review and improvement.

The estimate of bottom up leakage is derived from night-flows within DMAs, so require an estimate of night-use within the DMA. This is deducted from the night-flow to develop an estimate of leakage. NI Water estimate bottom up leakage on a monthly basis, by taking the 20th percentile of the daily minimum 15 minute flows into the DMA between midnight and 6:00am.

The revised estimate for household night use has been derived using the PCC monitor areas. This interim assessment was based on 12 months of data (July 2007 to July 2008), and has resulted in an increase from 1.7 l/prop/hr to 2.48 l/prop/hr. The revision of the non-household night use is ongoing and will not be fully completed until 2009/10, so the Managing Leakage default value of 8 l/prop/hr has been used for 2008/09.

The AZNP analysis is based on pressure logging undertaken on a sample of pressure managed areas (PMAs) for periods of approximately seven days. The AZNP is taken as the maximum pressure between midnight and 6:00am as this is likely to be coincident with the minimum night flows. As the survey is based on available periods of pressure logging; using these short 7-day periods may make the result susceptible to atypical incidents that would not influence results where continuous pressure logging were available.

The hour:day factor is a critical component for estimating the bottom-up level of leakage. Changes to the hour:day factor have an equivalent impact on the estimate of leakage; a 10% increase in the hour:day factor (from say 20 to 22) will lead to a 10% increase in leakage. Historically NI Water has used an hour:day factor of 20.0, which is

significantly lower than most E&W water companies. Companies with high levels of pressure management, tend to have higher hour:day factors of 23 or higher. NI Water does not have continual pressure logging, so the analysis has relied on short periods (of approximately 7 days) at various points throughout the network. The revised estimate for the hour:day factor was undertaken in a short study undertaken late in 2008/09. Due to time limitation a significant assumption was made for the interim assessment; the height of the AZP point which has been estimated at 30m. Future assessments will use GIS to determine the actual height. It is our view that, recognising the time limitations, the approach used by NI Water makes reasonable use of the available data to provide a company specific assessment of the hour:day factor. The Company is addressing the major weakness for their 2009/10 update to the hour:day factor, by using their GIS system to identify the height of both the pressure logging point and the average zonal pressure point. We recommend that the company investigate the use of continual pressure logging as the current use of short periods of data may be susceptible to atypical pressure patterns. NIW advise that the figure used in the current leakage estimate (22.5) is an interim assessment, since it makes an assumption on the height of the AZP point (30m).

Like many of the E&W water companies the estimate of trunk mains and service reservoir leakage is significantly less robust than distribution leakage. The trunk mains leakage is estimated using the trunk mains length and a default leakage per length of mains per year of age. The leakage per length of mains per year of age was taken from Managing Leakage.

The service reservoir leakage is estimated using total volume of service reservoirs and a default level of losses (expressed as a percentage of service reservoir volume). The default level of losses was derived from Managing Leakage. Leakage from service reservoirs is also based on a default value. Most E&W water companies undertake periodic drop tests to quantify and identify service reservoir leakage. We recommend that NI Water implement a drop test programme as part of their periodic service reservoir maintenance programme.

Trunk mains leakage remains one of the least robust components of leakage for all E&W water companies. A recent UKWIR report presented a range of options; best practice is considered to be the use of metering at both ends of lengths of trunk mains. However, many E&W water companies still rely on simple estimates, similar to that used by NI Water.

We recommend that NI Water investigate other approaches to validate their estimate of trunk mains leakage, using their available meters.

The analysis that is possible on night-lines is very limited, due largely to the current leakage management software. NI Water are currently in the process of updating their

leakage management software to allow more flexibility, although it is also possible this new software will result in further changes to bottom up leakage.

4.3.9 Distribution Input

For AIR09, NI Water has reported a pre-MLE DI of 635.56 Ml/d, some 21.11 Ml/d above the pre- MLE DI reported in AIR08 of 614.45 Ml/d

During the year NI Water undertook a comprehensive review of Distribution Input (DI) across the region. The purpose of the review was to establish the accuracy of the DI figure produced by NI Water and rationalisation of the number of meters used. We undertook a detailed review of the work undertaken by the Company, which we have summarised below.

We found that each resource zone has been reviewed on a systematic basis to ensure the total volume of water entering each of the zones was accurately captured. This process, combined with recently completed capital works improving the connectivity of the network, has enabled NI Water to rationalise the number of sources (typically groundwater sources) and thus DI meters utilised across the region. For AIR09, we found that NI Water has reduced the number of meters used to derive the DI figure for the Company, from 120 to 77. During this process, NI Water validated the accuracy of each meter utilised by completing internal connectivity audits within each zone and calibrating each of the meters

In order to test the appropriateness of the new ‘simplified’ DI network, NI Water undertook a high level analysis of DI using the source outlet meters only and compared this against the figure derived using the existing DI calculation method. The comparison was undertaken on three separate days (13/1/09, 17/1/09 and 26/1/09) and a variance of between 23.8 and 27 Ml/d was identified. As a result of this, NI Water undertook a detailed, meter by meter, source by source, comparison of the two sets of results, which highlighted a variance at Drumaroad WTW (19.2 Ml/d) and Dunore Point WTW (3.4 Ml/d).

In the case of Drumaroad, NI Water has historically measured DI as the aggregation of flows through one outlet meter (Newcastle Flow) and 21 downstream meters. As a result of this, NI Water was not recording DI along approximately 92km of main (predominantly the Aquarius Trunk Main) and included the following Service Reservoirs.

Service Reservoir	TDMS Name	DI as measured on 13/01/2009
Drumahoy	DRUMAHROY_INLET_FLOW_(0-1.5ML/D)	0.946
Ballycullen LL	BALLYCULLEN_OUTLET_FLOW_15	1.196
Ballycullen LL	BALLYCULLEN_OUTLET_FLOW_21	2.505
Ballycullen HL	BC_HL_BALLYHARRY_FLOW	0.504
Ballycullen HL	BC_HL_MOVILLA_FLOW_SIGNAL	2.071
Conlig HL	CONLIG_HLSR_OUTLET_(0-15ML/D)	10.0 (est)

Service Reservoir	TDMS Name	DI as measured on 13/01/2009
Ballyblack	BALLYBLACK_INLET_FLOW(0-1.5ML/D)	0.8
Ballyboghilbo	BALLYBOGHILLBO_INLET(0-4ML/D)	0.868
Glastry	GLASTRY_INLET(0-2ML/D)	0.808
	Total	19.698

We reviewed the results of the balancing audit undertaken at Drumaroad WTW resource zone between 1/2/09 and 31/3/09 and can confirm the reported variance. During the course of the balancing audit, the variance increased by circa 15 ML/d (on 19/2/09) and then by 10 ML/d (on 20/3/09). Subsequent NI Water investigation identified that a bypass had been opened on the New Ards Trunk Main and a surge relief valve failed on the Aquarius Trunk Main near Ballykine Offtake. These were quickly rectified, demonstrating the need for detailed systemic information that can be accessed and analysed.

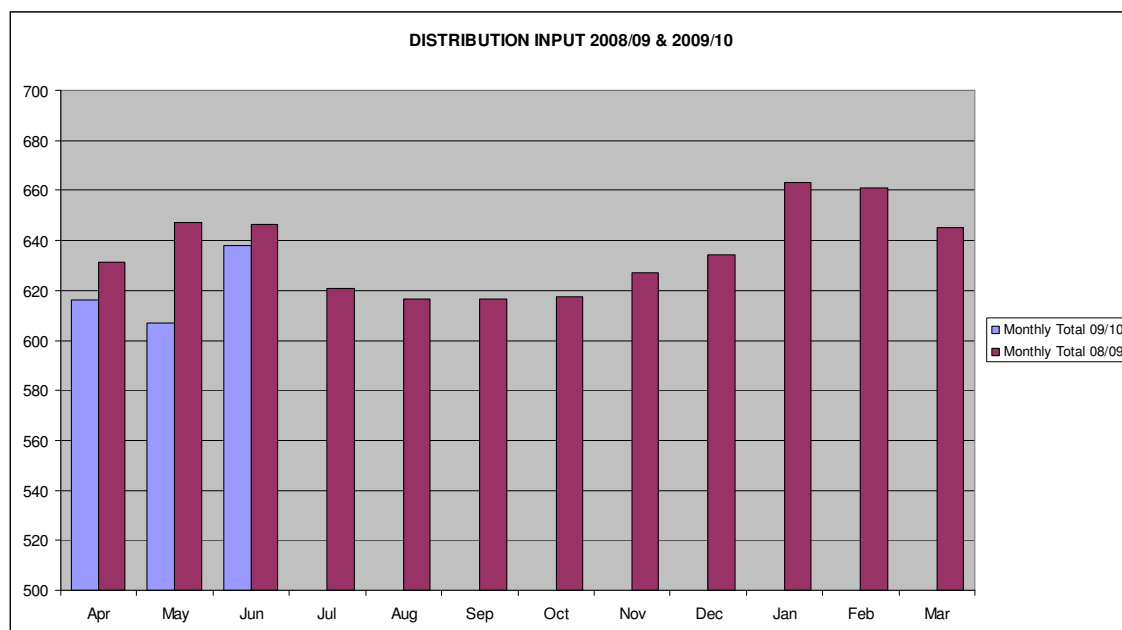
The systemic review of Dunore Point WTW identified that the outlet meters downstream of Dunore Point used to measure DI, were both unsuitable, unreliable and poorly located, facilitating a 3.4 ML/d imbalance. Recent completion of the PPP scheme at Dunore Point has seen new outlet meters installed at the works, which now ensures a close reconciliation of flows between the WTW and Hyde Park SR.

As a result of this review, detailed schematics have now been prepared for the overall region and each resource zone, clearly identifying sources and critical meters used to derive DI. This in itself, is a significant improvement, as this information had not previously been fully captured within the Company.

In addition to the above, NI Water commissioned WRC to undertake a desktop review of the confidence limit for DI meters. This was based on a series of allowances for manufacturer uncertainty, installation effects, meter age, telemetry and faulty meters etc. When applied to each meter in turn and aggregated, an estimated confidence limit of 2.1% was derived, which has been applied to the MLE adjustment.

Whilst this was basically a desk-top, theoretical exercise, the estimate of uncertainty is consistent with the confidence limits applied to DI at other companies in E&W, and is thus considered to be appropriate.

In addition to the above, we also reviewed the DI profile for NI Water for the report year, which highlighted an unusual demand profile. For 2008/09, NI Water appeared to experience a May/June summer peak rather than July/August, as normally expected, which confirms a wetter, cooler summer. In addition to this, NI Water recorded a stepped increase in DI in January 2009.



4.3.10 Bulk Supply Imports/Exports

The small volume of reported exports relate to supplies to 72 individually metered NI Water customers, located in the ROI.

4.3.11 Water Balance by MLE

The Company has estimated total leakage using MNF Analysis and has reported a pre-reconciled total leakage figure of 170.74 Ml/d for AIR09. The integrated flow method as applied by NI Water has produced an imbalance of 30.47 Ml/d, resulting in a final reported leakage figure of 180.92 Ml/d.

As highlighted in Section 4.1 above, NI Water has applied the 'squared' approach for the Maximum Likelihood Estimation (MLE) method, rather than the 'linear' approach previously applied. We note that the 'squared' approach will tend to apply the larger adjustments to the larger more uncertain components. We tested the impact this change in approach had on total leakage, and when compared on a like for like basis, application of the 'linear' approach would result in a circa 2 Ml/d reduction in leakage.

We note that the accuracy estimates applied to individual components used in the MLE have been subject to some change since AIR08, with increased error adjustments to Unmeasured Non-household consumption, Distribution Input (DI) and Bottom Up Leakage.

As highlighted in Section 4.3.8 above, we agree with the 2.1% allowance for DI, which was based on a review of DI meter uncertainty completed during the year, and is consistent with that applied in E&W.

Survey work completed during the year has identified a number of previously unidentified unmeasured non-households, hence the increase in uncertainty of the unmeasured non-household volumes component.

Based on the understanding that industry best practice has been applied to the derivation of bottom up leakage; we challenged the application of an accuracy estimate of $\pm 15\%$, particularly when an accuracy estimate of $\pm 5\%$ was applied for AIR08, and the previous Reporter considered 'a higher accuracy would not be unreasonable'. The Company advised that their assessment of leakage uncertainty was based on:

- The limitations of the current leakage management software
- The fact that current MNF methodology applied in NI Water is not best practice and limited by current leakage software
- That the HH night use figure is an interim value and requires updating.
- That the NHH night use is based on a single default figure and is to be replaced with a night use model.
- That there was an issue with the DMA naming conventions that may have influenced the accuracy of the area's attribute data such as property counts and mains length.
- There are limited validity checks made on the leakage values produced, and
- The level of meter data available to inform the analysis

As such, we agree that an accuracy estimate of $\pm 15\%$ to be appropriate for AIR09, with an expectation that this will be reduced to $\pm 10\%$ in the near future, when systems are further improved.

4.4 Security of Supply Index

Security of supply index – company's planned levels of service

The SOSI is a calculated column. We confirm that this calculation is correct and is consistent with that reported in Column 14 of Table 10a(i).

We identified that the changes to the parameters of the SOSI calculations, at Company level since AIR08, have resulted in a significant improvement in SOSI from -26 (AIR08) to 45 (AIR09) for the dry year average planned Levels of Service (LoS) conditions. Changes primarily result from completion of the PPP activity. This extensive activity has involved water resource schemes and has increased the WAFU in several of the WRZs.

The WAFU is largely consistent with the WRS, except for the Bradan WRZ. The Company informed us that this is related to a change in the Strule scheme. To restore the deficit in this zone there was an increase in abstraction from the Strule in 2008-09, followed by a need for Glendorgan Dam. NI Water has negotiated an additional abstraction amount from the Strule which will defer Glendorgan Dam. The WAFU will be achieved in 2010, representing a delay of between 18 months and two years due to discussion over the licence agreement with the Environment Agency.

We are satisfied that the Company has followed the NIAUR guidelines for the preparation of this index for the planned levels of service for average demand in a dry year.

Security of supply index – reference levels of service

As discussed in our reporting for Table 10a(ii), the Company has not calculated SOSI for its reference levels of service and these are identical to the Table 10a(i) annual average data entries. These would be expected to be different when the Company's planned Levels of Service (LoS) frequency statements are compared with the Reference LoS definitions. The Company reports in its commentary that there has been no separate assessment for a reference level of service and this will be addressed in the new water resource management plan.

We therefore confirm that the value given here is consistent with that reported in Column 14 of Table 10a(ii).

5. Confidence Grades

NI Water reported a confidence grade of B4 for unmeasured non-household PPC. This is in line with NIAUR's guidance for a B, because the reported figure was based on the consumption of comparable measured non-household properties. Due to the uncertainty over the numbers of unmeasured non-households (UNHH) within the province (highlighted by the recent survey results), we believe an accuracy band of 4 to be appropriate. However, we believe that identification of all UNHH during the current year and the correct application of MUR and SPL should help to further improve the accuracy of this data from a 4 to a 3.

For unmeasured household PCC, NI Water has reported a confidence grade of B3. This conforms to NIAUR's definition for PCC reliability, grade B, as an area monitor of 115 dead-end sites are utilised and the monitor does not fully comply with the UKWIR report "Best Practice for unmeasured PCC monitors" 1999.

For AIR09, NI Water has reported a confidence grade of B4 for Total Leakage. We confirm that the Company estimate leakage using the Minimum Night Flow Method, using night line data that is estimated with Continual Night Flow Monitoring covering over 60% of properties, recorded in excess of 20 times a year, which supports a B confidence grade. Due to the MLE adjustment of 15% applied to bottom up leakage, NI Water has assumed a 4 accuracy band.

NI Water has assigned a confidence grade of B2 for Distribution Input. This is consistent with the Company's assessment of the MLE where the water balance reconciled to within 5% of Distribution Input.

NI Water has reported a confidence grade of B3 for the overall water balance, which is not consistent with a water balance, where the components have been reconciled to within 5% of measured Distribution Input. However, NI Water believes that as the water balance is still subject to further review during the current year, a B3 would be prudent.

Date: 10 August 2009

Table 10a – Non financial measures – Security of Supply Index**Commentary by REPORTER****1. Background**

Table 10a calculates the security of supply index for the company planned and reference levels of service for average demand in a dry year.

2. Key Findings

- We identified that the changes to the parameters of the SOSI calculations, at Company level since AIR08, have resulted in a significant improvement in SOSI from -26 (AIR08) to 45 (AIR09) for the dry year average planned Levels of Service (LoS) conditions. Changes primarily result from completion of the PPP activity. This extensive activity has involved water resource schemes and has increased the WAFU in several of the WRZs.
- The Company has completed the Security of Supply Index using data from the Water Resources Plan prepared in 2002. Commentary on individual column entries is given below. The Company carried out a review of the water resource plan in 2007 and any changes to WAFU identified in the update have been incorporated into the Security of Supply Index calculation.
- The Company is preparing to undertake a major update of its Water Resource Plan for 2009-10 and therefore in completing this return it has relied on key data from the Water Resource Plan prepared by Northern Ireland Water Service in 2002 with current distribution input figures.
- We consider that the critical period conditions may be an important driver for the Company's water resource planning and therefore suggest that the Company considers this in its preparation of the WRMP. Critical period conditions could relate to increased leakage in winter and summer, as well as peaks in tourist activity.
- The WAFU is largely consistent with the WRS, except for the Bradan WRZ. The Company informed us that this is related to a change in the Strule scheme. To restore the deficit in this zone there was an increase in abstraction from the Strule in 2008-09, followed by a need for Glendorgan Dam. NI Water is in the final stages of negotiating an additional abstraction amount from the Strule which will defer Glendorgan Dam. The WAFU is now programmed to be achieved in 2010, representing a delay of between 18 months and two years due to discussion over the licence agreement with the Northern Ireland Environment Agency.
- We note a slight decrease from last year in the Company's Zonal Population estimate from AIR08 (380). This is related to an error in the 2007-08 numbers. We note that the Zonal Population reported in Table 10a(i) is estimated using mid-year population data from NI Statistics. Zonal population in Table 7 represents the population estimate to the end of September instead. We recommend that following completion of the Company's WRMP consistent data

is used between the tables.

3. Audit Approach

The audit consisted of an interview with the NI Water system holder to discuss the methodology and data that has been used to populate this table as well as plans for improving the data in future years.

4. Audit Findings

- We confirm that the Company has submitted out-turn data reporting on Security of Supply for the (i) Planned Level of Service and (ii) Reference Level of Service for the 2008-09 reporting period. The Company does not report a Critical Period level of service.
- We observed that, as for AIR08, Table 10a(ii) submissions are identical to the Table 10a(i) annual average data entries. These would be expected to be different when the Company's planned Levels of Service (LoS) frequency statements are compared with the Reference LoS definitions. The Company reports in its commentary that there has been no separate assessment for a reference level of service and this will be addressed in the new water resource management plan.
- We note that there has been no change in approach from AIR08 in the Company's calculation of SOSI for the dry year demand (Table 10a (i)-planned levels of service) and data has been updated based on the current year.

4.1 General

The Company's recent focus has been on developing its WRMP and therefore for AIR09 the methodology remains unchanged from AIR08 and the data is of similar quality.

We identified that the significant changes to the parameters of the SOSI calculations, at Company level, since AIR08 may be summarised as follows:

- Column 2 – an increase in WAFU of 15.96 Ml/d.
- Column 5 – increase in the dry year distribution input of 20.65 Ml/d.
- Column 6 – increase in the reporting year distribution input of 18.51 Ml/d.
- Column 8 – an increase in target headroom of 2.11 Ml/d.
- Column 11 – a decrease in population of 380.

We identified that the changes to the parameters of the SOSI calculations, at Company level since AIR08, have resulted in a significant improvement in SOSI from -26 (AIR08) to 45 (AIR09) for the dry year average planned Levels of Service (LoS) conditions.

Our detailed commentaries on the Company's submissions are given in the following sections, for Table 10a (i). As Table 10a (ii) contains identical entries we do not provide line by line commentary.

5. Company Methodology

Column 1 – Water Resource Zone (Text)

We have checked that the zonal names of water resource zones (WRZs) used in the reporting year are consistent with the Company's AIR08 submissions.

Column 2 – Water Available For Use (WAFU) (Ml/d)

Through our audits, we checked the differences between WAFU in this Reporting Year, AIR08 and the Company's WRS forecast as highlighted in the table below. Positive difference values indicate an increase in WAFU from 2007-08.

Water Resource Zone	Reporting Year (Actual 2008-09) (Ml/d)	AIR08 Actual for 2007-08 (Ml/d)	Difference (Ml/d)
Ballinrees	25.90	24.30	+1.60
Altnahinch	17.83	15.54	+2.29
Ballymena	26.65	25.40	+1.25
Antrim/Larne	36.20	32.90	+3.30
Magherafelt	29.90	28.60	+1.30
Dungannon	5.80	3.90	+1.90
Craigavon	77.60	65.60	+12.00
Newry	54.50	51.40	+3.10
Lough Ross	7.50	6.60	+0.90
Armagh	22.80	20.40	+2.40
Eastern General / Greater Belfast	313.50	341.88	-28.38
Lough Cowey	3.70	3.70	0.00
Faughan	59.80	45.50	+14.30
Bradan	31.00	31.00	0.00
Killyhevlin	35.80	35.80	0.00
Total	748.48	732.52	+15.96

The Reporter notes that there is an increase in WAFU of 15.96 Ml/d between AIR08 and AIR09. These increases are related to resource development: source realisation or extension of existing schemes. There are increases in all WRZs except for Eastern General / Greater Belfast, Lough Cowey, Bradan and Killyhevlin. The WAFU has decreased in the Eastern General / Greater Belfast WRZ. This is consistent with the WRS. For the other WRZs there has been no change to WAFU.

The WAFU is largely consistent with the WRS, except for the Bradan WRZ, where WAFU has not increased as predicted. We discussed this with the Company at our audit and the reason for this is due to a change in the Strule scheme. During planning for the

2007 submission, the Company assumed a particular level of abstraction from the Strule resource, coming online in 2008-09. This was to be followed by the Glendergan Dam in 2015. NI Water is in the final stages of negotiating an additional abstraction amount from the Strule which will defer the need for Glendergan Dam. The delay in this scheme therefore is related to discussion over the licence agreement with the Northern Ireland Environment Agency.

Column 3 – Bulk Imports (Ml/d) and Column 4 – Bulk Exports (Ml/d)

The Company reports no imports or exports. This is consistent with the WRS.

Column 5 – Dry Year Distribution Input (Ml/d)

The Company's dry year average distribution input (DI) is 20.65 Ml/d higher than its AIR08 estimate at the Company level. The Company has calculated its dry year DI from the reporting year DI and the dry year distribution input adjustment factor. Detailed calculations were carried out as part of the WRS in 2002 to derive these factors using the actual data for each WRZ. We confirm that the adjustment is consistent with the factors given in the WRS (2007).

Column 6 – Reporting Year Distribution Input (Ml/d)

We note that the Company reports that its Reporting Year distribution input (DI) is 18.51 Ml/d higher than its AIR08 estimate at the Company level.

We checked the Company's data and the reported difference between the Company wide JR08 and JR09 numbers is summarised in the table below as on a WRZ basis. Positive numbers show an increase and negative numbers indicate a decrease.

Water Resource Zone	Reporting Year (Actual 2008-09) (Ml/d)	AIR08 Actual for 2007-08 (Ml/d)	Difference (Ml/d)
Ballinrees	17.55	18.69	-1.14
Altnahinch	13.64	13.35	+0.29
Ballymena	24.22	24.67	-0.45
Antrim/Larne	30.23	30.36	-0.13
Magherafelt	26.59	26.36	+0.23
Dungannon	5.19	5.25	-0.06
Craigavon	72.37	68.52	+3.85
Newry	45.77	45.63	+0.14
Lough Ross	6.41	6.01	+0.40
Armagh	18.26	16.99	+1.27
Eastern General /Greater Belfast	262.22	249.78	+12.44
Lough Cowey	3.10	2.25	+0.85

Water Resource Zone	Reporting Year (Actual 2008-09) (Ml/d)	AIR08 Actual for 2007-08 (Ml/d)	Difference (Ml/d)
Faughan	44.86	46.59	-1.73
Bradán	37.07	35.52	+1.55
Killyhevlin	25.57	24.58	+0.99
Total	633.05	614.54	+18.51

The Company's methodology for measuring DI has been discussed as part of our audits on table 10.

Column 7 – Dry Year Available Headroom (Ml/d)

Dry Year Available Headroom is a calculated column. We have confirmed that the correct formulas have been used within the Table 10a(i) to calculate this.

Column 8 –Target Headroom (Ml/d)

The Company reported that Target Headroom values used in Table 10a are consistent with the method used in its WRS submission. The Company calculated target headroom using the UKWIR methodology (98/WR/13/1) in 2002 which gave target headroom of 5.7% of WAFU in 1999-00 and 12.1% of WAFU in 2029-30. A value of 7.62% is used for 2008-09 and we have checked this interpolation and these calculations.

Column 9 –Surplus/Deficit (Ml/d)

Surplus/Deficit is a calculated column. We have confirmed that the correct formulas have been used within Table 10a(i) to calculate the Surplus/Deficit.

Column 10 – Percentage Deficit (%)

Percentage Deficit is a calculated column. During our checking procedure, we have confirmed that the calculations are correct.

Column 11 – Zonal Population (000)

We note a slight decrease from last year in the Company's Zonal Population estimate from AIR08 (380). We queried this with the Company at our audit. These numbers were used last year in error. The Zonal Population reported in Table 10a(i) is estimated using mid-year population data from NI Statistics. The zonal population is not consistent with that reported in Table 7 as it uses population to the end of September instead. We recommend that following completion of the Company's WRMP consistent data is used between the tables. Details of our assessment of the Zonal Population calculations are given in our commentary for Table 7.

Column 12 – Percentage of Total Population with Headroom Deficit (%)

Percentage of Total Population with Headroom Deficit is a calculated column. We have confirmed that the correct formula has been used by the Company to calculate the Percentage of Total Population with Headroom Deficit.

Column 13 – Zonal Index (nr)

Zonal Index is a calculated column. During our checking procedure, we have confirmed that the calculations are correct.

Column 14 – Security of Supply Index (nr)

The SOSI is a calculated column. We confirm that this calculation is correct. We have also confirmed that the SOSI is consistent with that reported in Line 31 of Table 10.

We identified that the changes to the parameters of the SOSI calculations, at Company level since AIR08, have resulted in a significant improvement in SOSI from -26 (AIR08) to 45 (AIR09) for the dry year average planned Levels of Service (LoS) conditions. Changes primarily result from completion of the PPP activity. This extensive activity has involved water resource schemes and has increased the WAFU in several of the WRZs.

We are satisfied that the Company has followed the NIAUR guidelines for the preparation of this index for the planned levels of service for average demand in a dry year.

6. Assumptions

The Company's assumptions are consistent with those made in the AIR08 and WRS.

7. Confidence Grades

Confidence grades are not required for Table 10a.

8. Consistency Checks

We have checked for consistency with tables 7 and 10.

Date: 10 August 2009

Table 11 – Water Service Activities**Commentary by REPORTER****1. Background**

Network activities provide a good measure of work achieved provided they can be related to associated investment. The investment breakdown included in these reporting requirements provide this linkage, with the separation of base service expenditure from that related to enhancements in table 35.

2. Key Issues

- Significant difference between the sum of new, renewed and abandoned mains and the actual amount being reported from GIS.
- Following our recommendations, an adjustment factor has been applied to Line 7 to ensure continuity within table.
- Recommendation to amend the categorisation and reporting of new mains and the assigned balance between new and renewed mains.
- Some concerns regarding the collation of field data and in particular the Company's ability to correctly categorise and accurately report on mains bursts and material of communication pipes, although we acknowledge possible resolution through recent system improvements.
- Reported improvements to internal systems, in particular the transfer from the Leakage Activities Database (LAD) to the new Mobile Work Management system (MWM).
- Some disruption evident as a result of changes to internal systems and working structures.
- Significant improvements in the coverage of zonal study models.
- Recommendation for more centralised coordination of table and more detailed and unified methodologies to improve explanations and overall consistency.

3. Audit Approach

Our audit consisted of interviews with the relevant NI Water and PPP system holders, a review of the Company methodology, the commentary and the table entries. Table entries were reviewed for consistency with previously audited data and supporting data was audited for accuracy. Confidence grades were reviewed to ensure compatibility with the methodologies used.

4. Audit Findings

Due to the breakdown of Table 11 into multiple sub-tables and sub-headings, there are a large number of data fields which are populated and maintained by several different system holders. During our audit, we held separate direct and telephone interviews with a

total of 5 system holders, all with responsibility for a discrete area of contribution. Not only did this make the audit process more onerous, but we feel that the system would also benefit from stronger central coordination to collate and cross-check the data from the various sources. This relatively detached approach is also evident in the methodologies which are currently presented as a set of individual documents and we feel that similar improvements could be made by unifying these documents. The methodologies are discussed in greater detail in Section 5.

4.1 Asset Balance at 1 April (Line 1)

- **NI Water Inputs**

This figure has been correctly carried forward from the closing balance of last year's report.

- **PPP Inputs**

There are no PPP inputs into this line.

- **Total**

The total is the correct summation of the NI Water and PPP inputs.

4.2 Main renewal, relining and cleaning (Lines 2-6)

- **NI Water Inputs**

The NI Water inputs comprise input data from both Engineering and Procurement (E&P) and Network Operations. Our initial review of the line totals highlighted some concerns with the large lengths of new mains and relatively low figures reported by Network Operations. We also noted a large discrepancy (-110.4km) between the net total for lines 2, 6 and 7 and the relative increase in total main length between lines 1 and 12.

Specifically, the Company has reported 289km in for mains renewals (Line 2) this year, of which 287km were renewed under the water quality programme and 1.5km by Network Operations under maintenance programmes. There was no renewal of any length of trunk mains.

As applied by other companies, slip-lining is generally considered to replace the existing main and therefore the majority of slip-lined mains are categorised as renewals and hence included within Line 2. Where a lining is applied to the fabric of the existing pipe it is reported on Line 3. Historically, however, the Company has not employed this method and hence the Line 3 totals are zero.

The reported length of new mains (Line 6) installed this year has increased significantly from last year, with the Company reporting 354km of new mains installed within the Report Year. Our investigations identified that this figure included 7.3km of new trunk mains, but did not include any mains acquisitions. NI Water confirmed that mains for housing developments are typically laid directly by NI Water and therefore that the

acquisitions of private mains does not occur. Our checks on the source data provided by Network Operations indicated that 33.5km of mains were laid by NI Water for new housing developments during the report year. When queried, NI Water confirmed that these mains are considered capital works and hence not reported under Network Operations. However, further questioning confirmed that this length is not included in the E&P total either and hence not included within the line total. Given the apparent availability of this data, it is not clear why the Company have elected not to include this length in the line totals.

Engineering & Procurement (E&P) provided a breakdown summary of their input data by zonal area which we reviewed with the Company. We subsequently requested and were provided with detailed field data to support the reporting of four areas (Castor Bay Moira (New Trunk Main), Fofanny Banbridge, Cookstown and North Tyrone) which we selected for sample. In general, we found the records from the site teams supported the values reported in the table and commentary. However, our review of this data highlighted a number of significant concerns regarding the accuracy and methodologies which we subsequently raised with NI Water. NI Water duly responded to our queries which we have taken into consideration. Our resulting conclusions and recommendations are summarised in the following paragraphs.

Our main concern relates to the reporting of new and renewed mains in lines 2 and 6. Our audit confirmed that NI Water currently include the following categories under the different line totals:

- a) Line 2 - Mains Renewal includes:
 - Renewals by pipe-sleeving
 - Renewals by slip-lining
 - Replacement by like for like pipe bursting
 - Replacement by upsized pipe bursting
- b) Line 6 - New Mains includes:
 - New Mains (any installation method)
 - Off-line replacement of existing main by open-cut
 - Off-line replacement of existing main by directional drill
 - Replacement by upsized pipe bursting
- c) Line 7 - Abandoned Mains includes:
 - All categories except new mains.

NI Water advised that they report on this basis as this had been agreed with the Regulator last year and hence it is consistent with last year's approach. Whilst we confirm that the Company has followed the agreed approach, we believe that this interpretation of the reporting guidelines results in the double counting of mains being replaced by upsized pipe bursting and is distorting the proportions of mains being reported as new and renewed. The guidelines are specific in stating that mains renewals should only be considered a

length of new main where the “*prime justification is the requirement for additional capacity*”. We therefore strongly recommend that, except where the Company can demonstrate a replacement main driven by the need for additional hydraulic capacity, lengths contributing to Line 6 (new mains) should exclude all replacement main and pipe bursting operations which should be reported in Line 2 under mains renewals.

Data provided by the Company indicates that a total 116.95km length of mains is categorised as having been upsized by pipe bursting and is hence currently being counted in both Line 2 and Line 6. This is a very significant proportion of the line totals and in effect changes the net change in total mains length being reported by the sum of Lines 2, 6 and 7 (excluding the adjustment factor) from +169.3km to +52.3km.

For the purposes of this reporting year, NI Water have maintained their current approach to categorising mains. However, they informed us that they would be happy to amend their reporting if deemed more appropriate and hence we would ask the Regulator to review and consider our recommendations and provide clarification to the Company in due course.

Our checks on the breakdown for Castor Bay identified an error with the mis-categorisation of 260m of 25mm service pipes which had been incorrectly entered as the same length of 125mm distribution main. The Company acknowledged the mistake (which they advise was caused by an incorrect code on the Contractor’s report), but are confident that their internal checking procedures would have identified and corrected the error on relevant project completion. However, the issue highlights the reliance of the system on the supply of complete and accurate reports from contractors and field teams. Of the samples analysed, we found the field reports to have typically been completed well and the data transferred correctly. However, we noted that the report format (and to a lesser extent the level of detail) varied significantly between contractors possibly allowing greater scope for misinterpretation of data. Whilst we believe that the Company now have a reasonably robust and well structured system in place in the form of the Mobile Work Management system (MWM), we would encourage them to continue to improve data collation in the field to ensure data capture is sufficient and consistent. In particular, we understand that whilst a coding system is in place to differentiate between categories, it currently doesn’t clarify mains replaced for quality from those replaced for maintenance reasons. We are also aware of similar limitations in the breakdown of communication pipes by material (refer to Section 4.4 for full details).

Mains cleaning (Lines 4 & 5) is all undertaken by Network Operations and hence the E&P figure is zero. We asked for evidence of the cleaning programme and were provided with a monthly summary of cleaning activities from the Mobile Work Management system. We can confirm that the numbers support the line totals.

As NI Water only record the number of cleaning events and have no current system of recording or measuring the actual extent of any individual flushing event, they continue to log cleaning by number of events. However, in order to report against the required units, they have calculated and applied a conversion factor of 0.156 to provide a length of mains

flushed. This has caused an apparent reduction in Line 4 from last year. In fact, this year's figure of 1925.35km represents an actual increase to 12,342 discrete cleaning events. A further 96.4km of mains were reported as cleaned under quality programmes. The Company attribute the significant increase in reported mains cleaning since 2007 to improvements in reporting rather than any directly related increase in cleaning activity.

We queried the application of the 0.156 figure with NI Water and reviewed the defined line methodology with the Company. Whilst heavily reliant on assumed flushing volumes and pipe sizes, we consider it a logical and reasonable approach to enable them to report on total length as required, particularly given the tolerances allowed by the applied B4 confidence grade.

In previous years, the Company did not record a breakdown of cleaning by driver and hence the Line 5 total was reported as zero. The increase to Line 5 is therefore a reflection of improved reporting systems rather than any direct increase in cleaning for quality activity.

- **PPP Inputs**

PPP only have inputs in Line 6 relating to 16.42km of new 600mm diameter trunk main laid from Castor Bay to Forked Bridge. As explained in their commentary, the main was installed as a value-engineered option under the 'Alpha projects' scheme to avoid an initially proposed separate treatment works at Forked Bridge. We confirmed the reported length against as-built drawings of the main. We also challenged how the main is kept discrete from NI Water-owned assets to avoid double counting and asked for evidence on the GIS system. We can confirm that the main has been correctly input into the GIS system and is identified as owned by PPP.

We noted the start date of the project on site was 2006 and hence sections had been built in previous years. PPP confirmed that the main was not commissioned until 16/12/08 and that no sub-lengths had been reported in previous years.

PPP advised that 2 other mains were built by PPP (Ballymoney Link Main and Limavadey Link Main), but these were transferred on completion to NI Water ownership and are hence included within the NI Water total.

- **Total**

The totals for lines 2-6 were confirmed as the correct summation of the NI Water and PPP inputs.

4.3 Mains abandoned and other changes (Line 7)

- **NI Water Inputs**

The NI Water inputs comprise input data from both E&P and Network Operations. The Company has reported a total of 471km of abandoned mains this year, of which all except 1.5km are reported by E&P under the mains rehabilitation programme. It was not

clear from data provided by NI Water how much of this length was wholly abandoned and how much was through the process of renewal.

As discussed in Section 4.2, we reviewed the summary breakdown and a sample of detailed field data supporting the line total. Our findings concluded that the lengths of abandoned mains have been correctly determined and are in accordance with the Reporting Requirements. The total includes mains replaced by slip-lining as per the Line 2 definition.

Following our recommendations, NI Water subsequently applied an adjustment factor to Line 7 (and specifically stated the figure in Line 7c) to ensure the calculation of Line 12 matches the total length extracted from GIS systems. In our view, this not only ensures continuity within the table, but also provides a valuable check on the reported lengths between the project and GIS systems which can also be used as a guide to indicate the relative divergence of the two systems.

It is to be expected that some adjustment factor will always be necessary as some delay in transferral of data between the systems is inevitable. This year, the discrepancy between the calculated (from Lines 1, 2, 6 & 7) and the measured total (from GIS) is -110.4km. However, based on our conclusions on the reporting of lines 2 and 6, we believe this figure is actually nearer -227.4km. We note that the apparent exclusion of 33.5km of new mains for housing developments will have contributed to this total. However, it remains significantly greater than that which we would typically expect from data transfer delays alone and results in the total number of abandoned mains in Line 7 being reported as 361km rather than the 471km combined total of actual recorded changes.

We discussed the relative difference with NI Water who acknowledged that whilst there did not appear to be any single or over-riding explanation for the apparently large discrepancy, some proportion was likely to be attributable to changes in lengths following internal reconciliation of as-built data records.

Ultimately though, the recorded discrepancy is derived from comparison with last year's value from GIS, and hence is heavily reliant on a having an accurate and established baseline for comparative purposes. Due to the significant changes and improvements in the Company's data records and reporting methods in recent times, we are of the opinion that the discrepancy may well be more indicative of a 'settling down' period in the Company's systems rather than any specific omission of data. However, we are wary of the potential implications of this figure, in particular in relation to data capture, and hence we recommend that this is re-assessed next year in light of these comments.

- **PPP Inputs**

There are no PPP inputs into this line.

- **Total**

The total is the correct summation of the NI Water and PPP inputs.

4.4 Communication pipes (Lines 8-10)

- **NI Water Inputs**

NI Water do not currently have a strategic lead replacement programme and old communication pipes (lead or otherwise) are replaced on an opportunistic basis when encountered through other capital or maintenance works.

The NI Water inputs comprise input data from both E&P and Network Operations. The Company report a total number of lead communication pipes replaced during the year of 553 of which 168 were for quality reasons and 385 for maintenance. This is the first year that the Company has differentiated between quality and maintenance. This compares with 8801 non-lead communication pipes being replaced within the same period.

The summary breakdown and detailed field data provided by E&P included information on numbers of communication pipes and we discussed this with the Company. The numbers indicated that the 284 communication pipes reported by E&P all originated from the South East area, with no lead communication pipes being reported within any other area. The Company pointed out that lead is not as common in communication pipes as on mainland UK and therefore higher numbers of other pipe materials are expected. However, they agreed that it was unlikely that no lead pipes would have been encountered, particularly in areas around Belfast and Omagh, and hence accepted that some proportion of the other materials should be categorised as lead.

Our findings were supported by our subsequent review of the detailed field reports which, whilst containing comprehensive data on the new communication pipes installed, lacked the data necessary to identify the replaced material. It is therefore likely that pipes are being categorised as 'other' by default and hence skewing the Line 9 total.

We therefore recommend that the Company consider improving field data records to enable more direct categorising of the replaced material.

The totals are largely in line with last years totals and are considered a reasonable representation of the numbers encountered and replaced through its capital and maintenance works.

- **PPP Inputs**

There are no PPP inputs into this line.

- **Total**

The total is the correct summation of the NI Water and PPP inputs.

4.5 Mains bursts per 1000km (Line 11)

- **NI Water Inputs**

There has been little change in the reported numbers of mains bursts per 1000km this year, increasing slightly from 139 to 141 bursts per 1000km. As explained in the Company's commentary, this figure is derived from the total number of recorded burst events, divided by the total length of mains. The calculation applies a total length of 26,625km which is greater than that reported in Line 12 as it includes 276km of compensatory mains. The number of bursts is calculated directly from data compiled and reported by field managers within the Leakage Section and Networks Water.

We interviewed Company representatives from both the Leakage Section and Networks Water and requested breakdown data to support the figures. Last year, the Auditor focussed on the reporting by Networks Water. This year, we therefore focussed our attentions on the Leakage Section and requested a detailed breakdown from them of a single area by individual burst event to enable checks against the raw data.

NI Water informed us that they had undergone further system changes this year, transferring source data from their Leakage Activities Database (LAD) to the new Mobile Works Management system (MWM) in February 2009. The majority of the data reported by the Leakage Section is therefore from LAD, but is supplemented by data from MWM for the last two months.

The area summary data provided by Networks Water supported the total 2,288 number of reported burst mains repairs. However, our analysis of the data provided Leakage Section identified some concerns with the collation and reporting of mains bursts.

Primarily, we believe that the data in Line 11 is based on the number of 'reported mains burst' events rather than the number of actual 'mains bursts repairs'. Whilst this figure would normally be expected to be very similar, the data for the South and East regions differs significantly with the number of mains repairs equalling only 48% of the number of reported mains bursts. The respective proportion of mains being repaired to mains being reported for the North and West areas was 99%. This has two potential implications. Firstly, it may be significantly over-counting the number of actual burst mains repairs being carried out (our calculations suggest 1,071 compared to the reported 1,476); and secondly, it implies that the reporting of mains bursts between areas is not consistent.

We also found apparent additional duplication in a significant number of individual burst records. We believe that this problem stems from the fact that work orders can be entered independently into the LAD system by either Network Operations or a repair contractor without any strict control. Hence, a burst can be reported by one party when first identified and then again by a second when repaired under a different reference number. Crucially, we observed some entries with written comments suggesting that the identified burst was to be repaired later by a contractor, but the log is still categorised as a mains repair. The actual repair by the contractor is then also logged and counted as a mains repair.

Our principal concern therefore relates to the reporting and logging of data at field level and whether it is sufficiently robust to enable the accurate categorisation of events. For the North area, we noted that only 2 of the 308 logs were actually categorised as 'detection'. However, we were aware that the vast majority of the analysed data originates from the LAD system and that significant improvements may already have been made in the recently adopted MWM system. We therefore discussed these findings with the Company and to assess the validity of our concerns and to what extent they have been resolved by the new MWM system.

NI Water advised that the significant discrepancy between the reported and repaired figures in the South and East areas relates to known problems with the closing out of work orders in LAD rather than any significant duplication of records. Specifically, we understand that the LAD system was initially successfully adopted in the North area and recently rolled out to the other areas. However, its adoption had not been as successful and operatives in the South and East areas were often failing to close out work orders. For this reason, NI Water admitted that they currently report on the basis of number of reported bursts, rather than actual repairs. However, NI Water confirmed that this has now largely been resolved through the adoption of MWM which controls work order entries and enforces work order closure by applying financial penalties.

With regards the potential duplication of mains, the Company admitted that the flagged entries looked unusual, but advised that some are likely to represent multiple burst repair jobs, particularly as the contractors are paid per repair and hence in effect incentivised to report related burst defects as multiple burst repairs. As above, the Company believes that this problem has been substantially resolved by the transfer to MWM, whereby work orders are raised and controlled by a NIW field operative rather than the contractors themselves. By limiting contractors to only update and close out work orders, this reduces the potential for duplicated logs.

We are therefore satisfied that the Company has taken sufficient action to rectify these problems. However, we recommend that a further review of the data from MWM is undertaken next year to confirm resolution of these issues.

The summary reports appeared to be a correct summation of the data obtained from LAD and MWM and have been correctly transferred to the line totals.

- **PPP Inputs**

There are no PPP inputs into this line.

- **Total**

The total is the correct summation of the NI Water and PPP inputs.

4.6 Asset Balance at 31 March (Line 12)

- **NI Water Inputs**

The total length of mains has increased by 282km this year to 26,349km. This figure has been taken directly from a query of its GIS system on 31/03/09. NI Water confirmed that this length excludes raw water, private mains, non-potable mains and all small diameter service pipes. Checks against GIS confirmed that approximately 276km of private, raw water and non-potable mains were excluded.

The total is supported by the direct calculation of mains changes in Lines 1, 2, 6 & 7 which includes the newly applied adjustment factor of 110.4km in Line 7. The net total increase from recorded changes in mains lengths is 171.8km.

- **PPP Inputs**

PPP report 16.42km of new main which relates directly to the new Castor Bay to Forked Bridge trunk main.

- **Total**

The total is the correct summation of the NI Water and PPP inputs and concurs with the numbers reported in Table 12.

4.7 Distribution Studies (Lines 13-17)

- **NI Water Inputs**

NI Water started zonal model development in 1999 leading to the adoption of a distribution zonal study programme in 2001. The Company aim to set up models to cover all 71 water supply zones and currently predict completion by 2011. NI Water report a cumulative total of 46 distribution zone studies completed since the start of the programme with a further 19 studies ongoing. This represents a significant improvement from last year and increases the percentage population coverage to 61%. The Company provide a full breakdown of the data in their commentary (although slightly different from the recommended table layout) and our audit confirmed the entries for lines 13-15 appear to be an accurate reflection of their current position. The percentages in lines 16-17 have been correctly calculated based on numbers of properties and population extracted from their POINTER database.

We questioned the definitions of a zonal study and its completion date to assess whether they qualify under the line definitions. NI Water advised that the studies are divided into three phases; a needs phase, an options phase and a solutions phase. The completion of each zonal study therefore includes the completion of the physical network model, as well as analysis and production of a needs report to identify possible problems on the network. This is then assessed by NI Water staff at options phase for cost implications and used to create a programme of works. Solutions are then presented and passed onto design consultants for action. Models are re-visited and updated after completion of the related works (which can be several years later once all planned works have been

completed). These updates are then checked and verified against field survey data in the affected locations. This concurs with the line definitions and hence validates their inclusion in the line totals.

NI Water admitted that many models have not been re-analysed since first completion and hence several studies are now over 5 years old. However, we were informed that NI Water are prioritising the completion of zonal studies for the currently un-modelled zones, but plan to re-visit all models once all zones have been completed (probably in 2011). It is anticipated that this will be done on a priority basis based on a review of operational reports and customer complaints.

Currently, the construction and management of all models is undertaken by sub-consultants. NI Water confirmed that they provide strict guidelines for the development and operation of models to ensure consistency between sub-consultants. However, they admit that some staffing issues have led to prioritisation of key models and inevitable delay of a small number of models (eg Moyola, Castor Bay Shanmoy, Ballintemple).

We asked what impact the PPP Castor Bay to Forked Bridge main has had on the completion of models and were advised that it has been a further reason for the delay in completion of the models at Castor Bay Shanmoy, Altmore/Gortlenaghan, Ballintemple and Lough Ross.

No consolidation of zones has occurred this year, although NI Water expected some consolidation of zones to occur in the future.

- **PPP Inputs**

There are no PPP inputs into this line.

- **Total**

The total is the correct summation of the NI Water and PPP inputs.

4.8 Water Service Activities (Lines 18-27)

There are no current requirements for NI Water to report in this area.

5. Company Methodology

The majority of information in lines 2-10 is based on data extracted from the Company's centralised project database system entitled 'Captrax'. The database is a working record of all active capital works projects and is updated regularly with project information obtained directly from the relevant team. During the report year, this comprised of forms being submitted via email to the relevant NI Water project manager for review and approval before update of the database. From April 2009, we were advised that the system has now been improved to enable direct remote access to update forms via an

external portal. This form is then submitted via the web to the relevant project manager for check and approval.

As part of our audit we viewed Captrax and checked the operation and output of queries. We can confirm that the database appeared robust and appeared to provide a logical and comprehensive record of all project data. However, we recognise that all databases are ultimately reliant on the supply of accurate and complete data.

We queried whether NI Water had experienced problems in receiving data from contractors and site teams. NI Water advised that historically, there had been problems, but that they were in the process of linking the system with the financial process to incentivise contractors to provide complete and prompt record data. NI Water currently use the primarily to compare invoices with physical progress reports to avoid over-payment. However, they advised that they are planning to expand the system to link payment with completion of data delivery such as as-built information and operational data.

The Company do not declare any mains acquisitions as all water mains are installed by themselves and hence theoretically already included in their figures.

During the report year, NI Water introduced a new system whereby field data is now compiled by field managers in a central Mobile Work Management system (MWM). Remote access for operatives is available via 'toughbooks'. This has led to reported improvements in the level of detail and accessibility of related records.

Prior to September 2008, Network Operations did not record data on mains renewals, abandonment or cleaning. This data is therefore typically unavailable for the period April 2008 to August 2008. The Company have hence applied a simple extrapolation of the periods where data has been collated to estimate numbers for the whole report year. The methods of extrapolation appear reasonable and we note that the lengths of new, renewed and abandoned mains are relatively insignificant compared to E&P inputs. The confidence grades have been adjusted accordingly.

We ascertained that the Company don't currently have a separate identification code to differentiate between work undertaken for quality and maintenance. Instead, they rely on reports from field managers to provide the breakdown between the two. This current system is heavily reliant on the individual contractors and operations staff logging accurate and up to date breakdown of events.

Mains burst data for Line 11 is obtained from records compiled by the Leakage Section and Networks Water. The data is compiled by interrogation of the work order code and categorisation.

Fundamentally, the Leakage Section are pro-active and use actual flow measurements to identify high-risk areas for further on-site investigation. Prior to February 2009, all data

within the Leakage Section was entered by field managers and contractors and stored within the Leakage Activities Database (LAD). This has now been superseded by the Mobile Work Management system (MWM) with tighter management and control of work order entries. Specifically, work orders are raised and logged in the system by a NIW field operative before passing to a contractor for action. The contractor updates the log with progress on site and is responsible for closing out the work order when complete. Crucially, NIW have now applied financial penalties for failure to do this to reduce the numbers of unclosed work orders and enabled links to other financial systems to assess physical progress against invoicing.

Networks Water are reactive and their work orders are largely in response to customer and third party calls. Networks Water underwent a restructuring during the latter stages of the report year and is now split into Repair & Maintenance (R&M) and Distribution who record and report on their specific areas. Systems utilise a simple logging and reporting system based on individual work orders. Each work order is assigned a unique reference number.

The Company does not include work on valve packing, hydrants, air valves, communication pipes or third party bursts which is in line with the Reporting Requirements.

The total length of mains in Line 12 is extracted from the Company's GIS database which is applied as the baseline figure for comparison against the other line totals. The systems are largely independent and are not updated with the same regularity. The GIS mapping system in particular requires regular updating to keep pace with new developments and other physical changes. As a result, there is invariably some difference between the totals reported on the two systems. To ensure continuity between totals, an adjustment factor can be applied in Line 7 which is considered the most suitable as it encompasses 'other changes'. The adjustment factor principally represents the difference in year end data stored on the Captrax and the GIS systems and hence some adjustment is considered inevitable. The figure is usually positive to reflect the delay in getting data from project records onto the GIS system, although the factor can be negative if the Company removes a back-log of data. At present, NI Water do not apply any factor, and hence the line totals are not wholly consistent.

The numbers of lead and other communication pipes replaced for quality, maintenance and other reasons are extracted from Captrax based on direct field records.

Zonal study models are built and maintained by sub-consultants based on a set of strict guidelines to ensure continuity. Models are based on a snapshot of the Company's GIS system at time of development and are not typically re-visited to check for updates. This inevitably results in some models not being fully up to date with the current GIS system.

The GIS system was set up in 2001 and utilises an Oracle database with graphical front end and stores all infrastructure data. Data records prior to 2001 have been digitised and

transferred into the database to include all existing assets. Each asset has its own unique ID reference and confidence grades are assigned to asset properties to guide to reliability. The system is updated via direct requests from water mains rehabilitation teams, new developments or engineering procurement (capital works) via a relevant manager for check and approval. All changes are undertaken centrally once approved. The Company aims to undertake all changes within 4 weeks, but acknowledges that they are currently experiencing greater delays, mainly attributable to the collation of information from site teams. All changes to the GIS system are subject to a peer review to provide a level of checking.

The Company currently produce 6 separate methodologies for this table. In general, the stated methods are largely robust and in accordance with reporting guidelines. However, we felt that assumptions were not always clearly stated and that typically they lacked a sufficiently detailed explanation of the process. We also found some significant overlap between documents. We recommend that the Company consider consolidation of their methodologies, ideally into a single document to improve usability and avoid possible conflicting information.

6. Company Assumptions

Following our recommendations, the Company has opted to include a balancing amount or adjustment factor in Line 7 so the line totals tally. This is necessary primarily to account for the time lag between completing mains work and inputting these changes into the GIS System and to account for the low confidence grades in the data from Network Operations. It also encapsulates any discrepancy between the two data sets.

The calculation for Line 4 is based on an assumed flushing rate based on typical hydrant flushing volumes.

Line 12 assumes that the GIS system is the most reliable source of information and hence the other lines are adjusted to suit it.

Data inputs from Network Operations for Lines 2-7 is based on extrapolation and hence assumes the sample is representative of the whole.

For Line 11, the Company assume that the number of work orders relating to burst mains relates to a single burst event. Although unusual, it is possible that some work orders may cover the repair of multiple bursts.

7. Confidence Grades

The Company continue to report a B3 grade for its data from GIS systems. Given the apparent discrepancy between line totals we consider this reasonable, but would question whether B2 is now more appropriate given the theoretical accuracy of the GIS system.

NI Water Only

Data provided by E&P is generally applied a confidence grade of A2 due to the detailed project records held and theoretical accuracy of the data. We feel that the Company's methods generally support this, but air some caution regarding the scale of the apparent discrepancy between these figures and the GIS total.

Data provided by Network Operations for Line 2-7 is subject to significant extrapolation of data and is reliant on accurate field data records. As such we agree that C5 is largely appropriate for these entries. As Line 4 is based on an applied flushing factor rather than any improvements in measuring actual lengths, we consider the proposed increase in grade to B4 to be unjustified. We recommend that this is retained at C5. Following our concerns on the breakdown between lead and non-lead communication pipes and on the reporting of mains bursts, we propose that the grades for Lines 8-10 are down-graded to C4.

In light of our concerns regarding the accuracy of mains burst data on the LAD system which provides over 80% of the base data for this year, we recommend that a confidence grade of C3 is more appropriate than B3 for Line 11. However, we note that significant improvements have been made this year and that an improved confidence grade next year may be more justifiable.

Given the theoretical accuracy of the data, the A1 grades applied to Lines 13-17 appear reasonable.

PPP

The applied confidence grade of A2 is considered appropriate.

Total

The combined scores are difficult to assess as the grade needs to consider the grade of each component and its relative contribution. However, on the whole the 'averaged' grades appear a reasonable representation of the inputs, although we note that adjustments would be necessary if our proposed changes are adopted above.

8. Consistency Checks

Following the initial audit, the Company made some amendments to their table and commentary to take into account our recommendations regarding the inclusion of the adjustment factor. Checks were made on the revised table and text to confirm that the changes made were appropriate and accurate.

Date: 10 August 2009

Table 11a – Water Service Activities**Commentary by REPORTER****1. Background**

This table provides information on turbidity at water treatment works and is required to enable NIAUR to identify trends, which may indicate declining asset condition at treatment works. Companies are required to analyse turbidity results for each operational water treatment works that produced water for drinking purposes in the calendar year and determine 95 percentile values. Companies should identify and report number of works and their aggregated output (Ml/d) over the calendar year where the 95 percentile is greater than or equal to 0.5 Nephelometric Turbidity Unit (NTU) and less than 0.5 NTU.

2. Key Findings

- General improvement in the performance in turbidity levels at water treatment works, achieving target levels for 98.6% of sampled output.
- A significant number of water treatment works have been taken out of service mid-year resulting in excluded works.
- Recommendation to include intermittent sites in Line 3.
- The Company monitors iron and manganese levels, but has no proposals for the reporting of similar performance indicators.
- PPP have no related inputs this year.

3. Audit Approach

Our audit consisted of a direct interview with the NI Water system holder, a review of the Company methodology, the commentary and the table entries. Table entries were reviewed for consistency with previously audited data and supporting data was inspected for accuracy. Confidence grades were reviewed to ensure compatibility with the methodologies used.

4. Audit Findings**4.1 Block A – Water Treatment Works – Turbidity**

There have been some significant changes to Water Treatment Works (WTWs) during this Report Year, including an effective change in operational responsibility at some sites from NI Water to PPP and the subsequent decommissioning of several older sites. During the Report Year, PPP commissioned and commenced operation of 4 new WTWs at Moyola, Dunore Point, Ballinrees and Castor Bay. For the purpose of reporting, and following clarification from NIAUR (as explained in the Company commentary), the Company categorise these works under NI Water inputs as they were under NI Water

operational control for the majority of the calendar year. For the purposes of this report, the Company define the changeover date as the date of formal handover rather than any commissioning or live supply date (we understand the old and new works are run in parallel for some time before formal handover). We consider this to be a practical and reasonable approach to adopt and, as such, these sites are thus reported on the basis of combined average results for the year as agreed with the Regulator. However, we found the commentary lacked the requested detail required to identify the attributed time periods and relative change in performance between ownership periods and we advised the Company to expand their text accordingly. Consequently, there are no PPP inputs to report on this year (and the PPP Only table is blank). Next year it is expected that these sites will be reported by PPP.

The Company's commentary also refers to a fifth PPP site at Forked Bridge which completes the five 'Alpha' projects. Through our audits on other tables, we were aware that the construction of a new treatment works at Forked Bridge had been avoided by the construction of a new trunk main from Castor Bay WTW. We challenged the Company on the inclusion of Forked Bridge in the list of WTWs and were advised that the site has been included in the list of sites as it has its own discrete turbidity sampling point, and is included as a 'virtual works' to cover the related distribution volume from Castor Bay. As flow is not double-counted, this has no impact on the overall output totals, and hence we have no real objection to this approach. However, we note that it may create some conflict between the numbers of comparable WTWs listed in other tables and we therefore recommend that the Company look to adopt a consistent standpoint on this matter.

All data has been correctly reported by calendar year.

4.1.1 Lines 1 and 2 – Turbidity Levels

The Company continues to show improvement in the levels of turbidity at its works. This year, the number of exceedences has dropped to 42, compared to 50 and 114 in the respective previous years. This improvement is partially due to the commissioning of the new Alpha sites and respective closure of a number of older sites.

The total number of WTWs counted in lines 1-3 actually increased from 42 to 43 this year, due to the addition of the new 'virtual' Forked Bridge WTW. However, during the year the number decreased from 43 to 35 due to the closure within calendar year of 8 sites, full details of which are provided in the Company's commentary. These changes concur with changes to the Company's works reported in other tables (although the total numbers don't correlate exactly due to the inclusion of Forked Bridge and difference in report years).

NI Water confirmed that they don't have any sites classified as 'emergency' sites as the Company either have 'operational' or 'mothballed' sites. However, we were advised that one of the 8 sites decommissioned this year, Drumabest Borehole, has been subsequently brought back into operation to temporarily enhance supply. This raises a question as to the definition of 'mothballed' sites and whether some sites should actually be classified as

‘emergency’. NI Water advised that they have applied to NIEA to surrender the Abstraction licences for sites taken out of supply. We also note that such categorisation has no tangible impact on this table.

We reviewed the 5 sites contributing to the Line 1 total. Of these sites, 3 were within the range 0.5-0.7 and only 1 site (Gortlenaghan Borewell) had a 95 percentile NTU value >1. All 5 works have relatively low distribution outputs, totalling less than 1.5% of the total works output. We asked what measures the Company were taking to rectify the issues at the two worst sites; Altmore and Gortlenaghan Borewell. NI Water advised that both sites are due for closure following completion of capital works elsewhere. We also understand that Altmore currently has an Authorised Departure in place relating to THM and MCPA..

We noted that 3 sites with a combined total output volume of 35.66Ml/d had 95 percentile values of exactly 0.5 and were excluded from Line 1. We discussed the accuracy of the turbidity data with the Company and ascertained that the majority of instruments at sites are only sensitive to 1 decimal place (ie 0.1NTU) and hence it is not possible to determine the result any more accurately to confirm whether this value is actually above or below the line. Statistically, it is likely that at least one of the three sites is actually above 0.5NTU. However, to avoid subjectivity and the fact that the results are clearly borderline, we consider it a reasonable assumption to exclude them from Line 1. The Company advised that all 3 of these sites (Camlough, Forked Bridge and Carmoney) have either recently had or are currently undergoing some capital works improvements, and so improvements in turbidity levels are expected next year. We also note that the accuracy of the newly built WTWs is much greater and hence accuracy is now improved at a number of sites.

We subsequently reviewed the Company’s methodology and spreadsheet calculations behind the line totals. We noted that the 8 sites excluded from the line totals were all taken out of service during the year and questioned the real reason for their exclusion. Our assessments on the available data suggested that only Ballysallagh and Forked Bridge/Barbour boreholes would have impacted the figures by their inclusion (ie had 95 percentiles >0.5NTU). However, with 83 and 47 samples respectively for approximately 10 months of the year, these sites had insufficient data and are hence correctly excluded. Further checks confirmed that the Company have correctly excluded all 8 sites on the basis of the gaps in the data being too long.

To assess the improvements of the new ‘Alpha’ works, we extracted the relevant data for Moyola WTW to assess the relative performance of the new and old works. Our checks indicated a significant improvement, with the relative 95 percentile level decreasing from 0.3NTU to 0.07NTU following the changeover in September 2008. This is considered good evidence of the improvements that are being made.

In general, the methods used for excluding sites and the formulae used to analyse and calculate the line totals were found to be correct and in accordance with the Reporting Requirements. We undertook cross-checks with the source spreadsheet for a number of

sites including Forked Bridge, Moyola and Carmoney WTWs and can confirm that the relevant totals from the spreadsheet have been correctly transferred to the line totals.

4.1.2 Line 3 – Turbidity Not Recorded

Line 3 typically includes sites which are temporarily out of service for the majority or all of the year or those providing intermittent input. Our checks confirmed that 8 sites are excluded on the basis of providing intermittent service.

The Company do not report these sites in Line 3 on the basis that the sites were not in service at the end of the calendar year. However, following our review of the data and NI Water's confirmation of their exclusion on insufficient data, we concluded that the respective number and output volume should be included in Line 3 to be consistent with the Reporting Requirements, provide clarity on volumes being excluded and improve continuity between tables. We informed the NI Water system holder of our conclusions, but were unable to achieve agreement on the changes before issue due to staff leave. We therefore believe that the commentary and line totals have remained unchanged. However, we note that full details of the excluded sites are available in the Company commentary.

4.1.3 Line 4 – Total

The total number of WTWs operational during the calendar year increased from 42 to 43, although the number declined to 35 at year end. In line with the Company's approach to Line 3, the line total does not include the 8 excluded sites. With reference to our comments on Line 3, we recommend that these sites should be included. A full breakdown of the changes is provided in the Company commentary which we verified through checks against source data.

We queried the changes to the number of WTWs this year, in particular to confirm that the closure and opening of sites were within the correct calendar year and that no sites have been excluded from the list. NI Water confirmed that no non-operational sites have been utilised within the calendar year.

We can confirm that this appears to concur with information reported in Table 12, when accounting for the differences due to reporting years.

4.1.4 Other Performance Indicators

The Company carry out similar monitoring of iron, manganese and aluminium levels within zones through sampling at customer taps. NI Water advised that they have recently experienced some high levels of metals being recorded in samples which are causing some concern. However, they strongly suspect that the problems relate to contamination in the distribution system rather than any direct degradation in quality.

5. Company Methodology

The Company confirmed that its methodology remains unchanged from the previous year, with turbidity data being collated directly from field sample data and output data based on

average daily flows into distribution. All data is collated and analysed by calendar year in accordance with the Reporting Requirements and as agreed with the DWI. The different timescale explains why the distribution data may differ from other tables.

Typically, samples are taken daily at each relevant WTW on the basis of output volume and can provide up to 365 days of data per site. The Company keeps a record of every sample taken and categorise it according to its purpose and by date. They can then accurately exclude all non-scheduled samples by category and assess relative gaps in data for exclusion against the criteria. This method appears robust and correctly excludes non-routine samples in a simple and effective manner. At the time of writing, the Company were unable to confirm the relative proportion of readings excluded on this basis due to staff absence.

The 95 percentile figure is calculated using the standard Excel function rather than the pre-defined method in the Reporting Requirements. We carried out a comparative calculation using the defined method and found the difference in predicted percentiles to be insignificant.

The Company's documented methodology was not provided for review. However, our discussions and observations indicate that the Company have adopted methods that are compliant with the Reporting Requirements and have applied suitable criteria for excluding non-routine sampling and works with insufficient or long gaps in data.

The Company's internal monitoring of levels of iron and manganese is based on data obtained through samples taken at customer taps.

6. Company Assumptions

The methods employed use accurately recorded and documented data obtained from flow meters and sampling methods. There are therefore few assumptions to be made other than the standard logic that the results obtained from sampling are true representation of the whole.

Where the accuracy of turbidity data is to only 1 decimal place, the Company assume that an overall 95 percentile value of 0.5 is below the threshold 0.5NTU limit. Where the level is below the level of detection (eg <<0.1NTU) the Company assume a value of 0.05. As this only affects the very lowest values, this has no overall impact to the calculated 95 percentile values.

7. Confidence Grades

The assignment of A2 to all lines is considered appropriate grading given the level of accuracy of turbidity data and uncertainty in categorisation of borderline cases.

8. Consistency Checks

Due to time constraints, we were unable to agree revisions to the Company's table and commentary to take into account our recommendations to the line totals. Cross checks were carried out against Tables 9 and 12 to confirm consistency.

Date: 10 August 2009

Table 12 – Water Explanatory Factors**Commentary by REPORTER****1. Background**

This table is used in water service operating efficiency studies. The information collected in this table is used in NIAUR's operating efficiency studies. It provides explanatory factors for the number of sources, proportion of supply by source type, amount of pumping required for treatment and distribution, and the relative complexity of a company's water treatment works. Changes in these factors can have a significant impact on a company's costs.

2. Key Findings

- The total number of sources used during the year has remained fairly static compared to last year, although 4 sources were transferred to PPP ownership.
- Overall changes to the percentage split of distribution input across source type indicate relatively little change to the proportions between sources.
- There have been no drought influences reported on the sources and figures presented this year.
- No significant changes to treatment levels at existing works, although the 4 new PPP works rated at W4 level.
- No significant changes to calculated pumping head value or methodology.
- We recommend greater consolidation of Company methodologies.

3. Audit Approach

The audit comprised an interview with the relevant NI Water and PPP System Holders and deputies, a review of the Company methodology for data collection, an analysis of the source data and a comparison with last years table entries.

4. Audit Findings

The table is sub-divided into 3 sections relating to PPP only, NI Water only and the combined total outputs. To avoid potential conflict between proportional data, it was agreed that values for proportional distribution inputs need only be provided in the total table.

4.1 Block A Lines 1 to 4 - Source Type

- **NI Water Inputs**

The sources in lines 1-4 were cross-checked against the source data spreadsheet. Our checks confirmed that grouped boreholes had been correctly treated as a single source and NI Water confirmed that no site had more than one reportable source. The Company also confirmed that they have no compensatory sources to consider.

The Company commentary only specifically refers to two decommissioned sources. Our discussions with the Company confirmed that this only relates to the two sites that changed status from last year and does not include sites that were decommissioned prior to 2007. Checks against the source data indicate that 8 sites in total (comprising 7 boreholes and 1 impounding reservoir) were not used during the year. Two boreholes (Kilwee and Bellsiz) appear to have been brought back into service for part of the year. The resultant number of used sources this year has therefore only reduced from 42 to 38 due to the reassignment of 4 sites to PPP ownership. The closure of 9 sites during the year is expected to reduce this total to around 33 next year.

The Company have therefore reduced their total number of borehole sources from 22 to 19, following decommissioning of Lesters Dam, Glenburn and Donnelly's Springs (in the previous year). Of the remaining 19 boreholes, 5 were not operational during the report year. Lough Island Reavey is correctly excluded from the numbers of impounding reservoirs as it now supplies another source.

We discussed the inclusion of Forked Bridge WTW and its position in relation to PPP. NI Water confirmed that the works at Forked Bridge is included this year as it was operational for part of the year, but that they expect it to be removed from the list of operational WTWs next year as it is now non-operational following completion of the Castor Bay trunk main.

We can confirm that the relevant distribution inputs have been correctly totalled for each line. The Company identify a small discrepancy between the relative distribution inputs used between lines 1-4 and Line 5 in their commentary and have provided a full and detailed explanation. We discussed this with the Company and agree that potential impact of this difference is negligible.

The Company confirmed that there have been no drought conditions experienced during the Report Year.

- **PPP Inputs**

Following the successful completion and commissioning in year of 4 new WTWs at Moyola, Dunore Point, Ballinrees and Castor Bay, PPP are now responsible for the operation of these works and have therefore reported on the basis of these 4 works.

Initially, PPP reported related sources of 2 impounding reservoirs and 4 river abstractions on the basis that Ballinrees could be supplied from 3 sources; Ballinrees IR, Altikeeragh IR and the River Bann. However, our subsequent review of the supply chain with the Company confirmed that direct supply was currently not available from either Altikeeragh IR or the River Bann and that these were in fact chain sources. PPP agreed to remove the two chain sources and amended the table accordingly (NI Water subsequently confirmed that this was only treated as a single source last year and hence has not resulted in any overall change to the numbers from last year).

PPP confirmed that abstractions from Lough Neagh are treated as river abstractions as confirmed with NIAUR.

PPP do not report on distribution input and have left these columns blank to avoid potential confusion.

- **Total**

The total is the correct summation of the NI Water and PPP inputs. Checks against source data indicated that distribution inputs have been correctly assigned.

4.2 Block A Line 5 – Average Pumping Head

The line total indicates a small increase in the average pumping head from 111.28m to 113.67m.hd this year. This change is primarily due to the ongoing completion of zonal network models which has enabled more accurate estimates of pumping head in several areas. The Company provide a detailed and comprehensive explanation of this process in their commentary.

This year, the Company have compiled flow and pressure data to cover 420.93Ml/d of the total 633Ml/d distribution input equating to approximately 66% of their total input (or approximately 62% coverage of the population). This compares with a coverage of only 42% last year. NI Water advised that there are 13 zonal network studies left to complete (largely in the more heavily populated eastern regions) and that they expect completion of all models by 2011. Including all registered supply and distribution pumps, NI Water calculate that 917.7Ml/d of water is pumped within their system.

The resultant average pumping head value in Line 5 is calculated from a single spreadsheet covering all relevant supply and distribution pumps in the Company's network. We reviewed the spreadsheet with the Company and undertook several spot checks on the calculations along sample rows. We can confirm that we found no errors and the spreadsheet appeared logical and robust. Our checks also confirmed that the Company have only calculated the total based on the 420.93Ml/d of distribution input where reasonable data is available and therefore have avoided estimating in areas of significant uncertainty. The Company are therefore assuming that the calculation based on this proportion of the flow is representative of the whole. Whilst not ideal, we consider this to be a reasonable assumption given the lack of data currently available. However, we note that this will effectively be solved once the Company have completed all models, expected within the next 2-3 years. The method for calculating pumping head is in accordance with the reporting guidance.

We undertook detailed spot checks on two randomly selected pumps at Lisnasure WPS and Glenavy WPS for comparison against actual model data. The data provided by the Company supported the relevant data in the spreadsheet.

4.3 Block B Lines 6 to 12 – Treatment Type

- **NI Water Inputs**

The total number of water treatment works (WTWs) reported this year is 38, a net reduction of 4 from last year. This decrease is directly related to the transfer in operational responsibility of 4 WTWs to PPP this year. Cross-checks carried out against the source data confirmed the following breakdown:

- 29 sites were operational at year end
- 9 sites were decommissioned during year and hence operational for part of the year
- 4 sites were transferred to PPP

We checked the reported closure dates of the decommissioned WTWs and can confirm that all sites were operational during the year.

NI Water confirmed that there were no changes to treatment classification of the NI Water-owned WTWs this year. We checked categorisation of each site against relevant process summaries and found them to have been correctly categorised.

To avoid confusion, NI Water have not reported any proportional distribution input values in Lines 6-12 which are only reported in the combined total table.

- **PPP Inputs**

Checks against site process flow diagrams confirmed that all 4 works operated by PPP have ozone or GAC on site which are classified as W4 level treatment and are hence included within Line 10. To avoid confusion, PPP have not reported any proportional distribution input values in Lines 6-12 which are only reported in the combined total table.

- **Total**

In total, 42 WTWs were operational during the Report Year. The line totals are confirmed as the correct summation of the NI Water and PPP inputs.

Distribution inputs were applied to this table. Our checks against the source data confirmed the correct calculation and translation of data onto the table.

We investigated the works having a treatment below W3 level. Whilst a significant number of works exist, the data indicates that all 14 WTWs in lines 6-8 are works with borehole sources and they contribute only 2.8% of the Company's total distribution input. It is also noted that a significant number have been or are due for decommissioning and hence the proportion in these bands is expected to reduce further next year.

We advised NI Water of a minor error in the spreadsheet which they duly corrected.

4.4 Line 13 – Potable Mains

- **NI Water Inputs**

The total length of potable mains has increased from 26,067km to 26,349.22km. This is extracted directly from the Company's GIS systems. Our checks confirmed that the total excludes PPP-owned assets and 276km of compensatory and raw water mains.

The Company confirmed that they have 150.2km of unknown diameter mains on their system records. As it is expected that the vast majority of these are minor, small diameter mains, NI Water have elected to include these mains in Band 1 which we consider a reasonable assumption. Following the Auditor's comments last year, NI Water confirmed that they have undertaken investigations to confirm sizing for as many mains as possible but the remaining 150km of mains have no documented size records and therefore are only likely to be confirmed if actually encountered in the field.

- **PPP Inputs**

PPP report 16.42km of new main in Band 3 which relates directly to the 600mm diameter trunk main from Castor Bay to Forked Bridge.

- **Total**

The total 26,365.65km is the correct summation of the NI Water and PPP inputs and matches the total length of main reported in Table 11, Line 12.

5. Company Methodology

The Company uses several spreadsheets to analyse and summarise the relevant data concerning sources, treatment works and pumping stations which is required for inclusion within Table 12.

Distribution input is based on data obtained the Leakage Section as discussed in Table 10. The distribution output from the works and applied volume within the distribution network are therefore very similar. Where not available, NI Water may obtain data from other less reliable sources as explained in their commentary.

The Company currently provide 5 separate methodologies for this table, with significant overlap between individual documents. We recommend that the Company consider consolidation of their methodologies, ideally into a single document to improve usability and avoid possible conflicting information.

The methodologies and spreadsheets were reviewed against the Reporting Requirements and we can confirm that the Company has correctly excluded sources from which no water has been abstracted during the Report Year. The Company has also correctly excluded non-potable water volumes. No significant changes to the methodologies have occurred this year.

The Company does not generally fully abandon source sites which are retained and

‘mothballed’ for possible future use. Hence, the number of operational sites can fluctuate as sites are taken in and out of service. There were no fully abandoned sites this year.

Calculations for Line 5 Average Pumping Head are primarily based on data and results obtained from network models. Flow data for distribution pumps are based on annually averaged flow measurements from works outputs. However, the majority of the data, including pressure heads and flow data for pumps within the distribution system are based on data from the network models. The calculation is therefore reliant on the condition and accuracy of the network models.

The Company are currently in the process of constructing models for remaining zones to complete the overall coverage of their supply area. NI Water advised that model coverage now includes all of the Northern & Southern regions, 14 of the 15 Western Region DZS areas and 13 of the 30 Eastern DZS areas. This equate to approximately 65% of the total number of connected properties.

Currently NI Water rely on several sub-consultants to develop and manage their network models, although we understand there are plans to centralise the system once complete. NI Water issue a strict set of guidelines to ensure continuity between models. Each model is based on a comprehensive set of pressure and flow readings from a set of strategically positioned temporary loggers. Typically data is collated at 15min intervals for a full day which is then used to calibrate the model. Ground levels are based on information extracted from the Company’s GIS systems.

Once the model is created, NI Water do not typically take further field measurements or re-visit the model to re-calibrate. As several models are now over 5 years old, NI Water recognise that there is an increasing risk that models are out-of-date and hence less reliable. However, we acknowledge that NI Water are currently focussed on completing the model rollout programme to cover all areas and that the overall impact of changes are likely to be small.

Where models are incomplete, NI Water look to obtain field data on pumps, but advised that such data is usually unavailable or not sufficiently reliable and hence most data in these areas are omitted from the calculation. To avoid over or under estimating the total head, the calculations exclude the relevant proportion of contributing distribution input from any supply PS which supplies a booster PS where data is sufficient data is not available (i.e. it is in an area not covered by a network model). Our review suggested that these adjustments are logical and reasonable. We also note that such adjustments will only be required until the Company completes its model build programme.

The spreadsheet to calculate the pumping head is managed by a single document controller and updated each year via distribution of relevant sections to other sub-consultants. NI Water confirmed that the spreadsheet utilises unique ID codes to avoid duplication and that internal checks are carried out each year to assess any changes.

The Company provide a detailed and comprehensive explanation of their Line 5 methodology in their commentary, including comments on shortcomings and possible future improvements. Our checks confirm that the calculations are consistent with the NIAUR defined methodology. No significant changes to the methodology have occurred this year.

The Company's methodology currently states that pumps within PPP sites are excluded from the NI Water calculation and dealt with separately. We queried this approach and NI Water confirmed that whilst they have prepared NI Water and PPP only results, these were done for comparison purposes only and the reported Line 5 total includes both NI Water and PPP owned assets.

The Company does not import or export any water.

The totals for Line 13 are taken directly from the Company's GIS system. Pipes that are unidentified (which accounts for approximately 0.5% of the total) are assigned to Band 1 as the most likely category to ensure the total matches the total length of mains reported in Table 11, Line 12.

6. Company Assumptions

For calculating average pump head, the Company makes several key assumptions:

- network models are accurate and up to date representations of the actual pipe network and pump condition
- ground levels are representative of the operational head level
- no leakage occurs in the system
- where data is not known, the Company exclude the pump from the calculation and hence base the calculation on a sample. The applied data is therefore assumed to be representative of the whole.

For Line 13, unidentified pipes are assumed to included in size Band 1 as the most likely size category.

7. Confidence Grades

The assignment of A1 confidence grades to the number of sources in the NI Water and PPP only tables are considered appropriate. The lower confidence grades of B2 applied to the 'Total' table are considered justified on the basis of the reliability and accuracy in the calculation of proportional distribution input.

Last year the Auditor challenged the B3 confidence grade applied to Line 5 and recommended a reduction to C5. We have revisited this proposal with the Company and agreed that a reduction to a B4 grade is now more appropriate given the relatively reliable data sources and significant increase in network model coverage since last year.

8. Consistency Checks

Following the initial audit, the Company made minor amendments to their commentary and line totals to undertake corrections to calculations and take into account our recommendations. Checks were made on the revised text to confirm that the changes made were appropriate and accurate.

Date: 10 August 2009

Table 13 – Non financial measures – Sewerage properties and population**Commentary by REPORTER****1 Background**

This table reports on the properties connected during the year, billing information and average report year population estimates for the sewerage service.

2 Key Issues

- As discussed in our report for table 7, the Company reports that for AIR08, farms had been classified and reported as ‘billed’ households. Based on the NIAUR guidelines, this has been updated to include farms within billed non-households
- Also as for Table 7, a problem with the new connection application form in the first half of the year meant that approximately 10% of new connections had been classified as “unknown”. The Company has made an assumption and split these between household and non-household on a pro-rata basis.
- The Company has continued its Non-Household Metering Programme which has included surveying all unmeasured non household properties to determine if a meter could be installed on the premises. This has led to a significant decrease in the number of unmeasured non-household properties. These reductions were reflected as increases in measured non-households and site metered properties.
- The Company noted in AIR08 that it had an apparently high percentage of voids (32%). Surveys carried out as part of the non-household metering programme were also used to assess voids. The Company found that the total number of void non-household unmeasured properties was around half of that reported in AIR08. Records from surveys indicate that the total number of void ‘non-household unmeasured properties was 4428 and not 8178 as reported, although it will not be possible to determine the ‘sewerage’ status of these properties until this upload is completed.
- As discussed in our reporting for table 7, the Company has 11,500 ‘test’ meters which have also been investigated as part of these surveys. Of these, 7024 have been investigated and 1993 test meters are actually non-domestic measured meters and can therefore be billed retrospectively to April 2007. The Company has subtracted these from the test meter account but this has not yet been updated on Rapid. For the purposes of AIR08, these have been subtracted manually and added to the non-households billed measured water category. The Company reports that this methodology will be updated for AIR10.
- NI Water has also been investigating those meters where multiple properties are charged through a single meter. To ensure that these meters are not double counted, they are no longer included in property counts for this table or in Table 7.

- In April 2008, Northern Ireland Water introduced sewerage charging to include non-households, phased in at 50%. Volumes returned to sewer are assumed to be 95%, based on standard industry figures, unless the customer challenges this assumption, whereupon they can apply for a non-return to sewer allowance which will be investigated and determined by NI Water. This is discussed in further detail in our report on table 14.
- The Company's methodology has not been correctly applied, in order to derive the estimated connected sewerage population. We believe the population reported in Line 10 should be 1,467k rather than 1,366k.

3 Audit Approach

The audit consisted of an interview with the NI Water system holder to discuss the methodology and data that has been used to populate this table as well as plans for improving the data in future years.

4 Audit Findings

- There are several key changes from AIR08 that have had an impact on the count of properties and billing information. These are listed above and discussed in the commentary below.
- We note that despite deferral of charging for water and sewerage services for household customers, these are still defined as 'billed' due to the subsidy by DRD.
- We also note that in April 2008 the Company extended water charging to include unmeasured non-households in addition to measured non-households.

4.1 General

The Company reports that it is moving to a new system for determining the information required in this table. For AIR08, the Company made assumptions regarding the number of households and non-households connected to the public sewerage system (84% and 89% respectively). For this reporting period, NI Water is able to report actual figures based on the customer billing database, RapidXtra.

This is an automated system where customer information is updated through customer contact. The Company reports that data on property counts and classifications are reported monthly and reconciled with other data collection activities, such as the metering programme. During our audit, the Company explained the calculations used this year and the impact on numbers for AIR10. We are satisfied with the Company's approach and the move to the new automated system.

While the Company move from the old system to the new automated one there are a number of adjustments carried out to the data, due to the activities described above. The Company has calculated its line entries from the available data as the average of the April 2008 and April 2009 numbers.

4.2 Properties

Line 1 – Household properties connected during the year

This line reports the number of new household properties added within the Company's area of supply during the report year, previously not connected for water supply. We note an increase of 1,067 in the number household properties connected from 2007-08. This number is obtained directly from the Company's electronic system Rapid.

Line 2 – Non-household properties connected during the year

This line contains the number of new non-household properties added within the company's area of supply during the report year, previously not connected for water supply. We note that the number of non-household properties connected has reduced by 596 from 2007-08. This number is obtained directly from the Company's electronic system Rapid.

As discussed above and in our report for Table 7, the Company informed us at our audits that a problem with the new connection application form in the first half of the year meant that approximately 10% of new connections had been classified as "unknown". The Company has made an assumption regarding the split between household and non-household on a pro-rata basis. We queried this with the Company and as to whether the application form had now been replaced. The Company responded that they are seeking to properly classify these properties and have indeed replaced the form.

4.3 Billing

Line 3 – Households billed unmeasured sewage

We note a small increase of 30,546 in the number of households billed for unmeasured water within the supply area since 2007-08. The Company has calculated this line from the number of occupied unmeasured domestic households plus the occupied domestic properties with test meters plus the 223 occupied measured domestic households.

Line 4 – Households billed measured sewage

We note that the company has changed its definition of households with respect to farm customers. Therefore we note that this number is now reported and zero and these properties are included in the definition of billed non-households. The number of billed measured households was 25,616 in 2007-08.

Line 5 – Households billed sewage

There has been an increase of 4,930 in the number of households billed for sewage by NI Water. This increase results from a number of new connections less those farm

properties re-assigned to the non-household category. This is a calculated line and is the sum of lines 3 and 4.

Line 6 – Non-households billed unmeasured sewage

We note that the number of non-households billed for unmeasured water within the supply area has decreased by 2,757 since 2007-08. The Company reports that it has continued the application of its universal non-domestic metering policy, surveying all unmeasured non household properties to determine if a meter could be installed. This work has resulted in a significant decrease in the number of unmeasured non-household properties during the year.

For this number, the Company have used an adjusted method based on the transition to an automated system. The number is the sum of the occupied non-domestic unmeasured customers, plus the occupied non-domestic test meters plus the 3750 non void properties, then subtracting the 1993 test meters which are now to be billed.

Line 7 – Non-households billed measured sewage

We note that the number of non-households billed for measured water within the supply area has decreased by 5,939 since 2007-08. This number is calculated by the Company from the number of occupied non-domestic measured customers plus the occupied non-domestic site meters plus the 1993 test metered properties which are now to be billed.

Line 8 – Non-households billed sewage

We note that the number of non-households billed for water within the supply area has decreased by 8,696 since 2007-08.

This is a calculated line and is the sum of Lines 6 and 7.

Line 9 – Void properties

We note that the number of properties within the supply area, which are connected to the distribution system but do not receive a charge, as there are no occupants (void properties) has increased by 1,112 since 2007-08.

As reported in Table 7, the Company has carried out surveys to confirm if the property was occupied or void. At time of reporting on AIR09, the void data had not been uploaded into the customer billing database. Records from surveys indicate that the total number of void 'non-household unmeasured properties was 4428 and not 8178 as reported, although it will not be possible to determine the 'sewerage' status of these properties until this upload is completed.

4.4 Population

We found that the estimated population connected to the sewerage system is based on the percentage of sewerage properties (reported in table 13) as a proportion of water properties (from table 7).

For AIR09, NI Water has reported a total population connected to the sewerage system of 1,366,330, which is ~129k lower than that reported for AIR08, despite there being an increase in the overall number of sewerage properties.

Our review of the Company's methodology statement for table 13, line 10, suggests that for AIR09, the sewerage population should equate to 81.41% of the water population, which is based on 620,417 sewerage properties and 762,102 water properties. However, this is not consistent with property data reported in tables 7 and 13 of AIR09. Application of this methodology would suggest a population of 1,445,125 which is consistent with that reported previously.

Application of the Company's methodology to data actually reported in tables 7 and 13 of AIR09, would suggest a ratio of sewerage to water properties of 82.6% and a total connected sewerage population of 1,467,044.

Based on the findings of our review, we would suggest a population of 1467k should be reported in table 13 line 10 of AIR09.

5 Confidence Grades

The Company has assigned a confidence grade of C4 to the property numbers reported in Table 13. As discussed above, the Company reports that it is moving to a new automated system for determining the information required in this table. For AIR09, the key source of information for the new connections and property data is the customer billing database, RapidXtra however there are a number of adjustments made to the calculations as a result of transition to the new system. We are satisfied with the Company's approach and the move to the new automated system.

These adjustments include:

- 'test' meters - of the 11,500 in total, 7024 have been investigated and 1993 test meters have been identified that should be attributed to the non-domestic measured category. The Company reports that these have been subtracted from the test meter account but have not yet been updated on Rapid. For the purposes of the Annual Information Reporting, these have been subtracted manually and added to the non-households billed measured water category.

6 Consistency Checks

The property numbers reported in this table are consistent with the rest of the submission.

Date: 10 August 2009

Table 14 – Non financial measures – Sewage collected**Commentary by REPORTER****1 Background**

This table records the sewage volumes collected from measured and unmeasured households and non-households, together with the volumes of trade effluent, cesspool and septic tank waste.

2 Key Issues

- The Company reports that despite meters being installed on all new domestic properties, legislation changes and deferral of charging by the Northern Ireland Assembly in March in 2007 means that bills are not issued and therefore meters are not read.
- The reduced volumes reported year on year from 2006/7 are due to industrial closures and reduced volumes in the textile trade, together with a major high volume works closure in 2008.
- The recording of trade effluent data in Northern Ireland Water has been through a number of transitions since the early 1990's. This is due to changing policies on charging which relate to whether the trader paid rates or not. However, from April 2009 all traders will pay charges.

3 Audit Approach

The audit consisted of an interview with the NIW system holder to discuss the methodology and data that has been used to populate this table as well as plans for improving the data in future years.

4 Audit Findings

- Due to increased non-household metering the Company has updated its methodology for estimating volumes from AIR08. It is assumed that sewerage consumption is 46% of total water consumption. There are some exceptions to this and examples have been discussed with the Company.

4.1 General*Line 1 – Volume unmeasured household sewage*

This line summarises the volume of water delivered to household properties billed for unmeasured water that is returned to the sewerage system.

We note an increase in volume of 13.32 Ml/d. In April 2008, Northern Ireland Water introduced sewerage charging to include non-households, phased in at 50%. The

Company has assumed that volumes returned to sewer are 95% of the volume of water delivered, factored by the percentage of the number of households billed for water against the number of households billed for sewerage services.

The Company calculates this number from the Billed unmeasured household supply volume (table 10 line 4), the number of households billed for unmeasured sewage (table 13 line 3) and the number of households billed for unmeasured water (table 7 line 3) and we confirm that this calculation is correct.

Line 2 – Volume unmeasured non-household sewage

This line summarises the volume of water delivered to non-household properties billed for unmeasured water that is returned to the sewerage system. We note that this has decreased by 2.65 Ml/d corresponding to an increase in the meter penetration for non-household properties.

The Company informed us that this volume is calculated by assuming a 95% return to sewer of volume delivered to non-households factored by the percentage of the number of non-households billed for water against the number of non-households billed for sewerage services.

The Company calculates this number from the Billed unmeasured non-household supply volume (table 10 line 5), the number of non-households billed for unmeasured sewage (table 13 line 6) and the number of non-households billed for unmeasured water (table 7 line 8) and we confirm that this calculation is correct.

The average non domestic unmeasured usage is based on 265m³ per property and 30.5k properties. The 2009/10 tariff calculations assumed 20.4k non domestic unmeasured properties and that this lower number resulted in a reduction of the average consumption to 165m³ per property. The difference in the numbers of properties (AIR compared to tariff submission, 30.5k & 20.4k respectively) is largely due to a reduction in the overall number in voids 2.5k, the inclusion in the AIR of test meters 4.3k and the averaging basis used in AIR

Line 3 – Volume unmeasured sewage

This line is derived by summing lines 1 and 2.

Line 4 – Volume measured household domestic sewage

This line summarises the volume of measured household domestic sewage effluent discharged to the sewerage area and billed. The volume of billed measured households was 11.78 Ml/d in 2007-08. Even though NIW has been installing meters on all new household connections since April 2008, as explained above, customers are not being charged on a measured basis, so the property is still being reported as unmeasured. Therefore this line is reported as zero.

Line 5 – Volume measured non-household domestic sewage

This line summarises the volume of water delivered to measured non-households returned as domestic sewage (not trade effluent) to the sewer in the sewerage area and billed. We note that there has been a decrease of 25.83 Ml/d in the volume compared with that reported in 2007-08. This relates to variations from year to year. The Company started billing non-household customers in April 2008 and as bills are issued up to 6 months in arrears, the first half of the year billings only had an element of sewerage volume for the period relating to 2008-09. Therefore the measured sewage consumption of non-household customers in 2008-09 was assumed to be 46% of total water consumption, except where the customer had requested a different percentage. The Company informed us that around 40 customers believe that their non-return to sewer differs from standard assumptions. We discussed some examples of this with the Company during our audit such as a power station or an agricultural college. To determine the percentage returned the Company carried out an assessment of processes through a site visit. We are satisfied with this approach.

This method will be updated for AIR10 as further information is collected through metering and the Company expects that the confidence grade will increase.

Line 6 – Volume trade effluent

Trade effluent management in Northern Ireland Water has been through a number of transitions and it is useful to record these changes as they affect the basis used for recording trade effluent data.

In the early 1990's when the trade effluent charging policy was first introduced, it was decided that companies paying rates would not be charged, and only those premises which were industrially de-rated or rate exempted would be subject to trade effluent charges. This resulted in charges for large industrial companies, but also for residential and nursing homes which were both rate exempt. The remainder of the discharges were consented but no charges were levied.

In the latter case, because the companies were not charged no data was recorded on the volume of trade effluent discharged to sewer.

In 2009 a review took place on the charges for hospitals and nursing homes on the basis that the bulk of the discharge was domestic in nature, and only the discharge from onsite laundries and other smaller discharges were of trade effluent nature. Accordingly an initial estimate was made that only 10% of the total volume was trade effluent. After further investigation it has been proposed that this should be further revised to 5% plus the volume discharged from the laundries as measured by a separate meter.

The latest revision is that from April 2009 all traders will pay charges, in all categories. This approach should greatly improve the gathering of accurate trade effluent volume data compared to the current position.

There is a steady reduction in trade effluent volumes reported over the last three reporting periods. The Company attribute this to actual trader shutdowns and reductions, together with a major single trader shutting down in 2008.

For the larger industrial traders where discharge flow meters are fitted and operating, this data has been used. Where no discharge meters are fitted, discharge volumes are based on metered water supplied, with an allowance deducted for domestic and process use onsite. We were advised that domestic use is assumed to be 25 litres per head per day where there is no onsite canteen, or 50 litres per head per day where there is an onsite canteen. We queried these figures since they are somewhat different from the equivalent figures of 50 litres and 60 litres respectively used by one of the English water plcs. We were advised that a recent benchmarking exercise carried out by NIW indicated that the figures of 25 and 50 litres were the industry norm. The onsite process use deduction depends on agreed site specific details.

For sites where charges have not been levied, and water supply data was unavailable, discharge volume has been estimated as 100% of the consented volume. Our initial opinion was that this could introduce significant error but we were advised that the majority of traders estimated in this way were small traders discharging small volumes and that the total volume estimated was 1.43 ML/day, or 7.8 % of the total.

This problem will be largely eliminated from April 2009 when all traders will be billed and discharge volumes will be recorded or calculated for all traders.

All the above data is collected by the "Rapid" billing system, operated by Crystal Alliance, the outsourced billing company for NIW. The AIR09 data is based on actual figures for the period April 2008 to November 2008 which have then been extrapolated to reflect the 12 month period April 2008 to March 2009. We queried why this has been done and were advised that the complete data set was not available at the time required, and therefore to be consistent with similar data for the recent PC10 submission it was prepared in the same way. Since the purpose of the AIR09 data is to report actual performance we question the validity and accuracy of this approach, although with the lack of a full 12 months of actual data it is the only approach.

Line 7 – Volume waste water returned

The total volume returned to sewer is the total of the preceding entries.

5 Company Assumptions

The company has assumed that for discharges which have not been charged and therefore volumes not measured, that the discharge volume is estimated to be equal to the discharge volume in the consent. We requested a figure for the volume estimated in this way, and were advised that it is 1.43 ML/d or 7.8 % of the total. It therefore represents a reasonably small inaccuracy.

The Company has also assumed that trade effluent volumes will be constant throughout the year and has extrapolated data for the period April 08 to November 08 to an annualised volume. We question the validity and accuracy of this approach but have been advised that actual data for the whole 12 month period was not available at the time of reporting and the annualised approach was then taken to be consistent with similar data submitted with the PC10 business plan.

6 Confidence Grades

We note some changes in the confidence grades for table 14. For lines 1 and 2 the confidence grades have changed from B3 and B4 respectively to C3 for both lines.

This is related in changes to the confidence grades for tables 7 and 13, from which the information is calculated. Confidence grades are discussed in our summary reports for Table 7 and Table 13. We are satisfied with these confidence grades.

The confidence grade for Line 4 is now given as A1 as this represents zero properties as discussed above. The confidence grade for line 5 has been upgraded from C3 to B3 based on the use of improved data from metering.

7 Consistency Checks

We confirm that lines 1 and 2 are consistent with the numbers given in table 10 line 4, table 13 line 3 and table 7 line 3.

Date: 10 August 2009

Table 15 – Sewage Treatment

Commentary by REPORTER

1. Background

This table collects details on sewage loads, sewerage service facilities and sewage sludge disposal. The information in this table is used to assist in operating efficiency studies.

2. Key Findings

- Trade effluent volumes for this report have been obtained from the outsourced billing company Crystal Alliance. Data is based on trade effluent discharge meters where fitted, or on adjusted metered water supplied, with an allowance deducted for domestic and/or process use on the premises involved. Where no other data is available volumes have been based on the discharge consents. A figure of 18.44 Ml/d has been reported for total trade effluent flow at a confidence grade of C4 in table 14 line 6.
- Actual data has been obtained from the “Rapid” billing system for the period April 2008 to November 2008. This has then been annualised for the period April 2008 to March 2009. We questioned this approach. The Company advise this was done because actual data for the full year was not available at the time of reporting, and the foregoing approach was taken to ensure consistency with similar data provided in the NI Water PC10 submission. Although we question both the validity and accuracy of using this same approach for the AIR09 submission it is probably the best approach where full data is lacking
- For traders discharging more than 5,000m³/year BOD loads are based on sample results. For traders discharging less than this, BOD has been estimated as that of standard sewage strength. This is measured as the average of monthly samples taken at the inlets of twelve major works sampled for UWWTD compliance. The result is a strength of 200 mg/l BOD. We queried the accuracy of this approach in measuring trade effluent strength. NI Water advised that if the discharge could be stronger than standard strength then samples will be taken. Alternatively if a trader considers his discharge is weaker than standard strength then again sampling will be undertaken. NI Water advised they do not have the resources to sample all trade discharges now subject to charges. Standard strengths will be agreed with a number of sectors e.g. car washes, based on previous sampling and to that extent the data quality in terms of strength will improve. Accuracy will also improve in terms of volumetric measurement when all traders are charged, but there will still be a significant number of traders charged at standard strength.
- A confidence grade of C4 has been assigned by the company for this data. With the extrapolation and estimation of data for trade effluent flows, combined with similar partial estimation for strength, we believe this level of confidence in the data is appropriate. The position is likely to improve significantly next year with the adoption of full trade effluent charging from April 2009.

- Significant work has been carried out in the past year to update sewage works population equivalent data, summarised in detail in the company commentary. Holiday populations have been estimated from hotels, caravans and tent pitches.

3. Audit Approach

The responsibility for the compilation of table 15 is split between two system holders, each of whom was audited. The methodology was examined and the sources of data were reviewed.

4. Audit Findings

4.1 Sewage – Loads (NI Water Only)

4.1.1 Line 1

Trade effluent management in Northern Ireland Water has been through a number of transitions and it is useful to record these changes as they affect the basis used for recording trade effluent data.

In the early 1990's when the trade effluent charging policy was first introduced, it was decided that companies paying rates would not be charged, and only those premises which were industrially de-rated or rate exempted would be subject to trade effluent charges. This resulted in charges for large industrial companies, but also for hospitals and nursing homes. The remainder of the discharges were consented but no charges were levied. Companies which discharged less than 5,000m³/year were charged at a standard rate of £0.732/m³ based on consented volume.

In the latter cases, because the companies were either not charged, or charged a standard rate, no data was recorded on the volume of trade effluent discharged to sewer.

In 2006 a review took place on the charges for hospitals and nursing homes on the basis that the bulk of the discharge was domestic in nature, and only the discharge from onsite laundries and other smaller discharges were of trade effluent nature. Accordingly an estimate was made that only 10% of the total volume was trade effluent. After further investigation it has been proposed that this should be further revised to 5% plus the volume discharged from the laundries as measured by a separate meter.

The latest revision is that from April 2009 all traders will pay charges, in all categories. This approach will greatly improve the accuracy of trade effluent volume and load data compared to the current position which has a number of inherent inaccuracies.

4.1.1 Line 2 – 7

The Asset Performance Team within NI Water has developed and maintained the database for this information, and has carried out a lot of updating over the past year

particularly relating to the population equivalent (PE) banding of the works using a recent study carried out by [X] as part of the PC10 growth study.

4.2 Sewage – Service Facilities (Lines 8 – 13, NI Water Only)

Data for line 8 is compiled from the master spreadsheet minus PPP treatment works and minus sea outfalls as required by the definition. Line 9 data is calculated from design PE's which have been comprehensively reviewed and updated since AIR08, with 28 works revisions. Lines 10 and 11 data has been updated with four additional works with nutrient removal since AIR08, together with revised PE data at 18 other works, summarised in detail in the company commentary. Lines 12 and 13 reflect an additional works with pathogen reduction at Newtownards and revised PE data for the other pathogen reduction site at Larne.

4.3 Sewage – Sludge Disposal (Lines 14 – 17, NI Water Only)

No unsatisfactory sludge has been recorded.

The mass of sewage sludge disposed in the year has remained relatively constant over the past few years, reflecting both stable operation of the system and a relatively constant population, as well as good data recording facilities that have been in place for some time, allowing accurate capture of the mass of sewage sludge produced.

The figure of 38.0 ttds is a decrease of 0.4 ttds from AIR08, however the methodology has changed slightly to remove sludge from unregulated septic tanks from the figures presented in this table, in line with the AIR08 reporter's recommendation. The sludge contribution from unregulated septic tanks was estimated at 2 ttds, therefore there has been an increase in sludge produced from AIR08 of 1.6 ttds when considered on a like-for-like basis.

As NIAUR does not require this section of the PPP table to be completed, NI Water has included sludge produced from the two PPP sites in this section of the table. We do note that there is sufficient information collected to allow the company to separate PPP sludge volumes from NI Water sludge volumes, as they have done in table 17g.

There is negligible sludge storage capacity available within the system, as most of NI Water's sludge is incinerated and fresher sludge incinerates more efficiently, therefore the mass of sludge produced is the same as the mass of sludge disposed.

There has been no additional sewage sludge produced arising from new quality obligations since 2005.

4.4 Sewage – Loads (PPP Only)

As the loads to the PPP STWs are measured on the influent sewer at the head of the treatment works, it is not possible to separate loads originating from trade effluent, therefore line 1 of the PPP table is not completed.

Both of the PPP STWs are secondary treatment plants, however the data that is collected and reported to NI Water through the PPP contracts allows the load that receives full treatment and the load that only receives preliminary treatment (under storm conditions) to be quantified. These loads have been calculated and reported in lines 2 and 4 respectively. This is a level of detail that is not practical to collect for the NI Water STWs, where all loads would be attributed to the treatment provided by the STW (preliminary, primary, secondary, tertiary), regardless of whether all the loads entering the STW were actually fully treated.

While we believe that the methodology used for the PPP sites is appropriate given that the data exists, this difference must be taken into account when comparing the PPP sites and the NI Water sites.

The equivalent population served has been calculated based on the load receiving secondary treatment and a loading rate of 60g/c/day. In fact, it should have been calculated based on the total load delivered to the treatment works, which would result in a population equivalent of 182,000, rather than the 152,000 reported.

Both sites have numerical consents, so the total population served is equal to the population served with numerical consents.

4.5 Sewage – Service Facilities (PPP Only)

There are now two PPP STWs reported in AIR09, an increase of one (North Down) from AIR08, resulting in an increased treatment capacity.

Both of the STWs provide nutrient removal, but only one provides disinfection.

The comments above relating to equivalent population apply to the populations presented in this table as well.

4.6 Sewage – Sludge Disposal (PPP Only)

NIAUR does not require this section to be reported.

5. Company Methodology

5.1 Sewage – Loads (NI Water Only)

5.1.1 Line 1

For the larger industrial traders where discharge flow meters are fitted and operating, this data has been used. Where no discharge meters are fitted, discharge volumes are based on metered water supplied, with an allowance deducted for domestic and process use onsite. We were advised that domestic use is assumed to be 25 litres per head per day where there is no onsite canteen, or 50 litres per head per day where there is an onsite

canteen. We queried these figures since they are somewhat different from the equivalent figures of 50 litres and 60 litres respectively used by one of the English water plcs. However, the company response indicates that the figures have been benchmarked against water plcs in England and Wales and are representative of the norm. The process use deduction depends on agreed site specific details.

For sites where charges have not been levied, discharge volume has been estimated as 100% of the consented volume. In our opinion this can introduce significant error but this problem will be largely eliminated from April 2009 when all traders will be billed and discharge volumes will be recorded or calculated for all traders. Also, the proportion of the total trade effluent flow estimated in this way is only 7.8%.

All the above data is collected by the “Rapid” billing system, operated by Crystal Alliance, the outsourced billing company for NI Water. The AIR09 data is based on actual figures for the period April 2008 to November 2008 which have then been extrapolated to reflect the 12 month period April 2008 to March 2009. We queried why this has been done and were advised that the purpose was to be consistent with similar data for the recent PC10 submission, prepared in the same way. Since the purpose of the AIR09 data is to report actual performance we questioned the validity and accuracy of this approach, although if actual data is not available then it is probably the best option.

5.1.2 Lines 2 – 7

The Asset Performance Team within NI Water has developed and maintained the database for this information, and has carried out a lot of updating over the past year particularly relating to the population equivalent (PE) banding of the works.

We reviewed the master spreadsheet used to populate the table and in each case were able to observe the derivation of the data and match it to the reported numbers. The data is also consistent with that reported in table 17(d) which covers comparable information.

Data has been reconciled with the previous reporting year, with full details in the company commentary. The increase in the total load receiving secondary treatment is due to a combination of works upgrades carried out since AIR08, together with works closures and pumpaways. There have been small reductions in the loads receiving primary and preliminary treatment since AIR08, with the former due to flows gravitating to other works, and the decommissioning of another works. Population served data shows a marginal reduction since AIR08.

We reviewed a number of spreadsheets and data checks carried out by the Asset Performance Team, together with confirmatory emails. To reduce the complexity of this system and the potential for errors, a new project database is to be created under “Project Diamond” to place all asset data into one database specifically for AIR reporting. We confirm this will be a valuable step forward and will help to improve confidence in the data.

5.2 Sewage – Service Facilities (NI Water Only)

Treatment capacity data shows some small variations from AIR08 data. Treatment capacity available (line 9) is based on design pe's with 28 individual site variations since AIR08, itemised in detail in the company commentary. Four additional works are providing nutrient removal since AIR08, at Downpatrick, Dunmurry, Lisburn and Newtownbreda.

5.3 Sewage – Sludge Disposal (NI Water Only)

The total mass of sewage sludge produced/disposed is taken from line 2 column 9 of the 'total' section of table 17g. The methodology for calculating the mass of sludge is discussed in more detail in our commentary to table 17g.

5.4 Sewage – Loads (PPP Only)

The PPPs are required to measure influent and effluent loads, as well as other parameters, through their PPP contracts. NI Water has access to this data through telemetry and it is also reported on a regular basis by the PPPs to NI Water. This data is used to calculate the total annual loads receiving full treatment, as well as the loads of storm flows receiving only partial treatment for each PPP site. For further detail, refer to our commentary on table 17d.

The equivalent population served is calculated by dividing the measured loads by a rate of 60/capita/day. As discussed in the audit findings, this should be applied to the loads entering the STWs, not just the loads receiving full treatment.

5.5 Sewage – Service Facilities (PPP Only)

Data from the two PPP sites (Kinnegar and North Down/Ards) is developed from a sound basis, with both sites subject to flow and load surveys and regular influent and effluent sampling for compliance reporting. Data is also cross checked by complementary NI Water systems.

5.6 Sewage – Sludge Disposal (PPP Only)

Not applicable.

6. Assumptions

The company has assumed that for discharges which have not been charged and therefore volumes not measured, that the discharge volume is estimated to be equal to the discharge volume in the consent. The volume estimated in this way is 1.43 Ml/d or 7.8 % of the total. It therefore represents a moderate to small inaccuracy.

The Company has also assumed that trade effluent volumes will be constant throughout the year and has extrapolated data for the period April 08 to November 08 to an

annualised volume. We question the validity and accuracy of this approach and believe that actual data for the whole period should have been employed, although we have been advised the data was not available at time of reporting.

It is assumed that the mass of sludge produced is the same as that disposed of, given that there is negligible sludge storage within the system.

A loading rate of 60g/capita/day is used to calculate loads (NI Water STWs) or equivalent population (PPP STWs) in accordance with the NIAUR guidance.

Refer also to our commentary on tables 17d and 17g for further assumptions that have been made in the background data used to estimate populations, loads and sludge volumes.

7. Confidence Grades

The Company has assigned a confidence grade of C4 to line 1. The grading is consistent with the methodology of extrapolating part year data to full year together with the estimation of other data based on discharge consents rather than measurement. The introduction of trade effluent charging for all discharges in April 2009 for the current financial year should greatly improve this situation for AIR10 reporting.

The confidence grades for loads received (lines 2 – 4) are C3. This is consistent with table 17 (d) from where the data originates. PE data (lines 6 – 7) has a confidence grade of C5. This is largely based on discussions with [X] who developed a growth model for NI Water as part of the PC10 preparations. The PE projections are based on the “theoretical polygon” which assesses typical population agglomerations in the catchment of the works. Confidence will be improved in this data when targeted flow and load surveys have been carried out at selected treatment works.

Confidence grades for lines 8 to 13 (NI Water only data) remain the same as AIR08. We support the A2 grades for the straightforward data in lines 8, 10 and 12, and trust that grades for lines 9, 11 and 13 will be improved by the planned targeted flow and load surveys referred to above.

A confidence grade of A1 has been assigned to lines 14 and 17 as these are zero values and known to be correct.

A confidence grade of B3 has been assigned to lines 15 and 16, which is consistent with table 17g.

A confidence grade of A2 has been assigned to line 2 (PPP), which is consistent with table 17d.

A confidence grade of B5 has been assigned to line 4 (PPP), reflecting the less accurate measurement of the storm flows.

A confidence grade of A2 has been assigned to lines 6, 7, 11 and 13 (PPP), reflecting the accuracy of the measured loads. As discussed in the report above, we believe that the equivalent population should be calculated on total loads to the treatment works, not just that receiving full treatment. Taking into account the different confidence grades of lines 2 and 4 and the relative proportion of the contribution from each line, we believe that a confidence grade of B3 is more appropriate for these lines.

A confidence grade of A1 has been assigned to lines 8, 10 and 12, which we believe is appropriate.

A confidence grade of B4 has been assigned to line 9, which we believe is appropriate.

8. Consistency Checks

No consistency checks are required for this table.

Date: 10 August 2009

Table 16 – Sewerage Service Activities**Commentary by REPORTER****1. Background**

Network activities provide a good measure of work achieved, provided that they can be related to associated investment. The investment breakdowns included in these reporting requirements provide this linkage, with the separation of base service expenditure from that related to enhancements on table 36.

2. Key Findings

- The information in this table is input by a number of people, among whom it appears there is little co-ordination. As a result, quite different definitions have been applied to “critical sewer” resulting in inconsistencies within the table. We recommend that there are fewer line owners who are responsible for gathering the required information from the appropriate people. This would result in a more consistent interpretation/methodology.
- A project to improve the classification of critical sewers in GIS is going through the final stages of approval for funding and resources. This project will review sewer criticality for location (i.e. sewers on traffic sensitive roads, sewers near critical infrastructure, etc) as currently only diameter/depth criteria are accounted for. It will also assign a new field, which can be used to label each sewer as critical or non-critical within GIS. Currently the total length of critical sewers is determined by running a report from GIS to identify those sewers greater than a certain diameter or depth.
- A project to calculate the length of public lateral sewers is going through the final stages of approval for funding and resources. Most public laterals are not mapped, so this exercise will estimate the length of these laterals by calculating the distance from each property to the nearest main surface water and foul sewer.
- There has been a significant reduction in the number of unsatisfactory intermittent discharges (UIDs) reported this year, compared to AIR08. The latest methodology reports those discharges classified to date by the NIEA as unsatisfactory. The previous approach extrapolated to the likely ultimate number of UIDs.
- The total number of intermittent discharges from the sewerage system has increased to 1739 for AIR09, an increase from 1710 in AIR08. This is mainly due to new CSOs and new SPSs having been constructed
- Progress on completion of drainage area plans is limited, with the cumulative total completed increasing from 49 last year to 54 this year, out of a total of 109 drainage areas.

3. Audit Approach

The responsibility for the compilation of table 16 is split between 6 line owners, each of whom was audited. The systems and methodologies used to gather data were reviewed.

4. Audit Findings

4.1 General

At present the date of construction entered into GIS only includes the year, meaning that the sewers constructed within a report year (i.e. April to March) can not be extracted from GIS. Instead, a report must be run from GIS on the 31st of March each year to measure the sewer stock on that date. As a result, sewers constructed towards the end of the reporting year, but not yet mapped in GIS will not be included in this total. Further, the report is not repeatable on other days, as the sewer stock will have changed due to additional sewers having been mapped.

We recommend that in future the data entered into GIS provide a sufficient level of detail such that all of the information for lines 1, 2, 3, 7, 8, 11, 14 and 15 can be extracted from GIS. This would involve identifying the date of construction/abandoning in a day-month-year format (or at least month-year) so that the new/abandoned sewers in the April-to-March reporting year can be identified. This would require remodelling of the GIS sewers database to accommodate new fields, including a field to identify the source of the date information. The Company notes that this will be possible after the critical sewer identification project is completed. For larger projects, the date for a particular length of sewer does not necessarily need to coincide with the actual date that it was laid, but may instead relate to the date that the project output is claimed, or the date of the as-constructed drawings. The exact methodology should be determined by NI Water and documented so that any such assumptions are clear, with the important point being that each new sewer can be clearly allocated to a particular reporting year in an unambiguous and auditable way. This will require a focus on getting sewers that have been constructed towards the end of the reporting year mapped into GIS before the data needs to be extracted for AIR, and will rely on the information being submitted by contractors and project teams in good time. The methodology should allow for any sewers that were not able to be mapped in time to be included in the following year's return, with a record of any such lengths to be made in the commentary. These would be accounted for in lines 7 and 11.

The methodology would need to account for on-site sewers (i.e. sewers within developments), which are formally adopted by NI Water only when the final adoption certificate is issued after a defects liability period, i.e. more than 12 months after construction. These sewers should not be included in the numbers on table 16 until the final adoption certificate is issued, as is the case with the current methodology.

4.2 Asset Balance (Lines 1 to 2) (NI Water only)

The total length of sewers at the start of the report year is consistent with the asset balance at the end of the previous year (lines 14 and 15, column 4) and was carried forward correctly.

NI Water, unlike other water companies, is responsible for most lateral sewers as well as main sewers. Only the main sewers are included in the lengths reported in lines 1 and 2 as there are very few laterals mapped. The laterals that are mapped within GIS are clearly distinguished from main sewers and are excluded from these totals.

A project will shortly be undertaken to estimate the total length of lateral sewers that NI Water is responsible for. This will involve calculating the length from each property to the nearest surface water and foul sewer. This will allow NI Water to report this information in AIR10.

We note that the information reported in lines 3 to 11 relates only to main sewers and not to lateral sewers. If lateral sewer information is to be included in lines 1, 2, 14 and 15 in subsequent returns then this information will also be need to be collected for lines 3 to 11.

4.3 Changes during Report Year (Lines 3 to 11) (NI Water Only)

Both Engineering and Procurement (E&P) and Operations (Ops) are responsible for carrying out sewerage service activities. Data has been gathered from both sources and summed to determine the total activity during the report year.

Line 3 – New Critical Sewers

There were 11.43km of new critical sewers laid by E&P during the year. Sewers laid by E&P are new public sewers within roads and other public areas. This information is supplied by the delivery teams and is collated by E&P on a monthly basis. The delivery teams make the assessment as to whether the sewer is critical or non-critical, however it is understood that this may only be against category A critical sewers from the WRc rehabilitation manual, not against category B. Based on their knowledge of the schemes, the line owners will sometimes query the classification of critical or non-critical with the delivery team project manager. It appears that interpretation of critical and non-critical sewers is being applied differently by the GIS team (who generate lines 2 and 15), leading to inconsistencies within table 16. Because the classification of critical and non-critical is being made by each delivery team project manager, it is possible that each project manager is also making a different interpretation of critical and non-critical, however because they only submit the length of critical and non-critical sewers laid, there is no clear audit trail that can be used to verify this classification.

In the draft table, Operations (Ops) reported no new critical sewers adopted during the year as it reported all new sewers as non-critical. However discussions with the line owner revealed that critical sewers were being taken as only those sewers very close to, or

under, buildings. The depth, diameter and location criteria from the WRc Rehabilitation Manual were not being applied, and on examination of the raw data, it was found that some of the sewers should be classified as critical sewers. This has been revised in the final table, which now includes 1.61km of new critical sewers by Ops.

New sewers by Ops relates to new sewers built by developers and adopted by Northern Ireland Water. They include all sewers that have been issued a final adoption certificate within the reporting year.

Line 4 – Critical Sewers Inspected by CCTV

There were 3.74km of critical sewer inspected by CCTV by E&P and 27.32km of critical sewer inspected by Ops.

The sewer inspected by E&P generally relates to new sewers inspected following their construction. The classification into critical and non-critical sewers is made by the delivery team project managers.

The information gathered by Ops means that it is not possible to classify whether the sewers that were inspected by CCTV were critical or non critical, therefore it is assumed that the proportion of sewers inspected by CCTV that is critical is the same as the proportion of NI Water's sewer stock that is critical.

Line 5 – Critical Sewers Renovated

There were 3.15km of critical sewers renovated by E&P in the reporting year. The classification into critical and non-critical sewers is made by the delivery teams.

There were no critical sewers renovated by Ops in the reporting year, as this is not activity that would normally be carried out by Ops.

Line 6 – Critical Sewers Replaced

There were 2.81km of critical sewers replaced by E&P in the reporting year. The classification into critical and non-critical sewers is made by the delivery teams.

There were no critical sewers replaced by Ops in the reporting year, as this is not activity that would normally be carried out by Ops.

Line 7 – Abandoned Critical Sewers and Other Changes

There were no critical sewers abandoned during the report year.

An adjustment of -407.05km has been applied so that the totals presented in lines 14 and 15 are consistent with the lengths measured in GIS at the end of the report year. The majority of this change is a result of the increase in critical sewers as a result in the

change of methodology for calculating the proportion of sewers that are critical. This is offset by a reduction in non-critical sewers in line 11.

Currently there is no field within GIS that identifies sewer criticality, and instead the proportion of critical sewers is determined by running reports from GIS that count the length of sewers that meet certain depth and diameter criteria. A project will shortly be undertaken by NI Water that will establish a new field within the GIS database for each sewer that will identify it as either critical or non-critical. As part of this project, sewers that are critical because of their location (e.g. in traffic sensitive streets, near key infrastructure like hospitals) will also be identified. This project will improve the quality of the information that is reported in table 16 with regards to critical and non-critical sewers and is likely to result in further adjustments in lines 7 and 11 in AIR10.

Line 8 – New Non-critical Sewers

There were 41.64km of non-critical sewers laid by E&P and 94.24km of non-critical sewers adopted by Ops.

Line 9 – Non-Critical Sewers Renovated

There were 0.75km of non-critical sewers renovated by E&P during the report year. There were no non-critical sewers renovated by Ops in the reporting year, as this is not activity that would normally be carried out by Ops.

Line 10 – Non-Critical Sewers Replaced

There were 5.42km of non-critical sewers replaced by E&P during the report year. There were no non-critical sewers replaced by Ops in the reporting year, as this is not activity that would normally be carried out by Ops.

Line 11 – Abandoned Non-critical Sewers and Other Changes

There were 0.87km of non-critical sewers abandoned during the report year.

An adjustment of +409.37km has been applied so that the totals presented in lines 14 and 15 are consistent with the lengths measured in GIS at the end of the report year. The majority of this change is a result of the decrease in non-critical sewers as a result in the change of methodology for calculating the proportion of sewers that are critical. This is offset by an increase in critical sewers in line 7.

4.4 Sewer Collapses and Blockages (Lines 12 to 13) (NI Water Only)

There were 96.3 collapses per 1000km and 1936 blockages per 1000km reported in 08/09. Rising main failures account for 1.8% of collapses.

This figure will appear to be high compared to English and Welsh water companies because it includes blockages and collapses on public lateral sewers (which are the

responsibility of NI Water, but not of English and Welsh water companies), however it is only reported as a proportion of main sewers.

The length of lateral sewers is being estimated for AIR10, however a rough estimate is that there could be 7,000km of public lateral sewers. This would increase the total length of sewers by 50%, which would reduce the reported blockages and collapses per 1000km by one third. The confidence grade reflects this.

Even if the length of public lateral sewers is accounted for in this calculation, it is possible that NI Water would experience more blockages than other water companies per km because they are responsible for lateral sewers. Given that lateral sewers are small diameter and experience more intermittent flows than main sewers they would probably be more prone to blockage. At present NI Water does not collect sufficient information to be able to distinguish between lateral sewer and main sewer blockages and collapses, so it is not possible to assess whether this is actually the case. This would be a useful level of detail to collect and include in the commentary, so that a more direct comparison with other water companies can be made. The recommendation from the AIR08 Reporter's commentary remains in place that the company identifies whether the blockage or collapse occurs on:

- a private lateral or drain (excluded from lines 12 and 13)
- a public lateral or drain
- a public main sewer

This would require a further level of information to be collected when blockages or collapses are investigated to allow this information to be reported in the annual information return.

4.5 Asset Balance at March 31 (Lines 14 to 15) (NI Water Only)

The total length of sewers at the end of the reporting period is 14465.23km, of which 2889.10km is considered to be critical.

This represents a difference of 145.73km of sewer from the beginning of the reporting year. These lines have been calculated based on the changes during the year reported in lines 3, 7, 8 and 11 as appropriate.

Of the 2889.10km of sewers that are reported as critical, 1906.39km were positively identified as critical due to one or more of their parameters (depth, construction type or diameter) meeting the WRc definition of critical sewer (category A or B). Approximately 34% of the total sewer stock in GIS has missing data from one or more of the key parameters. It has been assumed that the same proportion of this stock is also critical, accounting for the remaining 982.75km.

The total of 14465.23km of sewers represents only adopted main sewers, and there is a further 1100km mapped within GIS that are not adopted main sewers. Some of these

will be sewers within developments that have been mapped but not yet adopted because they are still in their defects liability period (i.e. preliminary adoption certificate has been issued but final adoption certificate is yet to be issued). However given that in the order of 100km of sewers were issued with their final adoption certificate in AIR09, and the defects liability period is one year, we would expect only approximately 100km to fall into this category. There will also be some mapped lateral sewers within this total. It would be useful if the Company could carry out further investigation for AIR10 and report in their commentary a breakdown of this length into:

- length of sewers issued a preliminary adoption certificate within the last year but yet to receive a final adoption certificate (i.e. the length that would expect to be reported in the following year's return)
- length of mapped lateral sewers
- length of sewers constructed more than one year ago but not yet adopted (i.e. warrants further investigation as perhaps these sewers should have been adopted)

4.6 Intermittent Discharges (lines 16 and 17) (NI Water Only), and Drainage Area Plans (lines 18 and 22) (NI Water Only)

The Company summary of overflow types and locations is as follows

Overflow Type	Sewerage System	WwTW	Total
Formula A		106	106
FFT Overflow		228	228
3DWF Overflow		23	23
CSO	814	17	831
Overflow at PS	925	92	1017
Total	1739	466	2205

Since AIR08 the Asset Performance Team has reviewed the above data with respect to Water Order Consent applications, and now has increased confidence in the AIR09 data. Further checks are continuing.

4.7 Other Sewerage Service Activities (lines 23 to 30) (NI Water Only)

This section is not required to be completed for AIR09.

4.8 Asset Balance (lines 1 to 2) (PPP only)

In AIR08, the company reported no PPP activity in lines 1 to 15, however there were actually 10.4km of new critical sewers laid and inspected by CCTV in that reporting year. The Company has therefore revised the data in lines 3, 4, 14 and 15 for the AIR08 reporting year. The 10.4km of sewer has been carried forward to lines 1 and 2 AIR09.

4.9 Changes during Report Year (lines 3 to 11) (PPP Only)

No new sewers have been laid under PPP contracts in the current reporting year, nor has there been any CCTV inspection, renovation, replacement or abandoning of sewers.

4.10 Sewer Collapses and Blockages (lines 12 to 13) (PPP Only)

No PPP sewers have collapsed or blocked in the reporting year, however there are mechanisms to collect this data if they do occur.

4.11 Asset Balance at March 31 (lines 14 to 15) (PPP Only)

As there has been no change to PPP sewer stock, lines 14 and 15 both show 10.4km of sewer.

4.12 Intermittent Discharges (lines 16 and 17) (PPP Only)

This information is not required to be completed for PPP contracts, as it is not relevant.

4.13 Drainage Area Plans (lines 18 and 22) (PPP Only)

This information is not required to be completed for PPP contracts, as it is not relevant.

4.14 Other Sewerage Service Activities (lines 23 to 30) (PPP Only)

This section is not required to be completed for AIR09.

4.15 Asset Balance (lines 1 to 2) (Total)

NI Water had 14329.9km of sewers at the beginning of the reporting period, of which 2479.41km was critical. The overwhelming majority of these totals are from NI Water only stock.

4.16 Changes during Report Year (lines 3 to 11) (Total)

There was no activity reported in these lines for PPP, therefore the total of each of these lines is the same as for NI Water only.

4.17 Sewer Collapses and Blockages (lines 12 to 13) (Total)

There were no collapses or blockages reported under PPP contracts. The length of PPP sewer is such a small percentage of the total sewer length that these lines are the same as for NI Water only.

4.18 Asset Balance at March 31 (lines 14 to 15) (Total)

NI Water had 14475.63km of sewers at the end of the reporting period, of which 2899.50 was critical. The overwhelming majority of these totals are from NI Water only stock.

4.19 Intermittent Discharges (lines 16 and 17) (Total)

Refer to the commentary for NI Water. Only, as these lines are not completed for PPP.

4.20 Drainage Area Plans (lines 18 and 22) (Total)

Refer to the commentary for NI Water. Only, as these lines are not completed for PPP.

5. Company Methodology**5.1 Asset Balance (lines 1 to 2)**

These lines are equal to lines 14 and 15 of the previous year's return

5.2 Changes during Report Year (lines 3 to 11)

Information is collected from a variety of sources to complete these lines.

Both Engineering and Procurement (E&P) and Operations (Ops) carry out the activities in lines 3 to 11 for NI Water. The PPP contractors may also carry out these activities.

The base information for E&P is prepared by each delivery team based on the contractor's on site records and is reported to the E&P team on a monthly basis. E&P then compile this information to calculate the totals for each month and for the year. The information is cross-checked against invoices prepared by the contractor, which ensures that work being completed and invoiced is being reported.

Within Ops, 3 functions have the potential to be involved in the activities – Networks Sewerage, Operations Contract Management Centre and Tactical Asset Management (TAM). It was found that in past returns the activities of all the functions of Ops were not necessarily being fully captured, so for AIR09, each function was asked to confirm which activities, if any, it carried out. As a result of this process, the only activities that were identified were lines 3 and 8 (TAM) and line 4 (Networks Sewerage).

The components of lines 3 and 8 (new critical and non-critical sewers) that are the responsibility of TAM are those sewers constructed by developers and then adopted by NI Water. Design drawings are submitted by developers for approval by TAM. Once as-constructed drawings are submitted (and inspection of the new sewers is passed), TAM issues a preliminary adoption certificate and the sewers are mapped in GIS, but marked as "unadopted". Following the defects liability period (12 months) a final adoption certificate is issued by TAM and the status of the sewers is changed to

“adopted” in GIS. When the final adoption certificate is issued, the details are logged in a Final Adoptions book, and then compiled from there into a spreadsheet tabulating the diameter and lengths of pipe for each scheme. This information is used to generate the lengths of new sewer for lines 3 and 8.

The length of sewers inspected by CCTV by Networks Sewerage is compiled by the field managers based on checked and paid invoices from the sewer maintenance contractor. This process does not allow the identification of critical and non-critical sewers, so the percentage of total sewer stock that is critical is calculated, and this is applied to the total length of inspected sewers to calculate the length of critical sewers inspected.

Activity by the PPP contractors is reported by each of the PPP contractors, based on as-constructed drawings.

5.3 Sewer Collapses and Blockages (lines 12 to 13)

The number of sewer collapses and blockages per 1000km is calculated based on other data as follows:

- line 12 (sewer collapses) = [table 16a line 1 (rising main failures) + table 16a line 2 (gravity sewer collapses)] / [table 16 line 14 (length of sewers at end of year)]
- line 13 (sewer blockages) = [table 16a line 3 (sewer blockages)] / [table 16 line 14 (length of sewers at end of year)]

5.4 Asset Balance at March 31 (lines 14 to 15)

This is calculated from the previous lines as:

- line 14 = line 1 + line 3 + line 8 – line 7 – line 11
- line 15 = line 2 + line 3 – line 7

The length of critical sewers is determined by running reports to identify those sewers made of brick, and those sewers with diameter or depth greater than criteria set out in the WRc Rehabilitation Manual for category A and B sewers as follows:

- all sewers with depth greater than 3m
- all brick sewers
- all sewers with diameter greater than 450mm diameter (foul) or 600mm (combined or storm)

This method is used to calculate the proportion of critical sewers (19.973%) for the sewers where all of these parameters are known. Of the total sewer stock, approximately 34% (4,933km) have unknown construction type, depth or diameter, so it is not possible to determine whether these are critical or not. It has been assumed that 19.973% of this is also critical.

The majority of sewers with unknown parameters are those with unknown depth parameters (3,443km). The Company has included in this category all sewers with both upstream and downstream depth recorded as zero, as well as those with upstream depth less than 3m and downstream depth zero. This methodology will include sewers with upstream depths of, say, 1m and unrecorded downstream depths. It is very unlikely that sewers with a shallow upstream depth will have a downstream depth greater than 3m. Therefore as a further refinement to this methodology, we recommend that sewers with an upstream depth of between 2m and 3m and an unknown downstream depth are included in the count of 'unknown' sewers, but those with an upstream depth of <2m and an unknown downstream depth are excluded.

This methodology for determining critical sewers has been revised from AIR08 in line with a recommendation by the AIR08 reporter. In AIR08, assessments of the proportion of critical sewers were made in drainage area plans and these proportions were applied to the total length of NI Water sewers. As a result of this change in methodology, the estimated proportion of critical sewers has increased from 17.2% to 19.973%.

5.5 Intermittent Discharges (lines 16 and 17)

Lines 16a and 16b

A database of CSOs has been prepared for NI Water by Atkins. From this, the number of intermittent discharges classified as unsatisfactory by the NIEA to date has been obtained. This approach is different to that used for AIR08 which was an extrapolation to an expected number of UIDs. The latest data gives lower figures as the original projection was overly pessimistic.

Lines 17a and 17b

Line 17a is the number of intermittent discharges excluding CSOs. Thus from the above table this is the number of overflows from pumping stations in the sewerage system (925) plus the total number of overflows from WwTWs (466) giving a total of 1391

Line 17b is the number of CSOs, 814 in the above table.

5.6 Drainage Area Plans (lines 18 and 22)

This data is obtained from the Drainage Area Study report updated by NI Water. In our opinion, limited progress has been achieved in this area with the cumulative total of plans completed only increasing from 49 no. in AIR08 to 54 no. in AIR09. Plans completed so far cover just below 50% of the total number of drainage areas and 46% of population and properties.

5.7 Other Sewerage Service Activities (lines 23 to 30)

This is not required to be completed for AIR09.

6. Assumptions

Various assumptions have been made regarding the classification of critical sewers, and this needs to be reviewed and made consistent for following reporting years. The GIS analysis assumes both category A and category B sewers in the Sewerage Rehabilitation Manual to be critical, whereas E&H only assume category A sewers to be critical. TAM originally did not use criteria in the Sewerage Rehabilitation Manual, but instead assumed that only sewers close to or under buildings are critical. After discussion with the line owners, this has been revised so that category A and B critical sewers are included for the TAM sewers.

It is assumed that the proportion of sewers with unknown depth/construction/diameter parameters in GIS that are critical is the same as for those with known parameters (19.973%).

It is assumed that the proportion of sewers that have been inspected by CCTV by Ops that are critical is the same as the proportion of the whole sewer stock that is critical.

7. Confidence Grades

The company has assigned a confidence grade of B3 to line 1, recognising that the GIS record is not complete, and that there will be some unmapped sewers.

The company has assigned a lower confidence grade of C4 to line 2, because of the sewers that are mapped, not all have material, diameter or depth attributes so it is not known whether they are critical. The extent of critical sewers does not currently include sewers that are critical because of their location, however this will be included in AIR10, which should improve the confidence grade of this line.

The company has assigned a confidence grade of A2 to line 3, which we believe is appropriate.

The company has assigned a confidence grade of C4 to line 4. The total length of critical sewers inspected by CCTV has been recorded, but the length of critical sewers inspected has not, so the company has had to make assumptions to calculate the entry for this line, resulting in a low confidence grade.

The company has assigned a confidence grade of A3 to lines 5 and 6, which we believe is appropriate.

The company has assigned a confidence grade of C4 to line 7 and 11. We expect that this will be able to be improved in future years once the methodology for calculating the length of critical sewers is further refined.

The company has assigned a confidence grade of B3 to line 8, which we believe is appropriate.

The company has assigned a confidence grade of A3 to lines 9 and 10, which we believe is appropriate.

The company has assigned a confidence grade of C5 to lines 12 and 13. This reflects the fact that the number of collapses and blockages are for both main sewers and lateral sewers, whereas the length of sewer is only the length of main sewers. Initial estimates are that the number of collapses/blockages per km could reduce by one third if the sewer length included lateral sewers. The length of lateral sewers is being estimated for AIR10, meaning that this can be included in the calculation for lines 12 and 13, allowing the confidence grade to be improved.

The company has assigned a confidence grade of B3 to line 14, which we believe is appropriate.

The company has assigned a confidence grade of C4 to line 15, which we believe is appropriate.

The Company has assigned a confidence grade of A2 to lines 16a and 16b. This has increased from the AIR08 grade of C4 as the latest data is based on actual NIEA classifications rather than the previously extrapolated data.

Confidence grade are maintained at B4 to lines 17a and 17b, the same as last year. Based on the additional checks carried out since last year we support this grading.

Confidence grades vary between A1 and A2 to lines 18-22. Since the data is pure direct measurement we support this grading.

8. Consistency Checks

- Lines 12 and 13 are consistent with lines 1-3 of table 16a and line 14 of table 16.
- [X].

9. Company Commentary

The Company has not addressed a number of issues that the NIAUR requires to be included in the company commentary, including:

- a method statement which explains fully how the company identifies and reports on sewer collapses in line 12 including an explanation of how the company distinguishes collapses from other essential repairs to sewers; and the context of the number of sewer collapses in relation to all sewer repairs

- identify rising main failures within line 12
- report on the proportion of sewers repaired as a result of planned CCTV surveys, as opposed to a more reactive approach

Date: 10 August 2009

Table 16a – Sewerage Service Serviceability Indicators**Commentary by REPORTER****1. Background**

This information in this table is required to measure the level of maintenance activity undertaken within a Company.

2. Key Findings

- NI Water's data recording and reporting now allows the separation of rising main failures and gravity sewer collapses, which was not possible in AIR08.
- It is still not possible to distinguish failures on laterals from failures on main sewers. The numbers in this table would be expected to be higher than those of other water companies (who are not responsible for laterals) for this reason.
- The company have reported a total of 10965 equipment failures repaired in this category, at a confidence grade of B2. Since this is the first year of reporting there is no comparative data for previous years.
- Recent systems improvements have been made which greatly improve the management and recording of M&E maintenance, failures and repair. Once fully bedded in, other developments are planned to further improve the capture and accurate reporting of equipment failure data and statistics.
- The data obtained so far is already being used to target improvements to the maintenance regime and other equipment improvements.
- It is too early to identify trends in the data, although the broad impression so far is that failures are stable overall.

3. Audit Approach

The responsibility for the compilation of table 16a is split between 2 system holders, each of whom was audited. The audit consisted of an interview with the line owners to discuss the methodology and data used to generate this table.

4. Audit Findings**4.1 General**

The Company has addressed a number of the issues raised in the AIR08 commentary, including improved data recording that allows separation of rising main failures from gravity main collapses, and the reconciliation of work orders against invoices for improved confidence in the data.

However there may still be some items that are being included in this table that should not be, including:

- collapses resulting from third party damage
- collapses or blockages on private laterals

We would expect the number of such events to be relatively small compared with the total number of collapses and blockages, however the ability to exclude these events would provide greater accuracy.

Of more significance is the fact that NI Water is responsible for most laterals, whereas their English and Welsh counterparts are not. We would expect blockages and collapses on public laterals to account for a reasonable percentage of the totals reported in table 16a, meaning that the numbers in this table can not be easily compared with other water companies. It would significantly improve the usefulness of the data in this table if the information could be broken down (in the commentary) to collapses or blockages on public main sewers and collapses and blockages on public laterals. Therefore the recommendation from the AIR08 reporter's commentary remains, that is to identify whether a collapse or blockage has occurred on one of the following:

- a private lateral or drain
- a public lateral or drain
- a public main sewer

4.2 Sewers – Maintenance (lines 1 to 4)

Rising Main Failures (line 1)

There were 25 rising main failures recorded in the reporting year. In AIR08 the data recording did not separate rising main failures so it is not possible to compare this to last year.

Gravity Sewer Collapses (line 2)

There were 1368 gravity sewer collapses recorded in the reporting year. This is approximately double the number of collapses reported in AIR08. While this is of some concern, it is difficult to draw strong conclusions until a consistent methodology is established over several years to see whether there is a trend, and it may reflect that collapses were under-reported in AIR08 because not all collapses were recorded on the mobile works management system.

Sewer Blockages (line 3)

There were 28010 sewer blockages recorded in the reporting year. This is approximately 60% greater than the number of blockages reported in AIR08. Again, it is difficult to draw strong conclusions until a consistent methodology is established over several years.

Equipment Failures (line 4)

Systems used for managing and recording M&E maintenance have recently been upgraded substantially and are operating well but still require some degree of bedding in, mainly related to remote field communications. Further development is required to enhance the ability of the systems to differentiate between failures which cause a detrimental impact on service to customers or the environment, and those which don't, and the Company is already reviewing actions in this area.

The Company has already made a substantial investment in this area and the systems already in place will provide an excellent foundation for future development. The company is already using the data being gathered to improve the performance of the equipment, and the service provided to customers and the environment.

5. Company Methodology**5.1 Rising Main Failures, Gravity Sewer Collapses, Sewer Blockages (lines 1 to 3)**

Network failure data is collated by the Networks Sewerage field managers using checked and paid invoices from the sewer maintenance contractor. The base data that is collected differentiates between rising main failures, gravity sewer collapses and sewer blockages. This data is submitted on a monthly basis to the three network area managers and then to the Networks Sewerage Business Unit.

This information is then compiled to give totals for the whole year.

The separation of rising main failures and the reconciliation of data against invoices represent improvements over the AIR08 methodology.

5.2 Specific methods (line 4)

The Company recorded the relevant information for this category in the Asset Maintenance Management System (AMMS) and the Mobile Work Management (MWM) system. In November and December 2008 all data was transferred to a new mobile work management system known as "Ellipse" Data is gathered on sewage pumping stations, terminal pumping stations, CSOs etc, but currently is not recorded for non-electromechanical equipment such as storage tanks or hydrobrakes.

The systems also are currently unable to differentiate between a pump failure and the outcome of that failure ie whether there was a detrimental impact. Pump blockages are also recorded even if the blockage was due primarily to a flash flood rather than an actual pump failure.

We asked for a description of the process which gathers the information regarding failure and repair to be illustrated by e.g. a pump failure and were advised as follows:

- Failure is recorded by either telemetry (approximately 90% of cases) or by a mobile operator site visit (10% of cases).
- Alert is passed to the Function Supervisor in the Work Control Centre. Details are passed out to the mobile technicians via the recently introduced 'toughbooks'. These are mobile laptops fitted with wireless communication and record details of the failure. The technician then completes the repair and records job completion and/or any further work requests.
- Data is passed back to the Work Control Centre and recorded via Ellipse.

We observed this system in operation in the company work control centre and believe that it provide a sound foundation for future developments.

5.3 Information Analysis

We asked the company if they were working towards an improved system for capturing the required and relevant data. The 'Ellipse' work management system and associated 'toughbooks' are greatly improving this, although communication issues with the latter need to be overcome in some areas.

We also asked if the new data was being used beneficially. The company is already using the improved data gathering to target problem areas with high failure rates to see if there are fundamental causes which can be addressed to reduce recurrences.

We enquired whether there was sufficient data to identify any trends in failures. The company advised that sewer blockage data was being captured from August 2008 and a package of data would soon be available to enable an initial assessment. The broad view was that of a stable position.

The Company is also using the failure data pro-actively to drive planned maintenance regimes. Thus high failure rates in equipment may result in an increased planned maintenance frequency, or vice versa. Also, more modern pump sets less prone to blockage and ragging are being reviewed and installed where appropriate.

The Company is introducing improved control systems where possible to prevent blockages. These systems detect increased motor electrical current usage from a partial blockage and instigate a brief temporary pump reversal to attempt to unblock the pump before full blockage occurs and intervention is required.

6. Assumptions

No significant assumptions to report.

7. Confidence Grades

The Company has assigned a confidence grade of B3 to lines 1 to 3. This is an improvement in confidence grade as a result of the improved reliability of the data due to cross-referencing with maintenance contractor invoices.

The Company has assigned a confidence grade of B2 to all of their data in this category. The data quality is good although there is some concern that data transfer from the old AMMS to the new Ellipse system in November and December last year may have introduced a few errors. Similarly failures from non-electromechanical systems are not recorded. Finally, there is some inability of the system to identify when a failure caused a detrimental impact to service. On this basis we support the confidence grade assigned.

8. Consistency Checks

- Line 1 is consistent with line 12 of table 16.

Reporting Requirements describes that

- line 2 = table 16 line 12 multiplied by table 16 line 14 divided by 1,000 minus table 16a line 1
- line 3 = table 16 line 13 multiplied by table 16 line 14 divided by 1000

These calculations do not derive to reported figures in lines 2 and 3. We discuss these issues in table 17c.

Date: 10 August 2009

Table 16b – Sewerage Service Serviceability Indicators**Commentary by REPORTER****1. Background**

This table illustrates sewage treatment works performance in relation to consent standards for biochemical oxygen demand (BOD), suspended solids (SS) and ammonia (NH₃). The performance estimate made enables the trend in performance to be identified and serviceability assessments to be made.

2. Key Findings

- The population equivalents for each STW used to derive size band (the basis of excluding size band 1 and 2 STWs) is that which was approved by Northern Ireland Environment Agency (NIEA) for 2008 for the purpose of sample scheduling. This differs from the population equivalents derived by NI Water for Tables 17b-f, which have been updated to reflect revised population estimates. This results in an inconsistency between this table and Tables 17b-f in terms of the STWs that have been considered for analysis. This is expected to have a relatively small effect on the results, however it would be preferable if a consistent population equivalent was used.

3. Audit Approach

The audit consisted of discussions with the line owner to understand the methodology, inspection of the data held within the Laboratory Information Management System (LIMS) and how this is extracted for the purpose of generating the data for this table, and review of the spreadsheet that is used to carry out the analysis for this table.

4. Audit Findings**4.1 General**

The Company has not counted those sites without the relevant numerical consent (BOD, SS, NH₃) in the number of excluded STWs (lines 2, 5 and 8), therefore the total number of STWs given in lines 3, 6 and 9 is the total number of STWs with numerical consents. These lines should include STWs with descriptive consents as well, such that the total number of STWs includes all STWs that NI Water is responsible for. This will have no effect on the results presented in lines 1, 4 and 7.

The population equivalent that has been used for calculating the size band of each STW is the population equivalent that was agreed with NIEA for 2008 for the purpose of sample scheduling (larger STWs are required to have more frequent samples taken). Population equivalents have not yet been agreed with NIEA for 2009. While we understand the rationale for using the 2008 NIEA-approved population equivalents, this creates an inconsistency between the STWs that have been excluded from the analysis

for being size band 1 and 2, and the number of size band 1 and 2 STWs in tables 17b-f. The reporting in this table for NIAUR is separate from the scheduling and compliance sampling and reporting that is carried out for NIEA. We recommend that, for future annual information returns, the population equivalents that have been used to derive size bands for Tables 17b-f are also used as the basis for excluding size band 1 and 2 STWs from the analysis for table 16b, to create more consistency between the tables. This is simply an initial screening process for the information that is used for Table 16b and will have no effect on the sample scheduling and compliance reporting that is carried out for the NIEA.

It is difficult to draw significant conclusions in terms of trends from a short data set, particularly as there is an element of randomness to the nature of compliance as acknowledged by the use of the poisson distribution (e.g. performance may have been poor due to a particularly wet season, or due to process upsets caused by abnormal trade effluent discharges). However, over a longer time period, trends will become more evident. Therefore it would be useful if the Company could include in their commentary graphs of predicted performance (i.e. the percentages given in lines 1, 4 and 7) versus Report Year, that can be added to year on year. This will give a useful visual representation of the results in Table 16b that will demonstrate the trend in performance.

4.2 BOD Performance

NI Water Only

Predicted performance for BOD for NI WATER only STWs ranges from 87.8% to 92.6%. These represent very small changes (increased for 95th percentile and decreased for maximum and mean) compared with AIR08.

PPP Only

Predicted performance for BOD for the 2 PPP sites is 100% for all categories.

Total

Given that there are only 2 PPP sites, they make up a very small percentage of the total number of STWs and therefore contribute a very small amount to the total performance percentages. As a result, the “total” results are almost identical to the “NI Water only” results, and the predicted performance for all sites ranges from 87.9% to 92.6%.

4.3 SS Performance

NI Water Only

Predicted performance for SS for NI Water only STWs ranges from 90.4% to 93.9%. These represent very small changes (increased for mean and decreased for 95th percentile and maximum) compared with AIR08.

PPP Only

Predicted performance for SS for the 2 PPP sites is 85.8% for the “maximum” category as a result of a “failure” (maximum value of samples greater than 2 times the maximum consent condition) at one of the sites in one of the years. Predicted performance for against mean and 95th percentile is 100%.

Total

Given that there are only 2 PPP sites, they make up a very small percentage of the total number of STWs and therefore contribute a very small amount to the total performance percentages. As a result, the “total” results are almost identical to the “NI Water only” results, and the predicted performance for all sites ranges from 90.5% to 93.8%.

4.4 Ammonia Performance

NI Water Only

Predicted performance for ammonia for NI Water only STWs ranges from 89.1% to 94.5%. These represent very small changes (increased for 95th percentile and decreased for maximum and mean) compared with AIR08.

PPP Only

Neither of the PPP sites have numerical ammonia consents.

Total

As neither of the PPP sites have ammonia consents, the “total” results are identical to the “NI Water only” results.

5. Company Methodology

The only change to the Company methodology this year is that results from 3 years have been used (in accordance with the guidance), whereas for AIR08 only 2 years of data was used.

The Company identifies all STWs that it is responsible for and downloads the current and historical consent conditions for each STW from LIMS, then excludes some from the analysis for the following reasons:

- no numerical consent (includes sites that only have urban wastewater treatment directive consents)
- size band 1 or 2
- insufficient data (3 years of data needed with 6 or more samples in each year)
- closed within the year

For the remaining STWs, the analysis is carried out in accordance with the guidance set out by NIAUR. The process is a mechanical one, and having reviewed the spreadsheet used to make the calculations, we can confirm that it does comply with the procedure set out in the guidance.

We can also make the following clarifications.

- sample data is downloaded from LIMS, which holds all test results
- tests are carried out by NI Water accredited laboratories
- information in LIMS has been through various quality control procedures, both in the laboratory and entering the data. Any results that are abnormally high are retested. If the second test supports the first test result, then the first result stands. Otherwise, with further evidence, the result is changed
- changes to results in LIMS are clearly identified with the original result, the new result, the date of the change and the reason for the change.
- only samples that were taken for regulatory compliance monitoring purposes are used in the analysis. Ad-hoc samples that might have been taken for other reasons (e.g. by operations for process monitoring) have not been included in the analysis
- the sample data is divided by the consent condition that was in place at the time that the sample was taken to produce a normalised value, therefore any changes to consent conditions are accounted for

6. Assumptions

Results that are “below the limit of detection” have assumed to be half the limit of detection.

7. Confidence Grades

The Company has assigned a confidence grade of A2 to the NI Water data. We believe this to be appropriate.

The Company left the PPP data without a confidence grade and discussed this during the audit. Their query was whether a confidence grade of B2 should be used because the PPP sample results are reported through the PPPs introducing an additional layer into the process where errors could be introduced. However, NI Water has access to the laboratory results for the PPPs and cross checks the results against these, so we believe that a confidence grade of A2 is appropriate for the PPP data.

A confidence grade of A2 is therefore also appropriate for the “total” data.

8. Consistency Checks

Line 3 (NI Water only) in the Company's submission does not consist with table 15 line 8. The Company explained in its commentary that a number of sea outfalls is not included in table 15 line 8. We discuss this issue in detail in table 17c.

Date: 10 August 2009