Northern Ireland Water Ltd

Annual Information Return 2011 To the Northern Ireland Authority for Utility Regulation



Public Domain Version

Part 3 of 10 containing:

Non-financial measures - commentaries for tables 7 to 16b (excluding table 10b)

Reporter's Submission

By

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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

- The Company provided a methodology statement used to derive the estimates reported in this table and using this statement we were able to reconcile the property numbers reported to the Rapid extract presented by NI Water.
- The Company has continued its non-household metering programme which has included surveying and installation of meters in 1,000 unmeasured non household properties. This has led to a decrease in the number of unmeasured non-household properties.
- The methodology is consistent with that used in AIR10, with the exceptions that the number of unconnected properties is now obtained from the Company's own property database (RAPID) and the population estimates are derived from the revised (2008) NISRA projections.
- NI Water has assigned confidence grades to the population data reported in Table 7 of AIR11. Whilst we feel NI Water has made a reasonable estimate of the confidence grades, based on an understanding of the NISRA methodology, we do not consider this provides 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 holders 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 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 various means including 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 test metering project. During the audit we sought an update on various issues which had been raised in previous AIRs and PC10 reviews. The following provides an overview of the discussions held with NI Water:

Test Meters

NI Water outlined that their test meter project is ongoing with accounts being assessed and reclassified as appropriate. The Company advised that of the 11,500 accounts identified on the Rapid system in AIR10, circa 1,738 still need to be surveyed or investigated.

NI Water also advised that a contrasting approach has been adopted in reporting household and non-household property numbers, whereby 'test' meter numbers have been included in household property numbers but excluded from non-household numbers. This methodology is consistent with the Company approach in recent PC10 submissions and AIR10.

Site Meters

The Company explained that as part of their ongoing data checks the number of site metered properties (multiple properties being charged through a single meter) is currently being investigated and verified. To ensure these are not double counted the Company has excluded these meters from their Table 7 property counts. We understand this approach is consistent to that adopted in AIR10.

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. We confirm the total number of connections reported in this line is consistent with the extract from Rapid provided by NI Water.

We note a slight increase of 291 new connections when compared to the 09/10 Report Year. NI Water outlines that they believe this increase is associated with a slow economic recovery and that this will continue for the next few years.

We noted the Company audit trail included measured and unmeasured properties and, given that all new properties are metered, queried this. NI Water explained all new properties have meters installed but delays in the installation process may lead to these properties being reported as measured properties on Rapid. We believe this to be a reasonable explanation but have not in the time available been able to verify the status of newly connected household properties on Rapid. We will revisit this in AIR12.

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. We confirm the total number of connections reported in this line is consistent with the extract from Rapid provided by NI Water.

We note a slight increase of 12 new connections when compared to the 09/10 Report Year. NI Water outline that they believe this increase is associated with a slow economic recovery and that this will continue for the next few years.

	AIR11 (000's)	PC10 2010/11 (000's)	PS 2010-11 (000's)
Unmeasured Household	663,353	647,424	
Measured Household			-
Unmeasured non-Household	13,648	12,945	12,553
Measured non-household	68,713	70,565	70,359
Void Properties	51,290	40,572	

Note that the figures for AIR and PC10 are annual average while PS is a year end figure. The divergence from PC10 estimates is largely a result of methodology changes since the estimates were made in 2009. Nevertheless, measured non household estimates across the three submissions are reasonably well aligned with relatively small percentage differences.

4.3 Billing

Line 3 – Households billed unmeasured water

We note a increase of 8,728 properties reported in this line since 09/10. The Company was able to demonstrate the consistency of the number reported in this line to extracts from records on Rapid.

This line is calculated as the average of occupied domestic unmeasured plus the properties where a test meters has been identified.

In reviewing the Company's audit trail we noted a minor discrepancy in the number reported in the methodology statement and believe the figure as at 1 April 2010 should be 658,436 rather than 658,438.

Line 4 – Households billed measured water (external meter)

Whilst NI Water has been installing meters on all new household connections since April 2008, customers are not being charged on a measured basis. As such, all household properties should be reported as unmeasured.

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. The Company does install internal meters on household properties but these are not charged upon.

Line 6 – Households billed water

This is a calculated line, the sum of lines 3, 4 and 5. The figure reported represents the number of domestic properties that would have been billed had charges been introduced.

The increase observed is consistent with the rise in unmeasured household properties reported in line 3.

Line 7 – Household properties (water supply area)

We note that the number of household properties connected in the Company's water supply area has increased by circa 9,820 since 2009/10. The Company calculated this number as the total number of domestic connections (including voids) less those customers who are connected for sewerage only or receive water from well supplies.

Line 8 – Non-households billed unmeasured water

As expected we note that the number of non-households billed for unmeasured water within the supply area has decreased slightly by circa 2,400 (18%) during the year.

The decrease observed is also a result of the Company's non-household metering programme. We reviewed the Company's progress in delivering this programme and our commentary on this is provided in Table 8.

Line 9 – Non-households billed measured water

We note that the number of non-households billed for measured water within the supply area has slightly increased by 47 properties since 2009/10. According to PC10 business plan agreement the Company has targeted 1,000 higher consumption NHH properties for meter installation, and they have achieved at 1,071 (please see Table 8 commentary for the detail), thus we would have expected to observe a corresponding increase in the number of measured properties reported in this line. However, this increase was not fully evident in this line.

Line 10 – Non-households billed water

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 decreased by 2,962 from 09/10. Similarly to line 7, this number is calculated as the average of gross non-domestic, less those customers who do not receive a water supply or are connected for sewerage only. As reporting methodologies become embedded over time we would expect the number of properties reported within this line to remain relatively consistent over time.

Line 12 – Void properties

The number reported in this line has remained relatively consistent from that reported previously in AIR10. NI Water defines properties within this line as those which are connected to the distribution system but do not receive a charge as there are no occupants.

The Company has calculated this line for AIR11 as the sum of domestic and nondomestic voids, less properties reported as not receiving a water supply and non domestic site meters and test meters.

4.4 Population

Total population is derived from 2008 based population projections obtained from the Northern Ireland Statistics and Research Agency (NISRA), which are provided for the year ending 30th June. In order to comply with the Utility Regulator's guidelines, NI Water report a mid year average population for Table 7. For AIR11, NI Water has extrapolated between the June 2010 and June 2011 estimate, in order to derive a September 2010 (mid year) estimate of 1,798,480. This population is then assigned to the various categories required for Table 10 using the approach outline below and summarised in Figure 7.1.



Figure 7.1 Population Estimates

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 AIR11 the Company has revised the methodology used to estimate the population in unconnected properties. This line is now derived from the RAPID database number of unconnected properties of 7,994 and a revised occupancy estimate of 0.866. The occupancy estimate is taken from the NIHE Housing Condition Survey (completed in 2009, but not updated in time for AIR10).

The non-household population is based on the population associated with measured farms and the population in communal residence. The communal population (30,690) is based on the latest NISRA 2008 based Census estimate, which shows a small (1%) increase from the estimate used in AIR10. The communal population is split between unmeasured and measured on a pro-rata basis consistent with the

measured non-household split reported in lines 8 and 9, after excluding farms. The split is 73%:27%, which results in 8,286 being assigned to unmeasured non households (line 15) and balance of 22,403 being added to the measured non-household. The unmeasured non-household population has decreased by 450 (5%) from AIR10.

The farm population is derived from the number of metered farms (32,551) from RAPID and the average NI occupancy rate (2.5), giving a total 81,378. The total measured non-household population is the sum of communal measured population and the farm population giving at total of 103,660 (line 16). This value shows an increase of 8,330 (8.7%) over the value reported in AIR10

Unmeasured household population is reported as the balance when the nonhousehold population (farms and communal properties) is deducted from the total connected population, giving a value of 1,688,410 (line 13). This is a 440 (0.03%) increase from the AIR10 value.

5. Confidence Grades

5.1 **Properties**

The confidence grades assigned are aligned to those agreed during the Undertaking A review. We still believe that there are a number of weaknesses within the Company's methodology but that these are reflected in the confidence grades assigned.

The Company explained that they are currently running a Diamond system report to generate the equivalent figures for the current year. We propose to comment on this change in our AIR12 work.

5.2 Population

As we reported in AIR09 and AIR10 we do not consider it reasonable for NI Water to be required to provide confidence grades against population estimates as we do not feel this provides 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.

Northern Ireland Water

6. Consistency Checks

In E&W, a number of void properties is consistent with the following calculation: (Line 11 - Line 10) + (Line 7 - Line 6) = Line 12

If we carry out the same calculation, this will be as follow: (99.674 - 82.361) + (702.825 - 663.353) = 56.785

whereas the line 12 is 51.290 (11% difference).

According to the Reporting Requirements the total population (line 17) should be identical to the total population reported in Table 10A (column 11); a minor inconsistency was identified in the Table 10A population which is reported in our commentary for that table.

Date:29 July 2011Prepared by:HMS

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 good progress with metering of non-household customers.
- The Company has also made good progress in meeting the targets set out within Appendix 19 of their response to the draft determination. A total of 1,017 installations have been reported against a target of 1,000.
- The Reporting Guidance is unclear as to where meters that are installed in a new boundary box should be recorded, as this does not fall within the definitions of lines 9, 10 or 11. The Company currently includes these meters within line 9 *Meters installed externally within an existing boundary box.*
- The Company has improved its process for completing line 12, the *number of meter installation requests outstanding for greater than three months*, we therefore support the improvement in the confidence grade from C3 to B3.

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

The Company confirmed its metering policy:

- <u>Household</u>: 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.
- <u>Non-household</u>: metering of all non-household customers where possible.

NI Water has been increasing its meter penetration across its non-domestic customer base through selective metering or customer optants. The Company also reports that it has metered in excess of the target of 1,000 large volume non-domestic customers as outlined for 10/11 in Appendix 19 of their response to the draft PC10 Determination. Further commentary on these installations is provided below.

4.1 Block A - Household Installations (lines 1 to 6)

Within line 1 of the table the Company have reported the number of meter installation at new domestic properties. The number of installations reported (4,427) is circa 7% less than the number of new domestic properties reported in Table 7. We believe this is potentially due to the significant time lags between carrying out metering activity and recording. The Company confirmed that all domestic meter installations are made within an existing boundary box. Table 8 refers to meters fitted (from the works management system) whereas Table 7 refers to properties added to the billing system.

4.2 Block B – Non-household installations (lines 7 to 12)

Line 7 – Selective Meters Installed

The Company report that 1,071 meters were installed under this category.

We found that the vast majority (1,017) of the meters installed relate to the properties identified with the Company's Appendix 19 response to the PC10 Draft Determination. Within this submission NI Water committed to metering an additional 1,000 large non-domestic properties before the end of 2010/11.

The remaining meters were installed as a result of the metering of 28 new large diameter connections and 26 other installations performed by metering section staff.

Line 7a – Number of non-household meters renewed

NI Water report that 5,814 meters were renewed during the Report Year and provided a copy of their audit trail to support this figure. We undertook a detailed audit of the non-household meters renewed proactively and identified a minor error in the data for this component where the renewal date was recorded incorrectly. This resulted in a correction from 1,343 to the 1,348 as used in the calculation in the final table submitted.

We found that the Company currently assumes the lifespan of a meter to be circa 17 years and where a meter is removed for testing (and replaced with a new meter) then this would count as a renewal and reported within this line.

Line 8 – Meter Optants installed

The Company reports that 40 non-household customers opted to have a meter installed.

During the audit we queried how the Company promotes the optant scheme to customers and NI Water advised that whilst there is no formal promotion campaign, agents should be aware of the scheme and be able to process applications if requested by the customer.

Line 9, 10 and 11 – Meter Location

Within these lines the Company report the location of the meters they have fitted. NI Water's preference is to fit meters externally where possible but a number of installations have been reported as internal fits.

We confirm that total number of meter installations reported in line 7 and line 8 equals

the number of meters reported in lines 9, 10 and 11. We undertook a detailed audit of line 9 and can confirm that an audit trail exists for the 779 meters installed externally within an existing boundary box. This line also includes installation of meters where a new boundary box needs to be provided.

We undertook a detailed audit of line 11 and can confirm that an audit trail exists for the 304 meters installed internally.

Line 12 – Meter installations requests outstanding greater than three months

In total the Company reports that 27 installation requests were outstanding for greater than 3 months. NI Water advised that a small number of requests may take an extended period of time due to the complexity or type of installation required. We queried the source of the 27 installations reported and the Company representative provided a spreadsheet to support this value, which we were able to review in detail. This is a significant improvement from AIR10 where this line was an estimate based on the company's understanding of the metering programme rather than a documented evidence source.

4.3 Water demand at recently metered properties

We met with NI Water to discuss their methodology to report this volume and they were able to demonstrate how the figure reported had been derived. We found that using a report generated from Rapid the Company had extracted all recently metered property data where readings had been taken. Using data from 654 records the Company has taken the total consumption and calculated the volume reported. We have checked NI Water's calculation of this volume and confirm it appears reasonable and is consistent with the audit trail supplied.

We also reviewed the Company's methodology and note that they have included existing (not new) meters which have less than 10 cubic meters consumption. The figures excluded the meters which have no meter reference number against the property record, and the meters which the consumption was zero. We believe this is reasonable as the inclusion of any of the components would skew the estimate made.

5. Company Methodology

5.1 Meter Installations

We found the number of meters installed, and reported in Table 8, is derived from the Company's contractor's records. During the audit we discussed the process by which meter installations are requested and raised and the interaction between the Company's various systems and Directorates. The following provides an overview of these discussions:

• Customer driven new connections are processed through the Customer Services Directorate and a job request is raised on the Company's Work Management System and closed once the connection is complete.

- For new connections and selective metering, the Company raises an order with their metering contractor who surveys and installs the meter at the requested property.
- During the first half of the reporting year the metering contractor returned the results of the meters fitted and the Company checked 5% of the records for accuracy. In the second half of the year there was a change of contract and metering contactor and the company performed a 100% check on the data returns.
- Before uploading the details of the meter installation to the billing system the Company must obtain the co-ordinates of the meter installation. The Company advised that in the first half of the report year there was currently a minimum 4 week duration between installation and the co-ordinates of the meter being obtained. In the second half of the year there was a change of contract and metering contractor and this was reduced to one week.

NI Water provided sample copies of the contractor's spreadsheets which contain a list of meters installed between from April 2010 to March 2011 and were used to audit specific calculations within this table.

5.2 Water Demand at recently metered properties

The Company base their estimate on billing data held in Rapid. We reviewed the Company's audit trail and believe the methodology adopted is appropriate to meet the Reporting Requirements.

6. Assumptions

Except where noted above we do not believe there are any material assumptions to report.

7. Confidence Grades

During the audit we discussed the confidence grades assigned and the Company's rationale and in the majority of cases we concur with the grades assigned to each line. Lines 7, 7a and 8 have seen an improvement since AIR10, but we do not, however, feel that this improvement is sufficient to merit moving from B2 to A2 at this stage.

Due to the improvements in the data supporting line 12 we agree with the Company's view that B3 is now appropriate, an improvement from the C3 at AIR10.

8. Consistency Checks

The numbers reported in this table are used to complete lines 24a, 25, 25a, 26 and 26a in Table D; we confirm the numbers in Table 8 and Table D are consistent.

Date:29 July 2011Prepared by:HMS

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 Findings

- Overall improvements in water quality and OPI, largely due to the completion of further improvements of PPP 'Alpha' works.
- No existing or new 'Legal Instruments of Work' or Authorised Departures for distribution input in affect at the end of the Report Year.
- Further improvements to plumbosolvency with 99.55% zonal compliance with the current 25µg/l target limit for lead.
- Declaration of 4 CPEOs covering THMs, Aluminium and MCPAs.

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 no significant 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 (which is not explicit in the Company's commentary). For calculation purposes, the total average daily input applied to the 2010 calendar year is 628.36MI/d, only a slight increase from the 2009 figure of 623.06MI/d. We verified this and individual inputs against the source flow data.

This year, NI Water report a further improvement in the overall Mean Zonal Compliance to 99.81%, largely attributing this increase to the recent THM improvement works at Seagahan WTW. The success of these works is illustrated graphically by a chart included in their commentary and is good evidence of recent improvements being achieved.

Following a decline in performance last year, the Operational Performance Index has increased to 99.08%, although NI Water are disappointed this could not have been

higher due to a single exceedence at Gortlenaghan Borewell which skewed the figure significantly downwards due to the relative proportion of the incident compared to the small number of samples taken at the site (registering a 25% failure weighting for the site based on 1 out of 4 samples failing).

The results are supportive of the claim last year that the overall decline was largely due to a discrete cluster of failures rather than any general deterioration in service and we are hence satisfied that this appears to have been the case.

For the purposes of reporting in Table 9, the Company continue to report a distribution input at Forked Bridge WTW even though the actual site was 'mothballed' in 2009 with flows supplied via the trunk main from Castor Bay WTW. NI Water confirmed that flows are not 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, this has no impact on the overall line totals and hence we have no real concerns with this approach.

As in previous years, NI Water have continued to conglomerate some Water Supply Zones (WSZs) with the resulting decrease in number of WSZs this year to 55 from 60 in 2009. When challenged, NI Water advised that these changes were largely as a direct result of the closure of several borehole sites and the need to align the zones to suit the new supply arrangements. In addition, we note that a further rezoning has been carried out as noted in their commentary to provide a more logical breakdown of zones based on the current operational WTWs and define more zones in the more densely populated areas. Whilst this could in theory impact the change to the line totals in Line 4 and 5, there are no legal instruments to report this year and hence the values are both zero. We are therefore satisfied that this change has not materially affected the line totals this year.

Sites decommissioned during the year are not included, although we note that this has had no impact on the line totals 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.

We challenged NI Water to explain why they believe they have not needed any new legal undertakings for the last 3 years. They believe that this has been achieved through good communication and an open and honest relationship between NI Water and the DWI. Specifically, NI Water advised us that they provide monthly reports and hold quarterly meetings with the DWI to discuss potential issues. They also try to be pro-active in their approach targeting early identification of potential

issues through analysis of 50% and 75% exceedence levels, not just actual exceedences.

We therefore remain satisfied that the Company appears to be taking timely and appropriate action to identifying and resolving problems and that they are working in full co-operation with the DWI.

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

Following the expiry of the two Authorised Departures at Lough Bradan and Lough Macrory during the Report Year, the reported Line 1 total of zero is confirmed as the correct summation of the volumes of distributed water affected for all legal instruments still in place on 31st December 2010. NI Water confirmed that there are no other legally binding instruments in place.

Of the 2 Authorised Departures that expired during the year, both related to THMs and have largely been resolved through the completion of improvements at Lough Bradan WTW.

The volume from each WTW 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, Article 31s or other legal instruments have been agreed 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. As there are no Authorised Departures in place at the end of the Report Year, the total is 100%.

We reviewed the data behind the line totals and can confirm that the calculations appear correct and accurate. The Company have also included details of the expired Authorised Departures in their commentary for clarity.

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 any Authorised Departures applied to the distribution system and still in effect at year end. The Line 4 total is therefore correctly reported as zero.

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. In accordance with the guidelines, properties within each WSZ have been only counted once.

4.5 Nitrates and Pesticides (Line 6)

As detailed in the Company's commentary, the Authorised Departures at Altmore WTW and Lough Braden WTW relating to pesticides expired in 2009 and hence the line total is correctly reported as zero.

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 their treatment works to control plumbosolvency in the distribution system. This affects almost all water entering supply with the exception of the small number of remaining 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. This year, NI Water have agreed with DWI the reduction of the dosing rates at a number of sites where the Company believed some rationalisation could be applied. NI Water confirmed that these reductions have had no significant impact on the number of failures and that they remain committed to working with the DWI towards achieving the future lead target of <10µg/l in all zones by the end of 2013.

We reviewed the overall performance of the dosing with NI Water who informed us that total number of sample failures above the lead target of $10\mu g/l$ has continued to decline from 106 in 2009 to 69 in 2010 and with only 2 failures above the current $25\mu g/l$ limit. This represents an overall zonal compliance of 99.53% (based on a total sample base of 424). To illustrate the Company's continuing improvement in lead performance over the last few years and put the changes into perspective, a chart tracking the ongoing percentage of lead failures is presented in Figure 4.1 below.

The Company has not reported changes to existing measures at any site. Although the closure of sites such as Alcrossagh during 2010 will have affected the figures, the change in the Line 7 total is primarily due to fluctuations in average daily flow volumes rather than any direct change. 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 Company's borehole sites where orthophosphate dosing is not applied.



Figure 4.1 – Percentage of Sample Failing Lead Performance Targets

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)

There were no legal instruments in place at the end Report Year for *Cryptosporidium* and hence there are no contributory zones to Line 8. The total is therefore correctly reported as zero.

Prior to 2009, NI Water included all distribution input in Line 8 where there was a need for a risk assessment as agreed with the DWI. As pointed out in the Company's commentary, these are now captured under other areas and are currently being separately assessed by the DWI.

4.8 Other Parameters (Line 9)

Following clarification with NIAUR, NI Water have declared 4 Consideration of Provisional Enforcement Orders (CPEOs) within this line. Checks confirmed that all CPEOs were in place at the end of the Report Year. NI Water have included site specific details in an appendix to their commentary which clearly illustrates the requirements and progress at each site. Having reviewed and discussed the details with the Company, we are satisfied that they have undertaken appropriate actions to rectify the issues, primarily through the closure of Altmore WTW and the imminent completion of targeted works at Derg and Carmoney. We therefore understand that Killylane (THMs) is the only CPEO not expected to be shortly closed and that progress remains to the satisfaction of the DWI such that NI Water do not foresee any requirement for escalation of the issue.

5. Company Methodology

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

The Company uses 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 previously questioned this approach and recommend consideration of an annually averaged value for any site with active legal instruments still in place at year end. We note that due to the number of legal instruments still in place, this has no impact on the figures for this year.

The totals in lines 4 and 5 relate to percentage population in WSZs and so are based on estimates of total number of people per WSZ using the Company's GIS systems to derive the number of properties in each zone.

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. The Company also utilise a factor to estimate population from the property count based on external statistical data. As the calculation for the line total is based on proportions, this factor is largely irrelevant, although it can impact the zonal size limits and required sampling rates.
- 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:29 July 2011Prepared by:HMS

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.
- The Company highlighted the extreme freeze/thaw event and weather conditions from late November 2010 to January 2011 which had a significant impact on supplies. The company has undertaken additional analysis this year to separate exceptional customer night use from leakage. We have reviewed the leakage trend through the Report Year and can confirm that, until November 2010 the company was on track to achieve a level of leakage below the target of 175 Ml/d.
- A high level comparison of nightline suggests that without an additional nightuse allowance leakage would have been reported at ca. 182 Ml/d, whereas with the robust analysis presented during the audit the best estimate of leakage is ca 177 Ml/d. This suggests that the freeze/thaw event led to an increased leakage of ca 2 Ml/d and increased night-use (including plumbing losses) of ca 5 Ml/d. This ratio of 29% to 71% is consistent with the analysis reported in *Report of the investigations into the Freeze/Thaw incident 2010/11* by the Utility Regulator.
- AIR11 is the first full year of reporting following an ambitious two-year programme to improve the robustness of most components of the water balance.
- The Company has provided a detailed commentary on the water balance for AIR11.
- For AIR11, the pre-MLE estimate of distribution input (627.50 MI/d) exceeded the sum of the components of the water balance by 26.06 MI/d (4.15%), which is within the 5% threshold set by the Utility Regulator.
- 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), 45 (AIR09) to 88 (AIR10) to 97 (AIR11) for the dry year average planned Levels of Service (LoS) conditions.
- The SOSI has been calculated by reference to figures contained within the draft Water Resources Management Plan, which has not been audited. Full details on the changes in the SOSI base data from previous years, and the consistency with the DWRMP is presented in our Commentary on Table 10a.

3. Audit Approach

The audit consisted of an interview with the system holders and a review of documentation, systems and data used to generate the water balance for AIR11.

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, particularly exceptional night use allowances.

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.

There was an extreme weather event during the Reporting Year. Between November 2010 and January 2011 the weather was extremely cold, which the Company has demonstrated was the coldest winter period in the last 100 years. During December 2010 there were the highest numbers of air frost days in over 50 years. A record low of 18.7°C was recoded at Castlederg on 23 December 2010. The thaw occurred suddenly, with a 21°C increase overnight on 26/27 December from -14.6°C to +6.8°C. We have reviewed the impact this event had on Distribution Input and Leakage, and on the actions taken during the period to maintain supplies and manage the increase in leakage. We have also reviewed the conclusions of the Utility Regulator's Report into the incident.

We discussed the leakage trend through 2010/11 in detail, and can confirm that we concur with the Company that it was on track to achieve its leakage target until the un-expected increase in December 2010. The company has improved its analysis of night use allowances to calculate specific allowances for December 2010 and January 2011 to account for the exceptional circumstances (particularly the impact on plumbing losses).

During the AIR10 reporting year NI Water completed a comprehensive two-year programme to improve the robustness of most components of the water balance. AIR11 is the first full year since the completion of these studies, however the full benefits will not be realised until the company implement its new leakage management software. We expect to see continued improvements in data quality of most components of the water balance as the time-period of available data increases.

4.1 Overview of Water Balance

NI Water has reported an annual average leakage of 176.97 MI/d at year-end, a decrease of 9.98 MI/d from that reported for AIR10, but still 1.97 MI/d above its target of 175 MI/d. We confirm that we have reviewed the trend in leakage through 2010/11 which shows that the Company was on track to meet their target until November 2010. The severe weather from late November 2010 through to early January 2011

caused a major incident, with a combination of bursts on company and customers pipes and internal customer plumbing losses leading to a peak in distribution input of 861 Ml/d on 30 December 2010. Distribution Input and leakage had recovered to normal levels by April 2011.

Component		AIR10		AIR11		Variance	
	Initial Estimate (MI/d)	Accuracy (%)	Final Estimate (MI/d)	Initial Estimat e (MI/d)	Accuracy (%)	Final Estimate (MI/d)	for the year (MI/d)
Measured HH Consumption	0.00	10	0.00	0.00	10	0.00	0.00
Measured NHH Consumption	125.11	10	127.02	132.41	10	134.71	+7.69
Unmeasured HH Consumption	299.12	10	310.06	305.72	10	318.04	+7.98
Unmeasured NHH Consumption	11.35	15	11.38	9.02	15	9.04	-2.34
SPL	46.31		46.31	46.31		46.31	0.00
DSOU	4.78	25	4.80	4.64	25	4.66	-0.14
Water taken unbilled	28.79	25	29.43	27.42	25	28.04	-1.39
Top Down Leakage	202.57			194.60			
Distribution Input	625.41	2	623.24	627.50	2	625.15	-1.19
Bottom Up Leakage	178.12	15	186.86	168.54	15	176.97	-9.90
Water Balance Variance	24.45			26.06			

The Company has therefore missed its leakage target of 175 MI/d by 1.97 MI/d.

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.

4.2 Water Delivered – Volumes

4.2.1 Measured Volumes (lines 1 to 3)

Line 1 represents the average volume of water delivered to households which is measured. Legislative changes and deferral of charging by the Northern Ireland Assembly in March 2007 means that household customers are not issued with bills for water usage. Therefore no value is reported for billed measured households, which is consistent with AIR10.

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 measured non-households has increased from 127.02 MI/d to 134.71 MI/d. The number of measured non-households has increased by 47 properties (as reported in Table 7).

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 undertaken during AIR10, a Company specific value of 8.33% has been added.

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

4.2.2 Unmeasured Volumes (lines 4 to 6)

Line 4 - 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.

Line 5 - 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 211.65 m³/yr was derived (223.57 m³/yr in AIR10). This estimate includes an allowance for the freeze/thaw event (0.65 MI/d, 0.05 m³/prop/yr)

This estimate of PPC is then multiplied by the total number of connected unmeasured non-households (excluding voids) and adjusted for MUR (8.33%) to derive a total volume of 9.04 MI/d (a reduction of 21%). We consider this to be an appropriate means of deriving unmeasured non-household consumption.

The per-property consumption has decreased slightly (5%) from the value reported in AIR10 and consistent with the values reported by Water Companies in England & Wales.

4.3 Water Delivered Components

4.3.1 Unmeasured Water Delivered per Property (lines 7 & 7a)

These are calculated lines.

The estimated volume of water per unmeasured household (UHH) was based on estimates of unmeasured PCC, occupancy rate, SPL and the number of UHHs. We checked the basis of the calculations and for consistency between water delivered (line 5), the water delivered per unmeasured household (line 7) and the number of unmeasured non-households (Table 7, line 8) and found the results to be consistent.

4.3.2 Unmeasured per capita consumption (lines 8 & 9)

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 107 discrete areas (predominantly cul-de-sacs of similar property types). 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.

Over the previous two years NI Water has undertaken significant investigation into the properties within the monitor sites, with 100% of the properties having been surveyed during 2008/09, with a further 30% during 2009/10 and 20% during 2010/11 as part of an on-going programme to ensure the monitor remains up to date. Most customers within these areas are therefore acutely aware that their consumption is being monitored. The Company has therefore added 1.5% to the recorded consumption (Hawthorne Effect). We consider this small adjustment appropriate.

The occupancy rate for the PCC monitor of 2.26 is consistent with that quoted by NISRA in its latest population update, which further confirms the validity and value of the work undertaken.

NI Water has sought to continue 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.

We checked for consistency between the billed unmeasured HH water delivered (line 4) and the PCC (line 8) and found the calculations to be consistent.

In order to determine an overall average PCC value for the region, NI Water has employed a multi-regression analysis. 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 AIR11, a pre-MLE unmeasured household PCC of 144.74 l/h/d (141.47 l/h/d for AIR10) was calculated.

For AIR11, NI Water has reported a post-MLE estimate for unmeasured PCC of 164.19 l/h/d, which includes an adjustment for meter under-registration. This represents a 3.6% increase on that reported for AIR10 (158.41/h/d).

4.3.3 Supply Pipe Leakage (lines 10 to 13)

For AIR09 NI Water re-assessed its supply pipe leakage using the latest best practice principles, described in UKWIR Report "Towards Best Practice for the Assessment of Supply Pipe Leakage". The same approach was used for AIR10. More robust data was obtained for repair times and run times. The numbers of bursts was updated to the 2009/10 values. Company specific values were derived for AZNP and hour:day factor (see below). The estimate of supply pipe leakage for the AIR 10 Water Balance was 46.31 MI/d; this value has been retained for AIR11.

Application of the UKWIR methodology to a combination of NI Water specific data and UKWIR default values resulted in an estimate of 62.03 l/pr/d for unmeasured households and 31.01 l/pr/d for other customer types.

To allow consistent like-for-like comparison NI Water has agreed with the Utility Regulator to keep supply pipe leakage constant through the PC10 period. This is likely to have significantly under-estimated supply-pipe leakage as a result of the freeze/thaw event.

4.3.4 Meter Under Registration (MUR) (lines 14 & 15)

The MUR estimates are the same as AIR10:

- Household MUR of 7.39%.
- non-household MUR of 8.33%.

4.3.5 Distribution System Operational Use (line 16)

As was the case for AIR10, NI Water has undertaken a comprehensive assessment of DSOU for AIR10. 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 volume derived for AIR11 was 4.64 Ml/d pre-MLE (4.78 Ml/d for AIR10). The components, assumptions and approach are largely unchanged since AIR11 and are not considered to materially impact on the leakage estimate.

4.3.6 Water Taken Unbilled (lines 17 to 19)

Water taken legally and illegally unbilled was based on a variety of different

components. We found that the assessment of unbilled consumption is broadly consistent with that used for AIR10, although the Company has continued to work to ensure all components of unbilled consumption are identified, which has resulted in a number of changes. The value reported for AIR11 (28.04 MI/d post MLE) is circa 5% lower than the value reported for AIR10 (29.43 MI/d post MLE).

NI Water has made a continuing effort to obtain a better understanding of all unbilled consumption components and has derived a relatively robust list of sources of unbilled consumption.

4.3.7 Water Delivered (potable/non potable) (lines 20 – 23)

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).

NI Water has no customers eligible for billing at non-standard rates (line 22).

4.3.8 Total Leakage (lines 24 & 25)

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 (~1,070 in total) covering 99% of properties, from which MNFs are obtained to assess DMA leakage.

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 2.00am and 6:00am.

To ensure consistency between reporting years the AIR10 estimate for household night use of 2.42 l/prop/hr has been used. However, to account for the plumbing losses evident during the freeze/thaw event night use allowances of 4.08 l/prop/hr (December 2010) and 3.05 l/prop/hr (January 2011) were used in the two months of the event.

Likewise, to ensure consistency between reporting years the AIR10 estimate for nonhousehold night use of 8 l/prop/hr has been used. However, to account for the plumbing losses evident during the freeze/thaw event night use allowances of 13.51 l/prop/hr (December 2010) and 10.26 l/prop/hr (January 2011) were used in the two months of the event.

We reviewed the analysis undertaken to derive the night use allowances in these exceptional months and consider it to be reasonable and robust.

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.

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.

The analysis that is possible on night-lines using nonHH night use, DMA specific hour:day 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.

The Reporting Guidelines present a specific calculation for line 25, which is not followed by NI Water; the company's commentary explains the different leakage values that would be derived if the guidelines were followed. We concur with the company's conclusion that the value entered in line 25 is an accurate representation of total leakage for the report year.

4.3.9 Distribution Input (line 26)

For AIR11, NI Water has reported a pre-MLE DI of 627.50 MI/d, some 2.09 MI/d above the pre- MLE DI reported in AIR10 of 625.41 MI/d.

We reviewed the DI profile for NI Water for the report year, which highlighted an unusual demand profile. For both AIR10 and AIR11 NI Water appeared to experience peaks in May/June and December/March rather than a summer peak in July/August as normally expected.

The peaks in December 2010 and January 2011 due to the adverse weather can also be seen clearly.



4.3.10 Bulk Supply Imports/Exports (lines 27 & 28)

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 168.54 Ml/d for AIR11. The integrated flow method as applied by NI Water has produced an imbalance of 26.06 Ml/d, resulting in a final reported leakage figure of 176.97 Ml/d.

We note that the accuracy estimates applied to individual components used in the MLE are identical to AIR10.

For AIR11 there is sill a significant level of uncertainty, particularly since the planned new leakage management software has not been implemented (which has limited the improvements to the application of DMA based NHH night use, validity checks and availability of data).

As such, we agree that an accuracy estimate of $\pm 15\%$ to be appropriate for AIR11, 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) to 88 (AIR10) to 97 (AIR11) for the dry year average planned Levels of Service (LoS) conditions. Changes primarily result from revisions made during the analysis to support the development of the Draft Water Resources Management Plan (DWRMP). We have checked for consistencies with the DWRMP, although we note that this has not been audited at this stage.

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 the 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 that, as stated in the DWRMP, this is not appropriate for NI Water.

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 C4 for unmeasured non-household PPC.

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 107 dead-end sites are utilised and the monitor does not fully comply with the UKWIR report "Best Practice for unmeasured PCC monitors" 1999. With the recent improvements to the PCC monitor we consider a reliability grade A may be appropriate in the future

For AIR11, NI Water has reported a confidence grade of B4 for Total Leakage. We confirm that the Company estimates 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. We believe an accuracy band of 3 may be appropriate once NI Water commission its new leakage management software in the near future.

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 an improved confidence grade of B2 for the overall water balance for AIR10. We believe this is appropriate; it is consistent with a water balance, where the components have been reconciled to within 5% of measured Distribution Input and reflects the significant improvements that have been implemented over the last few years.

Date:29 July 2011Prepared by:HMS

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

- The Company has completed the Security of Supply Index using data from the Draft Water Resources Management Plan (dWRMP) which is currently in its final stages of preparation. Commentary on individual column entries is given below. Although the dWRMP plan has been audited, the final WRMP has not currently been audited.
- 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) to 88 (AIR10) to 97 for the current Report Year for the dry year average planned Levels of Service (LoS) conditions.
- The change for AIR11 primarily results from a minor re-allocation of PPP output (recorded as Bulk Imports, Column 3), increasing Eastern by 10 MI/d and decreasing Southern by 10 MI/d. Although these changes are not consistent with the DWRMP which states there could be a transfer of "around 20 MI/d", plus an additional 7 MI/d transfer into the East through Lough Island Reavy link, it is considered by the company an appropriate split of resources for 2010/11. We consider the assumption of a 10 MI/d is sensible for AIR 12.
- NI Water has not prepared a table for the Critical Period, although the Company now recognise that the critical period analysis may be relevant for NI Water and have therefore asked their consultant to undertake critical period analysis. If found to be relevant this will be included within the final WRMP and incorporated within AIR12.
- The Company do not feel it is appropriate to present scenarios based on "reference" or "planning" Level of Service as, unlike water companies in England & Wales it does not report its level of service in terms of return periods of hosepipe bans (or similar).

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.

We were provided with a copy of the Draft Water Resources Management Plan, against which we compared entries used in the calculations for this table.

4. Key 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 2010-11 reporting period.
- The Company does not report a Critical Period level of service, although following the freeze/thaw incident recognise that the critical period is relevant and intend to prepare this table for AIR12.
- We observed that, as for AIR08, AIR09 and AIR10, 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 that this is not appropriate for its circumstances as it does not report a "Level of Service" with specific return periods for hosepipe bans for example. The company has therefore not undertaken separate analysis for "planned" or "reference" levels of service.
- We note that there whilst has been no change in approach from AIR10 in the Company's calculation of SOSI for the dry year demand (Table 10a (i)-planned levels of service) the data has been updated based on the dWRMP and the current year.

4.1 General

The Company's recent focus has been on developing its WRMP and therefore for AIR11 the methodology remains unchanged from AIR10 and the data is of similar quality.

We identified that the significant changes to the parameters of the SOSI calculations, at Company level, since AIR10 may be summarised as follows:

- Column 2 all zones identical to AIR10 at 363.06 MI/d.
- Column 3 the total is identical to AIR10 at 403.00 MI/d, although Eastern Zone has increased by 10 MI/d and Southern Zone has decreased by 10 MI/d.
- Column 5 increase in the dry year distribution input of 2.33 Ml/d (0.3%).
- Column 6 decrease in the reporting year distribution input of 2.18 Ml/d (0.3%).
- Column 8 a slight decrease in target headroom of 0.34 Ml/d.
- Column 11 no change in the distribution of population across the zones.

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) to 88 (AIR10) to 97 for AIR11 for the dry year average planned Levels of Service (LoS) conditions.

The increase in SOSI for AIR11 has been driven by the re-allocation of 10MI/d of PPP output from Southern Zone to the Eastern Zone.

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)

The Company has used the same 5 WRZs used in AIR10.

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

The WAFU recorded in this column is identical to AIR10 and the dWRMP.

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

For the Report Year the company has slightly re-allocated output from the PPP schemes which are reported as Bulk Imports (Column 3)

	Bulk Import		dWRMP		
Water Resource Zone	AIR10 (MI/d)	AIR11 (MI/d)	Bulk Import (MI/d)	PPP Name	
North	50.00	50.00	50.0	Ballinrees	
East	187.00	197.00	180.0	Dunore Point	
Central	19.00	19.00	19.0	Moyola	
South	147.00	137.00	147.0	Castor Bay	
West	0.00	0.00	0.0	n/a	
Total	403.00	403.00	396.00		

We challenged the Company to explain the apparent discrepancy in the East WRZ. The company explained that the East WRZ is 7 Ml/d higher due to Lough Island Reavy being able to provide this into DI.

Once the WRMP is finalised we would expect to see consistency between AIR reporting and the WRMP.

The Company reports no exports. This is consistent with the dWRMP.

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

The Company's dry year average distribution input (DI) is 2.33 MI/d higher than its AIR10 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 dWRMP to derive these factors using the actual data for each WRZ. We confirm that the adjustment is consistent with the factors given in the dWRMP.

The dWRMP reports a very weak correlation between climate (temperature and rainfall) and DI. This is also evident in the dry year factors that have been used by NI

Water of 1.12 for households and 1.05 for non-households. These are typical of factors typically used by water companies in northern England and in Scotland, but are much lower than used by water companies in southern England.

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

We note that the Company reports that its Reporting Year distribution input (DI) at 627.58 MI/d which is 2.18 MI/d higher than its AIR10 estimate at the Company level.

The Company's methodology for measuring DI has been discussed as part of our audits on table 10. There is a small (0.05 MI/d) inconsistency between the DI reported in column 6 and that used in table 10 (pre-MLE) as the table 10 value includes an allowance for tankered water and direct borehole water; the pre-MLE value in table 10 is 627.50 MI/d. These adjustments were made at the company level, and not applied at the resource zone level for table 10a.

We recommend that for future returns (AIR12 and beyond) the company develop procedures to allow these adjustments to be applied at the resource zone level.

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

The Company reported that Target Headroom values used in Table 10a are consistent with an interpolation of the 2008 and 2012 values presented in the DWRMP. The Company calculated target headroom using the improved UKWIR methodology (02/WR/13/2). The aggregated values equate to 6.7%, which is consistent with the values used for AIR10 which were calculated using the previous UKWIR methodology ((98/WR/13/1). We have checked the interpolation of the values from the DWRMP.

Column 9 – Surplus/Deficit (MI/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)

In the final checks and reconciliations, we identified an inconsistency between the total population reported in Table 7 (1798.48) and that reported in table 10a

(1802.90). The Company explained that this discrepancy was due to the table 7 value being revised, but the update not being applied to Table 10a. Although this inconsistency had no impact on the SOSI the Company revised the total population entered in Table 10a, so in the final table submitted it is consistent with 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 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 DWRMP.

7. Confidence Grades

Confidence grades are not required for table 10a.

8. Consistency Checks

We have checked for consistency with tables 7 and 10 (pre MLE), with the exception of the minor (0.05 Ml/d) identified in Distribution Input (column 6), which has no impact on the reported SOSI, we found the values to be consistent.

Date: 29 July 2011 Prepared by: HMS

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 Findings & Recommendations

- Realignment of Lines 2-7 to be in line with the Reporting Requirements.
- Significant reduction in lengths of abandoned mains
- Inclusion of new mains laid for housing developments in Line 6.
- Continued improvements in the coverage of zonal study models.
- Continued decline in total number of communication pipes being replaced, largely in line with overall reduction in mains activity.
- Recommendation to reduce some confidence grades, but overall assignment considered justifiable due recent data improvements.
- Suggestion for inclusion of further detail and more unified commentary text.
- The migration to the Mobile Works Management system (MWM) appears to have significantly improved the data capture and the totals are now based on actual numbers of logged mains bursts repairs, rather than the number of 'reported mains bursts' as previously. As we reported for AIR10 this has theoretically removed a significant number (estimate around 20%) of previously duplicated event logs when entered for both the reported event and the actual repair.
- Nonetheless, the freeze/thaw incident during December/January appears have led to a significant increase in bursts during these months; the December number was 715 compared with a typical value of approximately 240 in other months.

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

4.1 General

With reference to our recommendations made last year regarding the possible double counting and inconsistencies in lines 2, 3, 6 and 7 totals, we are pleased to confirm that the Company have enabled categorisation of upsizing for hydraulic purposes and have amended their methods in line with our recommendations and recent NIAUR guidance.

Specifically, NI Water have revised their reporting this year to remove the areas of double counting from Lines 6 to exclude all replacement main and pipe bursting operations except where the Company can demonstrate a replacement main driven by the need for additional hydraulic capacity, which are now only reported in Line 2 under mains renewals.

We note that the Company have not adopted our further recommendation relating to Line 7 to improve continuity and consistency. For reference, we recommended that Line 7 should include a mains adjustment factor to ensure the calculation of Line 12 matches the total length extracted from GIS systems which can also be used as a guideline check on the reported lengths between the project and GIS systems. We do, however, recognise that this is not required under the Reporting Requirements and that neither approach is ideal (i.e. you can only make the calculation in Line 12 work by applying an arbitrary adjustment factor to Line 7). As such, we continue to encourage the Company to consider its use, but accept their current reservations for its application.

We are therefore satisfied that these lines are now being reported in accordance with the Reporting Requirements.

There have been no other significant changes to overall methodologies or commentary structures compared to last year. The commentary still segregates the inputs from Networks Water Operations (NWO) and Engineering and Procurement (EP). Whilst the current layout is clear and acceptable, we feel the commentary would benefit from more specific details to explain the breakdown of the line totals and fewer repeated statements such as "Engineering Procurement is the primary contributor to this information" which are unnecessary. Similarly, we would prefer a more unified structure through the combination of the sections in a line by line basis.

From 1st April 2010, the field data collation systems have been improved through the adoption of a standardised, electronic form which has removed many of the previous irregularities and significantly improved the capture, allocation and transfer of monthly data. This includes improved coding to more accurately capture information to improve aspects such as clarification between mains or communication pipes replaced for quality and those replaced for maintenance reasons. The impacts of this improvement are particularly apparent in the results for mains cleaning in Line 4.

4.2 Asset Balance at 1 April (Line 1)

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

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

In line with the Reporting Requirements, the inputs into the line totals comprise input data from EP and NWO. Mains owned and operated by PPP (comprising of 16.42km of 600mm diameter trunk main between Castor Bay and Forked Bridge) are correctly excluded from the line totals.

The Company has reported 174.49km in for mains renewals (Line 2) this year, all of which were carried out by EP under the water quality programme. The total includes 84.5km of renewals through pipe bursting. No renewals were carried out by NWO under maintenance programmes as expected. There was no renewal of any length of trunk mains. Data provided by the Company validated these figures.

This represents only a minor increase to the 172.2km of renewed mains reported in AIR10. A significant reduction in the length of mains last year renewals compared to the 288.6km in AIR09 was attributed to much of the programmed works being around the more urbanised eastern areas (including Belfast). Checks against the data for this report year confirm that a large proportion of EP projects have continued to be in the more densely populated south eastern areas and hence the relatively consistent total length of renewed mains in Line 2 appears justifiable.

Pipes replaced by pipe bursting or structural lining methods (standard slip-lining techniques are generally considered to replace the existing main) are correctly included in Line 2 as these are deemed to replace the existing pipe. Only where a lining is applied to the fabric of the existing pipe (e.g. spray application) is it reported in Line 3. Historically, the Company does not employ any lining methods and hence the Line 3 total is zero.

Mains cleaning (Line 4) is all undertaken by NWO under maintenance activity and hence the EP input is zero. This year, the Line 4 total of 837.41km represents a major reduction from the comparable combined total length of 1863.9km reported in Lines 4 and 5 last year. When investigated, we were informed by the Company that the reduction is almost entirely due to the removal of multiple counting of cleaning on the same main within the report year following improvements to their data allocation and collection methods this year.

Prior to 2010, NI Water logged each flushing event as a separate incident and had no method of identifying whether it was on a section of main already flushed that year or even whether it had been carried out as part of an ongoing regular flushing programme. The latter, for example, could result in the same length of main being counted 4 times in the case of a quarterly flushing programme, or even 12 times under a monthly programme. To put this into context, a total of 14,639 flushing events were logged this year which was filtered down to only 5,368 distinct flushing activities.

NI Water confirmed that they now assign 1 of 5 defined Maintenance Schedule Task codes along with a unique activity code to all flushing activities to clearly define whether the activity has been carried out as part of a regular flushing programme or a one-off/reactive operation. This enables clear identification of any repeat activities on the same length of main. The line total this year is therefore based on a total of the number of unique, allocated activity codes, rather than a count of the total number of activities in the year as previously applied. This has had the effect of removing a large number of duplicate lengths as indicated by the large reduction in line total.

The Company advised that the assigned activity code also enables exclusion of reactive flushes (e.g. due to burst incidents), and confirmed that these activities have not been included in the line total. As this relies on the assigned code, we understand that some events such as cleaning carried out in response to customer water quality complaints following a mains repair may still be included in the line total.

Having reviewed the newly applied system and apparent impact on the results, we are satisfied that the Company have taken necessary and appropriate actions to resolve what was a fundamental weakness in their assessment and significantly increased the reliability and accuracy of the data in this field. We identified that there remains a potential for some double counting of one-off incidents that may occur on the same main within the same year under this system. However, we accept that such events are relatively infrequent (as they would likely be transferred to a regular flushing programme if recurrent) and that the impact of any errors is likely to be well within the applied confidence grading.

This makes any assessment of the true change in value almost impossible to ascertain. However, we agree that the decline is predominantly representative of this change in data accuracy rather than any direct decline in cleaning activity.

Although the system is greatly improved, NI Water only record the number of cleaning events and do not record the actual length of any individual flushing event. They hence continue to log by the number of events rather than by actual length. In order to report against the required units, they hence apply a fixed conversion factor of 0.156 to provide a length of mains flushed. The line total of 837.41km is therefore based on 5,638 flushing events as indicated in the Company Commentary.

We have previously assessed the application of the 0.156 factor and reviewed the defined line methodology with the Company. Whilst heavily reliant on assumed flushing volumes and pipe sizes, it provides a convenient and logical approach to enable them to report on total length as required. Furthermore, provided the factor remains fixed, it also provides a stable benchmark around which to monitor performance. However, having now improved their data record system, we would encourage NI Water to consider reducing the reliance on this assumption and collate actual length of cleaning, particularly for regular flushing programmes where the extent is likely to be predefined.

The reported length of new mains (Line 6) installed has decreased significantly from 298.9km last year to 121.17km of new mains installed within the Report Year. This overall decrease masks two specific changes to the methods this year as follows:

- Following our recommendations last year, the line total now includes approximately 34.33km of mains laid for new housing developments which were previously excluded from the line total. Hence, whilst this figure is very similar that reported last year, it results in a direct corresponding increase in the line total.
- As discussed in the introduction to Section 4, the Company have amended the reporting of new mains to be in line with the Reporting Requirements and now exclude all replacement main and pipe bursting operations. Previously, 172.2km of mains replacement and pipe bursting operations were included in this line, resulting in a direct corresponding reduction in line total this year.

Taking these two factors into account, the true change in length of new mains is actually a net reduction of around -39.8km which is still a significant decline (approx - 25%). We asked NI Water to provide an explanation for this reduction. The Company estimate the overall reduction in EP inputs to be -31% and confirmed that this is in line with their expected reduction in lengths of mains installation works in recent months.

We requested and were provided with a breakdown summary of input data by zonal area for Engineering & Procurement (EP) which we reviewed. Of the 86.84km reported by EP, almost half (41.77km) relates to the Castor Bay to Dungannon trunk main. Our checks against the breakdown and clarifications with the Company confirmed the reported totals.

The 34.33km total reported by Networks Water Operations (NWO) all relates to new housing developments.

4.4 Mains abandoned and other changes (Line 7)

The Company has reported a total of 195.57km of abandoned mains this year, all of which are reported by EP under the mains rehabilitation programme. No lengths were reported by NWO for this year. Lengths are based on data provided by individual project managers.

The reduction in length from 325.1km last year is significant (approx -129.5km, or -40%) and seems greater than would be expected based on the relative values of Line 2 and Line 6. We discussed the change with the Company and identified a number of potential reasons for the apparent discrepancy:

• There will have been a direct corresponding decrease due to the overall reduction in new mains activity.

- 41.77km of the total new mains relate to the Castor Bay to Dungannon trunk main which has not resulted in the direct abandonment of mains.
- There may have been some impact from the change in methodology this year (e.g. in removing areas of double-counting or other previous errors).

Our review of the source data supporting the line total concluded that the lengths of abandoned mains have been correctly extracted in accordance with the Reporting Requirements. The total includes both wholly abandoned mains and those replaced by renewals as per the Line 7 definition. Due to the way NI Water report abandoned mains, it is 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.

NI Water confirmed that no adjustment factor to account for the difference between the calculated Line 12 value and the value extracted from GIS systems has been applied this year.

This year, the discrepancy between the calculated (from Lines 1, 2, 6 & 7) and the measured total in Line 12 (from GIS) is -93.73km. A significant adjustment factor is considered almost inevitable due to delays in the transferral of data between systems and the reconciliation of monthly reports against final data records. In particular, there have been several initiatives and changes to Company methods and systems which will have impacted the relative results. It is therefore difficult to draw any significant conclusions from this figure at this stage.

4.5 Communication pipes (Lines 8-10)

NI Water does 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 totals in lines 8-10 comprise input data from both EP and NWO. The Company report a total number of lead communication pipes replaced during the year of 1,586 of which 258 were for quality reasons and 1,328 for maintenance. These results are fairly comparable with the 385 and 1,371 respective values reported last year. The decline in pipes replaced for quality is considered to be largely in line with the steady reduction in capital works required for quality purposes to reduce lead.

The total number of non-lead communication pipes being replaced within the same period in Line 10, has declined significantly for a further year, down to 3,156 from 6,418 last year and 8,801 the year before.

We challenged the Company to explain this reduction. The Company advised that primarily, there will have been a direct effect due to the significant reduction in new and renewed mains activity as reported in lines 2 and 6. In addition, they believe there has also been a direct improvement in the data quality in this area as some 'repair burst service' jobs were previously being reported against this line which have now been rectified by improved activity codes and improved awareness of field managers. We

accept that these are reasonable explanations. On this basis, NI Water advised that they expect totals for AIR12 to possibly decrease further.

As investigated previously, lead is not as common in communication pipes as on mainland UK and tends to be clustered around the historic, urbanised areas such as Belfast and Omagh. As much of the programmed work in the last two years has been centred around these areas, the numbers of lead pipes has remained high compared to previous years with a corresponding decline in non-lead pipes. We carried out some checks against the source data which confirmed that significant and concentrated clusters of lead pipes were encountered in Breda North and Belfast City Centre as expected. These areas accounted for the vast majority of lead communication pipes in Line 9 with relatively few lead pipes encountered elsewhere. Similarly, other areas of significant activity outside the city centre such as Downpatrick and Dunore accounted for large numbers of other communication pipes. We are therefore satisfied that the results are a valid representation of actual activity, although we note that there remains a significant potential for error in the designation of numbers between lead and other materials due to the current methods of data capture (refer to Section 5 for details).

4.6 Mains bursts per 1000km (Line 11)

There has been a small change in the reported numbers of mains bursts per 1000km this year, decreasing from 147 to 137 bursts per 1000km, and is now similar to the AIR09 value of 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 26,441.81 km which is the length reported in Line 12. The number of bursts is calculated directly from data compiled and reported primarily by field managers within Networks Water Function and also some additional data provided by Leakage Function.

Following changes to the systems last year, all data is now stored and extracted from the Mobile Works Management system (MWM). We interviewed Company representatives from Networks Water and requested a breakdown of data from both Networks Water and Leakage Functions to support the figures.

We reviewed the monthly summary of burst events and concluded that the decrease can be largely attributed to improved data, with fewer duplicate entries. The freeze/thaw incident during December/January appears have led to a significant increase in bursts during these months; the December number was 715 compared with a typical value of approximately 240 in other months.

Checks against the source data confirmed the contributing total 2,573 number of reported burst mains repairs by Networks Water. An additional 1,094 repairs were undertaken due to waste detection (121 of these were reported by the Leakage Function). Additionally, 33 repairs due to third party damage on mains were deducted from the total giving a total of 3,634 repairs in the report year.

Although improvements are evident, we have some remaining concerns regarding the consistent collation and reporting of mains bursts. Our main findings are

summarised as follows:

- The migration to MWM appears to have significantly improved the data capture and the totals are now based on actual numbers of logged mains bursts repairs (rather than the number of 'reported mains burst' as previously). As we reported for AIR10 this has theoretically removed a significant number (estimate around 20%) of previously duplicated event logs when entered for both the reported event and the actual repair.
- The system is still reliant on the six regional managers, so there remains a degree of interpretation in the recording of data.

On the whole, we are satisfied that the Company have resolved the main concerns raised last year through the adoption of the MWM system.

NI Water confirmed that any repairs to PPP mains are not included in the totals. The line total is confirmed as the correct summation of the data obtained from the two data sources divided by 1000km as required.

4.7 Asset Balance at 31 March (Line 12)

The total length of mains has increased by only 6.36km this year to 26,441.81km, significantly less than the 82km reported last year and 241km the year before. This figure has been taken directly from a query of its GIS system on 31/03/11. NI Water confirmed that this length excludes raw water, private mains, mains owned and operated by PPP, non-potable mains and all small diameter service pipes.

The comparable total by the defined calculation method of mains changes in Lines 1, 2, 6 and 7 differs by -93.73km due to the difference in data sources. The difference is considered likely to be a result of recent changes to methods and more indicative a lag in transfer of data to GIS than any actual significant reduction in network expansion.

4.8 Distribution Studies (Lines 13-17)

NI Water started zonal model development in 1999 leading to the adoption of a distribution zonal study programme in 2001. The primary aim, to set up models to cover all 71 water supply zones, remains on target for completion by March 2012. NI Water report a cumulative total of 60 distribution zone studies completed since the start of the programme with a further 11 studies ongoing. This represents a continued and significant improvement from last year and increases the percentage population coverage to 80.9%. 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 have previously requested and reviewed copies of options reports and found them to contain all the necessary aspects of investigation, analysis and consideration of design solutions and expenditure to qualify against the Reporting Requirements. As no significant changes to the methods or process have occurred this year, no further investigations in this area were carried out this year.

NI Water acknowledges that many models have not been re-analysed since first completion and several studies are now over 9 years old (although the majority are less than 5 years old). Understandably, NI Water remain focused on 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 2012). It is anticipated that zones in 'Phase 2' will be prioritised on the basis of operational reports and numbers of customer complaints. In this way, NI Water is focussing on the zones that are most likely to require remedial or improvement works.

Currently, the construction and management of all models is undertaken by subconsultants under the management of a lead consultant. NI Water provide strict guidelines for the development and operation of models to ensure consistency between sub-consultants. In addition, the Company carry out regular audits at various stages of model build, including cross-checks against GIS records and OS mapping to ensure the model accurately reflects the real network. In general, we understand this set up works well, although they admit that there have been some minor issues that have led to the delay of a small number of models. We were advised that all projects are currently on time and due for completion as programmed.

No consolidation or amalgamation of zonal models has occurred this year, although NI Water expected some consolidation of zones will be necessary in the future and may be considered under 'Phase 2'. The population figures have been adjusted to be consistent with those reported elsewhere by Leakage Section.

4.9 Nominated Water Service Outputs (Lines 18-20)

As a new area to this table, we reviewed the table requirements and reported performance with the Company. We have the following comments:

- The Company report achievement of the beneficial use milestone at 2 of the 4 total PC10 nominated trunk mains in Line 18. We checked the source document and confirm the following 4 schemes are listed:
 - Castor Bay to Dungannon trunk main substantially completed
 - Cross Town Link in Belfast completed
 - Phase 1 Castor Bay to Newry trunk main company advised on target
 - Start of construction of Castor Bay to Belfast trunk main on programme

We noted that the Castor Bay to Dungannon trunk main project is not fully complete. When challenged, NI Water confirmed that the beneficial use milestone relates to the commissioning of the main and removal of service of Altmore WTW which has been achieved.

• The total in Line 19 comprises the completion of the required scope of works at Carmoney and Lough Bradan WTW of a total number of 3 schemes nominated in the PC10. NI Water confirmed that the remaining scheme at Killylane WTW has been started and was not scheduled for completion within the report year.

We requested details of the drivers and scope of works at the two completed sites and can confirm that the works completed within the Report Year are in line with the drivers and appear to fulfil the completion requirements. The works included the installation of a new GAC filter at Lough Bradan which has improved its level of treatment (as reported in Table 12).

• The Company provided a breakdown of the 13 nominated service reservoirs and clear water tanks which confirmed the completion and operation of the 5 schemes listed within year and also indicated the completion of two further schemes since April 2011. NI Water advises that all schemes are on target for completion by the end of March 2013.

It was noted in general that assessment of the numbers in Lines 18-20 is difficult without information identifying the nominated schemes. NI Water agreed they would consider including a list of the nominated schemes in their commentary for reference next year.

5. Company Methodology

As in previous years, 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. NI Water project managers are responsible for all inputs and updates on their projects based on forms submitted by site teams. All information is therefore reviewed and approved by the relevant project manager before being entered onto the database records. Internal cross-checks are also carried out on the data to ensure compatibility with other internal systems.

We reviewed the use of Captrax with the Company and viewed samples of data records and query outputs on the system. We can confirm that the database appeared robust and checks against the source data supported the summary output data.

Field data is compiled by field managers via the Mobile Work Management system (MWM) onto a central database. Remote access for operatives is available via 'toughbooks'.

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

Since April 2010, field data is collated through a standardised, electronic form which has removed many of the previous irregularities and significantly improved the capture,

allocation and transfer of monthly data. The form includes defined activity codes which enables clear allocation of work activities to specific data groups. This enables simple identification of the inclusion of any activity into the line totals through a simple query process.

Information on the form is always checked and updated against the final as-built records submitted at the end of the project. The monthly data collection is primarily used for monthly reporting and payments. Hence any errors are corrected through cross checks against the final logs and drawings and signed off by the contractor and project manager. This also explains why negative lengths are occasionally reported within monthly summaries as they represent data corrections from final records.

Mains burst data for Line 11 is obtained from records compiled by Networks Water, although part of the April and early May 2010 data was still provided by Leakage Function. The data is compiled by interrogation of the work order code and categorisation. Networks Water repairs are reactive and their work orders are largely in response to customer and third party calls. Networks Water is split into Repair & Maintenance 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 mains repairs due to third party damage 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 location 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 a 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 directly from Captrax which is based on field records and cross checked against data in the cost management system. Currently, the work activity code does not differentiate between lead and other materials and tends to default to the latter unless specifically noted on the form or manually amended. Whilst this system appears reasonably effective, it is an obvious source of potential error and we understand that NI Water are looking to improve the system to more effectively capture the material type.

Distribution study models are focussed around the production of zonal models based around the Company's 71 water supply zones, with typically one model to cover each zone. Zones are interlinked by defined network nodes.

Zonal 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 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.

A study is defined as 'completed' once the draft options report has been formally submitted for review and action by NWO.

The 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 unless specifically requested for a project. 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 experience some 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.

In general, we consider the methods listed by the Company to be largely robust and in accordance with the reporting guidelines.

6. Company Assumptions

The calculation for Line 4 is based on an fixed, assumed flushing rate based on typical hydrant flushing volumes (currently 0.156km per flush).

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.

Line 12 assumes that the GIS system is the most reliable source of information and hence supersedes the specified calculation from the individual line totals.

7. Confidence Grades

The Company generally apply average confidence grades for Lines 2-10 to reflect the two separate streams of information from Engineering and Procurement (EP) and Network Water Operations (NWO).

All data provided by EP for Lines 2-10 is applied a confidence grade of A1 due to the detailed project records held and theoretical accuracy of the data. Given recent improvements to the systems, we acknowledge the high reliability and theoretical accuracy of the data, but feel an A2 grade may remain more appropriate until more consistent results are obtained, particularly communications pipes.

Data provided by NWO for Lines 2-10 is applied a general confidence grade of B3 which we consider reasonable due to the ongoing reliability on field data records. We note, however, that recent improvements to the data collation system have significantly improved the reliability and accuracy of this data.

Given the above, we therefore have the following comments:

- We recommend a reduced grade of A2 for Lines 2 and 7.
- We agree that the A1 grade is appropriate for the zero value in Line 3.
- Given the recent improvements, but retention of the applied flushing factor, we agree B3 remains appropriate for Line 4.
- The Company have adopted B3 grades for Lines 8-10 in line with our recommendations last year. We agree that these remain appropriate, but acknowledge there may be some justification to improve them in future given recent improvements to data collection and allocation in this area, particularly if the material categorisation is improved.
- Following significant improvements to the source data at AIR10, we are satisfied that the B3 confidence grade applied to Line 11 is appropriate.
- The Company continue to report B3 grades for its data from GIS systems (lines 1 and 12). We consider this reasonable, but suggest the total is actually within a B2 grade given the estimated levels of discrepancy between line totals (<1%) and the theoretical accuracy of the GIS system.
- Given the discrete data entities, the A1 grades applied to Lines 13-17 and 18-20 are considered appropriate.

8. Consistency Checks

The Company provided further data and responses to queries following our initial audit. Cross checks were made against previous table data to confirm consistency of results.

The Company provided a revised data and commentary following our initial audit. Checks were made on the revised table and text to confirm that the changes made were appropriate and accurate.

Date:29 July 2011Prepared by:HMS

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 (MI/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 & Recommendations

- Further reduction in the number of works with 95%ile greater than or equal to 0.5NTU, but proportion of total output volume remains relatively high at almost 10%, primarily due to exceedences at Killyhevlin WTW.
- No sites with 95 percentile value >1.0 NTU.
- Exclusion of only 2 sites, including Cabragh/Gortlenaghan which was temporarily brought back into supply during the January freeze-thaw event.
- Full adoption of Reporter's recommendations from last year.
- Suggested targeting of marginal sites for improved accuracy (to 2 decimal places) in turbidity readings.

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

The Company has continued to demonstrate ongoing improvement compared with recent performance, with the number of exceedences of the turbidity level limit in 2010 at all WTWs decreasing to 29 compared to 39, 42, 50 and 114 in the respective previous years. Checks against the data confirmed that 1 exceedence occurred at a PPP site and hence only 28 of these are actually reportable under this table.

The improvements shown over the last 4 years have been largely due to the commissioning of the new Alpha (PPP) sites and the closure of a number of older and more frequently failing sites, particularly those with borehole sources. This year, the

changes in line totals are largely as a direct result of the closure of 2 further sites at Glarryford and Cabragh.

This year, the number of WTWs with 95%ile above the 0.5NTU level has shown further improvement with a drop from 7 to 5 in the number of failing works. It should be noted that last year, NI Water originally reported a line total of 3, but amended this to 7 following a challenge on the categorisation of exact 0.5NTU values assigned to several works. NI Water's methodologies have remained consistent this year with the inclusion of exact 0.5NTU values in Line 1 and hence we have quoted the 7 as the directly comparable value. However, the respective output volume remains fairly significant at approximately 10% of the total output volume.

The total number of WTWs counted in lines 1-3 decreased further this year from 31 to 26 this year, a net result of the removal of service of 6 sites closed during 2009 and the temporary reinstatement to service of 1 site (Cabragh) during the report year. These numbers tally with the changes reported last year.

For clarification, NI Water does not have any sites classified as 'emergency' sites as the Company either have 'operational' or 'mothballed' sites. However, in effect sites such as Cabragh borehole can be temporarily brought online to enhance supply if required. NI Water advises that they apply to NIEA to surrender the Abstraction Licences for sites taken out of supply and hence they are no longer operational. We also note that such categorisation has no tangible impact on this table.

There has been no transfer of any works to the PPP concessionaire during the report year. In accordance with the guidelines, all current PPP sites have been excluded from this table.

The total output volume of 362.23MI/d from NIW sites totals remains fairly consistent with the 361.55MI/d reported last year.

Checks against source data confirmed that all data has been correctly reported by calendar year.

4.1.1 Lines 1 and 2 – Turbidity Levels

We reviewed the 5 sites contributing to the Line 1 total. Of these sites, all reported 95 percentile NTU values were within the range 0.5-1.0 and no sites had a 95 percentile NTU value >1.

Of the 5 works, 4 of the works were relatively small contributors to output volume (typically <5MI/d) and represented less than 2.5% of the total output volume. However, the output volume is significantly increased by the inclusion of Killyhevlin in Line 1, one of NI Water's larger sites at 27.34MI/d. The net result is a combined output volume of approximately 10% of the total output volume which is a significant proportion of the total distribution input.

We investigated and asked what measures the Company were taking to rectify the issues at each site. NI Water advised as follows:

- Rathlin Borehole WTW the smallest of NI Water's works, Rathlin supplies water for an island community from a local borehole. Unlike other boreholes sources which are being systematically closed down, there are few options available for alternative supplies and hence NI Water has no plans to replace the current arrangements. The current reported failures are relatively marginal with the site being compliant in 2009. We therefore accept that immediate action is probably unnecessary and advise further monitoring.
- Altmore WTW a borehole source, confirmed as out of service from April 2011 following completion of works at Castor Bay WTW.
- Gortlenaghan Borewell WTW an exposed borehole site and hence considered a relatively high risk site. NI Water confirmed the site was taken out of service in March 2011.
- Camlough WTW following marginal failure of the site in 2009, Camlough has displayed further deterioration in turbidity levels in 2010 with a 95%ile value only just below 1.0 NTU. This was largely unexpected as last year NI Water advised that initial 2010 results looked good and no remedial works were considered necessary. Whilst NI Water now recognise that there is a potential issue, they confirmed that Camlough is timetabled for closure by the end of 2013 following conversion to supply from Castor Bay WTW and hence they have no plans for any major changes to the current arrangements.
- Killyhevlin WTW whilst the site also failed last year, both the 2009 and 2010 failures have been marginal with 95%ile values of 0.5NTU and no obvious reason for high turbidity levels as with the borehole sources. Analysis of the data identified that no NTU values were above 0.8NTU. The Company also confirmed that it has no reports of any actual PCV turbidity failures within the relevant supply zone nor has its investigations identified any potentially significant source of the turbidity. Without an obvious problem and with such marginal results, we can understand why NI Water has not currently taken any remedial action. However, the site is a significant contributory to supply (representing approximately 7.5% of total output) and is not planned for future closure as with other sites. Further action must therefore be considered necessary if it continues to be a problem in 2011/12.

Of the 7 sites included in Line 1 last year, Altmore, Gortlenaghan, Camlough and Killyhevlin remain on the list. The remaining 3 sites, Shanmoy, Carmoney and Killylane were all marginal failures last year (0.5 NTU value) and have achieved sufficient improvements to reduce the value to below the threshold this year, although Killylane and Carmoney both remain at 0.4 NTU. Rathlin is the only new site to be include in Line 1 this year.

We subsequently reviewed the Company's methodology and spreadsheet calculations behind the line totals. 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. The PPP sites have also been correctly excluded from their calculations. We undertook cross-checks with the source spreadsheet for a number of sites including Killyhevlin, Rathlin Borehole, Shanmoy Borewell 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 sites which have been activated or abandoned during the Report Year. The Company include those sites which supply for part of a year, providing the defined criteria are met, but only include sites which are still in active service at the calendar year-end. Where sites are wholly abandoned during the year, NI Water excludes them on the basis that they have been permanently removed from supply and are hence no longer reportable.

Our checks against the source data confirmed that both sites reported in Line 3 have been correctly excluded on the basis of having been previously abandoned, but brought back into service temporarily during the January freeze-thaw event for a few days only. On the basis of this, the Company's interpretation of the exclusion of wholly abandoned sites has no impact on the line totals.

4.1.3 Line 4 – Total

The total number of WTWs operational during the Calendar Year and related output for Calendar Year are confirmed as the correct summation of the individual totals in Lines 1-3. 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 continue to carry out similar monitoring of iron, manganese and aluminium levels within zones through sampling at customer taps. NI Water informed us that they have not identified any significant problems with this parameter during the Report Year. We reviewed the sampling data and can confirm that performance indicators in iron, manganese and aluminium have all improved on 2009 levels and that overall compliance across all parameters remains high with only iron (97.60%) and THMs (98.33%) below 99.0% zonal compliance, although iron remains just below the PC10 target value of 97.80%.

The Company advised that enhanced monitoring is installed where a possible problem is foreseen to ensure effective and proactive monitoring in key areas.

5. Company Methodology

The Company confirmed that its methodology remains fundamentally unchanged from the previous year.

Turbidity data is 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 data readings 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 which may include data errors by category and assess relative gaps in data for exclusion against the criteria. The Company advised that as sampling is generally carried out daily at all monitored sites, there are typically no non-routine samples.

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

Our review of the Company's methodology confirmed 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 aluminium, iron and manganese is based on data obtained though 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 at the threshold 0.5NTU limit and include it in Line 1. Where the level is below the level of detection (e.g. <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

Following our comments last year, the Company has adopted our recommended A3 grade for Lines 1 and 2 which we feel remains appropriate given the continued accuracy of the NTU value to 1 decimal place and the significant scope for fluctuation in the line total depending on the allocation of sites with exactly 0.5NTU.

We note that the uncertainty in Lines 1 and 2 would be significantly reduced if readings could be taken to 2 decimal places. We therefore continue to encourage the Company to improve the accuracy of turbidity sampling as and when opportunities arise and particularly at marginal sites such as Killyhevlin.

8. Consistency Checks

We discussed our findings directly with the Company and cross-checked our results to ensure validity. Cross checks were also carried out against Tables 9 and 12 to confirm consistency.

Date:29 July 2011Prepared by:HMS

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 & Recommendations

- Improvements in level of detail and clarity in reporting, including improved categorisation and breakdown of changes to sources.
- Further reduction in the total number of sources, particularly borehole sites, although relatively little changes in the overall percentage split of distribution inputs across source type.
- No changes to treatment levels at existing works, all changes to line totals resulting from closures of works.
- Significant increase in the value of the calculated pumping head (+16.8%), primarily due to changes in data sources applied to pumping head at PPP sites and a number of additional interstage pumps being included.
- Recommendation to improve collation of telemetry data at primary pump locations and to further investigate the revised lift head at Dunore HL.

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.

4.1 Block A - Lines 1 to 4 - Source Type

NI Water Inputs

In line with recent guidelines, the Company have included a table of sources, detailing all the changes in activities that have occurred throughout the year. A separate table is included of distribution inputs. This has made assessment of the changes to the network much easier and provides a transparent and accurate audit trail and we hope that this format will be adopted in all future commentaries.

The table shows that the total number of sources has reduced further this year from 30 to 26 due to the closure of 4 sites last year at Brishley (borehole), Stradreagh Springs (borehole), Drumabest (borehole) and Creightons Green (impounding reservoir). The Company has added comments to explain apparent anomalies such as Drumabest and Creightons Green. We reviewed several sites with the Company and suggested the addition of further comments to explain specific sites such as Glarryford and Cabragh.

We reviewed the categorisation of sources within the columns with the Company and carried out cross checks against flow data and can confirm that all sources have been correctly assigned and reported. Grouped boreholes are correctly treated as a single source and no site has more than one reportable source. NI Water confirmed that they have no compensatory sources to consider. Lough Island Reavey is correctly excluded from the numbers of impounding reservoirs as it now supplies another source. Gortlenaghan, Shanmoy and Altmore have been correctly included as being in service on the 31st March 2011, although we understand that these sites were closed in April 2011 and hence we expect a further reduction in source numbers next year.

There is an apparent discrepancy between the total 26 sources listed in the table in the Company Commentary and the 25 sources listed in Line 4 of Table 12. As highlighted by the Company, this relates to the exclusion of Cabragh BH from the line totals due to the lack of distribution input data. We questioned the reasoning behind excluding the site and understand that the decision was taken to provide consistent results across all lines and was considered acceptable due to the very small input volume associated with the source. We carried out some checks against other table data which confirmed that Cabragh BH was in service for less than 2 weeks and hence the estimated flow of <0.5MI/d is well within the assigned B2 accuracy grade.

The Company have also applied two manual corrections to the calculation of total distribution input. As stated in their commentary, whilst some flow has been recorded, neither Alcrossagh nor Drumabest were believed to be operational during the year and hence data from both sites has been removed from the calculations for consistency. It is noted that the total flow is almost negligible (0.01Ml/d) and checks carried out against flow data confirmed their inactivity. We therefore consider this to be an acceptable adjustment. Similarly, the comments made by NI Water regarding the uncertainty over the tankering of water during the freeze-thaw event in January 2011 are also considered to be acceptable, the net reduction in the adjusted figure being explained by the exclusion of double-counted volumes caused by cross-zone tankering. Both are noted as being well within the expected level of accuracy defined by the confidence grading.

Following our comments last year about the lack of clarity over the status of decommissioned and abandoned sites and their ability to be brought back into service, the Company have provided a full breakdown of 36 abandoned borehole sources and 22 WTWs in two tables within their commentary.

The first table identifies 2 sites, Cabragh and Glarryford boreholes which can be brought back into service at reasonable notice. This is clearly true as they were both utilised as emergency sources during the freeze-thaw in January 2011. However, the Company advised that the other 34 sites are mothballed and would require 'significant notice and investment' to be made operational. As such, they are not considered true 'emergency' sites, although we note that Bellsize and Kilwee were both brought back into service in FY08/09 so a reasonable level of capability appears to be retained at some sites.

Of the 22 WTWs listed in the second table, NI Water advised that all are considered fully abandoned and would not be available for operation without major investment. As such, all 22 works are essentially considered inoperable.

These lists have been useful to identify the Company's capabilities, but we do not consider it necessary to include the tables in future commentaries. We understand that the Company do not maintain assets or uphold the abstraction licence once decommissioned and hence the definition of an 'emergency operational' site may not be definitive. However, we would recommend that reference is continued to be made to the number of sites and that they are continued to be categorised where possible (e.g. 2 'emergency' boreholes, 34 'mothballed' boreholes, 22 'abandoned' WTWs).

With reference to Lines 1-4, we can confirm that the relevant source type and distribution inputs have been correctly assigned and totalled for each line. Although the source numbers have changed, the proportional split of distribution input remains fairly similar due to the already low proportion from borehole sources. Following the further reduction in numbers, borehole sources now account for just 1% of total distribution input, the vast majority (78.1%) from impounding reservoirs.

The Company confirmed that there have been no drought conditions experienced during the Report Year although we noted the extreme cold weather experienced in December and January caused a significant increase in flow input during these months (primarily due to bursts).

PPP Inputs

PPP are responsible for the operation of 4 WTWs at Moyola, Dunore Point, Ballinrees and Castor Bay and have therefore reported on the basis of these 4 works.

There are no significant changes to the line totals this year. PPP continue to correctly treat the 2 additional sources from Altikeeragh IR and the River Bann for Ballinrees as chain sources and are hence excluded from the line totals.

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

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

For the first time, the Company have compiled flow and pressure data to cover 100% of the total 627.5MI/d distribution input following completion of the key Distribution Zonal Studies for Dunore East and Killylane. We questioned whether this meant all pump data was now believed to be included and were informed that although the vast majority are now included, NI Water expect that a small number of booster pumps are still to be included.

Following a significant increase last year in calculated average pumping head from 113.67m to 138.6m.hd, the total for Line 5 has shown a further significant increase to 161.82m.hd. The chart below illustrates the overlying change over the last 5 years.



Fig 4.2 – Recent changes in calculated total average pumping head

The gradual inclusion of all the flow is not considered a particularly significant factor in the increase this year due to the way the Company calculate on partial data. We therefore questioned this further increase and were informed that unlike previous changes which were primarily due to new information and improved zonal models, the change is almost entirely due to updated pump and lift information applied to PPP sites. Comparison with last year's data indicates an increase of <+0.1m.hd for the NIW only figure compared against +26.28m.hd for the PPP only figure, suggesting that the overall increase in pump head resulting from the changes and addition of new zonal models this year was negligible. This is also reflected within the Company's tables illustrating the changes in pump data from AIR10. Therefore, whilst the changes in heads and respective flow volumes for the NI Water sites are largely insignificant, the changes to some of the PPP sites such as Castor Bay and Dunore have been substantial, caused by significant increases in lifts for existing pumps and the addition of several new interstage pumps.

We further challenged the Company to explain why such large modifications had been made to these sites, particularly as previous information from these sites would

be expected to have been relatively available and reliable compared to many older sites. The Company advised that previous information was based on a simple assessment of static water levels at the delivery and outlet tanks. However, this method does not take into account any frictional loss in the system. The revised data utilises the actual recorded pump data for each site and applies the operational duty head of the pump as listed on the pump nameplate. This is theoretically a more accurate assessment of the true head as it represents the head the pump has been designed to operate at. However, it relies on the pump actually operating at the design duty point which is not always the case.

To test this, we requested supporting information for 3 PPP pump sets (Dunore LL, Moyola WTW-Mullaghboy and Dunore HL) which we identified as having a significant increase in lift head. Whilst we recognise that there may be significant losses through specific fittings, manifolds etc and losses can be very high where flow velocities are high, our assessment of this data concluded that the general allowance for frictional head appears high, with Dunore LL in particular registering an apparent 17m frictional loss over a length of <1.5km. We did not have time to investigate this in greater detail, but given the relative contribution to the total figure from these large pump sets (Dunore HL alone contributes about 10% of the total average pump head value), we recommend that this is investigated in greater detail next year to assess the appropriateness of these revised lift heads.

We also identified some increases to individual average pump flows, most significantly at PPP sites. The Company advised that these increases are largely in line with their changes to distribution input requirements. Although we were unable to validate this claim, we note the possible impact of factors such as the freeze thaw event and the recent closure of a number of smaller sites.

In our opinion, the ideal method for assessing pump head is to utilise telemetry data, to provide continuous data on flow rates, power consumption and pump running time. We asked the Company why telemetry readings are not available at major sites and discussed with the Company as to how the accuracy of the primary pump sets may be improved in future. NI Water advised that whilst they collate telemetry information at most sites, the systems are not currently set up to log and record all necessary data to enable usage in the calculations.

Given the major significance of a relatively small number of pumps set (the PPP pumps account for <5% of the total number of pump sets, but approximately 48% of the total average pumping head), this level of detail would only be required at a small number of works to significantly improve the reliability and accuracy of the line total. We therefore recommend that the Company look to enabling such data to be obtained from key pump sets within the network as either a one-off check to validate the current estimates based on nameplates and pressure readings or more ideally as an ongoing data stream to provide annual data for these sites.

Considering the wider context, NI Water's reported average pumping head total of 161.82m.hd is high compared to other UK companies. However, unlike many UK water companies, we note that the majority of their water is from low lying river sources and impounding reservoirs, such as Lough Neagh, and hence distribution is likely to require a significant amount of pumping. Therefore, whilst this figure is high

and whilst we have some doubts as to the accuracy of some of the data, we accept that it is likely to represent a more accurate reflection of their true pumping operations than previous years. We also note that the magnitude of error is likely to be within the +/-25% allowed by the assigned B4 confidence grade.

Values of average pumping head are 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 and the information has been correctly assigned between NIW and PPP only sites. The method for calculating pumping head is in accordance with the reporting guidance.

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 25, a net reduction of 5 from last year. This decrease is due to the removal of the 5 No. sites decommissioned during last year and now excluded as no longer in operation (also noting Cabragh which is excluded from the line totals as explained in Section 4.1).

A detailed breakdown of the changes and status of sites is provided in the Company's Commentary. We checked the flow outputs of the decommissioned WTWs against the source data and can confirm that all 5 sites were non-operational at year end.

NI Water confirmed that there has been one change in treatment classification at NI Water-owned WTWs this year at Lough Bradan where GAC filters have been installed. The site has therefore correctly been recategorised from W3 to W4. All other changes are due to site closures. The other reductions of -2 SD, -2 W2 and -1 W2 are in line with our expectations following the targeted closure of the low treatment level borehole sites.

PPP Inputs

All 4 works operated by PPP have ozone or GAC on site and are correctly classified as W4 level treatment.

Total

In total, 29 WTWs were operational during the Report Year. The line totals are confirmed as the correct summation of the NI Water and PPP inputs. Our checks against the source data confirmed the correct calculation and translation of data onto the table.

We reviewed the remaining works having a treatment below the W3 level. NI Water continues to reduce the number of works within this group through closure of their smaller sites. This year, the combined numbers of WTWs in lines 6-8 have reduced from 9 to 5; all borehole sources. These sites now contribute less than 1% of the Company's total distribution input, continuing the Company's ongoing removal of relatively low-treatment level works with borehole sources.

The percentage of flow receiving W4 level treatment has correspondingly increased to 66.1% from 63.9% last year, reflecting the change in proportional split.

4.4 Line 13 – Potable Mains

NI Water Inputs

The total length of potable mains has increased from 26,435.45km to 26,441.81km largely in line with reported changes in new and abandoned mains. This is extracted directly from the Company's GIS systems and matches the total length of main reported in Table 11, Line 12. Our checks confirmed that the total excludes PPP-owned assets and 276km of compensatory and raw water mains. Checks were carried out against the source GIS system to confirm the reported lengths in size bands.

The Company have a small number of unknown diameter mains on their system records (estimated <0.5% of the total). 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. NI Water advise that the remaining mains have no documented size records and therefore are only likely to be confirmed if actually encountered in the field or removed through abandonment.

PPP Inputs

PPP report 16.42km of main in Band 3 which relates directly to the 600mm diameter trunk main from Castor Bay to Forked Bridge. No change from previous year.

Total

The total 26,458.23km is the correct summation of the NI Water and PPP inputs.

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. No significant changes to the methodologies have occurred this year.

Distribution input is based on data obtained from 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 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. Several manual adjustments to the data have been made which have been clearly highlighted in their commentary and are considered appropriate.

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.

Calculations for Line 5 Average Pumping Head are primarily based on data and results obtained from network models, although operational data is used for some of the more significant pump sets. 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.

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 prioritising completion of 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 unreliable 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). These adjustments are considered logical and reasonable and we note that such adjustments will only be required until the Company completes its zonal model study 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 subconsultants. 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. The Company does not import or export any water and hence no account is made in the calculations.

The totals for Line 13 are taken directly from the Company's GIS system. Pipes that are unidentified (which account for <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
- where referenced, pumps are operating in line with parameters recorded on nameplates.
- where applied, 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. The applied data is therefore assumed to be representative of the whole.

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

7. Confidence Grades

The assignment of B2 confidence grades to Lines 1-4 is considered appropriate on the basis of the reliability and accuracy in the calculation of proportional distribution input.

In line with our recommendations last year, we note that the Company has reverted to a B4 confidence grade for all Line 5 entries which we believe remains appropriate given the estimations and levels of uncertainty associated with the pump head data.

8. Consistency Checks

Cross checks were made with total lengths in Table 11 to confirm consistency. PPP data was cross checked with Table 42. The installation of GAC filters at Lough Bradan was verified with information obtained for Line 19 in Table 11.

Date: 29 July 2011 Prepared by: HMS

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 Findings

- The Company provided a methodology statement used to derive the estimates reported in this table and using this statement we were able to reconcile the property numbers reported to the Rapid extract presented by NI Water.
- The Company has continued its non-household metering programme which has included surveying 1,000 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.

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 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 various means including 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 test metering project. During the audit we sought an update on various issues which had been raised in previous AIR and other reviews. The following provides an overview of the discussions held with NI Water.

Test Meters

NI Water outlined that their test meter project is still ongoing with accounts being assessed and reclassified as appropriate. The Company advised that of the 11,500 accounts identified on the Rapid system, 1,738 meters still need to be surveyed or investigated. Our Table 7 commentaries provide a summary of the Company's test meter project.

Site Meters

The Company explained that as part of their ongoing data checks the number of site metered properties (multiple properties being charged through a single meter) is currently being investigated and verified. To ensure these are not double counted the Company has excluded these meters from their Table 7 property counts. We understand this approach is consistent to that adopted in AIR10.

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. We confirm the total number of connections reported in this line is consistent with the extract from Rapid provided by NI Water.

We note a slight increase of 445 new connections when compared to the 09/10 Report Year. NI Water outline that they believe this increase is associated with the slow economic recovery. We confirm that a similar trend has been observed in a number of other water companies.

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. We confirm the total number of connections reported in this line is consistent with the extract from Rapid provided by NI Water.

We note that the number of non-household properties has increased slightly from that reported in 09/10.

4.3 Billing

Line 3 – Households billed unmeasured sewage

We note a small increase of 5,514 (1%) reported in this line since 09/10. The Company was able to demonstrate the consistency of the number reported in this line to extracts from their property records on Rapid.

This line is calculated as the average of occupied domestic unmeasured plus the occupied test meters plus those household properties which are connected for sewerage only.

Line 4 – Households billed measured sewage

Whilst NI Water has been installing meters on all new household connections since April 2008, customers are not being billed on a measured basis. As such, all household properties should be reported as unmeasured.

Line 5 – Households billed sewage

This is a calculated line, the sum of lines 3 and 4.

Line 6 – Non-households billed unmeasured sewage

As expected we note that the number of non-households billed for unmeasured water within the supply area has decreased steadily during the year. Indeed, the number of properties has decreased by 2,139 (16%) from that reported previously.

The Company explained that this was a result of their non-household metering programme. We reviewed the Company's progress in delivering this programme and our commentary on this is provided in Table 8.

	AIR11 (000's)	PC10 2010/11 (000's)	PS 2010-11 (000's)
Unmeasured Household	574,400	736,180	
Measured Household	0	0	
Unmeasured non-Household	11,496	10,520	10,513
Measured non-household	23,374	23,282	23,577
Void Properties	51,290	40,572	

Note that the figures for AIR and PC10 are annual average while PS is a year end figure. The divergence from PC10 estimates is largely a result of methodology changes since the estimates were made in 2009. Nevertheless, measured non household estimates across the three submissions are reasonably well aligned with relatively small percentage differences.

Line 7 – Non-households billed measured sewage

We note that the number of non-households billed for measured water within the supply area has increased by 307 properties since 2009/10.

Line 8 – Non-households billed sewage

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

Line 9 – Void properties

NI Water stated that they have interpreted this line as the average number of properties within their supply area which are connected to the sewerage system but do not receive a charge as there are no occupants. We found NI Water had taken the gross number of properties reported on Rapid (inclusive of measure household test meters) and subtracted the number of occupied properties reported in line 8 above.

5. Confidence Grades

The confidence grades assigned are aligned to those agreed during the Undertaking A review. We still believe that there are a number of weaknesses within the Company's methodology but that these are reflected in the confidence grades assigned.

The Company explained that they are currently running a Diamond system report to generate the equivalent figures for the current year. We propose to comment on this change in our AIR12 work.

Date: 29 July 2011 Prepared by: HMS

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 Findings

• Line 7 reported in NI Water's submission is incorrect as trade effluent volumes (Line6) were excluded from the calculation. The figure should be 328.19 MI/d.

3. Audit Approach

The audit consisted of an interview with the NIW system holders 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

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 a small increase in volume of 5.36 Ml/d or 2% reported in this line.

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 has been made correctly.

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.

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.

We note that this volume has decreased significantly during the year, reducing by 1.96 Ml/d which equates to a circa 20% decrease. This is consistent with the decreases observed in the unmeasured property base.

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. As customers are not being charged on a measured basis 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 challenged the Company to provide an audit trail to substantiate the volume reported and the Company advised that this volume was based on their 'Dynamic Consumption' report. NI Water was unable to present a copy of this report to support the volume reported.

We note that there has been a decrease of 10.22 MI/d or 21% in the volume compared with that reported in 2009/10. The Company explain that this decrease is associated with reduced consumption due to the economic downturn and a number of non-return to sewer allowances which were granted during the year.

We noted that the volumes reported are also somewhat lower than reported in the Company's Principal Statement submission. The volume reported in the Principal Statement submission was 42.81 MI/d which is circa 9% higher than that reported within AIR11.

Line 6 – Volume trade effluent

The volume of trade effluent for AIR11 is 20.18 MI/d, a 30% decrease on the volume of trade effluent discharged for AIR10 (29.37 MI/d). The methodology used to compile the volume of trade effluent is unchanged from that adopted since AIR09. Trade effluent volumes have been obtained from the Billing Section, and for the small number of traders where no volumes were available, consented volumes were used.

Volumetric data from the 320 traders is extracted from the corporate Billing Section of Customer Services which is interrogated to ensure all relevant data has been included.

Samples are taken from traders and actual analytical concentrations stored on the Laboratory Information Management System. Sites where charges are based on standard strength and assumed as complying with standard strength, volumes are obtained by averaging monthly inlet samples taken from weighted averages from twelve major works. For AIR11, BOD has increased by one to 201mg/l.

The reported decrease in volume is considered to be a result of:

- Using a common denominator of 365 days rather than using the actual days the trader discharged, and
- Utilisation of actual volumes discharging from Hospitals.

Previous returns from four large hospitals used consented maximums. To comply with AIR10 recommendations, meters have been installed at each site, resulting in a reduction of 500,000 m³ per annum. Previously it was assumed that where measured discharge volumes or water supply information was not available, the discharge volume should mirror the maximum consented discharge.

NI Water has also investigated activities within the hospital i.e vehicle wash/X ray/laboratory and have concluded that only 5% of the flow is actually trade. Based on this result, NI Water have decided to revert nursing homes to domestic only, and will report on this basis for AIR12. Whether hospitals should be classed as trade premises is questionable, as from a PE perspective, double counting could result and from a sampling perspective there are health and safety issues.

As recommended in our AIR10 commentary, NI Water has adopted a consistent approach for AIR11 whereby all trade flows have been divided by 365 irrespective of whether the trader only operates for 5 out of seven days.

Line 7 – Volume waste water returned

The total volume returned to sewer is the total of the preceding entries. This line should be a sum of lines 3, 4, 5 and 6 which equates to 328.19. However the reported figure is 308.01 suggests that NIW has not included Line 6.

Line 8 – Volume of Road Drainage

The Company had provided a volumetric estimate for the volume of road drainage returned and within their commentary provide an overview of their methodology.

We have not sought to verify the assumptions made within the methodology applied but note it is based on a number of third party data sources and assumptions.

5. Company Assumptions

Lines 1 to 2 – unmeasured volumes

The Company assumes a 95% return to sewer of volume.

Line 6 – Trade Effluent

For large volume and high risk customers, meter readings are taken and where there are no meters the discharge volume is calculated by taking water supplied minus any allowances.

In line with Ofwat guidance the Company assumes that 95% of water delivered is returned to the sewerage system. Domestic water consumption is deducted from water supplied to trade premises (25 litres per person per day and 50 litres per person per day where there is a canteen on site).

Line 8 – Volume of Roads Drainage returned

As detailed within the Company's commentary a number of assumptions have been used to derive the volume reported. As stated above we have not sought to verify the accuracy of the assumptions used.

6. Confidence Grades

The confidence grades assigned to the volume estimates in lines 1 to 5 are consistent with that reported previously and are a fair reflection of the methodologies in place.

A confidence grade of B1 was initially considered for Line 6 to reflect the overall improvements. Whilst acknowledging the improvements in methodology, the accuracy of meter readings would suggest a B2 to be more appropriate, which was agreed by the Company.

The Company has assigned a grade of CX to line 8 - volume of road drainage returned. We believe that this is reasonable as the estimate made is based on third party data and a number of assumptions.

7. Consistency Checks

Line 7 should be a sum of Lines 3, 4, 5 and 6 which equates to 328.19. However the reported figure is 308.01 suggests that NIW has not included Line 6.

Date: 29 July 2011 Prepared by: HMS

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 & Recommendations

- Through the utilisation of actual flow data and less reliance on utilisation of consented volumes, the Company has reported significant reduction in volumes and loads.
- Total trade effluent BOD loads have reduced by 3% compared to AIR10, from 3965.81 tonnes BOD per year down to 3841.35 tonnes BOD per year.
- Significant work has been carried out in the past year to update sewage works population equivalent data. Since AIR10, 136 STWs have been updated.
- As a result of using actual flows the standard charged traders registered a 66% reduction in loading
- Armagh STW operated by Omega under PPP has reduced from (from Band 6 to Band 5)
- The reduction in load receiving biological treatment at PPP facilities is not reflected by the volume of sludge produced, as this has increased

3. Audit Approach

The responsibility for the compilation of table 15 is split between a number of system holders, all of whom was audited. The Company methodologies were examined and the sources of data were reviewed.

4. Audit Findings – Sewage Treatment

4.1 Sewage – Loads (Lines 1-7)

Line 1 – Trade Effluent Load (NIW + PPP)

All traders have paid charges since 2008/09. Trade effluent volumes have been obtained from the Billing Section of Customer Services. 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.

For traders that have been sampled, BOD strengths are based on sample results. For traders not sampled and on standard charge, BOD has been estimated as that of standard sewage strength, 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 196 mg/l BOD, marginally lower than the figure of 200 mg/l BOD calculated in the same way for AIR09

Trader loads have then been allocated to their respective receiving sewage treatment works to allow a division of loads between NIW and PPP receiving works.

The variance from AIR10 is due to the fact more meters have been installed and there is less reliance on the utilisation of consented volumes, resulting in more accurate data. As a result of using actual flows the standard charged traders registered a 66% reduction in loading.

As recommended in our AIR10 commentary, in order to ensure a consistent approach, NI Water has divided all trade flows by 365 irrespective of whether the trader only operates for 5 out of seven days.

The total trade effluent loading reported for AIR11 (3841 tonnes/year) is circa 3% lower than that reported for AIR10. The reported reduction in the loading is due to a number of factors, including (as detailed in our Table 14 line 6 commentary); that trade effluent discharge volume has decreased by 17% (8856 MI/year v 7357MI/year).

Whilst the load being treated by the PPP has increased the load treated by NIW has decreased. On inspection of the results spreadsheet, it can be seen that this 3% reduction has been split between the Northern area, having a 13% loading reduction and the Southern area increasing its loading by 6%.

During the year, a number of the major traders in the Northern area have reduced their loading - in one case by 85%. This however was offset by another trader increasing their loading by 6% of the total Northern loading.

In the Southern area, there was a 17% increase in loading from the sampled and charged traders, of which two reported 50% volume increases. Of the 56 sampled and charged traders, 25 had increases in volume whilst 26 had increases in strength. It should also be noted that as a result of using actual flows, the traders on standard charged tariff had a significant reduction in loading of around 66%.

4.1.1 NI Water Data

Lines 2 to 5 – Loads (NIW Only)

The data used to populate this table is extracted from a master spreadsheet populated and updated by the Asset Performance Team. To track changes and maintain the process as live as possible, the Asset Performance team monitor and update by liaising with various sections i.e. Operational Technical Support., Environment Regulation, Engineering and Procurement and the Rural Wastewater Investment Programme. Trade Effluent information is obtained from NI Water's Trade Effluent Section. The COD: BOD conversion factor was not utilised as BOD is analysed as part of the Trade Effluent analysis suite.

Loads at each NI Water works having a Population equivalent greater than 250 are calculated from population figures using the 60g BOD per person per day. For those sites with a PE of less than 250, loads were derived largely from a desk-top exercise using house count information from Map-Extreme and an assumed occupancy rate of three.

The master spreadsheet was reviewed in detail, and information contained used to populate tables 17c,d requirements. The size banding of works is inputted manually. To eliminate any potential errors it was suggested that this could be automated for AIR12.

In AIR11, NIW have information on imports of septic tank and sludge volumes to the receiving wastewater treatment works being discharged into the sludge reception centre prior to transfer to PPP facilities for further treatment.

All Lines 2 to 5 indicate a slight reduction from AIR10 Data. Preliminary treatment and primary treatment categories experienced a reduction of less than 1%, with secondary treatment having the greatest reduction of 2.9%. This can be explained by the fact trade effluent load has reduced by 3%, and that 136 WwTW PEs were updated during the year.

The confidence grade against these lines is C3, as previously. As the treatment processes at the WwTWs, whether secondary, primary or preliminary treatment is definitive, the confidence grade of C3 can be supported.

Line 6 and 7 – Equivalent Populations (NIW Only)

Not all WwTWs have Water Order Numerical Consents - some only have descriptive consents, hence the variance between lines 6 and 7. Population figures are gathered on a theoretical basis. The confidence grade against these lines is C5, as per previous years, as these lines refer solely to WwTWs loading, and the majority of the WwTWs's PEs are based on a theoretical desk top approach, with some substantiation at a small number of works through on site house counts. Flow and Load survey programme will improve confidence year on year with associated increase in confidence from the current C5 grade.

Of the existing 1028 treatment facilities only 232 have numeric consents. Equivalent Population served is 59,480 less than AIR10. Changes to Water Order Consents and more emphasis on flow and load data can account for this overall 3.2% reduction.

4.1.2 PPP Data

Line 2 - Load receiving secondary treatment (PPP only)

The biological load in tonnes receiving secondary treatment in PPP facilities is slightly less for AIR11 (7396.5) when compared to AIR10 (8105.2), due primarily to the change in size band of Armagh STW (from Band 6 to Band 5) and the severe weather in December when the terminal pumping station feeding Kinnegar STW was out of action for seven days.

It should be noted that although the reporting requirements do not require such consideration, sampling is carried out at the inlet and does not take into account any reduction associated with primary treatment. While Line 2 complies with the requirements of table 15 to collect information of various types and sizes of works, it fails to produce accurate data on the load actually receiving secondary treatment. Line 5 - "The total load entering the works", also mirrors this figure.

All six PPP facilities have secondary treatment and information is based on sampling dictated by NI Environment Agency requirements. On one establishment monitoring is generally carried out on a daily basis (weekly at worst). The data sets are therefore as robust and secure as line determination permits.

We found that the reduction in load receiving biological treatment is not reflected by the volume of sludge produced, as this has increased. The reported disparity could be due to the fact the effluent quality has improved; the load entering the works has less hard BOD; or greater than required power is being utilised resulting in cost inefficiencies. Sampling of flow actually feeding to secondary treatment would provide more line appropriate data. This additional information would require increased sampling and analysis with associated costs.

As highlighted above, although it would result in increased levels of sampling and analytical costs, we consider it may be prudent to sample flows actually discharging to secondary treatment and compare the load with the inlet information.

Line 3 - Total load receiving preliminary treatment (PPP only)

A zero return has been reported for Line 3, as all six PPP facilities are secondary treatment works.

Line 5 – Total load entering the sewerage system (PPP only)

Prior to AIR11 this line was reported as "Not Applicable" as it was considered that the PPP Contractors did not operate the catchments. To align with our AIR10 recommendation that the load from PPP facilities should be incorporated, the Asset Management Section have used the PPP WwTW PE (derived from measured flow at each of the PPP WwTWs), converted to BOD after applying the conversion factor of 60g/head day. Data for this line equates to 7396.4 tonnes BOD /year and a confidence grade of B3 has been applied to reflect the increased monitoring at PPP facilities. As the PPP Contractors carry out, at worst, weekly analysis, the actual loading should be utilised rather than theoretical population equivalent, and the information network reversed.

Lines 6 and 7 - Equivalent Population served (Resident) (PPP only)

The equivalent population served by the treatment facility utilises the line2 total load entering the works divided by agreed 60g/head BOD. As all PPP facilities have numeric consents both lines have similar values.

Significant work has been carried out in the past year to update sewage works population equivalent data. Since AIR10 136 STWs have been updated.

4.2 Sewerage Service Facilities (Lines 8 – 9)

4.2.1 NI Water Data

Line 8 – Number of sewage treatment facilities (NIW Only)

The number of wastewater treatment works, which does not include 4 screened and 13 unscreened outfalls, has reduced by 12 from 1040 in AIR10 to 1028 in AIR11. This reduction is explained by the conversion of 8 WwTW to transfer pumping stations, with influent from the associated catchments pumped to larger works. An additional 2 septic tanks have been decommissioned, a sea outfall converted to a primary tank and 3 sites becoming private as they serve only one property.

Line 9 - Treatment capacity available (NIW Only)

Due to the greater number of NI Water Facilities (1028 compared to 6 PPP facilities) the confidence grade is reported as D3. Although the new PPP facilities have Functional Design Specifications resulting in a confidence grade of B3 this is not the case with the older NI Water facilities with treatment capacity being based on industry standard design criteria. Of the 1028 facilities, 709 have PE's of less than 100 which are generally served by septic tanks. Due to upgrading, provision of additional design information, or changes to Water Order Consents the design capacity has increased from AIR10

4.2.2 PPP Data

Line 8 - Number of sewage treatment facilities (PPP only)

We confirm there are six PPP facilities, identical to the reported in AIR10.

Line 9 - Treatment capacity available (PPP only)

Data is based on the actual design specification and there is no change from AIR10. Based on Line 2 data, the daily load receiving secondary treatment equates to 20.26 Tonnes BOD. This line records 30.4 tonnes BOD Year indicating a presumed overall head room of 10.14 tonnes BOD. Allowing for reduction in load associated with primary tanks the headroom differential could be greater.

4.3 Sludge Disposal (Lines 14-16)

4.3.1 NI Water Data

Lines 14–16 - Sludge Disposal

The Company confirmed that the procedures in place for the disposal of sludge are well controlled and robust. All sludge produced by NIW has been transported to PPP incineration facilities for disposal. As all sludges are disposed of through incineration it can be considered that all disposal is satisfactory, there is not a concern that the control measures in place may allow some unsatisfactory disposal to occur.

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 reported figure in line 14 is 30.5 ttds which combined with the 7.6 ttds

from PPP activities amasses to 38.1 ttds; 0.2 ttds greater than last year and 0.1 ttds greater than AIR09.

The Company commentary for lines 14-16 NI Water only is limited. However, as with previous years the company methodology document for these lines has a detailed commentary statements specific to AIR11 within it which we have reviewed. Again we would recommend that elements of this methodology statement are reproduced in the Company commentary for future returns.

The Company would appear to have a well controlled management system for controlling sludge movements both as liquid and cake through use of a GPS logging system. Further improvements are planned with the introduction of weighbridges at each site.

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

The Company has included the weight of grit and screenings in the reported data (0.6ttds). This was calculated from skip volumes using a 30% dry solid conversion, which is appropriate.

4.3.2 PPP Data

Line 14 - Percentage Unsatisfactory Sludge Disposed (PPP only)

The Company has reported that no unsatisfactory sludge has been disposed of during the year.

We queried a possible disparity in relation to Table 42 Line 44 - Sludge disposed to Farmland Untreated. The Company explained that the table 42 line 44 entry related to raw untreated cake being subsoil injected to willow coppicing which was an accepted activity under paragraph 10 of the waste management licence Regs - 2003.

Whist the Sludge Disposal Contractor is self regulating, the protocol in place and third party involvement by The Department of Agriculture, who carries out soil analysis and identifies package numbers, provides security.

Operational issues have hampered incineration during AIR11. As it is in the Concessionaire interest to incinerate as much sludge as possible, it is anticipated that in AIR12 the quantity of sludge being incinerated will increase, providing further security that sludge would not be disposed of in an unsatisfactory manner.

Line 15 - Total Sludge Produced (PPP only)

There is a minor increase in sludge 0.2 ttds produced between AIR10 (7.4ttds) and AIR11 (7.6ttds). This is attributed to either increased breakdown of solids to produce better quality effluents or a result of loads delivered to the PPP contractor from the NI Water sewer network, which is outside the PPP contractor's control.

Sludges produced from four of the PPP treatment works at North Down Ards, Ballyrickard, Richill and Armagh are transferred to either Ballynacor or Duncrue Street. Monitors at both sites record flow input as well as dry solids content. Cake produced by the belt press at Ballynacor is transferred to Duncrue Street for incineration prior to disposal. The indigenous sludge produced from the Ballynacor catchment is derived from the differential of imported to exported product.

Sludge exported from Kinnegar to Duncrue are determined by weighbridge.

Line 16 - Total sewage sludge disposed (PPP only)

In AIR10 the PPP Only table reported on a limited amount of sludge disposed of, under a contract side agreement, where the Contractor took over Ballynacor Sludge Disposal Facility, six weeks in advance of service commencement. This year's data represents a full year of PPP disposal, hence the significant change in data recorded

In comparing Line 15 with line 16 for the PPP Only data, there appears to be a significant variance in sludge produced and sludge disposed. i.e. 7.6 ttds versus 37.5ttds. This is explained by sludge originating from NIW Water establishments 29.9 ttds being transferred to PPP for treatment prior to disposal.

4.3.3 Total

Line 14 - Percentage Unsatisfactory Sludge Disposed (NIW+PPP) See Line 14 comments above.

Line 15 - Total Sludge Produced (NIW+PPP)

There is a minor 0.2 ttds increase in sludge produced from that reported in AIR10 (37.9 ttds) and AIR11 (38.1 ttds). This could be attributed to increased breakdown of solids to produce better quality effluents.

Line 16 - Total Sludge Disposed (NIW+PPP)

In AIR10 the PPP Only table reported on a limited amount of sludge disposed of, under a contract side agreement, where the Contractor took over Ballynacor Sludge Disposal Facility, six weeks in advance of service commencement. This year's data represents a full year of PPP disposal, hence the significant change in data recorded

The under noted provides the pathway associated with ultimate disposal, with sludge produced in NI Water facilities being transferred from the intermediate caking PPP facility at Ballynacor and various other direct routes to the terminal PPP sludge treatment disposal facility at Duncrue Street for ultimate disposal. In addition, a further 0.6 ttds associated with screenings and grit produced by NI Water facilities was disposed of to landfill.

Sludge produced in NI Water facilities as well as sludge produced in PPP facilities at Glen Water and Kinnegar are transferred to the sludge treatment centre at Duncrue Street. Sludge produced and transferred by NI Water facilities equates to 29.9 ttds. In addition to this, grit and screenings following conversion to dry solids equates to a further 0.6 ttds resulting in an overall sludge production figure of 29.9 + 0.6 = 30.5 ttds which agrees with The NI Water Return for this line. It should be noted that the 0.6ttds associated with screenings and grit is disposed of to landfill.

The PPP catchments and treatment facilities' generate an additional 7.6ttds which when added to the NI Water Figure inclusive of the 0.6ttds disposed to landfill equates to 38.1 ttds.

Sludge produced in AIR 11 is marginally higher than AIR10 indicating stability in the network.

		NIW	PPP	Total	Comments
	Produced	30.5	7.6	38.1	
	Transferred	29.9 *	Nil	Nil	* to PPP Sludge Treatment Centre
	Disposed	0.6 **	37.5	38.1	** Screenings Grit To Landfill

Table 15.1 Sludge production disposal (ttds)

The fine detail is confusing as the table line derivations do not register sludge transfers

5. Company Methodology

5.1 Sewage – Loads (NI Water Only)

Line 1 – trade effluent

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 the normal procedure of an allowance deducted for domestic and process use onsite.

For sites where neither discharge flow nor water supply data is available, discharge volume has been estimated as 100% of the consented volume.

No conversion from COD to BOD is required for this data as the trade effluent group analyse effluent for BOD, as well as COD which is used for charging.

Line 2 to 13 – sewage loads and treatment facilities

We reviewed in detail the asset performance master spreadsheet which is used to populate this and other tables. The spreadsheet allows the basic data on each STW to be entered such as works name, design pe, treatment process etc, and then the data can be manipulated to populate the various parts of the tables. The spreadsheet also covers Tables 17b, 17c and 17d as they contain comparable information. Inputs to the spreadsheet are gathered from a variety of information sources as shown below.

- Environmental Regulation Team. Updated consents and regulatory obligations
- Operations Technical Support. STW improvements and changes to treatment process
- Engineering & Procurement. New works, extensions and modifications

Population data is gathered on a theoretical basis from properties in the catchment and standard occupancy assumptions. It is planned to check and improve this data with a series of flow and load surveys in the future to improve the confidence grade in Lines 6 & 7. Better links are also required to the customer database to ensure new properties are included. Tourist populations are excluded as required, based on the proportion of pe in hotels, caravans and tent pitches.

The Auditor was advised that it is possible for a number of issues arise which create uncertainty within the dataset. For example, a septic tank serving two houses is classified as a single sewage works. However, if one property is then sold, the septic tank is only then serving one house and is no longer designated a sewage works. Such updates are not always discovered, hence a small reduction in the confidence grade. Small septic tank STWs can also be easily overlooked as overgrown underground structures giving further uncertainty.

Treatment capacity available (Line 9) is calculated from design capacity in terms of population equivalent served, converted to BOD load.

Data reported has been reconciled with the previous Reporting Year, with full details stated in the Company commentary

The AIR10 report queried whether tankered waste loads had been included and were advised that although requested, the data was not currently available. This has been rectified for AIR11.

We reviewed a number of spreadsheets and data checks carried out by the Asset Performance Team, together with confirmatory emails on data queries and checks.

The general reductions in loads and population equivalents served in the NIW only Table 15 are matched by equivalent increases in the data for PPP Table 15.

5.2 Sewage – Sludge Disposal

The total mass of sewage sludge produced/disposed is taken from line 2 column 10 of the 'total' section of table 17g.

The methodology for deriving the PPP volume is similar to the NIW methodology, whereby recorded wet tonnes are converted to ttds using annual average percentage dry solids.

6. Assumptions

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.

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.

Northern Ireland Water

7. Confidence Grades

For Line 1, a confidence grade of B1 was considered for this data to reflect the overall improvements (as per T14 L6). Whilst acknowledging the improvements made, we believe that due to the accuracy of meter readings and vagaries of analytical sampling and analysis, the confidence grade should be adjusted to B2.

In relation to PPP data, the confidence grade for Line 1 is the same as for the NI Water data and since the data is derived using the same methodology, we support this grade.

For Line 2, 6 & 7 (PPP data), a confidence grade of B3 was based on the lowest denominator 52 samples per year. Due to the frequency of sampling and concerns associated with sampling locations, we consider a B3 to be appropriate.

For Line 14, as no unsatisfactory sludge has been disposed of, and protocols are robust and data secure, we confirm a confidence grade of A2.

For Line 15 & 16, the methodologies and record keeping systems for liquid and cake movements (as required by the PPP contract), confirm a confidence grade of B3.

For lines 2 to 13 (NIW data only), the confidence grades are broadly unchanged from AIR10 and are as described in the commentary above.

A confidence grade of A1 has been assigned to lines 14 as this is zero value and understood to be correct.

A confidence grade of B3 overall has been assigned to lines 15 and 16, which is consistent with table 17g. The NIW element of these lines is felt to be B2 but the PPP element is only B3 resulting in a B3 overall. This is appropriate.

8. Consistency Checks

No consistency checks are required for this table.

Date: 29 July 2011 Prepared by: HMS

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 comment made last year on potential improvements to the reconciliation of records for new sewers recorded by CSD has been addressed.
- Reconciliation of lines 1 & 2 with 14 & 15 does not follow the table definition, instead adjustments are made in line with the Company GIS database which is appropriate and consistent with AIR10.
- There is an inconsistency between the reporting of WwTW IDs in line 17a but excluding WwTW UIDs from line 16a, however reporting is consistent with AIR10.
- Only a single drainage area plan has been completed and there are none ongoing at present. This is a consequence of the expiry of the previous framework for studies and ongoing delays in procurement of a new framework.
- As the methodology for lines 12 and 13 is unchanged from last year we would recommend retaining a C5 for AIR10. When NI Water is able to assess the number of collapses/blockages occurring on lateral sewers, we would support an improvement to the confidence grade.

3. Audit Approach

The responsibility for the compilation of table 16 is held by a single manager who collates information from a number of contributors. The manager and contributors to the various lines where audited. The systems and methodologies used to gather data were reviewed.

4. Audit Findings

4.1 General

The methodologies for collection of data into the table are unchanged from last year and continue to give generally good data with only minor short comings.

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.

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

Both Engineering and Procurement (E&P) and Customer Services Directorate (CSD) are responsible for carrying out sewerage service activities. CSD encompasses Networks Sewerage, Operations and Tactical Asset Management. Data has been gathered from both sources and summed to determine the total activity during the report year.

Line 3 – New Critical Sewers

New critical sewers are added onto the Company's GIS system in two ways, through adoptions by CSD and completion of capital projects by E&P.

Sewers laid by E&P are new public sewers within roads and other public areas. Information is captured on the Company's CPMR database which has been designed with regulatory reporting in mind. Data is entered by contractors via a portal to the database and is approved by the appropriate project manager. The data collection by this process is quite extensive; drop-down boxes are used to define critical and non critical sewers. Approval by the project manger and the link to contractor payments helps with data verification. Improvements have been put in place since last year including improved quality assurance with further sense checks and exception checks undertaken on the data and spend.

CSD maintain a database of new adoptions which feed into the GIS database of sewer records. Although the methodology is principally unchanged from last year the reporter's comment regarding reconciliation has been addressed through further assurance checks and checking of the collated spreadsheet against the sum of certificates.

The identification of critical sewers as part of this process does not follow completely the guidelines of the WRc Rehabilitation Manual. Although the definitions of critical sewers are known by Ops they do not have sufficient information to check all parameters and rely on size of sewer being greater than 450mm dia as the main classification criteria. It is understood from last years audit, proximity to buildings is also considered, but information on high traffic volumes, sensitive areas, difficult access etc is not known. As the nature of most adoptions are new housing developments, the diameter criteria is likely to capture most critical sewers but there is still going to be some small degree of error.

Line 4 – Critical Sewers Inspected by CCTV

There were 15.53km of critical sewer inspected by CCTV/Man Entry by E&P, 29.85km of critical sewer inspected by Customer Services Directive - Networks Sewerage and 41.51km by Asset Performance – Network Sewerage.

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. There may be an issue with respect to when the sewer was surveyed compared to the report year as the date of survey relates to the date of construction in their database. This difference is largely immaterial if the Company consistently reports in this manner and double counting between report years does not occur. This procedure has been confirmed again for this year resulting in consistent reporting of this line.

The information gathered by Networks Sewerage 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 are critical is the same as the proportion of NI Water's sewer stock that is critical. For AIR12 the Company plans to use its Corporate Asset Register to report on CCTV/Man Entry surveys undertaken using the information held on the critical sewer layer, this would remove the requirement to proportion survey work.

Line 5 – Critical Sewers Renovated

There were 9.40km 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 Network Sewerage in the reporting year, as this is not an activity that would normally be carried out by them.

Line 6 – Critical Sewers Replaced

There were 4.42km 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. 2.08km have been reported by CSD which is a proportional allocation of the total of sewers replaced by Network Sewerage in the overall ratio of critical to non-critical.

Line 7 – Abandoned Critical Sewers and Other Changes

A small entry has been included for line 7 this year - 0.05km. Only E&P would undertake this activity, the information comes from the Company's CPMR database.

Line 8 – New Non-critical Sewers

As with line 3 (new critical sewers) new non-critical sewers are added onto the Company's GIS system in two ways, through adoptions by CSD and completion of capital projects by E&P.

There were 27.96km of non-critical sewers laid by E&P and 167.66km of non-critical sewers adopted by Customer Service Directorate.

The value of adoption of sewers has greatly increased from the previous year. The Company suggested this is, in the main, a result of increased pressure placed upon developers from [x] providers to achieve adoption so that [x] can be released.

Line 9 – Non-Critical Sewers Renovated

There were 6.26km 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 2.99km of non-critical sewers replaced by E&P during the report year. In addition, Network Sewerage replaced 1.59km which is a proportion of the total length of sewers replaced by Network Sewerage. The ratio applied, is the overall ratio of critical to non-critical sewers, and is consistent with line 6.

Line 11 – Abandoned Non-critical Sewers and Other Changes

Only 0.09km of non-critical sewer has been reported abandoned. This comes from the Company's CPMR database and reported by E&P; network sewerage would not normally undertake this activity.

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

There were 85 collapses per 1000km and 1760 blockages per 1000km reported in 09/10. Rising main failures account for 2.5% of collapses.

The above figures appear to be extremely high when compared to water companies in England and Wales, as the figures include blockages and collapses on public lateral sewers (which are the responsibility of NI Water, but not E&W water companies).

As reported previously, the Company has added critical and lateral sewer base layers to NI Water's Corporate Asset Register. Work is also progressing on identifying sewer repairs as a result of CCTV surveys. As such, NI Water should be in a better position to report on whether collapses or blockages have occurred in a private lateral, public lateral or public main sewer for AIR12.

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

Lines 1 & 2 are transferred data from the previous year as discussed above and are correct. Lines 14 & 15 should then be the summation of data entries from lines 1 & 2 and lines 3 to 11, however NI Water have not followed this approach, instead opting to adjust lines 14 and 15 to corrected figures obtained from their GIS database. This approach has allowed them to report the correct entries in lines 3 to 11 and also a more appropriate value for the total lengths reported in lines 14 and 15.

Reconciliation of the asset balance correction is needed as the Company continues to update and improve its GIS database.

During the AIR10 reporting period the Company undertook a study to improve the identification of critical sewers. An independent consultant has carried out the work, a desk study to identify the proportion of the sewer stock that falls into the critical

category under the WRc rehabilitation manual definitions. It can be noted that the study although appropriately undertaken does have limitations which have been acknowledged within the report. The WRc definitions are extensive and information is not readably available to undertake a full categorisation, similarly the report identifies that large proportions of data on sewer attributes are missing which make some classifications difficult, for instance depth of sewer is not known for 12.8% of records. However, the study as presented still provides a good estimation of the extent of the Company's critical sewer stock. Further investment to improve the identification could be undertaken but the benefit to the Company of doing this is probably limited.

The recommendation of the reporter for the Company to be consistent with the use of single depth parameters to classify sewers has been taken on board but this does not affect the entries in lines 14&15 as the records in question have been classified as non-critical.

There has been a small reduction in the total length of critical sewers despite an increase in total sewer stock. The Company have assessed this as the result of changes to 3rd party GIS datasets used as part of the process and better information. They consider that undertaking the role in-house going forward will result in more consistency of reporting.

The total length of sewers at the end of the reporting period is 14904.68km, of which 3622.52km are considered to be critical. This is only a minor change in the percentage of critical sewers from 24.8% to 24.3%.

4.6 Intermittent Discharges (lines 16a, 16b, 17a and 17b) (NI Water Only)

The identification of UIDs by NI Water is continuing from last year but has yet to be completed and an estimate to the total number has been made to present applicable information.

Line 16a: Number of UIDs excluding CSOs is estimated from the identified number of IDs multiplied by the percentage of IDs that have been classified rather than from a defined list agreed with NIEA. The percentage of UIDs is calculated from the historic sample of combined pumping stations only and is therefore likely to have limited accuracy. The information for this line and 17a (number of intermittent discharges ex CSOs) is only based upon combined pumping station overflows. Foul-only pumping station overflows are not included as they do not have a formal NIEA classification. Similarly overflows within the boundaries of WwTWs are not included in line 16a as it is expected that any improvements to overflows at works are expected to be included in improvements at works, the total number of overflows at works are however included in line 17a. This approach is consistent with last year's reporting.

Information for lines 17a and 17b is extracted from the Asset Information Centre (AIC) database which is updated throughout the year. A study commissioned to review the classification of UIDs was concluded in December however the validation of these findings by AIC is not complete and only those validated up to 31/3/11 have been included in the return, the completion of this process is planned before AIR12.

Cross checks are understood to have been undertaken between the Asset Information Centre and the Asset Performance Team. Unconsented CSOs that have been identified have been included. The Company has provided comprehensive details and breakdowns of the reconciliation exercises that they have undertaken in their commentary.

The regulator guidance on the preparation of lines 16a and 17a is not explicit but NI Water have continued their methodology from last year which includes WwTW and foul only PS overflows in the total for line 17a but excludes unsatisfactory WwTW and foul only overflows from the total for line 16a. There is a possible discrepancy in information, but year on year reporting is consistent. An estimate of the number of foul-only pumping station UIDs and WwTW UIDs is not known.

Lines 16a and 16b are based on extrapolated estimates using historic % classification. This provides the best estimate given the information available but has a potential to possibly overestimate. As an increased number of overflows are classified it would be expected that the stock left unclassified is going to have a lower percentage that are unsatisfactory. The estimate used by NI Water is however consistent with AIR10 and appropriate.

4.7 Drainage Area Plans (lines 18 and 22) (NI Water Only)

The Company uses a definition of all networks greater than 250PE for line 20, total number of drainage areas. This would appear a reasonable approach and results in 260 being reported for the line, a drop of 2 from last year as a result of better information. The Company's ongoing programme of studies is based upon drainage areas with a resident population greater than 1000 and hence they have only 109 areas out of the 263 in their programme, although some studies have been completed for less than 1000 domestic population in the last 5 years.

The Company has only completed one DAP in the report year and have returned a zero in line 19 for studies in progress. This lack of investment is a result of the expiry of the previous 5 year framework for drainage areas studies and the non renewal of it through procurement issues. It is expected that a new framework will not be in place until the end of 2011 which will further impact on their programme of studies and an expected low return for AIR12.

The Company has used a 2003 baseline for reporting model builds including all those built or maintained after this date.

The percentage completions and percentage coverage of population have been calculated appropriately.

The confidence grades associated with the lines are appropriate. Line 18 has an appropriate A1 associated with the zero entry. The confidence grade for line 22 has been increased from C4 last year to B3 which is a reflection of the accuracy of table 13, connected population which has improved.

4.8 Nominated Sewerage Service Outputs (lines 23 to 25) (NI Water Only)

The Company originally had 117 UIDs in their PC10 plan, but this has increased to 200. The Company maintains a spreadsheet of outputs against their plan. A draft version of the spreadsheet and table was reporting 21 outputs but this has been revised to 20 which relates to the spreadsheet. An error in the spreadsheet over the completion date for one asset was questioned during audit. This was confirmed following the audit meeting and a corrected spreadsheet issued.

A suggestion was made by during the audit that the Company should include a commentary on progress against target in the Company commentary for line 23.

For line 24 NI Water are reporting 18 outputs which comprises 17 carry over and 1 new start project delivered. The details behind change to the programme and carry over have been presented by the Company in their commentary. The Company's CPMR database is used to collate the information on a quarterly basis, this information relies on having correct beneficial use dates which are understood to be maintained though project management checks. Manual checks are carried out to compare spend profile against predicted dates and ensure correct information.

It is understood the plan for 2010/11 was to achieve the 18 outputs that have been reported.

Line 25 - Investments in improvements to small WwTW. The definition for 'small' wastewater treatment works is not clear, but the assumption of <250PE which is those included in the rural wastewater improvement programme, has been used as a criteria, which would appear to be appropriate. The spend obtained from the Company's accounting system has been adjusted for COPI to 07/08 prices which is correct.

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 Customer Services Directorate (CSD) carry out the activities in lines 3 to 11 for NI Water. The PPP contractors may also carry out these activities.

The information is collected through the Company's CPMR database. Data is entered directly by contractors via a portal. The database has been developed with the reporting of AIR returns in mind and has comprehensive data fields to collect appropriate information about new assets. Drop-down boxes have been created to allow the selection of critical and non-critical sewers. The information entered by contractors is checked and approved by E&P. The information is cross-checked

against invoices prepared by the contractor, which ensures that work being completed and invoiced is being reported.

Within CSD, 3 functions have the potential to be involved in the activities – Networks Sewerage, Operations Contact Management Centre (OCMC) and Tactical Asset Management (TAM). It was found that in past returns the activities of different functions were not necessarily being fully captured, so for AIR09, each function was asked to confirm which activities, if any, it carried out.

The components of lines 3 and 8 (new critical and non-critical sewers) that are the responsibility of CSD are those sewers constructed by developers and then adopted by NI Water. Design drawings are submitted by developers for approval by CSD. Once as-constructed drawings are submitted (and inspection of the new sewers is passed), CSD 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 CSD 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.

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)

These should be 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

However the Company adjusts the entries to allow reconciliation of the sewer stock data recorded on its GIS database as discussed above.

The Company introduced a new methodology for determining critical sewer lengths in AIR10, which is based upon the work undertaken by a consultant on their behalf. The consultant has completed a study report to better identify critical sewers using a combination of Mapinfo queries and MapBasic programming to run an analysis of the data held within the Company's GIS database. The study report bases the analysis around the WRc manual 4th edition but has limitations due to two factors; not having

all the information fields available to fully comply with the possible definitions for critical sewers (eg ground conditions, proximity to sensitive areas etc) and incomplete data fields within the database (eg depths, sizes or material types missing for some records).

The study exercise was only desktop so no reconciliation of data was undertaken to try to improve records this will be an ongoing exercise for the Company. There has been no material improvement in records from AIR09 to AIR11 only in the method of analysis.

The study report highlights that considerable data sets are missing;

- 18.2% of records have no data for material
- 26.5% of records have no data for downstream depth
- 23.8% of records have no data for upstream depth
- 12.8% of records have no data for up and downstream depth combined
- 0.2% of records have no data for function
- 6.6% of records have no data for size 1
- 99.4% of records have no data for size 2

It is understood that for these records the sewers have been classified as unknown and hence the analysis is based on the know records only which is circa 76% of the sewer stock. The remaining 34% has been classified in the same proportion for critical and non-critical.

The recommendation to report sewers with a known shallow depth either upstream or downstream (but with no known complementary depth) as 'non-critical' has been incorporated into the Company's methodology. The recommendation has led to an additional 2386km previously unknown sewers being reclassified as non-critical.

5.5 Intermittent Discharges (lines 16 and 17)

Lines 16a and 16b

The methodology for this line changed from AIR09 following the clarification of a query and is consistent with AIR10. In AIR09 the Company reported on the number of UIDs classified by NIEA to date, for AIR10 and now AIR11 the Company has made an estimate of the total number of UIDs based on those classified to date and the total number. A historic percentage generated at AIR10 has been used for AIR11 which is an appropriate approach.

Lines 17a and 17b

The methodology for these lines is unchanged from last year. Rationalisation exercises have been undertaken to identify the incorrect entries such as dual manholes and bifurcations. In addition an independent consultant is undertaking an exercise to ascertain any additional sewerage system overflows which may exists but for which NI Water has yet to apply for a Water Order Consent. This work is now complete and the verification has been completed for 8 of the catchments.

Information for these 8 catchments has been included in the return with the remainder added in AIR12.

5.6 Drainage Area Plans (lines 18 and 22)

Data for this line is obtained from the maintained plan of drainage studies and is unchanged form last year.

5.7 Nominated Sewerage Service Outputs (lines 23 to 25)

Data for line 23 is maintained in a spreadsheet along with beneficial use date, analysis of the spreadsheet is undertaken to determine the return for the table.

Data for lines 24 & 25 comes from CIM based on Q4 cross referenced to PM information on programme dates.

6. Confidence Grades

The Company has assigned a confidence grade of B3 to line 1, repeating the CG for line 17a in last year's return from which line 1 is copied. The confidence grading recognised that the GIS record is not complete, and that there will be some unmapped sewers.

The Company has assigned a lower confidence grade of C3 to line 2, a repeat of the CG assigned to line 15 in AIR10. This is an associated improvement from last year Following the work undertaken to improve the classification of sewers on their database.

The Company has assigned a confidence grade of B2 to line 3 as last year, the data is a combination of two sources E&P and Ops although the E&P data could be classed A2 overall the confidence grade should be lower. In the draft table reviewed at audit an A3 grade was proposed but following the suggestion of the auditor this was revised to the more appropriate B2.

The Company has assigned a confidence grade of B3 to line 4 an improvement from C4 last year. This is an appropriate assumption given the mix of A2 confidence in data from one source and small proportion of data from another source which only has a C4 grading.

The Company has assigned a confidence grade of A2 to lines 5 and 7 which we believe are appropriate.

Line 6 and line 10 were A2 last year but is reported B3 this year as a result of the inclusion of data from Operation Services which only has a C4 CG. The A2 and C4 have been combined into a B3 entries, this is appropriate.

The Company has assigned a confidence grade of B2 to line 8 and A2 to lines 9 and 11 as per last year. We consider these are appropriate.

The Company has assigned a confidence grade of B2 to lines 12 and 13, on the basis the data is derived from checked and paid invoices. As the methodology for lines 12 and 13 is unchanged from last year we would recommend a C5 for AIR11. When NI Water is able to assess the number of collapses/blockages occurring on lateral sewers, we would support an improvement to the confidence grade.

The CG for line 14 is B3 the same as last year and in alignment with the CG for line 1 which is appropriate.

The confidence grade for line 15 has remained at C3 for this year it was improved from C4 to C3 at AIR10 as a result of the improved assessment undertaken by the external consultant but no further work has been carried out in the last year. Although the Company's GIS data still has a high degree of missing information we believe the C3 confidence grade is appropriate.

The Company has assigned a confidence grade of C2 to lines 16a and 16b. This is a repeat of last year and is appropriate as generation of the line data includes estimates of the number of intermittent discharges as well as those listed by NIEA.

Confidence grade are maintained at B4 to lines 17a and 17b, the same as last year and continues to be appropriate.

Confidence grades vary between A1 and A2 for lines 18-21. Since the data is pure direct measurement we support this grading.

The confidence grade for Line 22 has been improved from C4 last year to B3 has been applied to line 22 which is a reflection of the grading for the population data reported elsewhere in AIR11.

8. Consistency Checks

- Lines 12 and 13 are consistent with lines 1-3 of table 16a and line 14 of table 16.
- Lines 14 and 15 are not consistent with lines 1, 2, 3, 7, 8 and 11, as discussed in the body of this report but the reason this is understood.

9. Company Commentary

The Company has not addressed the following issues that the NIAUR requires to be included in the Company commentary;

• Levels of activity forecast compared to achieved with relation to nominated service outputs

Date: 29 July 2011 Prepared by: HMS

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

- It is still not possible to distinguish failures on laterals from failures on main sewers, although NI Water has recently added critical and lateral sewer base layers to NI Water's Corporate Asset Register. Work is also progressing on the identification of sewer repairs resulting from CCTV inspections
- The improved collapse/blockage performance would suggest an improvement in wastewater infrastructure serviceability; however, it is difficult to draw strong conclusions until a consistent methodology is established over several years to determine the real trend.
- The Company have reported a total of 11,492 equipment failures repaired in the year. This is a 5.6% increase compared with last year which the Company is attributing to the abnormally wet weather conditions which resulted in an increased burden on sewage pump stations.

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

As highlighted previously NI Water is responsible for most laterals, whereas their E&W 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, and have previously recommended that NI Water develop systems to enable the identification of critical and lateral sewers and thus identify what proportion of collapses and blockages occur on public laterals.

We confirm that the Company added critical and lateral sewer base layers to NI Water's Corporate Asset Register for AIR10 and work is also progressing on identifying sewer repairs as a result of CCTV surveys. As such, NI Water should be in a better position to report on whether collapses or blockages have occurred in a private lateral, public lateral or public main sewer for AIR12.

4.2 Sewers – Maintenance (lines 1 to 4)

There were 37 rising main failures (Line 1) recorded in the reporting year, 50% higher than that reported in AIR10.

There were 1229 gravity sewer collapses (Line 2) recorded in the reporting year, 25% higher than that reported in AIR10.

There were 26,040 sewer blockages (Line 3) recorded in the reporting year, 369 fewer than reported in AIR10. As above, this could suggest an improvement in wastewater infrastructure serviceability; however, it is difficult to draw strong conclusions until a consistent methodology is established over several years to determine the real trend.

On the surface, this suggests a slight deterioration in wastewater infrastructure serviceability; however, it is difficult to draw strong conclusions until a consistent methodology is established over several years to determine the real trend.

In terms of equipment failures, the systems used for managing and recording M&E maintenance were upgraded at the end of 2008 and are operating well. Initial problems with remote field communications have been overcome by improvements to band width and are performing well. 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. Manual review of the monthly return figures is used to filter the information for the AIR return.

Despite the investment and expected improvement in rate of failures the return this year has seen an increase in failures from 10,882 for 2009/10 to 11,492 for 2010/11 (+5.6%). This increase is attributed to the abnormal weather experienced in the reporting period as it is understood that it is was one of the wettest years on record for Northern Ireland. This increased rainfall has put an increased load on the sewage pump stations which has translated into increased equipment failures. This is a probable explanation given that rainfall was high in 2010/11 and a high proportion of failures would expect to be attributed to pump stations.

The Company has proposals to invest in a future commission to undertake improved asset data tagging of its assets to further improve collection of data on its assets. It is understood this is proposed for a September or October start and will be complete for AIR13.

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.

5.2 Equipment Failures Repaired (line 4)

The Company recorded the relevant information for this category in the Mobile Work Management (MWM) system. This is the second full report year of the mobile work management system known as "Ellipse" which was introduced in late 2008. 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.

A description of the process which gathers the information regarding failure and repair is best illustrated by e.g. a pump failure 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 '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.

The system has been observed in operation at company work control centre at previous audits and is unchanged this year.

5.3 Information Analysis

Implementation of the new system for collecting data at the end of 2008 has improved the collection of data. The 'Ellipse' work management system and associated 'toughbooks' are working well, early communication issues have been overcome by increasing the band width of the data link.

The Company is 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.

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 that are less prone to blockage and ragging are being reviewed and installed where appropriate.

Northern Ireland Water

The Company is introducing improved control systems and optimisation 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 B2 to lines 1 to 3 on the basis the data is derived from checked and paid invoices.

The Company has assigned a confidence grade of B2 to line 4. The data quality is good however failures from non-electromechanical systems are not recorded. There is some inability of the system to identify when a failure caused a detrimental impact to service which relies upon manual intervention to filter results. On this basis we support the confidence grade assigned.

8. Consistency Checks

- 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

Date: 29 July 2011 Prepared by: HMS

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 (NH_3). The performance estimate made enables the trend in performance to be identified and serviceability assessments to be made.

2. Key Findings

- Steady performance across all indicators.
- General improvement in performance at PPP sites, although only as a result of the rolling data set rather than any actual improvements.

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

There have been no significant changes to the data sources or methods used to calculate the line totals this year.

The Company provide a detailed list of all excluded sites in their commentary which we reviewed with the Company. Of the 72 NIW sites excluded for BOD and SS, 8 are listed as being out of service at 31st March 2011. Checks against the source data confirmed that all 8 sites were taken out of service during FY10/11 and it was noted that the majority of these sites were compliant prior to exclusion. The remainder have all been correctly excluded due to size banding. No NIW sites have been excluded for insufficient data.

Of the 6 PPP sites, only Ballynacor WwTW has been excluded from all performance tables as it is a new site with less than the 3 years requisite data set. All other PPP sites have been included with 2008 data based on the pre-upgrade status when under NIW ownership. Richill WwTW has been excluded from the ammonia performance results as there was no imposed ammonia consent and hence no data prior to 2009.

For clarity, the Company includes a list of approximately 700 small sites which are excluded on the basis of size banding.

The Company has a number of sites without relevant numerical consents (i.e. relating to BOD, SS, NH_3) which are not monitored and not recorded in LIMS. However, these sites are predominantly all Band 1 or 2 sites and hence excluded on the basis of size banding anyway and hence have no impact on the line totals. These sites are included within the 700 small sites listed in their commentary.

NI Water has provided performance charts to indicate change over time in each indicator. However, as this is only the third year of data, the charts only indicate three points for each line and it remains difficult to assess any real trends in the parameters.

Although the charts indicate an overall decline in all parameters compared to last year, the decline is considered insignificant when compared to the range of data points over the last 3 years, all of which are typically within +/-2%, and a number of other potential influencing factors including:

- Potentially moving baseline due to ongoing and periodic tightening of consent levels
- Site closures and temporary usage
- Impact of temporary consent relaxations
- Seasonal variations (e.g. extreme weather events)
- Other network events (e.g. abnormal effluent discharges)

Furthermore, the Company informed us that the actual number of sites failing consent levels has actually fallen slightly from FY09/10 levels. Whilst we have not verified this claim, we agree that the results are probably more indicative of a relatively steady and consistent performance, and recognise that real trends may only become apparent in future years as the historical data set grows.

The Company's performance against specific parameters is discussed in more detail in the following sections.

We identified that the Company had not referred to operating costs in their commentary and requested an explanation. NI Water advised that they believe the requirements are being addressed by the 'Cost to Serve' Project which automates coding of jobs within the financial systems enabling more detailed and site and job specific information on running costs. The Company also advised that details of this have been fully disclosed in Tables 17b-f and did not feel the need to repeat these details here which we accept.

4.2 BOD Performance

NI Water Only

Predicted performance indicates a slight decline across all event indicators ranging from 87.2% to 92.5%, although levels remain within +/-1% of previous years' results. The changes cannot be considered significant at this stage as stated in Section 4.1.

PPP Only

Predicted performance for BOD for the included 5 PPP sites has increased from event indicators ranging from 80.7% to 92.9% to within the range 88.7% to 94.3%. This is fully in line with expectations as the rolling 3 year data set gradually removes lower performance results from the pre-upgrade status at the sites.

We checked the performance of the excluded site, Ballynacor WwTW, and can confirm that the site would report as 100% if listed.

We are therefore satisfied that all PPP sites are performing well and expect the results to improve to near 100% next year when the 3 year data set fully covers the post-upgrade period and all sites.

Total

We can confirm that final totals are a correct conglomeration of the previous tables.

4.3 SS Performance

NI Water Only

Predicted performance indicates a slight decline across all event indicators ranging from 90.2% to 93.6%, although levels remain within +/-2% of previous years' results. The changes cannot be considered significant at this stage as stated in Section 4.1.

PPP Only

Predicted performance for the 5 included PPP sites has improved from 92.9% to 94.3% in all categories. This is fully in line with expectations as the rolling 3 year data set gradually removes lower performance results from the pre-upgrade status at the sites.

As with BOD, we checked the performance of the excluded site, Ballynacor WwTW, and can confirm that the site would report as 100% if listed.

We are therefore satisfied that all PPP sites are performing well and expect the results to improve to near 100% next year when the 3 year data set fully covers the post-upgrade period and all sites.

Total

We can confirm that final totals are a correct conglomeration of the previous tables.

4.4 Ammonia Performance

NI Water Only

Predicted performance indicates a slight decline across all event indicators ranging from 86.1% to 92.7%, although levels remain within +/-2% of previous years' results. The changes cannot be considered significant at this stage as stated in Section 4.1.

PPP Only

Only 3 of the 6 PPP sites (Armagh, Ballynacor and Richill WwTWs) have numerical ammonia consents. Of these, both Ballynacor and Richill were excluded from the calculations as they had no ammonia consent in place prior to 2009 and hence lack the requisite 3 years of data.

Due to the continued inclusion of only a single site, the table results indicate no change from last year with performance at 71.7% for the max and 95% ile indicators. We analysed the source data to check the actual performance at the 3 sites and can confirm that all 3 sites are currently performing within consent levels and that the 71.7% reported figure is wholly due to the pre-upgrade performance in 2008. We therefore expect a significant improvement next year when the 2008 data is omitted from the data set.

Total

We can confirm that final totals are a correct conglomeration of the previous tables.

5. Company Methodology

There are no significant changes to the Company methodology this year. The Company continues to report on results from the last 3 years in accordance with the guidelines.

For consistency across tables, the population equivalents used to allocate size bands are based on population equivalents at 31st March 2011 taken from the AIR11 returns. However, the performance data used to calculate the event forecasts is based on the calendar year. Whilst in theory this means that the two data sets are misaligned, in practice, as the totals use a set calculation based on a rolling 3 years of data, the overall impact is considered insignificant. NI Water excludes works that were out of service on 31st March 2011, even though a full set of data may exist for the respective calendar year to ensure continuity between tables. We agree with this approach as a reasonable compromise and expect any discrepancy to be well within the limits of the assigned confidence grade.

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 (ie <500 PE)
- insufficient data (if less than the specified 3 years of data needed with 6 or more samples in each year)
- site taken out of service within the financial year (on the basis that the table is providing a prediction of future compliance rather than past performance)

For the remaining STWs, the analysis is carried out in accordance with the guidance set out by NIAUR; although the Company elects to use the equivalent excel function for calculating the 95 percentile. The calculation process is a mechanical one, identical to previous years, and we can confirm that it complies with the procedure set out in the guidance.

We can also provide 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" are assigned a value equal to half the limit of detection.

The performance data taken from the calendar year is assumed to be representative of the period to the end of the Report Year.

7. Confidence Grades

The Company has assigned a confidence grade of A2 to all lines. On the basis of the data collated and pre-defined methods for calculating line totals, we believe this to be appropriate and justified.

8. Consistency Checks

We found no errors in the Company's calculations. Comparison of the data against last year's table indicated general consistency in the numbers, although there is a slight increase in the total number of NIW-only STWs from 244 to 251. When

challenged, the Company advised the total fluctuates due a number of factors, but primarily changes to pumping away from a previously included site and natural growth causing sites to exceed the 250 and 500 PE thresholds.

Reporting Requirement states that Lines 3, 6 and 9 are copied from Table 15 Line 8, which are not consistent. As we mentioned above, there are circa 700 Band 1 and 2 sites in NI Water area, and they are excluded from Table 16b figure. Hence these lines for NI Water and total do not match with Table 15 Line 8.

Date: 29 July 2011 Prepared by: HMS