Annual Information Return 2014

Northern Ireland Water

Non-financial Measures

(Commentaries for Tables 7 - 16)

Public Domain Submission

Prepared for

Utility Regulator and NI Water

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Table 7 – Water Properties and Population

1. Introduction

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

2. Key findings

- We were able to reconcile the property numbers reported to the Rapid extract presented by NI Water.
- We are content with the confidence grade of A2 for non-household. After the Company's submission, we discussed and agreed with the Company that the confidence grade for household should be B2. We also agreed that the CG for HH remains B2 until NI Water having a direct commercial relationship with their household customers.
- The methodology for Population is consistent with that used in AIR13
- Total population has increased by 0.5% from the value reported in AIR13.
- We audited the reported data and challenged the processes on a sample basis. Except where detailed below, we consider the data reported in the table is robustly prepared using systems and process that are appropriate and in line with the reporting requirements and that are properly implemented with effective quality control and governance arrangements.

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. Company methodology

4.1 Properties

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 outlined that data on property counts and classifications are reported monthly and reconciled with other data collection activities, such as the data quality programme. During the audit we sought an update on various issues which had been raised in previous AIRs. The following provides an overview of the discussions held with NI Water.

Whilst we acknowledge that the Company's commentary and methodology statement have significantly improved. For completeness in line with the Reporting Requirements, a sentence could be added in appropriate lines that the data are consistent between tables showing reconcilable figures. The Company agreed with the reconciliation between Tables 2 and 7 (please see Section 8.1).

Test meters

We acknowledge that the Company has provided the detailed history on Test Meter categorisation and the summary table of the review in their commentary. The Company advised that the survey of all 10,898 test meter accounts was finished at the end of 2011/12, some still need to be confirmed and uploaded to Rapid.

Whilst the Reporting Requirement expects that NI Water to *'use a consistent approach to reporting 'test meters' between customer groups e.g. between household and non household customer groups*', NI Water advised that a different approach has been adopted in reporting household and non-household property numbers: 'Test' meter numbers have been included in household property numbers but excluded from non-household numbers. This methodology is consistent with the Company's approach in AIR13.

We checked the Table 10 methodologies which confirmed that the consumption from NHH Test meter accounts is included as water taken legally unbilled, therefore the approach of NHH test meter between Tables 7 and 10 are same. The consumption from HH Test meter accounts is included in the unmeasured household water consumption. Therefore the approach of HH test meter between Tables 7 and 10 are consistent.

NHH Test Meter: Even though the test meter project is now completed – there are circa 2,000 test meters which need further reviewed before a billing decision is finalised e.g. shared supplies, unable to locate etc – therefore for reporting they have been kept as test meters until a change has occurred on the billing system.

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 previous AIR submissions.

NHH Site Meter: these are properties which are linked to another property that has a primary meter. This category ensures NI Water holds the property appropriately on Rapid and ensures they do not bill it directly for water. NI Water keeps such records to enable us to ascertain what our water supplies serve, for property count purposes and MIP situations.

NHH Unmeasured not charged

The 'unmeasured not charged' category is primarily used on the non-household side – NI Water and Fire Authority connections making up the majority of this category. On the household side, the difference between the 'unmeasured' and the 'unmeasured not charged' is that NI Water would bill the properties in the unmeasured category if domestic charging was introduced, whereas they would not bill those in the 'unmeasured not charged' category.

4.2 Populations

Total population is derived from 2012 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 reports a mid-year average population for Table 7. For AIR14, NI Water has extrapolated between the June 2013 and June 2014 estimate, in order to derive a September 2013 (mid-year) estimate of 1,827,790 (1,818,470 for AIR13, an increase of 0.5%). This population is then assigned to the various categories required for Table 10 using the approach outlined below and summarised in Figure 7.1.

We are aware that companies in England and Wales that use census derived data to estimate populations can see large fluctuations when estimates are updated. We challenged the company to explain how it would handle any large fluctuations in population estimates should they arise. The company explained that from its experience the population forecasts within Northern Ireland are significantly more stable. This is likely to be due to the smaller and more defined location and greater

knowledge of any movement of population into and out of Northern Ireland. As stated in the Company's commentary the difference between the forecast and actual 2011 census population for May 2011 is only 158 (<0.01%).

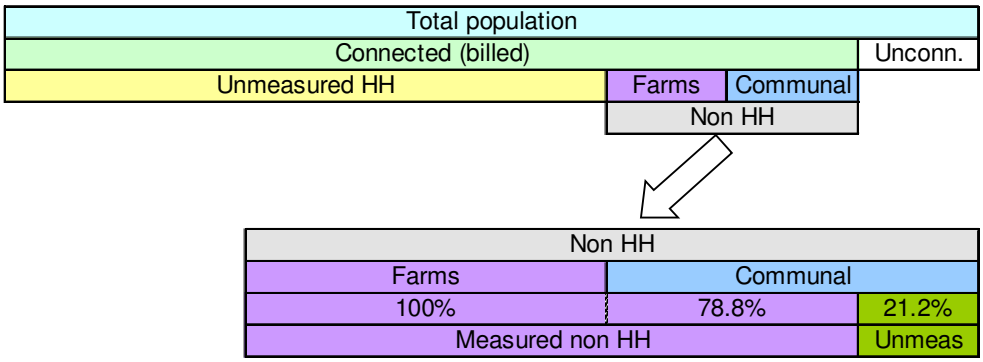


Figure 4.1: Population Estimates

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. This line is derived from the RAPID database number of unconnected properties of 8,000 (8,016 in AIR13) and an occupancy estimate of 0.866 (the same as AIR13, AIR12 and AIR11). The occupancy estimate is taken from the NIHE Housing Condition Survey.

The non-household population is based on the population associated with measured farms and the population in communal residence. The communal population (32,042) is based on the latest NISRA 2012 based Census estimate, which shows a small (1.4%) increase from the estimate used in AIR13. 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 78.8%:21.2%, which results in 6,781 being assigned to unmeasured non households (Line 15) and balance of 25,261 being added to the measured non-household. The unmeasured non-household population has decreased by 329 (5%) from AIR13.

The farm population is derived from the number of metered farms (31,309) from RAPID and the average NI occupancy rate (2.46), giving a total 77,021. The total measured non-household population is the sum of communal measured population and the farm population giving at total of 102,282 (Line 16). This value is virtually identical to AIR13, being only 0.4% lower.

Unmeasured household population is reported as the balance when the non-household population (farms and communal properties) is deducted from the total connected population, giving a value of 1,718,727 (Line 13). This is a 9,066 (0.5%) increase from the AIR13 value.

4.3 Reporting procedures

Population data is obtained from NISRA and NIHE, which is updated on a regular basis. Adjustments are made to account for farms and unconnected properties using data from the Company's Rapid billing system.

4.4 Quality assurance

The Company demonstrated the quality assurance controls they have in place to ensure the data collation process is robust.

5. Audit findings

5.1 New connections (Lines 1 and 2)

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 decrease of 543 (or 13%) new connections when compared to the AIR13 figure.

In previous AIR submissions we carried out sample checks and found anomalies on both household and non-household new connections. The Company explained that they were currently undertaking a review of these categorisations in the Rapid system. We understand from AIR14 audit, the Company is still in the process of the review.

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 9 new connections (or 5%) when compared to the AIR13 figure.

5.2 Property numbers (Lines 3 to 12)

Line 3 – Households billed unmeasured water

We note an increase of 7,737 properties (or 1%) reported in this line since AIR13. 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 properties plus the properties where a test meters has been identified. NIAUR has previously asked the Reporter to check the numbers and comment if there are difference between PCs and AIR submissions.

	AIR14 (000's)	PC13 FD 2013/14	PS 2013-14	PC15 2013/14
Unmeasured HH	688.832	682.946	690.300	688.320
Measured HH	0	0	0	0
Unmeasured NHH	9.741	10.193	9.989	10.225
Measured NHH	69.567	70.927	68.809	68.604
Void	52.798			

Note that the figure for AIR is April-March average, and PC13 is November-October average while PS is 1st of December figure. The divergences in each of the 3 submissions are largely a result of the dates of each submission. Nevertheless, the three submissions are reasonably well aligned with relatively small percentage differences.

NI Water provided a year on year reconciliation to derive Block B figures in their Methodology Statement (Annex B) attached with the Table 7 commentary. We have reviewed the figures amongst the Table, Methodology Statement and the supported document and confirm that they are consistent.

The movement of HH customer group is provided in their commentary. We can confirm that the figures in this table are consistent with their Rapid data, except data cleanse/BAU activity. We assume that the number associated with data cleanse activity is calculated from Start/end of year and new/deletions of the properties. Therefore we are not able to confirm the details of this figure. We also queried the Company to provide the current year's figures below.

Unmeasured HH	Previous Year	Reporting Year	Current Year
	Actual	Actual	Forecast
Start of Year	676,970	685,219	692,444
New/Metered (plus)	(+) 4,154	(+) 3,611	3,834
Data Cleanse/BAU Activity	(+) 5,362	(+) 3,357	
Test Meters	(-) 537	(-) 7	
Site Meters	(+) 31	(+) 10	
Voids	(-) 761	(+) 254	
End	**685,219**	**692,444**	

NI Water explained that they currently have forecast figures for new connections and switches from uNHH to mNHH. They also explained that their forecast figures are not split to the level provided in the table and are currently unable to report a numbers of demolished properties or properties associated with data cleanse activities (inc. test meters and site meters). The Company noted that the actual demolition figures are provided by LPS.

Lines 4 and 5 – Households billed measured water

Whilst NI Water has been installing meters on all new household connections since April 2007, customers are not being charged on a measured basis. As such, all household properties are reported as unmeasured. We believe this is appropriate.

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.

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 7,484 since 2012/13. We have checked that 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 by circa 625 (6%) during the year. We assume that the decrease observed is a result of the Company's non-household metering programme. We reviewed the Company's progress in delivering this programme and our commentary on delivery of the programme this is provided in Table 8.

To comply with the Reporting Requirements, we queried NI Water to provide the following table:

Unmeasured NHH	Previous Year	Reporting Year	Current Year
	Actual	Actual	Forecast
Start of Year	11,267	10,525	10,016
Metered (FMO/Selective) (minus)	737	481	1,016
Demolitions			
Voids			
End	**10,525**	**10,016**	

As noted in Line 3 above, NI Water explained that their forecast figures are not split to the level provided in the table and are currently unable to report demolished figures.

Line 9 – Non-households billed measured water

Our audit indicates that the Company has followed their stated methodology in preparing this line.

We note that the number of non-households billed for measured water within the supply area has slightly increased by 409 properties (1%) since 2012/13. A sum of Table 8 Lines 7 and 8 – Meters installed (selective and FMO) is 481. We would expect that some of the metered properties became voids during the year.

Again, we asked the Company to provide the following figures:

Measured NHH	Previous Year	Reporting Year	Current Year
	Actual	Actual	Forecast
Start of Year	6,860	69,456	69,678
New (plus)	195	204	466
Metered (FMO/Selective)(plus)	737	481	1,016
Demolitions			
Voids			
End	**69,456**	**69,678**	

As noted in Line 3, NI Water explained that their forecast figures are not split to the level provided in the table and are currently unable to report demolished figures.

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 180 (0.2%) from 12/13. This number is calculated as the average of gross numbers of measured and unmeasured including voids. 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

We note that the average number of void properties has decreased by 217 (0.4%) from 12/13. The number reported in this line has remained relatively consistent from that reported previously. 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 as per the Reporting Requirement.

NI Water confirmed that NHH Test Meter customers, NHH Site Meter customers which are currently not charged are excluded.

5.3 Populations

As we reported in previous years 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 its 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 UR reconsiders their requirement for NI Water to report confidence grades against population data. NI Water has no real influence over the derivation of this information, and unless they commission their own annual population survey it will be difficult for NI Water to improve this methodology and thus confidence grades in the future.

6. Assumptions

There are no assumptions to disclose.

7. Confidence grades

7.1 Properties

NI Water explains that as they have introduced an automated tool to populate the Table 7 figures. We acknowledge that this improvement have made the process more robust. We also appreciate that for the last 3-4 years, the Company has been undertaking data cleanse activities to improve their data accuracy, especially on NHH properties. Therefore, we are content with the NI Water's confidence grades of A2 for NHH.

We had discussed with NI Water after their submission and agreed that the confidence grades for unmeasured HH is B2. We believe that substantial improvements in both data reliability and accuracy would come from NI Water having a direct commercial relationship with the household customers, which currently is absent. Therefore we also agreed with the Company that the confidence grades for household can only be improved, if and when NI Water has direct billing to the household customers.

In the meantime, the Company added that they would investigate alternative ways to reconcile their customer data with third parties in next 1-3 years and improve their reliability and accuracy of their data.

In summary, we

- Are ccontent with NI Water's CGs of B2 for new connections in Lines 1 and 2
- Agreed with NI Water that the CGs in Lines 3, 6, 7 and 12 are B2
- Are content with their CGs of A1 for measured households in Lines 4 and 5
- Are content with their CGs of A2 for non-household in Lines 8 to 11

7.2 Populations

Confidence grades are unchanged from AIR13, although as noted above the Company is unable to change its methodology to improve the accuracy as it is reliant on external sources of data.

8. Consistency checks

8.1 Reconciliation of property numbers

Tables 2 and 7

Whilst the Reporting Requirements ask the Company to provide a reconciliation of the property numbers in Table 7 to the figures reported in Table 2, the Company has not commented. We provide our understanding of the reconciliation here, which NI Water agreed with.

Property categories	Number	Tables and Line
uNHH	17,692	T7L11 (but as at 31 March 2014)
mNHH	74,361	
uHH	696,928	T7L7 (but as at 31 March 2014)
mHH	35,008	
HH Test meter (mHH not charged)	397	
HH Site meter	588	
HH Unmeasured not charged	0	
Total	**824,974**	

In the table above, a sum of Table 7 Lines 7 and 11 as at 31 March 2014 equals to Table 2 Line 1.

Voids

We can also confirm that

The number of void properties is consistent with the following calculation for the reporting year:

(Line 11 – Line 10) + (Line 7 – Line 6) = Line 12

However when we carry out the same calculation for the current year, they are not consistent. NI Water explained that this is due to a change in their forecast methodology. Previously their forecast figures were calculated from forecasted new connections. The new methodology includes new connections and switches from uNHH to mNHH, which has been developed for PS and PC15 submissions. We are content with their methodology.

Treatment of Test meters and Site meters

As described above, NI Water uses a different approach of Test and Site meters between household and non-household. They are included in HH but not in NHH. However, this has been adopted previously and no changes in treatment of test meters from AIR13. We also checked Table 10 and the treatment of test meters are consistent between these tables.

8.2 Population

The total population Line 17 is identical to the total population reported in Table 10A Column 11.

The total population Line 17 has correctly be been entered in Table 46 Line 1.

Table 8 – Water Metering (Total)

1. Introduction

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.

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 made significant progress in understanding the difference between the number of domestic meters installed (Table 8 Line 1) and the number of new domestic properties (Table 7 Line 1) which we have identified in previous years. The Company explained that the main reasons for the difference is that a meter cannot be fitted due to the meter box being damaged, at insufficient depth or the groundwork not being completed. For 2014-15 it is proposed that a period of eight weeks is left between the date of connection and the date of meter installation to allow more time for the developer to complete the siteworks.
- We identified minor errors in the entries for Lines 1 and 10.

2.1 Key recommendations

- The values in this table are sourced from a number of different sources. Although the spreadsheet provided by the Company contained all the audit trails we recommend that the clarity could be improved for future years, with for example separate columns for each source that can be cross-referenced to the raw data.
- As we recommended during our PC15 audit we recommend that the Company follows up on when meters cannot be fitted. Although the PC15 recommendation was focussed on non-household metering we consider the same applies to household metering. The Company's suggestion that would require the metering contractor to records of why meters cannot be fitted at new properties, and if a follow-up visit is required (currently the meter installation job is closed and it is not always clear if a meter has actually been fitted) would help in this regard.
- As recommended at previous audits the Company should continue to investigate if promotion of the meter option may increase the opportunity for further non-household metering.
- We concur with the Company's suggestion that automatic meter reading (AMR) technology may provide an alternative to meter relocation (included as meter maintenance).
- We recommend the Company to seek further guidance from the Regulator on exclusions for Table 8 Line 13 and using lesser percentage of Trimmean function.

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. Company methodology

4.1 General

We found that 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.
- NI Water issue the meter install instruction to the contractor once a completed connection report is run; these instructions go out on a weekly basis.
- For selective metering the Company raises an order with their metering contractor who surveys and installs the meter at the requested property.

The values in this table are sourced from a number of different sources. We recommend that the clarity of the calculation spreadsheet could be improved for future years, with for example separate columns for each source that can be cross-referenced to the raw data.

4.2 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. We found a small discrepancy between the number of installations in the data (3,030) and the number reported (3,031).

The number of installations reported is circa 15% less than the number of new domestic properties reported in Table 7, this is a significant improvement from AIR13 (circa 25%).

Although the difference has improved significantly from 2013-13 there are still approximately 600 new household that do not appear to have been metered, as shown in the following table.

		AIR11	AIR12	AIR13	AIR14
Number of new domestic properties (Table 7 Line 1)	'000	4,748	3,838	4,154	3,611
Number of new domestic meters (Table 8 Line 1)	'000	4,427	3,458	3,078	3,031
Percentage of meters installed	%	93%	90%	74%	84%

The Company explained that the main reasons for the difference is that a meter cannot be fitted due to the meter box being damaged, at insufficient depth or the groundwork not being completed. For 2014-15 it is proposed that a period of eight weeks is left between the date of connection and the date of meter installation to allow more time for the developer to complete the site-works.

4.3 Block B – Non-household installations (Lines 7 to 12)

Line 7 – Selective Meters Installed

The Company reports that 458 (692 in AIR13) meters were installed under this category. The Company provided a spreadsheet that supported the calculation of this number. We found that the majority (247) of the meters installed relate to the properties identified with the Company's Appendix 19 response to the PC10 Draft Determination.

The remaining meters (454) were installed as a result of the metering of new large diameter connections and other installations performed by the metering section staff.

We undertook a detail audit of the sources of data that were used to populate this entry, and found that the calculations were accurate.

We reviewed the number of non-household meter installations separately, as part of our PC15 audits and recommend that the Company investigates each case where a meter could not be fitted in more detail to identify if the property is already metered, a domestic property or no-longer exists (demolished).

The Company proposes a much lower level of meter installation for PC15 period.

Line 7a – Number of non-household meters renewed

NI Water reports that 6,722 meters were renewed during the Report Year. This value has varied significantly over recent years from 8,722 in AIR12 to 4,653 in AIR13. The Company explained that the replacement/renewal is driven by the ability of meter readers to obtain a meter reading. Where a meter cannot be read, either due to failure or the location of the meter then a meter maintenance request (MMR) is generated. The Company target to meet DG8 (meter reading) in 2011-12 led to an increase in meter replacement which was then scaled back in 2012-13. The Company intends to consider if automatic meter reading (AMR) technology can be used as an alternative to re-location of meters that are difficult to read.

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. This assumption is consistent with PC13 and PC15 business plans.

Line 8 – Meter Optants installed

NI Water reports that 23 (45 in AIR13) non-household customers opted to have a meter installed.

Lines 9, 10 and 11 – Meter Location

Within these lines the Company reports 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 challenged the Company to provide supporting data for Lines 10 & 11 and can confirm that the spreadsheets provided contain the audit trails to support the reported values.

We identified a minor discrepancy between the value recorded in Line 10 (23) and the number of large diameter new connections (DSCT) which was 22.

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.

Line 12 – Meter installations requests outstanding greater than three months

In total the Company reports that 8 installation requests were outstanding for greater than 3 months, this is a slight improvement from the 10 in AIR13. 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.

4.4 Water demand at recently metered properties (Line 13)

NI Water provided the list of properties which were uploaded onto Rapid in 2012/13. We checked this and confirm they have correctly excluded the properties with FMO, HH (including HH use at NHH property) and various other means of supplies such as free supply and DRD.

NI Water explains that they use an extracted data directly from Rapid. They also added that as the uploading to Rapid does not always complete on the day of installation, therefore properties may not have completed their first year of charging in 2013/14.

4.5 Reporting procedures

The Company uses a single spreadsheet to collate all the data from table 8 to provide audit trails. We recommend this spreadsheet is enhanced to provide greater clarity, such as including each data source in a separate column, and also to allow year-on-year consistency checks.

4.6 Quality assurance

We note that the Company's methodology demands that the table and commentary are signed off by senior management.

The Company demonstrated the quality assurance controls they have in place to ensure the data collation process is robust.

5. Audit findings

5.1 Meter installation

The Company confirmed its metering policy:

- Household: includes installing meters on all new connections as per the obligation associated with Article 81 of the Water and Sewerage Services (Northern Ireland) Order 2006.
- Non-household: 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.

We identified minor discrepancies between the data and the reported values for:

- Line 1: reported value of 3,031 whereas the data indicates 3,030.
- Line 10: reported value of 23, whereas the data indicates 22.

5.2 Water demand at recently metered NHH properties

During our audit, we have checked NI Water's calculation of this volume and confirm it is consistent with the audit trail supplied. We found that the Company had extracted all recently metered property data where readings had been taken using a report generated from Rapid, which equates to 866 records.

This excludes meters which have 0 cubic meters consumption and no meter reading taken in 2013/14. We believe this is reasonable as the inclusion of any of the components would skew the estimate made.

However we found that the Company had extracted all recently metered property including those meter installed during 2013/14 (67 properties), which does not complete the first year of measured charging in the report year. The Company explained that these meters were added to Rapid in 2012/13 and replaced in 2014, therefore these should be included.

We observed that the meter installation list includes a meter which was installed in 2002. NI Water explained that a meter reference and meter serial numbers of this meter appeared on Rapid in Jan 2013, therefore they included this meter in the reported figure.

The aim of this line is to see the customers' behavioural change in consumptions after metering. From our experience in E&W, meter installations reduce the consumption significantly but this reduction in consumption does not remain in long term. We, therefore, recommend the Company to seek further guidance from the Regulator on exclusions and using lesser percentage of Trimmean. In England & Wales, the exclusions are applied to: more than 24 months since meter fit, properties with void period, properties with leakage allowance, and properties with estimated bills.

NI Water noted that they have applied the same methodology as that applied to the unmeasured NHH consumptions, which is agreed with the Regulator.

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 concur with the Company's assessments in all cases.

The Company has indicated confidence grades for Lines 1 and 3 of B3. We do not consider the data accuracy has decreased since AIR13 when the confidence grades were assessed at B2. However, we consider the accuracy is borderline B3/B2 so are comfortable with either grade for these lines.

As we discussed in other sections of our submission, after the Company's submission, we agreed with NI Water that the confidence grades for non-household are A2. Therefore, we are content with the confidence grade of B3 for Line 13.

Table 9 – Water Quality (Total)

1. Introduction

This information (along with DWI reports) will be used to examine performance with quality standards, the outputs funded in PC13 and the quality of the water received by customers.

2. Key findings

- There was a slight improvement in Mean Zonal Compliance, OPI and SRs largely due to the decrease in number of iron exceedance. A slight decrease in compliance at WTWs.
- No existing or new 'Legal Instruments of Work', or Authorised Departures for distribution input were in effect at the end of the Report Year.
- Further improvements to plumbosolvency reported during the year, with 99.5% zonal compliance with the current 25 µg/l target limit for lead.
- We audited the reported data and challenged the processes on a sample basis. Except where detailed below, we consider the data reported in the table is robustly prepared using systems and process that are appropriate and in line with the reporting requirements and that are properly implemented with effective quality control and governance arrangements.

3. Audit approach

The audit consisted of an interview with the NI Water system holder and a review of relevant documentation, system methodology and data used to compile Table 9. Spreadsheets behind the table numbers were also examined to verify calculations. The audit also included a review and comparison of the Company's commentary and table data with previous year submissions.

4. Company methodology

The Company explained that there was no change in their methodology.

Contributing volume from each works is calculated from the average of the daily flow inputs throughout the calendar year. In line with previous clarification from NIAUR, the Company does not include sites which have been taken offline par-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 data spreadsheet can be accessed by the LIMS, Regulation and Internal Audit teams. No one can change the original spreadsheets and the original is downloaded to the LIMS team server and the team can change it. If something looks odd then they can see who saved the sheet last.

5. Audit findings

5.1 General

As the DWI requires calendar year reporting, the Company also continues to report Table 9 based on a calendar year. For calculation purposes, the total average daily input applied to the 2013 calendar year was 562.851 Ml/d, a slight (0.1%) decrease from the 2012 figure of 563.648 Ml/d. We verified this and individual inputs against the source flow data.

Mean zonal compliance

This year, NI Water reports a steady level of overall Mean Zonal Compliance to 99.85%. The slight increase in water quality was observed due to the improvement in iron and pesticide exceedances.

Operational performance index

Following an improvement in performance last year, the Operational Performance Index has decreased to 99.30%. The Company explained this is due to an improvement in iron exceedances.

5.2 New legal instruments of work and work programmes company data

The Company confirmed that they have not agreed to fulfil any new Legal Instruments of Work or Authorised Departures for distribution input this year. All Authorised Departures in place were issued prior to 2011.

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

5.3 Raw water deterioration (Line 6)

In 2013, one CPEO was issued at Clay Lake WTW for pesticide exceedances. Therefore, Line 6 includes volume from this site which is 3.65 Ml/d. We reviewed the Company's data and confirm the table entry is consistent with the data.

As detailed in the Company's commentary, 7 sites [x] are under the enhanced monitoring for MCPA (but no further Authorised Departures or Enforcement orders which replace the authorised departures), therefore these are not included in the calculation.

An existing CPEO and a new PEO at [x] have been closed during 2013. Hence this site was not included in the calculation. The PEO was issued due to pesticide exceedances. Another CPEO was issued for [x], therefore this site was not included in the calculations.

5.4 Plumbosolvency (Line 7)

As stated in their commentary, NI Water currently has 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 100.0% 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 25 µg/l limit. The dosing programme is optimised annually. Rathlin Borehole was not dosed since 2012.

	AIR11	AIR12	AIR13	AIR14
T9 L7	623.693 Ml/d	601.801 Ml/d	563.648 Ml/d	562.851
Average DI	626.64	604.08	563.73	562.92
T10 L26	625.15	583.93	558.82	562.72
% of dose base on average DI	99.5%	99.6%	100.0%	100.0%

In 2013, NI Water has agreed with DWI the reduction of the dosing rates at 24 sites where the Company believed some rationalisation could be applied. There was also a site which has not met the criteria in 2011 but the phosphate does rate remains at 2011 level. NI Water confirmed that these sites were monitored and that they remain committed to working with the DWI towards achieving the future lead target of <10µg/l in all zones.

NI Water added that whilst the maximum frequency for lead at customer tap is 8 samples per year, NI Water (in agreement with the DWI) has put in place an enhanced lead zone monitoring programme. This is up to a maximum frequency of 52 lead samples per year in each water supply zone (or up to the maximum frequency of sampling for the zone if this is less than 52). These lead zone results are combined by the supplying WTW and used for the overall assessment of the dosing from each individual works.

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 10µg/l has been stable at 11 in 2012 and 2013 and with only 4 failures above 25µg/l limit. This represents an overall zonal compliance of 99.00% (base on a total sample base of 396).

The Company has no reported changes to existing measures at any site. Although a possible site closure will have affected the figures, the change in the Line 7 totals 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 the exception of the Company's borehole sites where orthophosphate dosing is not applied.

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

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

5.5 Cryptosporidium (Line 8)

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

As pointed out in the Company's commentary, *Cryptosporidium* risk assessments are now captured under other areas and are currently being separately assessed by the DWI.

5.6 Other parameters (Line 9)

NI Water has no other legal requirements at their sites.

6. Assumptions

The Company made assumptions as follows:

- For Lines 6-9, the average daily flow volumes from WTWs are reliant on the accuracy of flow measurement devices at each site.
- 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.

Table 10 – Water Delivered (Total)

1. Introduction

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 has reported total leakage of 167 Ml/d against a target of 169 Ml/d.
- The Company has now implemented an improved leakage management software package and has used this for developing the estimate of bottom up leakage; this makes direct comparisons with leakage from previous annual information returns invalid. The pre-MLE estimate of bottom up leakage is 167.84 Ml/d for AIR14, this represents a 3.93 Ml/d reduction from AIR13 of 171.77 Ml/d when using a consistent methodology and assumptions. The post-MLE estimate of leakage for 2012-13 stated in the company's AIR13 commentary, using a consistent methodology was 170.73 Ml/d, this suggests leakage has been reduced by 3.52 Ml/d.
- During 2013-14 the Company developed an updated SELL (which we reviewed separately), and used the opportunity to refresh the leakage assumptions, including supply pipe leakage, hour to day factor and night use allowances. We reviewed the revised estimates and found them to be appropriate and recommend that the Company refreshes the estimates/assumptions on a regular basis.
- The Company has provided a detailed commentary on the water balance for AIR14.
- Distribution input has increased by 4 Ml/d (0.7%). This increase has been due to the balance between the decrease in leakage and an increased demand driven by the weather and a potential easing of the economic conditions.
- For AIR14, the pre-MLE estimate of distribution input (562.40 Ml/d) was less than the sum of the components of the water balance by 3.15 Ml/d (0.56%), which is well within the 5% threshold set by the Utility Regulator and continues to show the improvements seen in previous years 1.29% at AIR13, 2.32% at AIR12 and 4.14% at AIR11. As a consequence of this improvement we support a confidence grade of A1 for the water balance.
- The Company has achieved a SOSI score of 100 for the third year running. We identified that the changes to the parameters of the SOSI calculations, at Company level since AIR08, has resulted in a significant year-on-year improvements from -26 (AIR08) to 45 (AIR09) to 88 (AIR10) to 97 (AIR11) to 100 for AIR12, AIR13 and AIR14 for the dry year average planned Levels of Service (LoS) conditions.
- The SOSI has been calculated by reference to figures contained within the Water Resources Management Plan. Full details on the changes in the SOSI base data from previous years, and the consistency with the WRMP is presented in our Commentary on Table 10a.
- We audited the reported data and challenged the processes on a sample basis. Except where detailed below, we consider the data reported in the table is robustly prepared using systems and process that are appropriate and in line with the reporting requirements and that are properly implemented with effective quality control and governance arrangements.

2.1 Key recommendations

Over recent years the Company has made significant improvements to the water balance calculation. We do not consider further step changes are required, but recommend that the Company undertakes an on-going programme to refresh the assumptions/estimates. Some minor components could be reviewed on a 5-year cycle, whereas others should be reviewed on a more frequent basis.

Some of the least robust components of the water balance are the estimates of service reservoir and trunk mains leakage. The Company is part-way through a study to develop Company specific estimates for these two components based on flow data. We were shown the latest estimates from this approach and although the Company needs to complete validation of the data the initial indications are that it should be able to prepare more robust estimates of these components of leakage. Many companies within England and Wales still rely on the use of default values so if the Company is able to complete the study and develop robust estimates of these components of leakage it will be a leader in this field. We recommend that the Company continues to develop this approach with an aim of using the values within AIR15.

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 AIR14.

4. Company methodology

4.1 Overview of the water balance

NI Water has reported an annual average leakage of 167.21 Ml/d at year-end, a decrease of 3.52 Ml/d from the value of 170.73 Ml/d calculated at the start of the year with consistent assumptions. The Company has therefore met its leakage target of 169 Ml/d for AIR14.

The imbalance in the water balance has fallen again this year, from 2.32% at AIR12 to 1.29% at AIR13 to 0.56% at AIR14; we consider this is likely to be due to both better/more robust data and due to the relatively benign weather experienced within the year. We consider the Company should expect to achieve an imbalance of around 1% in future years, and investigate if it should increase outside this range.

The following table compares the water balance for AIR14 with that for the previous year.

Component	AIR13			AIR14			Variance for the year
	Initial Estimate (Ml/d)	Accuracy (%)	Final Estimate (Ml/d)	Initial Estimate (Ml/d)	Accuracy (%)	Final Estimate (Ml/d)	(Ml/d)
Measured Household Consumption	0	10	0	0	10	0	0
Measured Non-h'hold Consumption	120.83	10	121.44	126.14	10	125.79	4.35
Unmeasured Household Consumption	293.83	10	297.41	287.34	10	285.52	-11.89
Unmeasured Non-h'hold Consumption	6.86	15	6.87	6.08	15	6.07	-0.8
SPL	46.31		46.31	39.91		39.91	-6.4
DSOU	2.36	25	2.36	2.39	25	2.39	0.03
Water taken unbilled	15.24	25	15.3	15.68	25	15.64	0.34
Top Down Leakage	166.59			164.68			
Distribution Input	559.41	2	558.82	562.4	2	562.72	3.9
Bottom Up Leakage	159.38	15	161.75	167.84	10	167.21	5.46
Water Balance Variance	+7.21			-3.16			
	+1.29%			-0.56%			

We provide additional comment on the various components of the water balance and explanation for the above variances in Section 4.2 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 previous years.

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 121.44 Ml/d to 125.79 Ml/d after a fall of approximately 8 Ml/d last year. We consider the increase this year is likely to be a combination of the impact of the weather and the improving economic conditions.

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 (Line 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 2013-14 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), resulting in an average total consumption of 186.2 m^3/yr. This is a decrease from the value of 198.01 m^3/yr in AIR13 and continues the downward trend seen from AIR11 (211.65 m^3/yr) to AIR12 (191.21 m^3/yr). We reviewed and reported on this calculation separately within our audit for PC15.

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 6.07 Ml/d (a reduction of 0.8 Ml/d (12%). We consider this to be an appropriate means of deriving unmeasured non-household consumption.

4.3 Water delivered components

4.3.1 Unmeasured water delivered per property (Lines 7 and 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 and 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 104 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.

To ensure the monitor remains up to date NI Water has undertaken regular investigation into the properties within the monitor sites, with 100% of the properties having been surveyed during 2008/09, and ongoing surveys of approximately 20% each year. A further 20% were surveyed for AIR14. The aim is to visit each site once every five years, and so visit approximately 20% per year. We challenged the Company as we identified one site [x] which had been surveyed in both 2012-13 and

2013-14. The Company explained that site surveys are also undertaken when it identifies significant changes to the PCC, which was the case in this DMA. The Company confirmed it maintains a record of when each site was last surveyed to ensure a rolling 5-year programme of surveys is undertaken.

The occupancy rate for the PCC monitor of 2.44 is consistent with that quoted by NISRA in its latest population update (2.46), which we consider further confirms the validity and value of the work undertaken.

Most customers within these areas are therefore likely to be 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.

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 AIR14, a pre-MLE unmeasured household PCC of 133.38 l/h/d (136.38 l/h/d for AIR13) was calculated.

For AIR13, NI Water has reported a post-MLE estimate for unmeasured PCC of 145.54 l/h/d, which includes an adjustment for meter under-registration. This represents a 3.0% decrease on that reported in AIR13 and continues the downward trend seen over recent years of 149.98 l/h/d (AIR13), 152.82 l/h/d (AIR12) and 164.19 l/h/d (AIR11).

4.3.3 Supply pipe leakage (Lines 10 to 13)

The estimate of supply pipe leakage has no impact on total leakage, however a robust estimate is essential to understand where leakage is occurring on the network a developing leakage management policies.

For AIR14 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 previous assessments. More robust data was obtained for repair times and run times. The numbers of bursts was updated to the 2012/13 values. Company specific values were derived for AZNP and hour:day factor. We reviewed the assessment and found it to be robust and in-line with best practice

The revised estimate of supply pipe leakage is 39.91 Ml/d, a 6.4 Ml/d (14%) reduction from the previous assessment for in 2009/10 of 46.31 Ml/d. This Company proposes to retain the latest value for the PC13 period. The Company has continued to assume that measured SPL is 50% of the unmeasured values, which results in estimates of 51.22 l/pr/day (62.03 l/pr/d in AIR13) for unmeasured households and 25.61 l/prop/day (31.01 l/pr/d in AIR13) for other customer types.

4.3.4 Meter under registration (MUR) (Lines 14 and 15)

The MUR estimates are the same as AIR13:

- 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 AIR13, NI Water has undertaken a comprehensive assessment of DSOU for AIR14. 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 AIR14 was 2.39 Ml/d pre-MLE (2.36 Ml/d for AIR13). We checked the components, assumptions and approach and found them to be largely unchanged since AIR10 and are not considered to materially impact on the leakage estimate or the overall water balance.

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 AIR13, although the Company has continued to work to ensure all components of unbilled consumption are refreshed annually. The value reported for AIR14 of 15.67 Ml/d pre-MLE is slightly higher than the value reported for AIR13 (15.24 Ml/d pre MLE).

Although there was not much difference between the AIR13 and AIR14 values we anticipate that although the Company has a robust methodology in place, due to the range of different components, which are each estimated independently, there will continue to be a relatively high level of year-on-year variability. The level of uncertainty is recognised within the MLE adjustment by assigning this component 25% uncertainty.

4.3.7 Water delivered (potable/non potable) (Lines 20 to 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 and 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. The company specific AIR10 estimate for household night use of 2.42 l/prop/hr has been continued to be used. For non-household night use a revised value of 11.7 l/prop/hr has been used (8 l/prop/hr previously); this reflects latest consumption patterns.

The Company has also revised its estimate of hour:day factors which has resulted in an increase from 22.8 to 23.2 hours.

In order to reduce leakage the Company has undertaken a programme to investigate leakage at high volume DMAs; these studies target individual DMAs that have high leakage that does not respond to traditional interventions. The studies involve a range of issues such as data checks, investigating DMA boundaries, inlet/outlet meters, night use, options for sub-dividing, options for pressure management and network changes. We examined two reports (Babylon Tandragee DMA and Redhills DMA) and

found them to be comprehensive and should provide a key element of the Company's leakage reduction strategy.

The pre-MLE estimate of bottom up leakage is 167.84 Ml/d for AIR14, this represents a 3.93 Ml/d reduction from AIR13 of 171.77 Ml/d when using a consistent methodology and assumptions.

Following implementation of Netbase and the revised assumptions/estimates used within the calculation we support the improvement of the accuracy within the MLE process from 15% to 10% accuracy, and a corresponding increase in the confidence grade from B4 to B3.

Like many of the England and Wales 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'.

The Company provided details of an approach that has been developed over the past two years that makes use of Company flow data to provide company specific estimates of trunk mains and service reservoir leakage. We consider this will provide a significant improvement to the estimate, although the Company does not consider it sufficiently robust to use it for reporting purposes for AIR14.

We recommend that the Company should continue to develop and improve its understanding of service reservoir and trunk mains leakage with a view to using the improved estimates for AIR15.

The Company has correctly transferred the value of Line 24 (distribution losses) to Table 46 (Line 15), and the value from Line 25 (total leakage) to Table 44 (Line 32) and Table A (Line 11).

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. Although the difference is only 0.5 Ml/d 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 AIR14, NI Water has reported a pre-MLE DI of 562.40Ml/d (559.41 Ml/d for AIR13), which is adjusted slightly through MLE to 562.72 Ml/d. We were provided evidence that the meter calibration process we reported in AIR13 was continued through AIR14.

4.3.10 Bulk supply imports/exports (Lines 27 and 28)

The small volume of reported exports (1.09 Ml/d) relate to supplies to 72 individually metered NI Water customers, located in the ROI.

4.3.11 Water balance by MLE (Line 30)

The Company has estimated total leakage using MNF Analysis and has reported a pre-reconciled total leakage figure of 167.84 Ml/d for AIR14. The integrated flow method as applied by NI Water has produced an imbalance of -3.15 Ml/d (-0.56%), resulting in a final reported leakage figure of 167.21 Ml/d.

The Company has continued to see improvements in the accuracy of the water balance as a result of investment in more robust data systems and analysis over recent years. We would continue to expect

an imbalance of the order of approximately 1% in future years. As a result of this improved accuracy we support a confidence grade of the overall water balance of A1.

As recommended in our AIR13 commentary we note that the accuracy estimates applied to leakage has been changed from ±15% to ±10% to recognise the improvements resulting from the investment in the new leakage management system (Netbase). All other individual components used in the MLE are identical to AIR13.

4.4 Security of supply index (Lines 31 and 32)

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).

The Company has achieved again achieved a SOSI of 100. 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) to 100 (AIR12, AIR13 and AIR14) for the dry year average planned Levels of Service (LoS) conditions. We have checked for consistencies with the WRMP.

Further details are provided in our Table 10a commentary.

We are satisfied that the Company has followed the UR 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 WRMP, 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).

4.5 Reporting procedures

The Company uses a single spreadsheet to collate all the data from Table 10 to provide robust audit trails, ensure consistency of calculation and to facilitate year-on-year checks.

4.6 Quality assurance

We note that the Company's methodology demands that the table and commentary are signed off by senior management.

The Company demonstrated the quality assurance controls they have in place to ensure the data collation process is robust. Over the course of our audits we saw evidence of internal data challenge and consistency checks built into the calculation spreadsheet which includes trend and year-on-year comparisons.

5. 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.

As stated in the Company's commentary the weather in 2013-14 was "normal", which was demonstrated by rainfall, temperature and sunshine records.

The Company has reported total leakage of 167 Ml/d against a target of 169 Ml/d.

The Company has now implemented an improved leakage management software package and has used this for developing the estimate of bottom up leakage; this makes direct comparisons with leakage from previous annual information returns invalid. The pre-MLE estimate of bottom up leakage is 167.84 Ml/d for AIR14, this represents a 3.93 Ml/d reduction from AIR13 of 171.77 Ml/d when using a consistent methodology and assumptions. The post-MLE estimate of leakage for 2012-13 stated in the company's AIR13 commentary, using a consistent methodology was 170.73 Ml/d, this suggests leakage has been reduced by 3.52 Ml/d.

During 2013-14 the Company developed an updated SELL (which we reviewed separately), and used the opportunity to review the leakage assumptions, including supply pipe leakage, hour to day factor and night use allowances. We reviewed the revised estimates and found them to be appropriate and recommend that the Company refreshes the estimates/assumptions on a regular basis.

6. Assumptions

There are no assumptions to disclose.

7. Confidence grades

To recognise the improvements in the processes and the data, the company has proposed a number of improvements to the confidence grades for this table:

Line 7: from C4 to B4 – we consider this is appropriate as the unmeasured non-household PCC is calculated using a robust methodology derived from measured consumption.

Line 25: from B4 to B3 – we consider this improvement reflects the more robust leakage management software (Netbase).

Line 30: from B2 to A1 – The MLE imbalance of less than 1% supports this revised confidence grade.

We fully support these changes.

For unmeasured household PCC, NI Water has continued to report a confidence grade of B3. This conforms to UR's definition for PCC reliability, grade B, as an area monitor of 104 dead-end sites are utilised and the monitor fully complies 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.

Table 10a – Non financial measures – Security of supply index

1. Introduction

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

2. Key findings

- The Company has completed the SOSI using data from the Water Resources Management Plan (WRMP). Commentary on individual column entries is given below.
- The Company has achieved a SOSI of 100 in the Report Year. 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) to 100 for AIR12, AIR13 and the current report year for the dry year average planned Levels of Service (LoS) conditions.
- The calculated surplus capacity varies from 4% (Central Zone) to 30% (North Zone). The relatively small surplus within the Central Resource Zone suggests this zone could fall into dry year deficit within a few years, but we do not consider this an immediate cause for concern as dry year headroom is still in excess of 22%. Despite being the zone with the lowest surplus against peak distribution input the actual headroom in the Central Zone was 5.1 Ml/d (20%) for 2013-14.
- The Company has not prepared a table for the Critical Period. We recommend that the Company re-assesses the need for a critical period SOSI during its preparation of WRMP17. To remain consistency with the current WRMP we agree that it is not necessary for the Company to present a critical period SOSI.
- The Company does not feel it is appropriate to present scenarios based on "reference" or "planning" Level of Service as, unlike water companies in England and Wales it does not report its level of service in terms of return periods of hosepipe bans (or similar).
- We audited the reported data and challenged the processes on a sample basis. Except where detailed below, we consider the data reported in the table is robustly prepared using systems and process that are appropriate and in line with the reporting requirements and that are properly implemented with effective quality control and governance arrangements.

2.1 Key recommendations

- The Company has not prepared a table for the Critical Period. We recommend that the Company re-assesses the need for a critical period SOSI during its preparation of WRMP17. To remain consistency with the current WRMP we agree that it is not necessary for the Company to present a critical period SOSI.
- As 2013-14 has been assessed a normal year the company has applied a dry-year uplift of 7% to distribution input. In 2012-13 the Company also applied a 5% normal year uplift to DI as the year was assessed cool/wet. Whilst we agree that the Company has demonstrated that 2013-14 was a normal year we recommend the Company continues to investigate if data exists to further refine the normal year uplift for possible use in future years.

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 compared entries used in the calculations for this table the Water Resources Management Plan and checked for consistency in assumptions and approach.

4. Company methodology

4.1 General

- 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 2012-13 reporting period. We confirm that the company has followed the guidance for calculating the security of supply index as set out in Ofwat's RD 03/02.
- We consider the company has recognised that 2013-14 was a normal year and adjusted distribution input appropriately.
- The Company does not report a Critical Period level of service.
- We observed that, as for previous years, 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 AIR11 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 WRMP and the current year.
- We note that, as for previous years, the Company quote a pre-MLE distribution input whereas in Table 10 a post-MLE value is quoted. These two values are consistent, with the difference being the appropriate MLE adjustment.

Column 1 – Water Resource Zone (Text)

The Company has used the same 5 WRZs used in AIR13.

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

The Company has reported the same WAFU as recorded in AIR13 (358.69 Ml.d).

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

The Company has reported the same Bulk Imports as AIR13 (403 Ml/d), however there remains an inconsistency with the WRMP, although this is not material.

The Company reports no exports; this is consistent with the WRMP.

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

The Company's dry year average distribution input (DI) is 26.75 Ml/d lower than the AIR13 estimate. This decrease is largely due to 2013-14 being assessed a normal year, and therefore the 5% normal year adjustment was not applied (5% of AIR13 DI is 28 Ml/d).

We concur with the Company's assessment that 2013-14 was a normal year. However, we recommend the Company continues to investigate if data exists to further refine the normal year uplift for possible use in future years as the difference between the unadjusted report year DI for 2012-13 (559 Ml/d) and 2013-14 (562 Ml/d) was significantly less than the 28 Ml/d that the current 5% adjustment would indicate.

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

We note that the Company reports that its Reporting Year distribution input (DI) at 562.40 Ml/d which is only 2.99 Ml/d higher than its AIR13 estimate at the Company level (559.41 Ml/d). We note that the Company uses pre-MLE estimates of DI in this table, whereas Table 10 reports post-MLE, although due to the small MLE imbalance the difference is only 0.32 Ml/d for AIR14. We checked the Reporting Guidance which does not state whether Table 10a should be based on pre- or post-MLE estimates of DI.

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

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

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

Column 8 –Target Headroom (Ml/d)

The Company reported that Target Headroom values used in Table 10a are consistent with the WRMP. We have checked the values are consistent with the WRMP. Target headroom increases year-on-year due to increasing uncertainty in future years. As stated in previous audits we recommend that the 2012-13 values for target headroom are used for future years, until the WRMP is updated. However, if a new resource is commission this will also impact on target headroom, which will then need to be revised.

Column 9 –Surplus/Deficit (Ml/d)

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

Column 10 – Percentage Deficit (%)

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

Column 11 – Zonal Population (000)

We confirm that the total population in consistent with Table 7 and that the distribution of population across the zones is consistent with the WRMP.

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 and follows the guidance for calculating the security of supply index as set out in Ofwat's RD 03/02. 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 UR guidelines for the preparation of this index for the planned levels of service for average demand in a dry year.

4.2 Reporting procedures

The calculation of SOSI requires data from a number of sources, we have found that the Company has appropriate procedures in place to calculate this indicator.

The Company has an appropriate operational water resource plan, and if there is been consistency between the calculation of SOSI and the water resource management plan for:

- Water resource zones,
- water available for use,
- adjustments to reporting year distribution input to dry year; and
- target headroom.

The Company has followed the definitions set out in the Environment Agency's Water Resource Planning Guidelines for water available for use and reporting year distribution input.

4.3 Quality assurance

We note that the Company's methodology demands that SOSI is signed off by senior management.

The Company demonstrated the quality assurance controls they have in place to ensure the data collation process is robust. Over the course of our audits we saw evidence of internal data challenge and consistency checks built into the calculation spreadsheet.

5. Audit findings

- We confirm that the Company has submitted out-turn data reporting on Security of Supply for the (i) Planned Level of Service and (ii) Reference Level of Service for the 2013-14 reporting period.
- We consider the company has recognised that 2013-14 was a normal year and adjusted distribution input to dry year conditions appropriately.
- The Company does not report a Critical Period level of service.
- We observed that, as for previous years, 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 AIR11 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 WRMP and the current year.
- We note that, as for previous years, the Company quote a pre-MLE distribution input whereas in Table 10 a post-MLE value is quoted. These two values are consistent, with the difference being the appropriate MLE adjustment.

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, although the SOSI has been assigned a confidence grade of A2 on Table 44, which we confirm is appropriate.

8. Consistency Checks

We have checked for consistency with Tables 7 and 10 (pre MLE) and found the values to be consistent.

We confirm the SOSI (100) has been entered correctly in Table 10 (Line 31), Table A (Line12) and Table 44 (Lines 41 and 36).

We confirm that the company has followed the guidance for calculating the security of supply index as set out in Ofwat's RD 03/02.

Table 11 – Water Service Activities (NI Water only)

1. Introduction

This information will be provide a statement of activities in the Report Year relating to the water service. It includes activities and asset balance in respect of water distribution; information on water distribution zone studies, performance against water quality compliance and delivery of nominated outputs.

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

- A 12.44 km trunk main was located that was marked as "Out of Service" on the Corporate Asset Register. On review it appeared that the trunk main was strategic for water resources management purposes and although not currently in use, was not abandoned. Due to this we considered that this "Out of Service" trunk mains should be included in the Total length of Mains. NI Water has subsequently reviewed the methodology and updated it for the AIR14 submission.
- There has been a reduction in the lengths of mains renewals and abandonments compared to AIR13 figures which were unusually high.
- There has been a small increase in the total number of communication pipes being replaced.
- New lines (8a – 8d) were added during the report year, these have been populated based on an analysis of text fields in job records.
- All zonal study models were completed in 2012/13, so the Company has reported 100% completion. The Company is intending to start updating the oldest models.
- The confidence grades are similar to last year, with a slight improvement for Lines 4 (mains cleaning) and 6 (new mains).
- The reduction in the number of mains bursts reported (Line 11) is likely to be due to a combination of both the mild winter weather and the success of the mains renewal programme
- There was a slight improvement in Mean Zonal Compliance of 99.85% from 99.80% in AIR13.
- We have not located any material issues with the data reported in Lines 20 to 23, although we note that the confidence grade for Line 23 should be B2 as B1 is not permissible by the reporting guidance matrix. NI Water also noted the use of an inappropriate confidence grade for Line 23 and will issue a correction for this.
- We audited the reported data and challenged the processes on a sample basis. Except where detailed below, we consider the data reported in the table is robustly prepared using systems and process that are appropriate and in line with the reporting requirements and that are properly implemented with effective quality control and governance arrangements.

2.1 Key recommendations

- We have recommended further scrutiny of the impact of "Out of Service" versus "Abandoned" mains for AIR15 to assess the impact and/or long term effect on NI Water's data.
- With the change of personnel during 2013/14 it has become more apparent that the Company needs to maintain clear audit trails of the source data from Engineering Procurement and

Networks Water. This includes obtaining supporting commentary to explain any trends or one-off changes to activity levels.

- As recommended during our AIR13 audit we recommend that the Company reduces the reliance on the assumed mains length per flush and collates actual length of cleaning, particularly for regular flushing programmes where the extent is likely to be pre-defined.
- We recommend that the Company discusses changes to reporting requirements for distribution studies (Lines 13-17) with the Utility Regulator to develop table entries that reflect the ongoing activities in this area.

3. Audit approach

The audit consisted of an interview with the NI Water system holder and a review of relevant documentation, system methodology and data used to compile Table 11. A spreadsheet behind the table numbers was also examined to verify calculations. The audit also included a review and comparison of the Company's commentary and table data with previous year submissions.

4. Company methodology

4.1 General

The Company issued the Reporter with a copy of their updated commentary. A copy of the data table was also provided.

Lines 1 and 12

The methodology to derive the data reported for Potable Mains was discussed in detail at audit.

Line 1 is carried forward from the total closing balance of last year's report.

The totals for Line 12 are taken directly from the Company's GIS system in order to extract the required information. This data is provided in the form required by UR and only requires transcription to the data tables.

Lines 2 to 10

There are no significant changes to the Company's methodologies this year.

As in previous years, the Engineering Procurement (EP) element 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. A final check on the final measurements compared to as-built drawings is made at the end of each project.

For mains cleaning (Line 4), information is compiled separately via Ellipse and the Mobile Work Management (MWM) system. NI Water only records the number of cleaning events and do not record the actual length of any individual flushing event. In order to report against the required units, they apply a fixed conversion factor of 0.156 to provide a length of mains flushed. The line total of 1,097km is therefore based on 7,029 flushing events as indicated in the Company Commentary.

While heavily reliant on assumed flushing volumes and pipe sizes, the use of the 0.156 factor 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 improved their data record system, we 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 pre-defined.

With the current exception of mains from housing developments, field data is compiled by field managers via the Mobile Work Management system onto a central database. Remote access for operatives is available via 'toughbooks'.

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. This includes differentiation between mains or communication pipes replaced for quality and those replaced for maintenance reasons.

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 generally 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.

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

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 requires a significant amount of manual interpolation which is an obvious source of potential error. We therefore continue to encourage NI Water to improve the system to more effectively capture the material type.

Lines 11

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

Networks Water repairs are primarily reactive and their work orders are largely in response to customer and third party calls as well as those generated through proactive leakage detection methods. 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.

We undertook a sample audit of the data for August 2013 which confirmed that NI Water had undertaken a detailed validation of the individual burst data and that the numbers used in the analysis were correctly derived.

Lines 13 to 17

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 were all completed in 2012/13. Now that models have been completed for all 71 water supply zones, the focus is shifting onto maintenance of the models, starting with updating of the oldest models, and those covering areas where significant changes are known to have occurred since the original model was completed.

We recommend that the Company discusses changes to reporting requirements with the Utility Regulator to develop table entries that reflect the ongoing activities in this area.

Lines 18 and 19

The Company explained that there was no change in their methodology.

Contributing volume from each works is calculated from the average of the daily flow inputs throughout the calendar year. In line with previous clarification from the UR, the Company does 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 data spreadsheet can be accessed by the LIMS, Regulation and Internal Audit teams. No one can change the original spreadsheets and the original is downloaded to the LIMS team server and the team can change it. If something looks odd then they can see who saved the sheet last.

Lines 20 to 23

Lines 20 to 23 are based on extracting PC13 nominated output scheme data from CPMR which is then analysed to provide the required information. The focus of the data retrieval is to assess those schemes which have recorded beneficial use during the report year.

4.2 Reporting procedures

The entries of Lines 2 to 17 in this table are largely a summation of values provided from Networks Water and Engineering Procurement. The values are collated centrally before compilation of the commentary and table. During AIR14 the ownership of the data in this table changed, we consider it important that sufficient resources are provided to enable the new owner to take full responsibility of the reported values. We also recommend that the data providers (EP and Networks Water) supply a commentary with their data which discusses trends and highlights any reasons for a-typical years.

4.3 Quality assurance

We note, in general, that the Company's methodology demands that the table and commentary are signed off by senior management.

The Company demonstrated the quality assurance controls they have in place to ensure the data collation process is robust. The data is maintained by the data maintenance team who apply changes as they are reported to them. These changes are put through a digitiser and go through 100% QA checks to make sure the data was entered correctly.

For system governance, a change approval board meets monthly to discuss new assets and techniques. Any changes to the procedures are submitted on change control forms. The impact of the change is assessed and is required to have a legitimate business justification. This process has been in place for the last 2 to 3 years.

We recommend that additional consistency checks are built into the calculation spreadsheet which includes trend and year-on-year comparisons.

We note that there is an expectation that in the future queries that are currently run in MapInfo will be migrated to Oracle over the next 2 years. This will also be managed through the change control procedure referred to above.

5. Audit findings

5.1 Total length of mains (Lines 1 and 12)

The total length of mains has increased by 9.76 km this year to 26,710.55 km. This figure has been taken directly from a query of its GIS system on 31/03/14. 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 28.33 km due to the difference in data sources.

The nominal bore potable main lengths are extracted from the GIS database. The data provided for audit was checked against the data produced from the query run during audit which showed no errors.

At audit we discussed a trunk main that was not included in the total due to it being designated as "Out of Service". We considered that main should be included in the Total length of Mains and thus also the nominal bore breakdown. NI Water has subsequently reviewed the methodology and updated it for the AIR14 submission.

Prior to this change the total length of mains would have reduced by 2.68 km. The difference in the comparable total would have been significantly more substantial at a difference of 40.77 km.

5.2 Changes during report year (Lines 2 to 11)

There have been no significant changes to overall methodologies or commentary structures compared to last year. The commentary segregates the inputs from Networks Water Operations (NWO) and Engineering & Procurement (EP) for Lines 2 to 6b. This level of detail is not provided for Lines 7 to 10; we recommend a consistent approach is used for AIR15, even if some entries are zero.

The data for Lines 2 to 7 is based on information returned from construction and operations activities on site, whereas the data on total length of mains for Lines 1 and 12 comes from GIS systems. The GIS data is being continually improved using information from various sources, resulting on the correction of previous errors. The Company has the option of taking account of such corrections in Line 7 (Mains abandoned and other changes) but has not done so. Instead Line 7 is used only to report on mains abandoned. Therefore, the change to total length of main reported between Lines 1 and 12 differs from that which could be calculated using the information in Lines 2 to 7 by 174km.

5.2.1 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 trunk main between Castor Bay and Forked Bridge) are correctly excluded from the line totals.

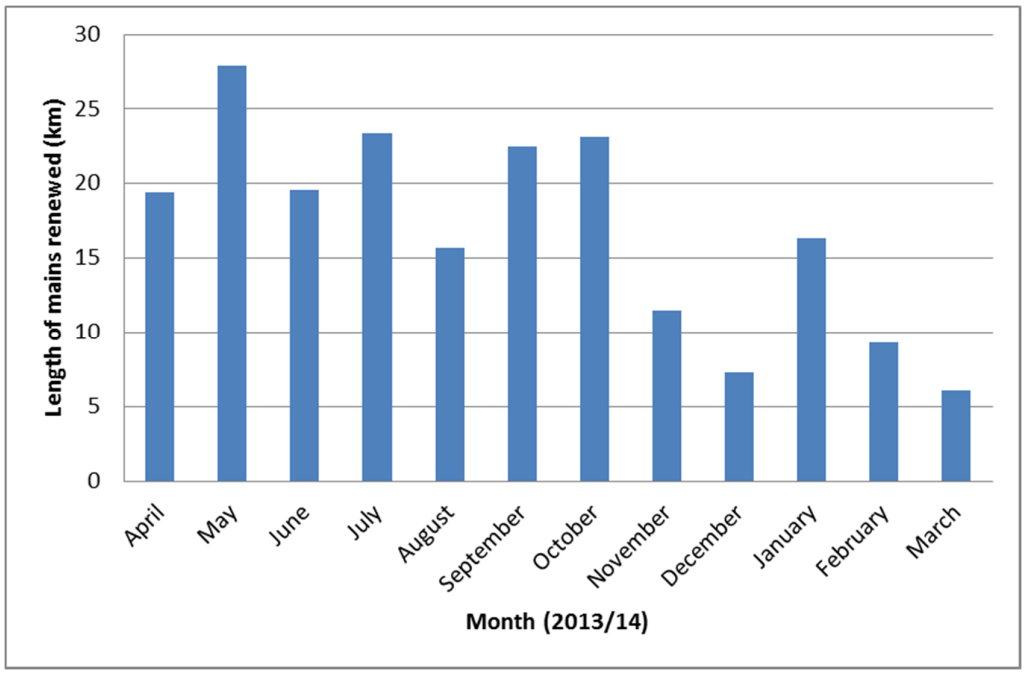
Trunk main lengths have been included in the totals.

Line 2 - Mains Renewals

The Company reports a reduction in mains renewals this year from 285.42km to 202.31km, all of which were undertaken by EP under the water quality programme. As with previous years, NWO does not carry out any main renewals works under their maintenance programme. Checks were carried out against the source data provided by the Company which confirmed the contributing lengths and line total.

The decrease in activity from last year is in line with Company expectations based on where they are in their investment programme.

The following chart shows the monthly trend through 2013/14.



Line 3 - Mains Relined

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 non-structural lining methods and hence the Line 3 total is zero.

Line 4 - Mains Cleaning

Mains cleaning is all undertaken by Networks Water under maintenance activity and hence the EP input is zero. This year, the Line 4 total of 1,096.52km represents an increase to the length of 683.75km reported last year. The increase in length for AIR14 has been due to an additional flushing programme being included within the reported number of jobs; this was expected at AIR13. The trend of switching from reactive to planned flushing is a positive one.

The Company undertakes manual checks to assess the data for errors and duplication. NI Water admits that there remains a potential for some double counting (primarily of repeated one-off incidents within year or for cleaning in response to customer water quality complaints following a mains repair), but advise that these occurrences are 'minimal'. We agree that recent changes to the system through the

adoption of work codes and that carrying out manual checks on the data have greatly improved the reliability and reduced the potential for error.

We are therefore satisfied that the impact of any remaining duplications is likely to be within the margin of error covered by the current B2 confidence grade.

Line 6 – New mains

The reported length of new mains installed has decreased from 89.05km last year to 50.40km within the Report Year. This comprises 26.41km (27.41km) reported by Networks Water and 23.99 (61.44km) reported by EP. The decrease in the length reported by EP has been driven by the reduction to nominated trunk mains projects from 20.45km last year to 0.18km within the Report Year. The reduction in trunk mains length is not explained within the Company's commentary; the Company was unable to provide the full audit trail for this value within the time available for our audit.

The 26.41km total reported by Networks Water relates to new housing developments, and is very similar to last year's total of 27.61km.

Line 6a – New, renewed or relined mains

This is a calculated line, the sum of Lines 2, 3 and 6, which is 252.72km.

Line 6b – New, renewed or relined mains delivered under the watermain rehabilitation programme

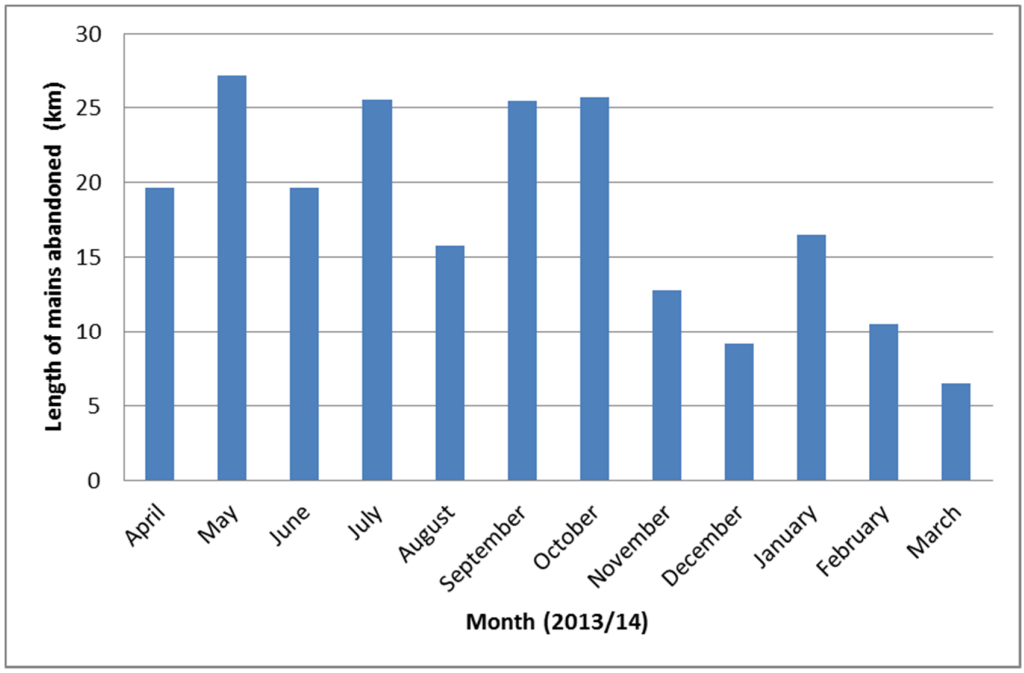
This is a calculated line, the sum of Lines 2, 3 and 6 (252.72km) minus new mains on new developments (26.41km) and nominated trunk mains (0.18km) giving a value of 226.13km.

5.2.2 Mains abandoned and other changes (Line 7)

The Company has reported a total of 357.29km of abandoned mains this year, all of which are reported by EP under the mains rehabilitation programme. Lengths are based on data provided by individual project managers.

Our review 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 reports abandoned mains, it is not possible to ascertain from the data how much of this length was wholly abandoned and how much was through the process of renewal.

The following chart shows the monthly trend through 2013/14.



5.2.3 Communication pipes (Lines 8 to 10)

The reporting requirements for Lines 8 to 9 have changed for AIR14, with greater detail requested for the reasons leading to the lead communication pipe replacement. This change was made during the reporting year, so the Company has used text fields to allocate jobs to the correct activity.

Line 8a – Lead communication pipes replaced as a consequence of water quality sample failures

This activity is undertaken by Networks Water. We were provided a list of addresses where the lead communication pipes were replaced and confirm these are consistent with the number reported (20). We can also confirm that although this line is new this year the company has historic data which shows that AIR14 is consistent with previous years.

Line 8b – Lead communication pipes replaced as a consequence of customers notifying NI Water that they are replacing their lead supply pipe

This activity is undertaken by Networks Water only; we were provided with monthly totals that confirm the annual total is 617.

Line 8c – Opportunistic lead communication pipes replacement undertaken under the watermain rehabilitation programme or during burst service pipe repairs

The Company reports that 1,239 lead communication pipes of this category were replaced, this was comprised of 1,187 by EP and 52 by Networks Water.

We undertook an audit of the data provided by EP and confirm that the total number replaced in 2013/14 was 1,187.

The total number replaced by Networks Water was 52; we were provided with monthly totals. We undertook an audit of the August 2013 values and confirm the company has a robust audit trail.

Line 8d - Lead communication pipes replaced under the proactive lead replacement programme

We challenged the Company to explain why this entry is zero. The Company explained that this programme did not start until April 2014, so would expect an entry for AIR15.

Line 9 - Lead communication pipes replaced - maintenance or other

There is an inconsistency in the reporting requirements for this line. The processing rule states it is the summation of Lines 8a, 8b, 8c and 8d whereas the definition states it should exclude replacements due to quality (which are in line 8a). The Company has therefore recorded the sum of Lines 8b, 8c and 8d in this entry.

This line shows a significant increase from 1,271 in AIR13 to 1,856 in the report year, which is likely to be due to more detailed analysis of the work orders for line 8c.

Line 10 - Communication pipes replaced - other

The Company has replaced 8,790 communication pipes, which is similar to the AIR 13 number of 8,566. This is built up from 7,486 from EP and 1,304 from Networks Water.

We were provided with a spreadsheet that confirms the EP total of 7,486.

The total replaced by Networks Water was 1,304; we were provided with monthly totals for these replacements. We undertook an audit of the August 2013 values and confirm the company has a robust audit trail.

5.2.4 Mains bursts per 1000km (Line 11)

There has been a further reduction in the reported number of mains bursts per 1,000km this year, decreasing from 93 to 86 bursts per 1,000km. 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.

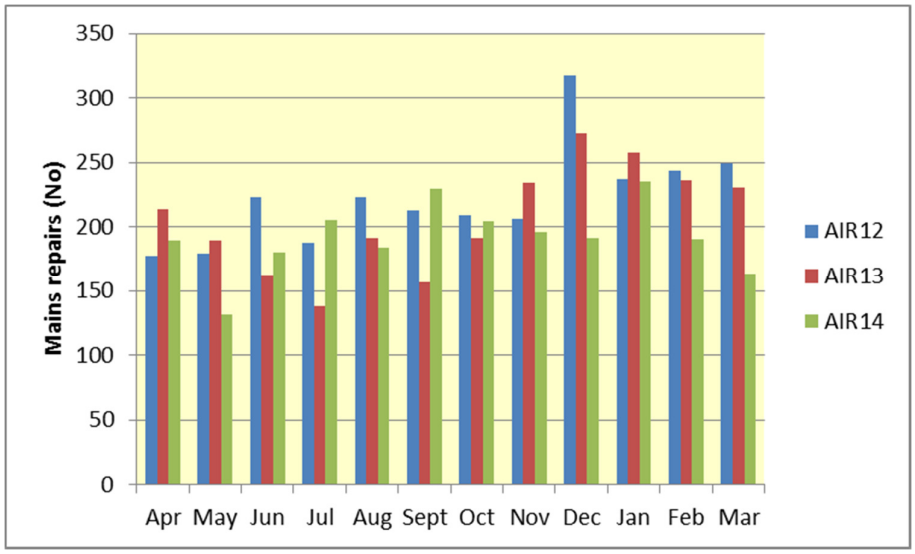
The calculation applies a total length of 26,698.11km, however this differs slightly from the value of 26,710.55km which is the length reported in Line 12. This has no impact on the entry for this line as both lengths result in 86 bursts per 1000km. However, we recommend further consistency checks are introduced for AIR15.

The number of bursts is calculated directly from data compiled and reported primarily by the Water Business Unit and agreed with field managers within Networks Water Function.

Following changes to the systems in AIR10, all data is now stored and extracted from the Mobile Works Management system (MWM).

A check against the source data confirmed the contributing total of 1,397 (1,467 in AIR13) reported burst mains repairs by Networks Water. An additional 985 (1,068 in AIR13) repairs were undertaken due to waste detection. Additionally, 83 (61 in AIR13) repairs due to third party damage on mains were deducted from the total giving a total of 2,299 (2,474 in AIR13) repairs in the report year.

We undertook an audit of the August 2013 values and confirm the company has a robust audit trail.



We consider that there has been a general decrease in the number of bursts each month, which has led to the reduction in the annual total. This reduction is likely to be due to a combination of the milder weather and the benefits of the mains renewal programme.

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 1,000km as required.

5.3 Distribution Studies (Lines 13 to 17)

NI Water's zonal model development started in 1999 leading to the adoption of a distribution zonal study programme in 2001. The programme aimed to set up models to cover all 71 water supply zones, and the final 7 models were completed by 2012-13. NI Water now has models for all 71 distribution zones, and consequently 100% of the zones studies have been completed, and 100% of the population are now covered.

Now that all models have been completed, the company has started a new programme to update the oldest models, those where significant changes may have occurred, and those covering areas where there may be operational problems.

Given that all of the original distribution zone studies have now been completed, the information requested in Lines 13 to 17 should be reassessed. It would be more relevant in future years to know how many of the models are up-to-date, perhaps measuring how many of the models have been updated within the previous 10 years, and what percentage of the population or properties are covered by these models.

5.4 Water quality compliance measures (Lines 18 and 19)

This year, NI Water reports a steady level of overall Mean Zonal Compliance to 99.85%. The slight increase in water quality was observed due to the improvement in iron and pesticide exceedances.

Operational performance index

Following an improvement in performance last year, the Operational Performance Index has decreased to 99.30%. The Company explained this is due to an improvement in iron exceedances.

5.5 Nominated water service outputs (Lines 20 to 23)

Lines 20 to 22 cover 'Completion of nominated trunk main schemes to improve security of supply', 'Completion of nominated water treatment works schemes to improve water quality' and 'Completion of nominated improvements to increase the capacity of service reservoirs and clear water tanks'. These lines are reported as nil returns for the reasons as described within NI Water's Commentary. To confirm the nil returns we reviewed a sample of CPMR records and are satisfied that the data reported correlates with that extracted from CPMR.

Line 23 - Completion of nominated Major Incident Mitigation schemes, has 5 schemes attributed to it, 3 of which were completed during 2013-14. We confirmed this output from CPMR by completing a sample review of 3 of the 5 CPMR records for this line. Two of these were completed during the year and the other is due for completion during 2014-15.

For all lines we found no errors.

6. Assumptions

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

Except where disclosed above, no assumptions have been identified.

7. Confidence grades

7.1 Lines 1 and 12

The Company has assigned a B3 grade (5% to 10%) to Lines 1 and 12. After high level consideration of the data methodology and audit discussions, we believe that the assigned confidence grades are reasonable. In brief, it is difficult to assess the level of accuracy/inaccuracy inherent in the datasets but we believe it is appropriate to retain the grades which relate to NI Water's underlying methodologies. We have however not undertaken any specific statistical analysis to fully verify this.

7.2 Lines 2 to 11

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).

Currently, all data provided by EP for Lines 2-10 is applied a confidence grade of either A1 or A2 due to the detailed project records held and theoretical accuracy of the data. Data provided by NWO for Lines 2-10 is applied confidence grades varying from A1 to B3. Given the relative accuracy of the various data sources, we consider these confidence grades to be appropriate.

The overall grade applied to each line is generally to lower of the confident grades from the relevant data sources.

We are satisfied that the B3 confidence grade applied to Line 11 is appropriate.

7.2 Lines 13 to 17

Given the discrete data entities, the A1 grades applied to Lines 13-17 are considered appropriate

7.4 Lines 18 and 19

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.

7.5 Lines 20 to 23

The Company has assigned an A1 grade (0% to 1%) to Lines 20 to 22 and B2 (1% to 5%) to Line 23. After high level consideration of the data methodology and audit discussions, we believe that the assigned confidence grades are appropriate.

8. Consistency Checks

The Company provided further data and responses to queries following our initial audit. Following corrections to line totals, additional checks were carried out on revised tables and commentaries. Cross checks were made against previous table data to confirm consistency of results.

The number of bursts per 1000km is used in the estimation of DSOU within Table 10; we confirm the value recorded in this table has been used correctly.

Table 12 – Water Explanatory Factors

1. Introduction

This table is used in water service operating efficiency studies. The information collected in this table is used in UR'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 the Company's costs.

2. Key findings

- No significant changes to numbers of sources or treatment levels at existing works; all changes to line totals resulting from fluctuations in distribution input.
- Continued expansion in the use of telemetry data to improve pump head data reliability at key pump sites.
- Small reduction (-4.3%) in the calculated Average Pumping Head, primarily due to removal of duplicated pump sets and the application of telemetry data.
- A 12.44 km trunk main was located that was marked as "Out of Service" on the Corporate Asset Register. On review it appeared that the trunk main was strategic for water resources management purposes and although not currently in use, was not abandoned. Due to this we considered that this "Out of Service" trunk mains should be included in the Total length of Mains. NI Water has subsequently reviewed the methodology and updated it for the AIR14 submission which affected Bands 2 and 3.
- We audited the reported data and challenged the processes on a sample basis. Except where detailed below, we consider the data reported in the table is robustly prepared using systems and process that are appropriate and in line with the reporting requirements and that are properly implemented with effective quality control and governance arrangements.

2.1 Key recommendations

- Average Pumping Head master spreadsheet would benefit from some further improvements in change control.
- Targetting of specific NI Water pumpsets to reduce reliance on model data for the largest contributing sites.
- Inclusion of excluded pumpsets in spreadsheet
- We have recommended further scrutiny of the impact of "Out of Service" versus "Abandoned" mains for AIR15 to assess the impact and/or long term effect on NI Water's data.

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 year's table entries.

4. Company methodology

4.1 General

The Company issued the Reporter with a copy of their updated commentary. A copy of the data table was also provided. Following a significant change to the way sources were reported in AIR13, there have been no changes to the methodologies used and the primary data sources, processing and reporting procedures applied remain the same as those adopted in AIR13. The methodology to derive the data reported for Potable Mains was discussed in detail at audit.

4.2 Information Sources

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. The data is compiled by the Asset Management Section and explained in detail in their commentary.

Distribution input is based on data obtained from Leakage Section. 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.

In AIR13, the Company proposed a significant change to the number of reservoirs qualifying for inclusion as an impounding reservoir source. This was investigated in detailed last year and a full explanation is provided in the Company's commentary for this year. It is understood that following our audit last year, these proposals were discussed and were generally accepted by UR in October 2013. It was however determined that Loughs [x] should be categorised as natural loughs (river abstraction source) resulting in a change to the initially reported figures in AIR13. There have been no changes to the agreed categorisation of sources this year. The Company correctly excluded sources from which no water has been abstracted during the Report Year and non-potable water volumes.

Calculations for Line 5 Average Pumping Head are based on data and results obtained from a combination of telemetry data, field test data, and data from network models. Recent improvements have seen the increasing application of data from telemetry based flow and pressure monitoring systems at PPP sites and NI Water sites. The system is referred to as 'Telemweb' at NI Water sites and it now provides measured data for about 60% of the larger sites (>50m.hd). Pressure values are typically based on the annual average of a set of readings from pressure monitors installed at the pump delivery and discharge points so to calculate the difference in pump pressure. Results from telemetry systems are generally consider the most accurate, followed by data from operational samples, registered pump parameters, DZS model results and GIS levels. Flow data for distribution pumps are primarily 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. Based on flow volumes, telemetry data accounts for approximately 80% of the total flow. The calculation is therefore reliant on the condition and accuracy of the network models.

Currently NI Water relies on several sub-consultants to develop and manage their network models. NI Water issues 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.

NI Water does not typically take further field measurements or re-visit the model to re-calibrate without a project requirement. However, with the model build programme complete and some models over 10 years old, NI Water is starting to update some of the oldest and least accurate models.

Where models are incomplete, NI Water looks to obtain field data on pumps, but advised that such data is usually unavailable or not sufficiently reliable and hence most data in these areas are omitted from the calculation.

The spreadsheet to calculate the pumping head is managed by a single document controller and updated each year via distribution of relevant sections to other sub-consultants. NI Water confirmed that the spreadsheet utilises unique ID codes to avoid duplication and that internal checks are carried out each year to assess any changes. The calculations are based on data covering the whole distribution network and calculated in proportion to 100% of distribution input.

The Company provided 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. 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.

4.3 Reporting procedures

The reporting procedure is based on running control queries on the GIS database in order to extract the required information. This data is provided in the form required by UR and only requires transcription to the data tables.

4.4 Quality assurance

The Company carries out a number of cross checks against source data and with relevant internal departments to check and challenge information included in the database.

The reporting procedure from the GIS data base to the reported data table is good. In terms of the governance of data, the GIS data is maintained by the data maintenance team who apply changes as they are reported to them. These changes are put through a digitiser and go through 100% QA checks to make sure the data was entered correctly. The QA is logged in the GIS records.

For system governance, a change approval board meets monthly to discuss new assets and techniques. Any changes to the procedures are submitted on change control forms. The impact of the change is assessed and is required to have a legitimate business justification. This process has been in place for the last 2 to 3 years.

We note that there is an expectation that in the future queries that are currently run in MapInfo will be migrated to Oracle over the next 2 years. This will also be managed through the change control procedure referred to above.

5. Audit findings

5.1 Block A – Source Type (Lines 1 to 4)

5.1.1 NI Water Inputs

Following the determination by UR of the Company's proposed changes to the number of impounding reservoir sources in October 2013 (which resulted in an increase of 6 impounding reservoirs and 3 river abstractions), there are no changes to the number of source types this year which remain at a total of 32. The small changes in proportional distribution input are therefore wholly as a result of annual variations in distribution input and are not considered significant.

Distribution input for Line 3 comprises distribution input from 1 No. borehole source (Rathlin Island). The input is actually 0.0001 based on the 0.07Ml/d distribution input, but correctly reported as 0.000 due to rounding. Due to its island location and the lack of alternative sources, NI Water has no plans to close this last remaining borehole source.

In line with the guidelines, the Company has included a table of sources, detailing all the changes to water sources and treatment types that have occurred throughout the year, including the determination of the changes in AIR13. A separate table is included of distribution inputs. The reported total distribution input of 562.4Ml/d represents a +0.5% increase from the AIR13 value (559.4Ml/d). The proportions between sources types has changed slightly with a 1.4% decrease in volume from river abstractions (and a corresponding increase in that from impounding reservoirs).

The Company has continued to report on the overall numbers of decommissioned and abandoned sites and categorise them by their ability to be brought back into service. There are no changes reported this year. The Company lists 23 WTWs listed as abandoned on the basis that they would not be available for operation without major investment and are essentially considered inoperable. Although not considered true 'emergency' sites, some of the 39 mothballed sites have been successfully brought back into service in the past and the potential remains for them to return to service in future should that be necessary. However NI Water advised that most are neither necessary not particularly suitable as backup sources due to their low output volumes and that there is generally good resilience provided otherwise through interconnectivity of the distribution network.

With reference to the totals reported in Lines 1-4, we can confirm that the relevant source type and distribution inputs have been correctly assigned and totalled for each line. As with previous years, borehole sources now account for a negligible proportion of total distribution input, with the majority (78%) sourced from impounding reservoirs.

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

5.1.2 PPP Inputs

PPP are responsible for the operation of 4 WTWs at [x] and report on the basis of these 4 works. As with NI Water, the change in classification of impounding reservoirs led to an increase in the number of impounding reservoir sources from 1 to 2 (Line 1), and the number of river abstraction sources from 3 to 4 (Line 2). There are no PPP borehole sources. These figures remain unchanged in AIR14.

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

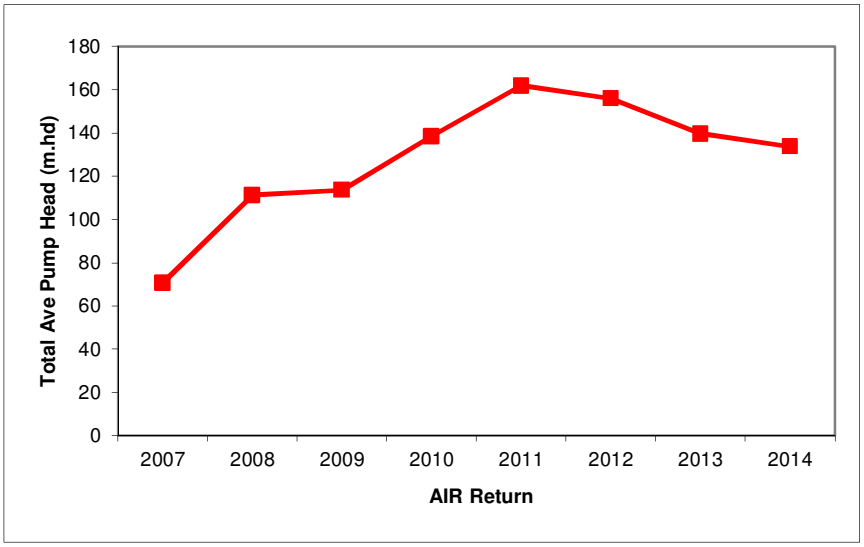
Average flow to supply from PPP sources remained almost unchanged at 235.57Ml/d resulting in no changes in the proportional distribution input from river abstractions (93.5%) and from impounding reservoirs (6.6%).

5.1.3 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.

5.2 Block A – Average Pumping Head (Line 5)

Following a peak in the line total in AIR11 at 161.8m.hd, the last 3 years have seen a significant decrease in the average pumping head value, with the calculated total average pumping head for AIR14 at 133.7m.hd. This represents a reduction of -4.3% from AIR13. The changes in reported total average pumping head are illustrated in the chart below.



The year to year variations in the calculated Average Pumping Head are broadly in line with expectations based on a gradual increase in pump head through addition and gradual build up of a complete database from AIR08 to AIR11 followed by a period of reduction through improvement in data quality and accuracy from AIR12 to AIR14.

The breakdown between NIW only and PPP works confirms that the majority of the reduction has occurred in the NIW only works, with the figure for PPP works staying relatively static at 155.6m.hd, a reduction of only -0.3% from AIR13. The Company provides a detailed breakdown and explanation of the changes in their commentary, including exclusions and impact of individual sites.

The data used in this calculation comes from a variety of sources, but is compiled and managed within a single master spreadsheet. This spreadsheet is treated as a live document and updated with improved information as it becomes available. The accuracy of the calculation depends on the comprehensiveness of the list of pumps, the accuracy of the average flow recorded for each pump, and the accuracy of the pumping head estimated or recorded for each pump. As such, the accuracy of the database should theoretically be gradually improving as better information is made available through checks and increased use of telemetry data. From discussions with the Company and from our review of the master spreadsheet, we are confident that this is the case and that the recent changes represent genuine improvements in accuracy.

By way of comparison, the latest average pumping head total of 133.7m.hd is fairly comparable with other UK water companies. As the majority of their water is from low lying river sources and impounding reservoirs, we expect NI Water's distribution to probably require a higher than average amount of pumping. Hence, further large reductions in pumping head are not expected.

In line with recommendations made by the Reporter in AIR13, NI Water has updated the master database to include a unique asset reference numbers for each pumpset (Site CAR ID and Facility CAR ID). This has reduced reliance on site names (NI Water admits some sites are referred to by more than one site name) and has assisted in the identification of 5 duplicated pumpsets as listed in the Company commentary. The removal of these duplications accounted for approximately one third of the overall change in line total. The numbers of duplications being identified is lower than previous years and whilst the number of errors in the data is being slowly reduced, there are almost certainly still some errors present in the data. A comments column to capture change control has also been included, although we observed that few assets actually had recorded comments and greater use is required to improve change control.

We carried out review of the spreadsheet and verified the numbers against the source data and calculation method. The method for calculating pumping head is in accordance with the reporting guidance. Checks confirmed that the spreadsheet appeared logical and robust and the information has been correctly assigned between NIW and PPP only sites. Changes to the list of pumps since the previous year are clearly listed in the Commentary. However, we noted that there is no way of easily assessing when data for any pumpset was last updated. Whilst not essential, the inclusion of a column to record the date that the lift head was last updated may enable quicker assessment of the level of confidence in the current data and possible prioritisation of assets requiring checks on information.

As detailed in their commentary, NI Water excludes 66 pumpsets on the basis of incomplete data. Whilst being a relatively significant proportion of the total 377 pumpsets reported as being in service, NI Water advised that they are generally all small booster sets with low flows and low heads. Hence the overall impact on the line total of their exclusion is considered low and well within the assigned confidence grade. However, we note that only 12 pumpsets are actually listed in the source data as having incomplete data suggesting that there are 54 pumpsets not even registered within the spreadsheet (this is supported further by their being only 323 pumpsets listed in total). For clarity and completeness, it would be best to have all pumpsets listed, highlighting reason for exclusion if anything other than lack of data. This will also serve as a useful tool for NI Water to target gaps in the data.

Information on pump flow rates comes from a variety of sources, including telemetry data, field test data, and data from network models. In accordance with our previous advice, NI Water is increasingly using telemetry data, considered the most accurate data source, and is prioritising for larger pumping stations. In AIR14, telemetry data now accounts for approximately 35% of all (NI Water and PPP) pump sets (a good increase on the AIR13 value of 21%). However, when compared against the total flow, due to the targeting of the larger pumpsets, telemetry data now accounts for 80% of the total distribution input. This suggests a good level of accuracy of flow data, although it is noted that all data for PPP works are based on telemetry data, hence the application of telemetry data to NI Water sites is lower. To investigate this, we carried out some analysis of the source data producing the following statistics:

Table 12.1 – Information Sources

Reporting Category	Percentage of APH derived using telemetry-based flow data	Percentage of APH derived using telemetry-based flow and lift data
NI Water Only	49%	17%
PPP Only	100%	100%
All sites	74%	58%

This implies that approximately half of the flow data for NI Water sites is still based on model data. We further investigated the top 10 ranking pumpsets for NI Water sites in terms of contributing pump head value. These are summarised in the table below.

Table 12.2 – Top 10 contributing pump heads (NI Water only)

Pumpset Name	Pump Type	Mean Lift (m)	Ave Flow (Ml/d)	Ranked Ave Pump Head	Information Source	Percentage of Line Total (NIW Only)
[x]	WTW HL	61.3	98.7	6052.1	Telemetry	15.7%
[x]	WTW LL	160.0	22.0	3520.0	DZS	9.1%
[x]	TM Booster	49.5	64.5	3192.0	DZS	8.3%
[x]	TM Booster	98.5	23.7	2334.1	DZS	6.1%
[x]	TM Booster	80.5	20.3	1630.8	DZS	4.2%
[x]	WTW LL	80.0	17.6	1407.2	Flow-Tele Lift-DZS	3.6%
[x]	WTW HL	157.0	8.7	1369.7	Flow-Tele Lift-DZS	3.6%
[x]	TM Booster	59.0	15.7	927.8	DZS	2.4%
[x]	WTW HL	110.0	8.4	924.7	Flow-Tele Lift-DZS	2.4%
[x]	WTW HL	131.0	6.3	821.2	Flow-Tele Lift-DZS	2.1%

The ranked data highlights the fact that only 1 of the top 10 ranked sites is based solely on telemetry-based data; 5 are still based wholly on model data. We note that these top 10 sites account for approximately 57% of the total average pumping head (NIW only) and hence the accuracy of the line total is heavily weighted by these pumpsets. We therefore recommend targeting of the above sites for future telemetry systems or internal audit checks.

Information on pumping heads also comes from a combination of telemetry data, field test data, and data from network models. The majority of data for pumpsets (although not the majority of flow) are still based on network models, some of which are more than 10 years old. The increased use of measured data is one of the primary reasons for the downwards trend in Average Pumping Head in recent years as the theoretical method used to calculate lift heads from model data is generally conservative.

We discussed possible methods for further improvements in data accuracy and validation with NI Water and requested whether it was possible to check the largest contributing sites against their power usage to see if there was a correlation between the pumping head ranking and the power usage ranking as would be expected. NI Water investigated but advised that it is currently not possible to obtain a full list of WPS with individual power usage as there is no sub-metering on sites so power usage cannot be obtained for individual pumpsets at WTWs where the majority of large pumpsets exist. However, we understand there may be proposals to install sub-metering during PC15, so this may be something that can be investigated further in future.

In general, the Company has acted appropriately on previous Reporter advice where practicable. We continue to encourage the programme to install telemetry monitoring of flow and head on all pumps with significant flow and/or head so that more accurate real data is compiled and targeting of the sites with an individual pump head of >50m.hd. We are satisfied that the Company has made good progress

on these recommendations to date. The updating of old zonal models continues to be an issue, although we note the reliance on model data is gradually reducing.

5.3 Block B – Treatment Type (Lines 6 to 12)

5.3.1 NI Water Inputs

The reported number of water treatment works (WTWs) reported in AIR14 is 20, representing no change from the previous year. This is line with expectations following the end of a programme that targeted closure of low level treatment type works supplied by borehole sources in recent years. Consequently, the only remaining borehole source is Rathlin Island where there is no alternative supply due to its remote location. Treatment levels for all sites remain the same as for last year.

The slight change (+/-1%) in proportional distribution input between treatment types is wholly due to typical fluctuations in works input volumes.

5.3.2 PPP Inputs

All 4 works operated by PPP have ozone or GAC on site and are correctly classified as W4 level treatment. No change from previous year.

5.3.3 Total

The line totals are confirmed as the correct summation of the NIW and PPP inputs. Our checks against the source data confirmed the correct calculation and translation of data.

5.4 Block C – Potable Mains (Line 13)

The nominal bore potable main lengths are extracted from the GIS database. The data provided for audit was checked against the data produced from the query run during audit which showed no errors.

At audit we discussed the trunk main that was not included due to it being designated as "Out of Service". We considered that main should be included in the Total length of Mains and thus also the nominal bore breakdown. NI Water has subsequently reviewed the methodology and updated it for the AIR14 submission which affected Bands 2 and 3.

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.

The total of 26,708.21 km is the correct summation of the NI Water and PPP inputs.

6. Assumptions

For calculating average pump head (line 5), the Company makes several key assumptions:

- Network models are accurate and up to date representations of the actual pipe network and pump condition. In particular, the flow applied to each pump set is representative of the actual flow in that particular year.
- Where applied, pumps operate 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 excludes 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

There are no changes to confidence grades this year. 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. Although the increasing use of telemetry data is improving the reliability and accuracy of flow data, the B4 grade for Line 5 is still considered appropriate given the known data omissions, errors still being identified and levels of uncertainty still associated with estimating pump head data.

No confidence grade is applied to Table 12 Line 13.

Table 13 – Sewerage Properties and Population

1. Introduction

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

- We were able to reconcile the property numbers reported to the Rapid extract presented by NI Water.
- We are content with the confidence grade of A2 for non-household. After the Company's submission, we discussed and agreed with the Company that the confidence grades for household are B2. We also agreed that the CGs for HH remain B2 until NI Water having a direct commercial relationship with their household customers.
- We audited the reported data and challenged the processes on a sample basis. Except where detailed below, we consider the data reported in the table is robustly prepared using systems and process that are appropriate and in line with the reporting requirements and that are properly implemented with effective quality control and governance arrangements.

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. Company methodology

4.1 Properties

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 outlined that data on property counts and classifications are reported monthly and reconciled with other data collection activities, such as the data quality programme. During the audit we sought an update on various issues which had been raised in previous AIRs. The following provides an overview of the discussions held with NI Water:

Whilst we acknowledge that the Company has renewed and expanded significantly to comply with the Reporting Requirements, the Company did not comment fully e.g. a reconciliation between Tables 2 and 7. We strongly recommend that NI Water check the Reporting Requirement again and include the commentaries required.

Test meters

We acknowledge that the Company has provided the detailed history on Test Meter categorisation and the summary table of the review in their commentary. The Company advised that the survey of all 10,898 test meter accounts was finished at the end of 2011/12, some still need to be confirmed and uploaded to Rapid.

Whilst the Reporting Requirement expects that NI Water to *'use a consistent approach to reporting 'test meters' between customer groups e.g. between household and non household customer groups*', NI Water advised that a different approach has been adopted in reporting household and non-household property numbers: 'Test' meter numbers have been included in household property numbers but

excluded from non-household numbers. This methodology is consistent with the Company's approach in AIR13.

We checked the Table 10 methodologies which confirmed that the consumption from NHH Test meter accounts is included as water taken legally unbilled, therefore the approach of NHH test meter between Tables 7 and 10 are same. The consumption from HH Test meter accounts is included in the unmeasured household water consumption. Therefore the approach of HH test meter between Tables 7 and 10 are consistent.

NHH Test Meter: Even though the test meter project is now completed – there are circa 2,000 test meters which need further reviewed before a billing decision is finalised e.g. shared supplies, unable to locate etc – therefore for reporting they have been kept as test meters until a change has occurred on the billing system.

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 previous AIR submissions.

NHH Site Meter: these are properties which are linked to another property that has a primary meter. This category ensures NI Water holds the property appropriately on Rapid and ensures they do not bill it directly for water. NI Water keeps such records to enable us to ascertain what our water supplies serve, for property count purposes and MIP situations.

NHH Unmeasured not charged

The 'unmeasured not charged' category is primarily used on the non-household side – NI Water and Fire Authority connections making up the majority of this category. On the household side, the difference between the 'unmeasured' and the 'unmeasured not charged' is that NI Water would bill the properties in the unmeasured category if domestic charging was introduced, whereas they would not bill those in the 'unmeasured not charged' category.

4.2 Populations

The total population connected to sewerage service is calculated as total water population multiplied by the percentage of sewerage properties. The properties connected to sewerage service were 81.35% of the numbers connected to water service. The detailed calculations are described in the Company's commentary.

5. Audit findings

5.1 New connections (Lines 1 and 2)

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 decrease of 347 (or 10%) new connections when compared to the AIR13 figure.

In previous AIR submissions we carried out sample checks and found anomalies on both household and non-household new connections. The Company explained that they were currently undertaking a review of these categorisations in the Rapid system. We understand from AIR14 audit, the Company is still in the process of the review.

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 of17 new connections (or 14%) when compared to the AIR13 figure.

5.2 Property numbers (Lines 3 to 12)

Line 3 – Households billed unmeasured sewerage

We note an increase of 4,916 properties (or 10.8%) reported in this line since AIR13. 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 properties plus the properties where a test meters has been identified. NIAUR has previously asked the Reporter to check the numbers and comment if there are difference between PCs and AIR submissions.

	AIR14 (000's)	PC13 FD 2013/14	PS 2013-14	PC15 2013/14
Unmeasured HH	591.043	589.223	591.927	591.337
Measured HH	0	0		0
Unmeasured NHH	8.706	8.709	8.441	8.667
Measured NHH	23.347	24.146	22.981	22.981
Void	44.479			

Note that the figure for AIR is April-March average, and PCs are November-October average while PS is 1st of December figure. The divergences in each of the 3 submissions are largely a result of the dates of each submission. Nevertheless, the three submissions are reasonably well aligned with relatively small percentage differences.

NI Water provided a year on year reconciliation to derive Block B figures in their Methodology Statement (Annex B) attached with the Table 13 commentary. We have reviewed the figures amongst the Table, Methodology Statement and the supported document and confirm that they are consistent.

The movement of HH customer group is provided in their commentary. We can confirm that the figures in this table are consistent with their Rapid data, except data cleanse/BAU activity. We assume that the number associated with data cleanse activity is calculated from Start/end of year and new/deletions of the properties. Therefore we are not able to confirm the details of this figure.

Line 4 – Households billed measured sewerage

Whilst NI Water has been installing meters on all new household connections since April 2007, customers are not being charged on a measured basis. As such, all household properties are reported as unmeasured. We believe this is appropriate.

Line 5 – Households billed sewerage

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

Line 6 – Non-households billed unmeasured sewerage

As expected we note that the number of non-households billed for unmeasured sewerage has decreased by 544 (6%) during the year. We assume that the decrease observed is a result of the Company's non-household metering programme. We reviewed the Company's progress in delivering this programme and our commentary on delivery of the programme this is provided in Table 8.

Line 7 – Non-households billed measured sewerage

Our audit indicates that the Company has followed their stated methodology in preparing this line.

We note that the number of non-households billed for measured sewerage has slightly increased by 333 properties (1%) since 2013/14.

Line 8 – Non-households billed sewerage

This is a calculated line and is the sum of Lines 8 and 9.

Line 9 – Void properties

We note that the average number of void properties has decreased by 158 (0.4%) from 13/14. The number reported in this line has remained relatively consistent from that reported previously. 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 as per the Reporting Requirement.

NI Water confirmed that Non Household Test Meter customers, Non Household Site Meter customers and Unmeasured Non Household which are currently not charged, are not included in their 'billed' figures.

5.3 Populations

We check the described calculation by NI Water. As previously, the difference is immaterial NI Water's calculation is not in accordance with their stated methodology. They stated in their commentary that the gross numbers of properties for water and sewerage are not end March figures but are AIR13 and AIR14 figures (which are averages). Therefore, the percentage should be 81.27% (667,574 / 821,468).

6. Assumptions

Except where disclosed above, no assumptions have been identified.

7. Confidence grades

7.1 Properties

As we discussed in other sections of our submission, after the Company's submission, we agreed with NI Water that the confidence grades for household are B2, while the CGs for non-household are A2. Please see our Table 7 commentary for further detail.

7.2 Populations

We understand that the CG for total population number in Table 7 is B2. We assume that non resident population is C2 as this is from Table 2. Therefore we are content with the Company's CG.

8. Consistency checks

Not applicable.

Table 14 – Sewage collected

1. Introduction

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

- After the Company's submission, we agreed with NI Water that the confidence grades for HH should be B2. Whilst we acknowledge significant improvements in property numbers, unmeasured sewage volumes (Lines 1-3) are based on several assumptions and figures used in Table 10. We believe that the confidence grades for Table 14 unmeasured volumes should remain consistent with those assigned in AIR11.
- Underlying slight (-1.2%) decrease in trade effluent masked by large (22%) increase in trade effluent volume caused by improved flow measurement at Duncrue Incinerator.
- Minor error identified in trade effluent calculations (corrected).
- Minor change to methodology in line 6 through exclusion of traders not discharging in year. Overall impact on line total negligible.
- Investigations underway to obtain more accurate estimate of trade effluent from hospitals.
- We audited the reported data and challenged the processes on a sample basis. Except where detailed below, we consider the data reported in the table is robustly prepared using systems and process that are appropriate and in line with the reporting requirements and that are properly implemented with effective quality control and governance arrangements.

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. Company methodology

4.1 Unmeasured sewage volumes (Lines 1 to 3)

The unmeasured sewage volumes are based on data from other tables, specifically:

- Volume of water delivered to billed unmeasured households and non-households (Table 10 Lines 4 and 5)
- Number of households and non-households billed for unmeasured water (Table 7 Lines 3 and 8)
- Number of households and non-households billed for unmeasured sewage (Table 13 Lines 3 and 6)

The sewage production is calculated as 95% of the water consumption, which is widely used in the industry. Unmeasured sewage volumes are calculated by multiplying sewage consumption (95% of unmeasured water volumes) by the percentage of properties connected to sewerage service over properties connected water service (85.8% for HH and 84.8% for NHH).

The total unmeasured sewage production (Line 3) is the sum of household and non-household production (Lines 1 and 2).

This analysis assumes that average water consumption is the same for those households connected to the sewer system as it is for those not connected. This may not be the case, as those on septic tanks may be more conscious of water use, however the effect of this is not easily quantifiable and is likely to be very small at a catchment scale due to the small number of properties not connected to the sewer system.

4.2 Measured sewage volumes (Lines 4 to 5)

This data to calculate these lines is taken from billing information held by the Company and DRD domestic allowance data. The value of sales is converted to a volume by dividing the total value of sales by the relevant measured tariff.

The methodology used to calculate Lines 4 and 5 is unchanged from previous years. The reported figures allow for accruals in order to account for sales to year end. A return to sewer allowance of 95% is applied to the total value of sewerage volumes.

4.3 Trade effluent volumes (Line 6)

There has been a minor change to the methodology used to calculate line 6 from previous years. The primary data sources, processing and reporting procedures applied remain the same. However, NI Water no longer includes consented volumes where a trader is confirmed as not discharging during that year.

Information on trade effluent used in line 6 is based on data collated for each individual trader as is identical to that used in Line 1 of Table 15. The names of individual traders are taken from the Primary Source of Trade Effluent Customers (PSTEC) database, which is updated regularly by NI Water. Trade volumes are obtained from the billing section of Customer Services using actual billing records. Data is based on either outflow trade meters (where fitted) or water meter readings, with allowances for domestic use and evaporation losses. Where no data is available, volumes are based on maximum consented volumes. As initiated in AIR14, NI Water does not include consented volumes where a trader is confirmed as not discharging during that year. Where traders start or cease discharging part way through the year, a pro-rata by days per year is applied.

The applied BOD concentration is based on actual sample data for each trader, taken from the LIMS system. Where unavailable, a 'standard sewage strength' is applied. In previous years, this has been based on a rolling average of the last 5 years weighted average inlet concentrations from twelve major STWs. For AIR14, NI Water has modified this method to apply the average of the concentration values from only the 2013 calendar year. As a result the applied value has increased significantly from 189mg/l to 229mg/l.

For a very small number of new traders with no existing sample data, the BOD is calculated using consented COD figure and a conversion factor of 1.32 (also based on data from 2013 calendar year).

To obtain daily flow volumes, NI Water adopts a consistent approach by dividing all trade effluent flows by 365 irrespective of whether the trader only operates for 5 out of seven days.

The volume of trade effluent from hospitals varies due to only a proportion of the total outflow comprising trade effluent. Where more reliable data is not available, NI Water assumed the volume to comprise 5% of the total metered incoming water supply to the hospital. However, to improve this data, NI Water is currently undertaking reviews of all hospitals with a view to providing more accurate assessment of trade effluent for each site. These reviews are based on documentary evidence of trade processes and should hence provide reliable data. To date, one such review has been completed at [x] concluding an applicable trade effluent volume of 32.6% of incoming water supply.

It is expected that updates to other hospitals will be available for AIR15. Other current exceptions to the 5% assumption are as follows:

- [x] – charged at 100m^3/day for a laundry discharge and 5% incoming water for the other TE processes.
- [x] – charged at 7% of incoming water due to documentary evidence provided at the time of consenting to include additional volumes.
- [x] is supplied by a borehole, so 100% of borewell water supply is applied.

The Company carries out a number of cross checks against source data. To ensure consistency, the same database is used for populating related lines in Table 15.

4.4 Wastewater returned volumes (Line 7)

This line is a sum of Lines 3, 4, 5 and 6.

4.5 Road drainage returned volumes (Line 8)

The Company provided a volumetric estimate for the volume of road drainage returned based on estimated areas of road services and annual average rainfall data. The methodology and applied estimated values have remained unchanged from previous submissions. The Company provided a full and detailed explanation in their commentary. 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. Audit findings

5.1 Volume unmeasured household sewage (Line 1)

We note a small decrease in volume of 10.40 Ml/d or 4.3% reported in this line.

5.2 Volume unmeasured non-household sewage (Line 2)

We note that this volume has decreased significantly during the year, reducing by 0.64 Ml/d which equates to a circa 12% decrease. This is consistent with the decreases observed in the unmeasured property base.

5.3 Volume measured non-household domestic sewage (Line 5)

We note that there has been an increase of 0.75 Ml/d or 2% in the volume compared with that reported in 2012/13. The Company explained that the sewerage volume is higher than last year due to the mild weather throughout the year. However this increase was only seen at measure NHH properties, we consider that this increase was due to the selective meter installations (switching from unmeasured to measured).

We note that the volumes reported in the Principal Statement, PC15 and AIR submissions are based on the same data, except the PS and PC15 include forecast data for 4 months of the year, while AIR is actual. Therefore the reported figures in 3 submissions are similar.

5.4 Volume trade effluent (Line 6)

The total of 41.73Ml/day for line 6 is extracted directly from Company records on traders with registered effluent discharges and compiled in a spreadsheet. A minor error in the formulae was identified and corrected by the Company. The line total for AIR14 represents a 22% increase in the line total from AIR13. However, as reported in the Company Commentary and confirmed by our analysis of the figures, the increase is almost wholly due to the increase in the volume at Duncrue Incinerator. The underlying total excluding Duncrue actually decreased slightly (-1.2%). As discussed in detail in our review of line 1, Table 15, the changes at Duncrue are more representative of improvements in accuracy rather than any significant increase in volumes passing through the incinerator.

The Company reported a reduction of 11 in the total number of listed traders in AIR14 to 507. Of this figure, 172 are 'sampled and charged' (i.e. NI Water used actual billing data for the basis of flow and load). The remainder are based on the 'standard sewage strength' with flow data either from billing data or, where not available, using the trader consented volume. In AIR 14, only 72 traders are based on consented flow data, a reduction from 109 in AIR13 indicating good progress in improving monitoring of traders. It is noted that although only 34% of the total number of traders, the 172 sampled and charged entries actually represent 96.6% of the total load (95.4% of total flow) listed in Line 1. Furthermore, the 72 traders based on consented volumes represents <1% of the total load. Hence, whilst the methods introduce a significant degree of inaccuracy where assumed values have been applied, the net potential error on the overall line total is well within the B2 confidence grade applied.

It is noted that the use of consented volumes will generally over-estimate effluent discharges and hence we continue to encourage the Company to extend the coverage of metered and sampled data to trade effluent sources, with priority to the largest inputters.

Checks against the source data confirmed that the change in line total resulting from the change in Company methodology to exclude traders who have not discharged through the year is negligible.

Enquiries into the impact of hospitals on the figures confirmed that trade effluent from hospitals currently comprise 1.3% of the total volume.

5.5 Volume of road drainage (Line 8)

The value of 175.80 applied to Line 8 is consistent with that applied in AIR13 and has remained unchanged for the past 4 years. No further investigation was carried out.

6. Assumptions

Lines 1 to 2 – unmeasured volumes

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

Line 6

The following assumptions are applied:

- For trade effluent, the average influent concentration is assumed to represent trade effluent concentration where not directly known.
- Where flow data and load samples are taken at inlets to works, these are assumed to be representative of the flows and load entering the catchment.
- Where relevant data is not available, the volume of trade effluent from hospitals is assumed to comprise 5% of the total.
- All traders are assumed to discharge 365 days per year, regardless of actual operating times.

- Discharge volume if not metered is based on 95% of water supplied.

Line 8

The volume of road drainage (Line 8) relies on estimates of the areas of road servicing and assumes all goes to the drainage system. Similarly, it assumes there are no additional inputs. The volume of runoff is assumed to be 100% of the annual average rainfall.

7. Confidence grades

As we discussed in other sections of our submission, after the Company's submission, we agreed with NI Water that the confidence grades for household property numbers are B2, while the CGs for non-household property numbers are A2. Whilst we acknowledge significant improvements in property numbers, unmeasured sewage volumes (Lines 1-3) are based on several assumptions and figures used in Table 10. We discussed internally on the confidence grades for Table 10 Lines 4 and 5 that these CGs would be B. We therefore believe that the confidence grades should remain consistent with those assigned in AIR11.

For measured sewage volumes (Line 5), the financial data is extracted from the Company's billing system and audited by their financial auditors. However the figures are calculated and reconciled during the process. We again agreed with the Company that the CG for the measured sewerage property number is A2 (please see our Tables 7 and 13 commentaries). Considering the above, we are content with B3.

The confidence grade of B2 for Line 6, as applied in previous years, is consistent with that applied to Line 1 of Table 15 and is considered appropriate in reflecting the high accuracy of the majority of data whilst acknowledging the need for a degree of estimation in about 5% of flow.

The confidence grade of CX applied to Line 8 is consistent with previous years.

8. Consistency checks

The methods and data used to calculate the line 6 total are consistent with those reported in Line 1 of Table 15.

Table 15 – Sewage Treatment

1. Introduction

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

- There has been no significant change to the totals in Lines 2 to 9 due to few physical changes to works (5 closures and 2 new works). The majority of change is due to adjustments in population equivalents.
- No significant change to methodologies. The Company initiated changes to the treatment categorisation of works with <5mg/l ammonia consent has no significant impact on the line totals.
- There has been a small increase in trade effluent loading, although the majority was due to improved measurements at Duncrue incinerator rather than any significant change in throughput.
- NI Water is proposing further flow and load monitoring, primarily for MCERTS compliance at all works with numeric consents to improve their understanding and the accuracy of their estimates.
- Confidence grades remain unchanged from previous years, but there appears to be scope for raising grades for Lines 5-7, particularly as they appear inconsistent with other tables (see Section 7).
- For PPP operated works the comparable ratios of BOD load increase from last year do not align with sludge loads, the explanation for this is not clear. Overall sludge loads are stable.
- We audited the reported data and challenged the processes on a sample basis. Except where detailed below, we consider the data reported in the table is robustly prepared using systems and process that are appropriate and in line with the reporting requirements and that are properly implemented with effective quality control and governance arrangements.

2.1 Key recommendations

- Consider increase in confidence grades for Lines 5-7 to C3 to recognize increased confidence in values and improve consistency across tables.
- Consider increase in confidence grade for PPP works line 5 (PPP works) from C5 to B2 to represent improved data accuracy and improve consistency across tables.
- Confidence grades for the PPP line entries should be reviewed in conjunction with the Reporter's recommendations.

3. Audit approach

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

4. Company methodology

4.1 General

There have been some minor changes to the methodologies used from previous years, although the primary data sources, processing and reporting procedures applied remain the same. As discussed in detail in Table 17c, the Company has proposed a modification to its assignment of treatment categories following a review of other UK water companies and a query with Ofwat. This has had a significant impact on the allocation of load between secondary and tertiary treatment levels. As these are not differentiated in the line totals in Table 15, the overall impact on Table 15 is relatively small.

4.2 Information sources

Information on trade effluent used in Line 1 is based on data collated for each individual trader. The names of individual traders are taken from the Primary Source of Trade Effluent Customers (PSTEC) database, which is updated regularly by NI Water. Trade volumes are obtained from the billing section of Customer Services using actual billing records. Data is based on either outflow trade meters (where fitted) or water meter readings, with allowances for domestic use and evaporation losses. Where no data is available, volumes are based on maximum consented volumes.

The applied BOD concentration is based on actual sample data for each trader, taken from the LIMS system. In AIR14, 172 traders were 'sampled and charged' representing 96.6% of the total load (95.4% of total flow) listed in Line 1. Where unavailable, a 'standard sewage strength' is applied. In previous years, this has been based on a rolling average of the last 5 years (weighted average) inlet concentrations from twelve major STWs. For AIR14, NI Water has modified this method to apply the average of the concentration values from the 2013 calendar year only. As a result the applied value has increased significantly from 189mg/l to 229mg/l. However, assessment of the data confirmed that there were particularly low readings between AIR08 and AIR10 which have skewed the results in the past and we note that the value would still have risen to 205mg/l even if the 5yr average methodology had remained unchanged. The application of data within which year the charges were actually applied seems more logical and as such we accept this change in method.

For a very small number of new traders with no existing sample data, the BOD is calculated using consented COD figure and a conversion factor of 1.32 (also based on data from 2013 calendar year).

We note that the application of the 'standard sewage strength' and calculated BOD values for new traders represents <3.5% of the line total and hence any inaccuracies caused by these methods will be well within the assigned confidence grade.

Following a determination in AIR12, discharges from nursing homes and clinics are not included as trade effluent. Where more reliable data is not available, NI Water assume the volume to comprise 5% of the total metered incoming water supply to the hospital to allow for discharge from facilities such as x-ray departments and bathing pools. As discussed in Table 14, there are some exceptions to this and NI Water is currently carrying out reviews to obtain more accurate data on trade effluent volumes from hospitals. In AIR14, input from hospitals comprised 0.9% of the total load (45.9 tonnes BOD/yr).

To obtain daily flow volumes, NI Water adopts a consistent approach by dividing all trade effluent flows by 365 irrespective of whether the trader only operates for five out of seven days.

Data used to populate Lines 2-9 is extracted from a master spreadsheet used as the basis for the population of Tables 15 and 17a-g to ensure consistency between the two. The spreadsheet contains rows for each individual Sewage Treatment Works (STWs) and is populated and maintained as a live document throughout the year by the Asset Performance Team. 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.

The methods used to estimate populations are consistent with previous years. Population data is gathered based on mapped GIS information using numbers of properties in the catchment and assumed standard occupancy rates. Tourist populations are excluded as required, based on the proportion of PE in hotels, caravans and tent pitches. A full explanation of the use, upkeep and control of this spreadsheet is provided on Section 4.2 of our commentary on Table 17c.

In recent years, NI Water has carried out a number of flow and load surveys, typically at larger works (>2000 PE) or works with high trade influent for correlation against population equivalents. This has typically involved installation of flowmeters at sites and collection of load samples. Data obtained through such methods is considered more accurate than that based on population equivalents as it takes into consideration unusual catchment demographics, high trade concentrations and shock loading. Generally, data has correlated reasonably well with that calculated from population equivalents, providing some confidence in their methodology. However, only 1 flow and load survey undertaken in AIR14 was formally adopted for inclusion in the spreadsheet and currently, load data for only 6 works are actually based directly on flow and load surveys, the remainder all being based on property counts. The application and impact of flow and load data to date is therefore limited, and used primarily as a method of checking.

We understand that NI Water is currently implementing a program to extend the installation of flowmeters and load sampling to achieve MCERTS compliance at all sites with a numeric consent (i.e. >250PE). This program is expected to start in PC15 and be rolled out over the next few years. In time, this should provide accurate flow data for comparison and correlation with population equivalents at all significantly sized works. However, the extent of load sampling has not yet been determined and it is not clear whether this will result in any change to the methodology or just improved confidence in the numbers.

The total for Lines 2-7 are taken directly from summary cells within the master spreadsheet based on suitable filtering of the data (e.g. treatment category). Loads received at NI Water STWs are calculated based on the estimated population equivalent (PE) for the works and applying an assumed fixed average rate of 60g BOD per person per day. Loads are hence directly proportional to allocated PE.

Methods for estimating population equivalent, treatment category, size band and BOD loading are identical to those applied to Tables 17b-d and follow the definitions by NIAUR. The allocations for each works are documented and controlled in the master spreadsheet by the Asset Performance Team.

Size banding for all works is based on the latest PEs excluding non-resident (i.e. tourist) PE in accordance with the reporting requirements.

It is possible for a number of issues to arise which create uncertainty within the dataset. For example, a septic tank serving two houses is classified as a single STW. However, if one property is then sold, the septic tank is only then serving one house and is no longer designated a STW. Such updates are not always identified. Small septic tank WwTWs can also be easily overlooked as overgrown underground structures giving further uncertainty. However, due to the size of such works, the impact on line totals is usually negligible.

Treatment capacity available (Line 9) is calculated based on design capacity in terms of population equivalent served, converted to BOD load using 0.06kg BOD person/day.

NI Water has a robust methodology for calculating Lines 15 to 17. The assumption is made that transfer of sludge to the PPP contractor for incineration allows zero to be entered into Line 15 (unsatisfactory disposal) with an A1 confidence grade. Other checks and balances carried out by NI Water strengthen this assumption.

The volumes produced and transferred (Lines 15 & 16) are reported as the same value less screenings and grit and are based upon robust measurements and logging of liquid sludge by meter, and cake by

weighbridge, coupled with the measured average %ds. Values recorded at the PPP facility is reported in the table, NI Water now undertakes a reconciliation between their records for cake volumes leaving site and the cake volumes received by the PPP contractor, the difference is within acceptable measurement tolerance.

The most inaccurate aspect of the methodology is the measurement of grit and screenings, where a standard assumed 30%ds is used across the board to convert weighbridge measurements into ttds.

The methodology for deriving the PPP volume is similar to the NI Water methodology, whereby recorded wet tonnes are converted to ttds using measured average percentage dry solids. They have invoked a more accurate measurement process at Kinnegar for grit & screenings by measuring %ds on each load instead of using a typical 30% value which is used at all the NI Water sites and the 5 Omega sites.

4.3 Quality assurance

The Company carries out a number of cross checks against source data and with relevant internal departments to check and challenge information included in the database. These are detailed in the Company's methodology, but include regular meetings to compare information with other departments, and cross-checking against department updates and reports. To ensure consistency, the same database is used for populating other related tables including Tables 15 and 17c.

5. Audit findings

5.1 Sewage – Loads (Line 1)

The total for Line 1 is extracted directly from primary data sources and compiled in a spreadsheet. The overall increase in line total is almost wholly due to increase in the volume at Duncrue Incinerator. Checks against the source data confirmed the correct summation and reporting of the line total.

The Company lists the significant changes by individual trader in their commentary. Checks of the source data were carried out against these companies and Duncrue Incinerator to confirm the validity of the entries. NI Water confirmed that the two removed traders were not discharging during the year and the reductions were due to improved treatment installed by the trader. The increases in the south region were all due to increased trader production. The table below summaries the key volumes and changes at Duncrue Incinerator.

Table 15-1 – Summary of Trade Effluent output from Duncrue Incinerator

Works Element	BOD Load AIR 13 (tonnes/yr)	BOD Load AIR 14 (tonnes/yr)	Net Change	NI Water comments on changes from AIR13
W1	35.5	46.9	+11.4	
W1A	9.3	11.1	+1.8	Temp flow meter removed
W2	79.5	102.3	+22.8	Incinerator operator identified a previous limiter on the flow meter – now removed
W4	1084.6	678.8	-405.8	New meter installed and no. of tanks reduced from 10 to 6 (in line with centrifuge installation)
W5	201.9	718.0	+516.1	New centrifuges installed with stronger BOD concentration
All	**1410.8**	**1557.1**	**+146.3**	

Although significant, the changes at Duncrue are more representative of improvements in accuracy rather than any significant increase in volumes passing through the incinerator.

There are no inputs to this line from PPP works.

5.2 Sewage – Loads (Lines 2 to 7)

5.2.1 NIW Only

The total for Lines 2 – 7 are taken directly from the master spreadsheet. Checks against the source data confirmed the correct summation and reporting of the totals.

Comparison against AIR13 totals indicates only marginal changes in line totals, with no individual total in Lines 2-4 changing by more than +/-60 tonnes/year (equivalent to +/-0.1% of the overall total). This is primarily a valid representation of the relatively few changes in the levels of preliminary and primary and treatment that have occurred during the year. The physical changes that will have impacted the figures are shown in the Table 15-2 below.

Table 15-2 – Summary of changes to works impacting lines 2-4

Works Name	Load (BOD/year)	Category in AIR 13	Category in AIR14
Drumavally	28.2	Primary	Replaced by pumpaway to new Magilligan Point Road WwTW (Tertiary)
Kilcarn Road (7-9)	0.13	Primary	Private
Moss Road (36-38)	0.07	Primary	Private

The only significant change to works impacting Line 3 will therefore have been the removal from operation of Drumavally WwTW. All other changes in line totals are primarily due to changes in population estimates. Specifically, the significant increase in Line 4 for preliminary treatment was wholly due to the net result of changes in population estimates for Ballycastle WwTW (decrease in AIR14 from 11,174 to 8,342) and Cranfield Down (increase from 3,915 to 4,140).

In addition to the above, Rathlin Island Retention Tank was also closed in AIR14 and replaced with a new secondary level treatment works (Rathlin Island WwTW). During the year, Benone WwTW and Aughill WwTW were also closed with flows being diverted for treatment at a new works (Magilligan Point Road WwTW). However, the change in treatment category from secondary to tertiary has no impact on the line totals.

The line totals correctly exclude data relating to screened and unscreened outfalls (where no treatment is undertaken by the Company).

The Company provide detailed breakdowns of the changes to line totals in their commentary. The table below summarises this data to indicate the locations with a change in population equivalent of more than +/-2300 (roughly equivalent to a value of 50kg BOD/yr) and hence the greatest influence on the total load entering the system.

Table 15-3 – Summary of main change in works PE estimates

Works Name	Change in PE	Justification
Belfast	+5779	Flow and load validation and updated with latest trade info
Killinchy	-2448	Population study and updated with latest trade info
Ballymena	-7951	Population study and updated with latest trade info
Larne	-4905	Population study and updated with latest trade info
Ballycastle	-2832	Population study and updated with latest trade info
Dungannon	+5894	Population study and updated with latest trade info

Although the PE for Belfast is based on flow and load data, the Company believe the current PE to be too low and predict a significant rise in this value in future reports.

Checks against the source data confirmed that the total for Lines 6 and 7 are the correct summation of listed population equivalents for qualifying works. The total for Line 7 correctly excludes sites without numeric consents. Of the 1015 WwTW reported, 230 currently have a numerical consent (no net change from AIR13).

5.2.2 PPP Sites

Line 2 complies with the requirements of Table 15 to collect information of various types and sizes. The works are categorised by the highest level of treatment provided, which is a simplistic assessment of the population that receives primary, secondary treatment etc. It is not a detailed assessment of the load for each type of treatment.

The Biological load receiving secondary treatment to the PPP facilities has increased from 6594.9 tonnes last year to 7209.5 tonnes for AIR14. AIR13 showed a sharp drop from previous years, the AIR14 figure is mid-range of the past two years and considered by the Company to be a representative value. The method of assessment is unchanged from previous years.

Data is the combination of the Omega contract, 5 separate treatment works and the single works Kinnegar contract. Data is reported on a monthly basis from the works and used to compile running totals for the year. The back-up spreadsheet with monthly data was viewed during the audit meeting and it was seen that this data correctly totals to the value entered in the AIR table.

Data from the 5 works making up the Omega contract is obtained as weekly samples of BOD which are submitted for analysis on selected dates as per the Sampling Schedule agreed between NIEA & NI Water

Contract Management Team on a yearly basis. These composite average daily BOD loads are multiplied by the flow for days in the period to calculate total loads for the period which in turn summed to monthly and the yearly totals.

For the Kinnegar contract daily 24hr composite sample are taken at the site, combined with the continuously recorded flow reading to give a good representation total load received on any one day. These daily values are summed to provide monthly and yearly totals to a good level of accuracy.

Reviewing the data from previous years it can be seen that the Omega and Kinnegar totals are in similar proportions to past years and the values are greater than AIR13 but higher than AIR12. The 5 works which make up Omega do not however follow a consistent pattern compared with the total, some are showing a year on year increase in load whilst others a down and up variance. The Company did not have a particular explanation for variances by site accepting that changes to loads from catchments can occur.

Treatment Works	Ave daily BOD load (kg/D)			Calculated Load (Tonnes BOD/yr)			Equivalent Population		
	AIR12	AIR13	AIR14	AIR12	AIR13	AIR14	AIR12	AIR13	AIR14
North Down WwTW	3902	4286	4739	1428.1	1564.4	1729.7	65033	71433	78983
Armagh WwTW	1404	1252	1024	513.9	457	373.8	23400	20867	17067
Richhill WwTW	157	196	154	57.5	71.5	56.2	2616	3267	2567
Ballyrickard WwTW	1632	1793	2453	597.3	654.4	895.3	27200	29883	40883
Ballynacor WwTW	9465	6148	6684	3464.2	2244	2439.7	157750	102467	111400
Omega Total	16560	13675	15054	6061	4991.4	5494.7	276000	227917	250900
Kinnegar WwTW	4846	4393	4697	1773.5	1603.5	1714.35	80759	73219	78281
Grand Total	21406	18068	19751	7834.5	6594.9	7209.05	356759	301136	329181

The increase load receiving biological treatment is reflected by sludge produced which has also increased. The relative proportions are different; BOD load has increased from AIR13 by 9.3% whilst sludge produced has only increased by 2.2% (see below Line 15 data). This apparent discrepancy is further complicated when examining individual sites for example the BOD load at Kinnegar has gone up 7% from AIR13 but the sludge produced has reduced by 12% from AIR13. The Company did not have a particular explanation for this, the PPP contractors do not operate the sewerage networks so do not have the detailed knowledge of the catchment with which to make an assessment. Generally it would be assumed that soluble to particulate BOD ratios in effluent are stable and hence the yearly variation in annual BOD load would be reflected in the annual sludge volume produced. It can only be hypothesised that the large proportions of trade effluent that exist in some of the catchments which discharge to the PPP facilities are responsible for varying the soluble/particulate BOD ratios and hence distorting comparable ratio assessments but no assessment has been carried out to confirm or disprove this.

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

A zero return has been reported for Line 4, as all six PPP facilities are secondary treatment works.

For Lines 6 and 7 (Equivalent Population served), the equivalent population served by the treatment facility is calculated from the measured load data at the two PPP operations based on 60g/h BOD.

The single works at Kinnegar is a single facility which is sampled daily on a 24hr composite basis, this should provide a good representation of the load received. Omega comprises of 5 sites where at weekly sampling is undertaken, this is not as accurate as Kinnegar but should still provide a good representation of the load received by the facilities.

Both Lines 6&7 are the same as all 6 works have numerical consents.

5.2.3 Total

The total number is the correct summation of NIW Only and PPP sites.

5.3 Sewerage – Service facilities (Lines 8 to 9)

5.3.1 NIW Only

The total number of WwTWs reported in Line 8 (1,015) correctly excludes the 2 No. screened outfalls and 7 No. unscreened outfalls and hence differs slightly from the total of 1,024 reported in Table 17c.

The net reduction of 3 outfalls since AIR13 result from the following works changes:

- Closure/removal of existing works in year at: KIlcarn Road, Moss Road, Aughil, Benone, Drumavally
- Commissioning of new works in year at: Magilligan Point Road, Rathlin Island

The total in Line 9 is correctly based on the works design PE rather than the actual PE. The small increase (+0.7%) in Line 9 is a net result of the above changes combined with upgrades at a number of works. The key contributing changes are summarised in the table below.

Table 15-4 – Summary of main change in works Design PE

Works Name	Change in Design PE	Comment
Ballynahinch	+8500	Works upgraded
Gulladuff	+651	Works upgraded
Maghera	+931	Works upgraded
Benone	-800	Site closed
Drumavally	-1290	Site closed
Magilligan Point Road	+8696	New works (replacing Benone, Aughil and Drumavally)
Rathlin Island	+200	New works (replacing Rathlin Retention Tank)

5.3.2 PPP Sites

The number of PPP facilities in Line 8 remains unchanged from previous AIR submissions at six. For Line 9, data is based on the design specifications and is unchanged from last year. Omega has a contract capacity of 19.6 tonnes and Kinnegar 10.8 tonnes (30.4 tonnes in total). Based on figure in Line 2, the daily load receiving secondary treatment equates to 19.75 tonnes BOD/day which would indicate a headroom capacity of 10.65 tonnes BOD/day.

The reported value is the theoretical design value, no investigation into actual performance or as constructed capacity has been undertaken to revise this value. No outages have been reported during the year to reduce the figure.

5.3.3 Total

The total number is the correct summation of NIW Only and PPP sites.

5.4 Sewage – Sludge disposal (Lines 14 to 17)

5.4.1 NIW only

The Company confirmed that the procedures in place for the disposal of sludge are well controlled and robust. All sludge produced by NI Water has been transported to PPP incineration facilities for disposal.

As all sludges are disposed of through incineration or are disposed of in an appropriate manner by the PPP contractor during incinerator outage, 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 operations of the system and a relatively constant population, as well as good data recording facilities. The reported figure in Line 15 is 32.5ttds compared to 32ttds last year and 31.4ttds for AIR12.

NI Water continues to have a well-controlled management system for controlling sludge movements both as liquid and cake through use of a GPS logging system and the recent introduction of weighbridges at the 8 cake transfer sites. The volume of sludge reported is taken from the PPP records of sludge disposed of at the PPP facilities as this value is used for payment purposes. This year a reconciliation has been undertaken for sludge cake transported between the total tonnage of cake leaving NI Water facilities and the total tonnage recorded to be disposed of at the PPP facility. The reconciliation has showed a difference of ~2.5% less sludge being recorded at the PPP facility than the NI Water works. The reasoning for this is not known and the quantum of the difference is not significant. Measuring facilities at both locations are understood to be well maintained and regularly calibrated, the likely cause is to be the variance in sludge density which can vary throughout a load and from sample to sample.

NI Water records liquid sludge volumes transported off sites as well as the cake volume transported. A reconciliation of sludge volumes would be a more complex task because of the number of works distributed across the sites and the sludge collection operation which involves multiple collection points. To date NI Water has not undertaken a reconciliation between data recorded at the collection points and the data recorded by the PPP concessionaire at the point of delivery to the disposal centre. The records of the PPP are considered good and robust, a reconciliation to their records would give additional comfort to the records and something NI Water is considering to undertake in the future.

The Company has included the weight of grit and screenings in the reported data (0.8ttds) which accounts for the difference between produced and transferred to PPP. This value is calculated from skip volumes using a 30% dry solid conversion, which is appropriate. This value is consistent with previous years.

5.4.2 PPP Sites

Line 14 - Percentage Unsatisfactory Sludge Disposed (PPP only)

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

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 to this return.

Line 15 - Total Sludge Produced (PPP only)

The volume of sludge produced has increased from AIR13 but is still less than previous AIR12, AIR11 and AIR10 values.

The changes in sludge produced data reflect the loads delivered to the PPP contractor from the NI Water sewer network. However, as discussed above the relative increase in sludge produced is not proportional to the increase in BOD load received as would be expected.

One minor change to the calculation of sludge load this year is in the calculation of grit and screenings from the Kinnegar contract, the % dry solids of the skip loads is now measured for each load so it gives an accurate representation of actual TDS, in previous years an assumed 30%ds had been used as a typical value. This change has doubled the recorded values of grit and screenings from Kinnegar compared to previous years but overall this only has a small effect on the total sludge volumes reported.

Grit and screenings from the Omega contract continue to be calculated using an estimated %ds value of 30% which is appropriate. The measured values for Kinnegar are much higher than 30% but the type of screening compaction installed at the site is not typical and can explain the higher than expected value.

The drop seen in the grit & screenings from Omega is probably due to over reporting in AIR13 which included skips from AIR12 that had not been emptied the 2011/12 reporting period and therefore not recorded until 2012/13 increasing the AIR13 figure.

A summary of the sludge production across the previous years is tabulated below;

Line 16 - Total sewage sludge received from NI Water (PPP only)

This is a repeat of the NI Water table Line 16 – sludge transferred to PPP.

Line 17 – Total sewage sludge disposal (PPP only)

PPP Production (ttds)	AIR14	AIR13	AIR12	AIR11	AIR10
Armagh WWTW	0.547	0.535	0.570	0.759	0.84
Richhill WWTW	0.071	0.065	0.066	0.213	0.21
Ballynacor WWTW	2.007	2.069	3.330	2.468	2.29
Ballyrickard WWTW	1.126	1.158	1.225	1.627	1.717
NDA WWTW	1.920	1.628	1.559	1.753	1.654
Kinnegar WWTW	0.643	0.726	0.823	0.792	0.7
Omega Screenings and Grit	0.088	0.106			
Kinnegar Screenings and Grit	0.047	0.022			
Totals	**6.449**	**6.309**	**7.573**	**7.612**	**7.411**

This is the correct sum of Lines 15 and 16.

5.4.3 Total

Line 14 - Percentage Unsatisfactory Sludge Disposed (NI Water + PPP)

NI Water reported zero unsatisfactory sludge disposals.

Line 15 - Total Sludge Produced (NI Water + PPP)

We confirm that the procedures in place for the disposal of sludge are well controlled and robust. All sludge produced by NI Water has been transported to PPP incineration facilities for disposal. As all sludges are disposed of through incineration or are disposed of in an appropriate manner by the PPP contractor during incinerator outage, there is not a concern that the control measures in place may allow some unsatisfactory disposal to occur.

Sludge cake is produced from 8 NI Water sites and transported to the PPP Contractor for incineration. Liquid sludge is also transported to the PPP Contractor (at Ballynacor & Duncrue Street, Belfast) where the contractor measures and processes the liquid sludge as well as Indigenous sludge from Belfast WwTW.

The mass of sewage sludge disposed in the year has remained relatively constant over the past few years, reflecting both stable operations 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 Sludge production for Line 15 is 32.5ttds compared to 32.0 ttds last year. This figure includes 0.8ttds of screenings and grit sent to landfill.

The Company continues to have a well-controlled management system for controlling sludge movements, both as liquid and cake through use of a GPS logging system, and the recent introduction of weighbridges at the 8 cake transfer sites.

The Company has included the weight of grit and screenings in the reported data (0.8ttds) which accounts for the difference between produced and transferred to PPP. This value is calculated from skip volumes using a 30% dry solid conversion, which is appropriate.

NI Water has a robust methodology for calculating Lines 15 to 17. The assumption is made that transfer of sludge to the PPP contractor for incineration allows zero to be entered into Line 15 (unsatisfactory disposal) with an A1 confidence grade. Other checks and balances carried out by NI Water strengthen this assumption.

Line 17 - Total Sludge Disposed (NI Water +PPP)

The value is equal to reported volume produced.

6. Assumptions

Assumptions are generally the same as those applied to Tables 17a-g as they are based on the same data:

- The sizing of works is assumed to be directly proportional to the population within its catchment (as defined in the reporting requirements).
- Population equivalents are based on property counts from GIS which include all recorded properties. These are typically based on counts of property on GIS with an assumed occupancy rate of 3 per property. The totals therefore assume the GIS system is accurate and up to date.
- The loads received at NI Water STWs are based on an assumed fixed average rate of 60g BOD per person per day (hence directly proportional to PE).
- With the exception of caravan parks and hotels, the Company assumes that all commercial and potentially non-residential properties are classified as residential.
- The impact of commuters is assumed to be negligible.
- For trade effluent, the average influent concentration is assumed to represent trade effluent concentration where not directly known.
- Where flow data and load samples are taken at inlets to works, these are assumed to be representative of the flows and load entering the catchment.
- In the absence of more reliable data, the volume of trade effluent from hospitals is assumed to comprise 5% of the total.
- All traders are assumed to discharge 365 days per year, regardless of actual operating times.
- 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.

7. Confidence grades

NI Water has good practices and procedures in place for the measurement and recording of data in Table 15 and hence confidence grades should reflect this. In past reporting years discussions and recommendations have been had and made around the appropriate CGs and the interpretation of the guidance. Audit team has reviewed the assignment of grades again for Table 15 with the following observations and recommendations.

Line 1: A confidence grade of B2, as applied in previous years, is considered appropriate and reflects the high accuracy of the majority of data whilst acknowledging the need for a degree of estimation in about 5% of flow.

Line 2-7 (NIW Only): NI Water has based confidence grades for Lines 2-7 on the confidence grade of C5 applied to individual sites based on advice from consultants on the degree of accuracy of PE estimates at individual sites. The Company proposes a higher grade of C3 for Lines 2-4 on the basis that they have greater confidence in process categories. This is not a logical argument as the accuracy of the base data cannot be improved by combining with more accurate data. However, we do agree that there is a logical argument that the confidence grade can be improved when individual sites are amalgamated together as whilst the confidence of individual sites is poor, the confidence of the total PE figure is relatively good and errors will tend to average out as they are amalgamated. Hence for Lines 2-5 which are direct sums of multiple PE values, a higher confidence grade is considered appropriate.

The current application of C5 to Lines 5-7 does not seem to correlate with other line totals which are also based on the same PE values and implies a +/-50% accuracy level. On the basis that Lines 5-7 represent summations of individual site PEs multiplied by a fixed rate, the application of a C3 confidence grade is considered more consistent with Table 17d and Lines 2-4. In particular the application of C5 to Line 5 appears illogical given that it is a near amalgamation of Lines 2 to 4. In our view, confidence grades of C3 are therefore considered more suitable for Lines 2 to 7 on the basis of the source data, the reliance on population equivalents and application of assumed BOD loading rates.

We note that similar data reported in Table 44 Lines 54-63 should also be adjusted accordingly for consistency (specifically change to C3 for Lines 55, 56, 58, 61 and 63).

We discussed our reasoning with NI Water who was reluctant at this stage to modify confidence grades, particularly with their concerns of potential inaccuracies at very large works such as Belfast WwTW. However, with increasing cross checks and confidence in their data, we suggest that the Company considers raising these grades next year when further confidence has been acquired.

Line 2 (PPP): Total Load ttds: This is a combination of two contracts Kinnegar and Omega. Kinnegar records daily 24hr composite samples and has continuous flow recording, this is best practice within 10% and is therefore A3. Omega has weekly sampling and continuous flow recording, because the weekly sampling is extrapolated within a 10% accuracy level B3 is appropriate. Combining the two sources into the line entry an overall B3 grade is appropriate (The previous recommendation to increase the grade to B2 to reflect the good practice is now considered incorrect).

Line 5 (PPP) is applied a confidence grade of C5. This appears to be somewhat contradictory to the confidence grade of B2 reported in Table 17d which is justified on the fact that loads at PPP sites are based on actual flow data and load samples rather than PE values. When challenged, NI Water advised that the C5 is assigned primarily to recognise the fact that the loads are based on that received at the works and the unknowns in what actually enters the system. In our view, the methods and data utilised by NI Water and PPP for this line total are significantly better than those using PE values and the current C5 grade does not differentiate it. We recommend allocation of a B2 grade to be more representative of the quality of data and be more consistent with similar data reported in Table 17d.

Lines 6&7(PPP) Population served: This is a direct calculation from Line 2 using the reporting guidance of 60g/h BOD conversion therefore the CG should mirror Line 2 i.e. B3.

Line 8 (NIW Only): The A2 confidence grade is considered appropriate as although the number is theoretically accurate, a large number of works treat flows from <10PE and can occasionally be re-categorised or removed from the list due to realisation of private ownership or where individuals have installed their own septic tank. A number of small WwTWs may also be under the ownership of the NI Housing Executive or may have become private due to customers installing their own private septic tanks or converting 2 houses into 1.

Line 9 (NIW Only) has historically been assigned D3, a slight reduction on Lines 2-4, primarily to take into consideration that older NI Water facilities treatment capacity are based on industry standard design criteria. More than 2/3 of NI Water STWs treat PE's of less than 100 which are generally septic tanks with no defined design PE.

Line 8 (PPP) Number of works: Definite number, therefore A1 is appropriate as submitted.

Line 9 (PPP) Treatment capacity: This is an actual value from the specification for each works and can be considered as "best method of assessment". There is an argument that the actual capacity has not been proved or physically tested on site but we do not believe this distracts from the method adopted. The accuracy is within 5% hence A2 is appropriate as reported.

Line 14 (NIW & PPP) % unsatisfactory sludge disposal: We are satisfied the processes in place would identify any unsatisfactory disposal and hence a return of 0% can be reported with an A1 confidence grade.

Lines 15, 16 &17 (NIW & PPP) Totals for sludge produced, transferred and disposed of (ttds): These three lines for both NIW and PPP use the same method of assessment and recording to arrive at the data entered into table lines. Each load of liquid sludge and cake is measured or weighed as it enters the disposal facility. The %ds for each load is measured using good sound practice (2 or 3 samples taken as the load discharges). This methodology for determining the total for the year is "best method of assessment" described for an 'A' confidence grade. If there are "minor short comings" then this would drop to a 'B'. In discussions with NIW the point has been raised that the non-homogeneous nature of sludge means spot sampling produces "minor short comings" and hence 'B' CGs are appropriate. We have reconsidered these discussion points and concluded that as all sludge loads are sampled and that this is the best method of assessment and we are not aware of a practicable alternative method that would improve this, an 'A' rating is appropriate for these lines. The % accuracy of the measurement should be good, the spot sampling would introduce a degree of inaccuracy but overall it falls within 5%. This accuracy envelope is borne out by the reconciliation of sludge cake volume between the measurements undertaken by NIW and the PPP contactor which was only 2.5% different. Overall the Reporter's opinion is that an A2 confidence grade should apply to Lines 15, 16 & 17.

8. Consistency checks

The populations and size bandings are consistent with those reported in Tables 17b-d. Cross referencing confirmed consistency of line totals with those in Tables 17b, 17c and 17d.

Table 16 – Sewerage Service Activities (NI Water only)

1. Introduction

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

- Due to timing issues we have not been able to confirm the post audit changes to the split in new sewers between Lines 3 and 8. We are however satisfied with the reasoning for the change and confirm that the overall totals of new sewers (for NI Water's formal post-submission amendment, shown in Section 5.2) are consistent with that audited.
- The number of reported collapses and blockages are improving year on year, but are still very high when compared to E&W water companies. We consider a targeted Sewer Rehabilitation Programme would help to further improve performance.
- The Company is now able to report on the time required to repair a blockage (Lines 13a-13c), and has reported that circa 5% of total blockages in 2013/14, required in excess of 6 hours to repair.
- As the methodology for Lines 12 to 13c is able to differentiate between failures on the main sewer and failures on laterals, we support a confidence grade of B3.
- Consent failures were recorded at 19 WwTWs in year, including one size band 6 site.
- We have not located any material issues with the data reported in Lines 25 to 27.
- We audited the reported data and challenged the processes on a sample basis. Except where detailed below, we consider the data reported in the table is robustly prepared using systems and process that are appropriate and in line with the reporting requirements and that are properly implemented with effective quality control and governance arrangements

2.1 Key recommendations

- We have no recommendations specific to these lines. However in light of the recommendation regarding "Out of Service" designations for water mains, it would appear sensible to extend any review on how this field is used to the sewer lengths database queries as well.

3. Audit approach

The responsibility for the compilation of previous Table 16a is split between numbers of managers who collate information from a number of contributors, 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. The systems and methodologies used to gather data were reviewed.

4. Company methodology

The Company issued the Reporter with a copy of their updated commentary. A copy of the data table was also provided. The methodologies for collection of data into the table remain unchanged from last year and continue to give generally good data with only minor short comings.

4.1 Asset balance (Lines 1 and 2)

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

4.2 Changes during Report Year (Lines 3 to 11)

For Sewerage Infrastructure changes during the report year, the reporting procedure is based on aggregating the data provided to the system holder.

4.3 Sewer collapses and blockages (Lines 12 and 13)

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

- Line 12 (sewer collapses) = [Table 46 Line 32 (rising main failures) + Table 46 Line 33 (gravity sewer collapses)] / [Table 16 Line 14 (length of sewers at end of year)]
- Line 13 (sewer blockages) = [Table 46 Line 36 (sewer blockages)] / [Table 16 Line 14 (length of sewers at end of year)]

4.4 Asset balance at March 31 (Lines 14 and 15)

Lines 14 and 15 are taken directly from the Company's GIS system. The queries used to extract this data are based in the WRc methodology, however for critical sewers, there is a degree of extrapolation and estimation based on the difference between the GIS data available and actual infrastructure. For example Hospitals are shown in the mapping information as a point reference rather than as an overall area. Criticality is determined from manhole to manhole.

There has also been a slight change to the sewer lengths database query. Although largely the same as last year the query has been adjusted to separate out those assets marked as "Out of Service" in the operational field. This has brought the query in line with that used for water mains. We note that this change has not lead to an alteration in the data reported.

4.5 Intermittent discharges (Lines 16a, 16a, 17b and 17b)

The methodology for Lines 16a and 16b remains unchanged from that agreed in AIR11 when a baseline number of UIDs was initially determined. Prior to this data, the Company reported on the number of UIDs classified by NIEA to date. However, following clarification with NEIA, the Company carried out a detailed review of Company GIS systems to estimate the total number of UIDs in the system by applying the percentage of NIEA classified UIDs to the total number of IDs. To improve consistency in reporting, this value has been applied as a baseline value since AIR 11, with values for subsequent years being calculated through adjustment of known improvement works only. The actual list of UIDs is subject to ongoing verification by NI Water and NEIA but the baseline remains fixed. Data is compiled and extracted within a single, controlled spreadsheet.

The methodology for Lines 17a and 17b remains unchanged from last year. Information is based on the total number of sewerage system overflows from wastewater pumping stations and treatment works which were initially compiled from Company GIS systems and now monitored and controlled within a live spreadsheet. Rationalisation exercises are undertaken to identify incorrect entries such as dual manholes and bifurcations. In addition, an independent consultant undertook an exercise to ascertain any additional sewerage system overflows which may exist but for which NI Water has yet to apply for a Water Order Consent. This work was completed in December 2010 but the verification process is still ongoing due to the large amount of data compiled. Information for Lines 17a and 17b is extracted from

the Asset Performance Team Data which is updated throughout the year. Changes to the master spreadsheet are initiated through either a change in consent (via NEIA), a correction to an existing consent (via NI Water Environmental Regulation Team), changes resulting from a project (via EP), or site observations made by NI Water Operations. In addition, changes are only made to the database when signed up to by the business unit which allows robust control of the information. Details of the additions and removals are fully documented in Company commentary.

The Regulator guidance on the preparation of Lines 16a and 17a is not explicit but NI Water has continued their methodology from last year. The information for Line 16a and 17a (historic from AIR11) 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 they would be classified as improvements to works. The total number of overflows at works are however included in Line 17a. 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.

4.6 Drainage area plans (Lines 18 and 22)

For drainage area planning the system holder manages the process of procuring the modelling work that NI Water utilise to undertake their DAPs. The records to demonstrate the data is provided through letters of appointment and the delivery of the consultants reports.

4.7 Sewerage treatment compliance measures (Lines 23, 24, 24a)

Data for Lines 23, 24 and 24a are taken directly from listed consent data and collated for all wastewater treatment works. The data is compiled and queried within a single spreadsheet to enable percentages to be calculated. Consent data is updated at the start of the year and based on those defined by NIEA.

For the purposes of the line total, the total number of WwTW with numeric consent is taken as 231 (excluding the 6 PPP sites) and is an identical list to that defined by NIEA. A site is deemed to have failed its consent if it exceeds the number of allowed fails or it exceeds the upper tier limit value (if specified) in accordance with NIEA definitions. The total number of consent failures is based on records of all samples taken and is recorded and extracted from LIMS. NI Water can exclude exceedances if they can demonstrate to NIEA that, at the time of the exceedance, a works was not under normal operating conditions. A number of samples from works were excluded from the assessment based on extenuating circumstances. On request, NI Water provided summary data of the samples which confirmed the following:

Table 16.1 – Summary of Discounted Samples

Discount	Number of Samples
Weather Conditions	15
Rogue Discharges	16
Other Reasons	5
Total	36

The largest number of discounted samples at a single site was at Larne WwTW where 5 samples were discounted over a period of 3 months due to levels of e-coli in rogue discharges. All discounts were reportedly agreed with NIEA and hence justifiably excluded.

Population equivalents (PE) applied to Lines 24 and 24a are based on those defined in the latest works consent by NIEA and hence differ slightly from those listed by NI Water in other line totals (which are

based on current best estimates). In AIR 14, the PEs are based on those figures agreed with NIEA for use in the 2013 calendar year and set by NIEA on 14th November 2012. The line totals hence include those sites with a consented PE of >250, even if that site has subsequently been reduced to <250 actual PE. Non-resident (tourist) populations are included in line with NIEA reporting and in accordance with the reporting guidelines. Sampling periods for consent compliance are based on calendar year.

4.8 Nominated sewerage service outputs (Lines 25 to 27)

The reporting procedure is based on utilising the PC13 nominated output list and extracting PC13 nominated output scheme data from CPMR which is then analysed to provide the required information. The focus of the data retrieval is to assess those schemes which have recorded beneficial use during the report year.

System data is extracted from the CPMR system and then analysed by the System holder and the associated data assistants. The information extracted from CPMR is maintained and controlled by the capital delivery team. The quality assurance of the extracted data is provided by the NI Water Reporting QA activity.

4.9 Quality assurance

For Lines 16a - 17b, the Company carries out a number of cross checks against source data and with relevant internal departments to check and challenge information included in the database. Evidence of quality control was observed in the master spreadsheets which contain cells to highlight when a works consent condition or status has changed. Further improvements have been undertaken AIR 14 through the addition of unique Site and Asset ID numbers to each data entry to avoid duplication and enable better reconciliation with other data. Changes from year to year are generally clear and auditable.

As we discussed in other sections of our submission, we have suggested improvements to the internal assurance of contractor-reported data, which is not consistently occurring, so that NI Water can ensure sufficient information (evidence) is collected to enable the true nature of each contact to be determined. Although we noted no issues with the data once provided to NI Water by the contractor we consider an internal assurance regime for contractor-reported data is needed.

5. Audit findings

5.1 Asset balance (Lines 1 and 2)

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) and was carried forward correctly.

5.2 Changes during Report Year (Lines 3 to 11)

5.2.1 Date provided by Developer Services

At our audit meeting with Developer services we discussed the methodologies used to produce the data and how the information is controlled. We noted that the 'As built' drawings and manhole detail sheets which are provided by developers are sense check and then if required or if the sense check fails a 10% QA check on all maps processed. For small developments of 5 houses or less a 100% QA check is undertaken. This Developer Services certify the application before it is entered on to the system, although we note that resourcing prevents specific site visits being undertaken.

We undertook a sample check of 5 developer submissions per quarter totalling 20 items across the Report Year. We found no material issues during our audit but did note that version control of the data provided to the system holder would be useful if restatements occur. We also noted 2 of minor data transposition issues which are not considered material.

We note that post-audit the Developer Services data was altered due to a further analysis on the criticality categories applicable to the Developer Services' dataset, impacting on Lines 3 and 8 (new sewers). We have not been able to confirm the post audit changes to the split in new sewers between Lines 3 and 8 at this time. We are however satisfied with the reasoning for the change and confirm that the overall totals of new sewers (for NI Water's formal post-submission amendment, shown below) are consistent with that audited.

The revised data for Lines 3 and 8 are below for reference:

Table 16.2 – Summary of revised data

Line	Description	EP	DS	CSD	**Total(km)**
3	New "critical" sewers	1.17	23.51	0	**24.68**
8	New "non-critical" sewers	8.20	164.02	0	**172.22**
				Total – New Sewers	**196.90**

5.2.2 Date provided by Customer Services Directorate's external contractor

We have not been able to complete a comprehensive audit of the data provided by CSD's external contractor. Although not material to the total changes made to sewerage infrastructure during the report year, it does comprise the majority of Line 5 (83%) and nearly half (46%) of Line 8. We noted no issues with the data once provided to NI Water by the contractor.

5.3 Sewer collapses and blockages (Lines 12 to 13c)

There were 73 collapses per 1000km and 1172 blockages per 1000km reported in 2013/14. Rising main failures account for 1.5% of collapses.

Whilst steadily improving, the above figures are still very high when compared to water companies in England and Wales. As highlighted in our commentary for Table 16 in AIR13, NI Water is now able to separately identify blockages occurring on the public main sewer, public laterals and private laterals, and have been reporting on this basis since April 2013. Additionally, NI Water has developed a method of estimating the length of lateral sewers, using geospatial technology to create logical lateral sewers from properties to the sewer collection system. On the basis of this an extra 2,155km of sewer has been estimated, increasing the total length of sewer to circa 18,000km.

We reviewed the breakdown of blockage and collapse data for 2013/14 and found that 371 of the 18,062 blockages (2%) and 74 of the 1120 collapses (7%) occurred on public laterals. Additionally, a further 668 blockages occurred on private laterals. On the basis of these findings (and even including the additional length of main in the calculation for blockages/collapses per 1000km), we conclude that the inclusion of lateral sewers in the sewer network is not the explanatory factor for the large number of blockages reported year on year, and it suggests that NI Water is an outlier and experiences a significantly higher number of blockages than comparable E&W water companies. Based on our findings in AIR13, we recommended that the Company considers the implementation of a prioritised programme targeting blockage hotspots. In response to this recommendation, we found that the Company has taken a more proactive response to repeat blockages, whereby a dedicated CCTV crew has been assigned to each area to complete CCTV inspections on all blockage hotspots and carry out cleaning, desilting and repairs, where problems are identified. For AIR14, the Company has reported a 17% reduction in blockages, which the Company attributed to this new renewed focus on repeats. Whilst the above appears to be delivering results, we consider implementation of a targeted Sewer Mains Rehabilitation Programme (SMRP) would ensure the replacement of poorly performing sewerage infrastructure and help to further reduce the number of blockages and collapses experienced each year.

In order to report on the time to repair blockages in Table 16 L13a-13c, NI Water now runs a monthly report in Ellipse which confirms the length of time a sewer blockage job took to be completed. We found that the Ellipse system provides details of all work requests raised, relating to blockages.

We undertook a detailed review of the Ellipse blockage data for two of the months in 2013/14 (May and October) and were able to identify a number of follow on / cancelled jobs which accounts for the variance. We also identified a number of other anomalies with the data that required manual adjustment, including;

- A large number of jobs with a negative time entry were apparent, i.e. the job was completed before it was raised. We found that these jobs were raised by the Field Manger in the field and completed before the job was raised on Ellipse. We reviewed a selection of these, which account for circa 5% of the total monthly work requests, and note that they appear to have been completed within 6 hours.
- Conversely, there were also a number of jobs that were raised and then cancelled, but were not closed out in Ellipse, thus recording a large job duration (in excess of 70m hours). These entries also account for circa 5% of the total monthly work requests.

5.4 Asset balance at March 31 (Lines 14 and 15)

Based on the formulae, Lines 14 & 15 should be the summation of data entries from Lines 1 & 2 and Lines 3 to 11. However, NI Water does not follow this approach, instead opting to adjust Lines 14 and 15 to corrected figures obtained from their GIS database. This approach has allowed them to mitigate any legacy data issues and report a more appropriate value for the total lengths reported in Lines 14 and 15. As such, this is considered a reasonable approach.

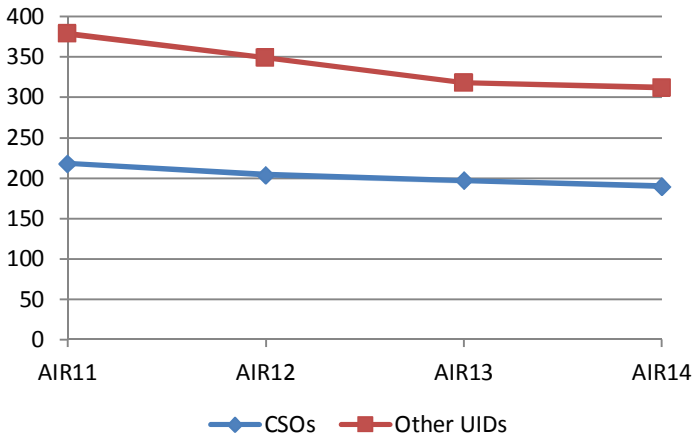
Reconciliation of the asset balance correction is needed as the Company continues to update and improve its GIS database.

The total length of sewers at the end of the reporting period is 15,254.37km, an increase of 1.0% from AIR13. The total length of "critical" sewers is 3,732.98 km at the end of the reporting period which is an increase of less than 0.5%. The proportion of critical sewers has stayed relatively static at 24.2%.

We confirmed the data extracted from the database and located no errors.

5.5 Intermittent discharges (Lines 16a, 16b, 17a and 17b)

The value reported in line 16a is equal to the number of UIDs (excluding CSOs) reported in AIR11, less the number removed from the network through direct improvement works in AIR14. The net change to the totals in Lines 16a and 16b total are correctly calculated from the recorded changes to CSOs (-6) and other UIDs (-7). The relative change in numbers since AIR11 is presented in the chart below, indicating relatively consistent change over the last 4 years, although a marked decline in UID improvements in AIR14.



The Company provide a full breakdown of the changes to Lines 17a and 17b in their commentary including detailed tables in changes. Checks carried out against the master spreadsheet and for wastewater treatment works confirmed the numbers reported and the net result of the changes to the line totals.

There has been no change in the baseline used since last year as NIEA have not classified any additional IDs in this period. Although there has been some further reconciliation of ID numbers in Lines 17a and 17b, this approach appears appropriate.

5.6 Drainage area plans (Lines 18 to 22)

There have been no new drainage area plans completed during the report year and thus the number reported in Line 18 remains the same as the previous year's submission. There has been a significant increase in the number of DAPs in progress and in order to confirm the data provided for this line we reviewed the letters of engagement sent to the consultants that will undertake the work on behalf of NI Water.

We can confirm that Lines 20-22 have been completed accurately and reflect the methodology described in NI Water's commentary for Table 16. Our checks on these lines included confirming the calculations and discussions of the methodology with the system holder.

5.7 Sewerage treatment compliance measures (Lines 23, 24, 24a)

Checks against source data confirmed consistency with the reporting methods and with figures reported by NIEA. In total, 19 WwTWs failed their consent during AIR14, the majority by exceeding the number of allowed fails, although 5 sites failed against the upper tier limit. The 19 listed sites includes one size band 6 site [x] and one size band 5 site [x] accounting for the majority of the non-compliant population. A full summary of the sites and their relative impact is listed below:

Table 16.3 – Breakdown of AIR14 WwTW with consent failures

Works Name	2013 Consented PE	Percentage of Total Population Equiv
[x]	52319	2.95
[x]	14019	0.79
[x]	7513	0.42
[x]	6426	0.36
[x]	4034	0.23
[x]	3167	0.18
[x]	2146	0.12
[x]	1900	0.11
[x]	1193	0.07
[x]	809	0.05
[x]	521	0.03
[x]	517	0.03
[x]	439	0.02
[x]	420	0.02
[x]	408	0.02
[x]	383	0.02
[x]	373	0.02
[x]	285	0.02
[x]	260	0.01

*Upper tier (UT) only failure

Of the above sites, the majority failed on number of allowed fails. It is noted that the largest site, [x], failed on the upper tier limit alone, although it had a number of listed fails within the allowed limit. The total in Line 24a is hence representative of the further exclusion of the two UT-only sites. Checks against relevant LIMS outputs confirmed the above list.

Due to the line definition requiring inclusion of sites with a numeric consent, the calculations exclude [x] WwTW as the site has an urban consent (applying an upper tier limit) but no numeric consent as defined by NIEA. This is a minor anomaly in the data this year, but as the site has now been decommissioned, this issue has effectively been resolved going forward.

We noted that the consented PE of 52,319 reported for [x] is significantly lower than the 84,836 being reported in other tables this year. We also asked if any action was being taken at this site to rectify the apparent problems at the works. NI Water advised that the PE is in line with that agreed with NIEA for 2013 calendar year and that the marked change has occurred due to a flow and load survey undertaken by NI Water during 2013 which identified a significant rise in trade effluent being discharged to the works. The revised PE value has identified the works as being overloaded which is likely to be causing performance issues. NI Water provided the following statement on Dungannon WwTW confirming positive action:

"*Dungannon is an old, conventional, activated sludge plant with primary settlement tanks, aeration tanks and final settlement tanks. As well as the local domestic intake of sewage, the works is also in receipt of a high trade effluent load, the nature of which has changed over the years. In recent years the works performance has declined due to various factors which include poor flow control and a fluctuating biological load which generates "spikes" which are considerably greater than the works was originally designed to cope with. The works is consistently overloaded and the solution is a major upgrade of the existing treatment process at Dungannon WwTW. The upgrade will be completed during the PC15 Capital Works Programme and, as this work has a priority status of No.3, it is expected that construction will be completed by the end of 2016.*"

5.8 Nominated sewerage service outputs (Lines 25 to 27)

5.8.1 Delivery of improvements to nominated UIDs as part of a defined programme of work (Line 25)

The Company is reporting that 11 of the 84 nominated UID improvement schemes have reached beneficial use during 2013-14. At audit NI Water had originally claimed 13 schemes, however via sample checking and discussion with supporting personnel it was established that only 11 were claimable for this reporting year. One of the schemes excluded was UID244 Winters Lane, Omagh, which was delivered prior to the reporting period. The other had not yet been agreed as a substitute scheme with the NIEA.

We note the process of data analysis takes the PC13 UID improvement programme and then utilises CPMR to confirm which schemes have a confirmed beneficial use date within the reporting year.

5.8.2 Delivery of improvements to WwTW through nominated schemes as part of a defined programme of work (Line 26)

We reviewed the evidence presented by NI Water at audit and confirm that of the 38 WwTW improvements nominated at PC13 for the 2-year period. 17 WwTW outputs were correctly claimed. At audit we found there were 13 records were claimable but that some of these contained grouped outputs and thus when outputs were tallied, the resultant figure corresponded to the final table data presented.

We note that 19 outputs have been completed in total, however 2 of those (Forkhill WwTW and Mullaghbane WwTW) were delivered prior to the report year and so have not been included in the line total. We confirmed this data via tracing a sample of schemes back to the CPMR database records.

We located no errors in the reported data.

5.8.3 Small WwTWs delivered as part of the rural wastewater investment programme (Line 27)

The small WwTW data has proved more of a challenge for NI Water to compile as the data is an aggregation of all small WwTW activity, which has made the retrieval of data a longer process. We were unable, therefore to view the records directly on CPMR at audit. NI Water provided us with their build-up spreadsheet for the data post-audit. This data was very thorough and provided similar detail to that provided in CPMR. The data in this spreadsheet is accurately reflected in the data table.

We located no errors in the reported data.

6. Assumptions

For Lines 16a and 16b, the applied number of UIDs estimated at AIR 11 is assumed to be up to date.

For other lines, no material assumptions have been noted. Data is reported based data provided to/held by the system holder.

7. Confidence grades

Lines 3 to 11a

The Company has assigned a C3 grade (5% to 10%) to Lines 3 & 8; a C4 grade (10% to 25%) to Line 4 and a B2 grade (1% to 5%) to Lines 5 to 7 and 9 to 11a. After high level consideration of the data methodology and audit discussions at our three audit meetings, we believe that the assigned confidence grades are appropriate based on the methodology used to produce the data.

Lines 12 and 13

The Company has assigned a confidence grade of B3 to Lines 12 and 13, on the basis the data is derived from checked and paid invoices, and relies on the total length of main (L14 CG B3) in its calculation. On this basis we support a B3 confidence grade.

Lines 14 and 15

The Company has assigned a B3 grade (5% to 10%) to Line 14 and a grade of C3 (5% to 10%) to Line 15. After high level consideration of the data methodology and audit discussions, we believe that the assigned confidence grades are reasonable given the data and methodology in use. In brief, it is difficult to assess the level of accuracy/inaccuracy inherent in the datasets but we believe it is appropriate to retain the grades which relate to NI Water's underlying methodologies. We have however not undertaken any specific statistical analysis to fully verify this.

Lines 16a and 16b

The Company has assigned a confidence grade of C2 to Lines 16a and 16b. This is consistent with last year and is considered appropriate as, whilst the changes are accurate, the generation of the line data is based on a baseline estimate of the number of intermittent discharges as well as those listed by NIEA.

Lines 17a and 17b

Confidence grades for Lines 17a and 17b remain unchanged at B3 which is appropriate given the continuation of ongoing work to improve data and complete the verification of the work carried out by the independent consultant.

Lines 18 to 22

The Company has assigned an A1 grade (0% to 1%) to Lines 18 and 19, an A2 grade (1% to 5%) for Lines 20 to 22 and a B3 grade (5% to 10%) for Line 22. These confidence grades have been derived by NI Water on the basis of the methodology and where other data is used (such as the population data for Line 22) the confidence grade of that data has typically dictated the grade applied to the lines reported. After high level consideration of the data methodology and audit discussions, we believe that the assigned confidence grades are appropriate.

Lines23, 24, 24a

Confidence grades for Lines 23, 24 and 24a are newly assigned this year. The application of A1 to Line 2 is considered appropriate as the numbers used to calculate the percentage are theoretically exact counts with no assumptions. As with other tables involving population equivalents, the Company initially proposed confidence grades of C5 to Lines 24 and 24a to reflect their lack of confidence in the accuracy in population estimates. However, the line is reporting a percentage of total consented PE values, the values of which are agreed with NIEA. From the Company's point of view, these values are essentially fixed (there is no data manipulation or estimation done by NI Water in producing the figures) and hence can be considered 'accurate' values. We therefore recommend a much higher confidence grade of B2 is applied to Lines 24 and 24a. The Company responded positively to this suggestion, but were unable to make changes in time for their submission.

Lines 25 to 27

The Company has assigned an A2 grade (1% to 5%) to Lines 25 to 27. After high level consideration of the data methodology and audit discussions, we believe that the assigned confidence grades are appropriate based on the methodology used which involves a repetitive manual analysis from the CPMR system.

8. Consistency checks

We can confirm that

- Lines 12 and 13 are consistent with Lines 35 and 37 of Table 46 and Line 14 of Table 16.

The numbers of treatment works and numeric consent data are consistent with those reported in Tables 17b. Checks against changes to overflows at WwTW were in line with expectations from known closures and commissioning of works during AIR14. The population equivalents used for categorisation of consents in Lines 23-24a do not match those used in Table 17b as they are based on consented populations defined by NEIA.