United Utilities Water Ltd

Annual Performance Report 2018/19

Additional regulatory information
Commentaries for cost assessment tables 4J-4W
and
Commentary of the bioresources market table

July 2019

Incorporating one November 2019 update to table 4R

United Utilities

helping life flow smoothly

2018/19 Additional regulatory information

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Executive summary

Introduction

This document is designed to support tables 4J to 4W within UUW's 2018/19 Annual Performance Report (APR). Together with commentary on the Bioresources market table, which is published on our website.

Tables 4J to 4W of the APR contains information on the allocation of expenditure to different investment categories. It also contains information on the drivers of expenditure, such as population served or asset capacities. This information and comparable information published by other water companies can be used by Ofwat, or others, to support the development of cost models that can be used within the PR19 process.

This document should be read alongside tables 4J to 4W and the bioresources market table and provides additional detailed information on and issues and assumptions used in developing our reported values together.

Assurance

As the information within the cost assessment tables contains detailed cost breakdown it has inherent data reporting risks. Despite Ofwat and the industry actively working to standardise reporting in these areas, there have been a number of Ofwat queries associated with companies potentially interpreting the reporting rules differently and it is possible that different companies may be allocating costs to different accounting units in different ways or interpreting the guidance on explanatory variables slightly differently.

As a consequence of these risks this data was identified as a targeted area within our 2018/19 regulatory report Final Assurance Plan that is published on our website.

The activities that we have put in place, which have helped to mitigate these risks are:

- We have implemented a major financial system upgrade roll out to improve the accuracy of reporting and definition of our cost reporting and ensure alignment to the new price controls.
- We have implemented a new reporting tool, CostPerform, to ensure that all directly rechargeable costs are allocated to the appropriate segment of the appropriate price control and that effectively weighted allocations of indirect costs can also be applied.
- The tool was audited by UU Corporate Audit, who confirmed that financial data had been completely and accurately transferred from the corporate finance system into CostPerform and then allocated in line with agreed methodologies to produce the service costs feeding into the year-end regulatory accounts.
- New information requirements to support the PR19 cost assessment process have been incorporated into our month six, month nine and yearend regulatory reporting.

As set out in the Final Assurance Plan we have applied a three lines of assurance review and governance approach.

All data has been subject to data owner and senior manager (Level 3) sign-off and independent expert / peer review of supporting information and audit trails;

The regulatory reporting process, including the cost assessment data, was reviewed by UU Corporate Audit. The audit covered the following areas, with no issues being noted:

- The validity consistency of the data reported in Sections 3 and 4 of the Annual Performance Report. This included sample testing to agree data back to underlying UU records and systems;
- Consistency of the commentary with the underlying data within the APR;

- Compliance of the reported data in the APR with key aspects of Regulatory Guideline 3.11 "Guideline for the format and disclosures for the annual performance report";
- Overall governance arrangements in place to ensure the regulatory data is complete and accurate and reported in line with the required timescales;
- Confirmation that assurance activities detailed in UU's published Final Assurance Plan have been completed in line with the plan; and
- Review the proposed Assurance Report (to be published along with the Annual Performance Report 2018/19) to ensure it is a fair reflection of the associated assurance activities and results thereof.

The data within this submission was also added to the scope of the assurance review undertaken by our technical auditor Glen Hawken from Jacobs Limited. Jacobs undertook an agreed upon procedures review and concluded that *"On the basis of our audit work and with exceptions as noted in Appendix 1 we are satisfied that the information within and which supports the RR19 has been assembled using appropriate data and methodologies and provides a reliable representation of Company performance. There is also good evidence of senior management engagement, governance and programme management".*

The results and findings from the review and assurance processes were presented to and discussed with the UUW Board, as part of their review and approval of the Annual Performance Report in June 2019.

The findings of the Jacobs review and the findings of the second line review undertaken by UU Corporate Audit are included within Appendix 1 of our APR, which is published on our website.

Table 4J – Atypical expenditure by business unit – Wholesale water

Wholesale water expenditure overview

As we set out in the commentary to our 2018 submission, total expenditure levels in the first three years of AMP6 was above the values assumed within the PR14 final determination. The key reason for the relative increase in expenditure over the first three years, is because we have chosen to accelerate our expenditure programme to enable us to target a better service level for customers, improve performance against our outcomes and to help to secure future efficiency savings.

During 2018/19, we incurred or committed to approximately £80m to manage the impacts of the hot and dry summer and to ensure that we did not need to implement a temporary use ban. We have also committed to investing an additional £100m to provide a flying start towards the tougher performance requirements that are likely to be set for a number of our AMP7 performance commitments. Despite these two changes we still expect to outperform the allowed wholesale totex by c£100m, on a like for like and outturn basis.

Since the final determination was published Ofwat have provided revised guidance (RAG 2.07) on cost allocation principles. This sets out that capital expenditures and associated depreciation of assets should be reported in the service of principal use of that asset with recharges made to the other services that use the asset.

Block A – Operating expenditure

Line 4J.1 – Power

Power costs increase due to inflation and asset growth, with reductions due to efficiencies to reduce gross consumption and targeted lower cost time of usage. Costs in the year increased relative to FY18 due to the impacts of the dry summer.

Line 4J.2 – Income generated as negative expenditure

No commentary

Line 4J.3 – Abstraction charges/discharge consents

UUW is charged for each abstraction licence based on the annual volume. There's a Standard Unit Charge (SUC) and an Environmental Improvement Unit Charge (EIUC) for each licence. This is allocated 100% against Water Resources. Charges have increased slightly but are broadly consistent with previous years.

Line 4J.4 – Bulk supply

Bulk supply costs are relatively small.

Line 4J.5 – Renewals expensed in year (infrastructure)

There was an increased level of activity in the water network in the first three years of the period to secure AMP6 outcome delivery incentive (ODI) performance requirements and to implement a number of large reservoir schemes. Spend in 2018/19 reduced to more typical levels, with the exception of the atypical costs incurred in managing the dry weather.

Line 4J.6 – Renewals expensed in year (non-infrastructure)

We have not included any expenditure within this line.

Line 4J.7 – Other operating expenditure excluding renewals

The values reported in line 4J.7 are comparable with previous years.

Line 4J.8 – Local authority and Cumulo rates

Rates are currently assessed on a cumulo basis and are not asset specific, in line with the RAGs we split Water cumulo rates by GMEAV and therefore movements will occur as GMEAV moves over time without any real cost fluctuations in overall cumulo rates costs. There is a slight increase in FY19 primarily as a result of a refund received in FY18.

Line 4J.9 – Total operating expenditure excluding third party services

This is a sum of lines 1-8, for an explanation of variance see the individual line commentary above.

Line 4J.10 – Third party services

The costs allocated to this line are relatively low.

Line 4J.11 – Total operating expenditure

This is a sum of lines 1-8, 10 for an explanation of variance see the individual line commentary above.

Block B – Capital expenditure (exc. atypicals)

To develop the capex values reported within this table we have, presented expenditure on a principle use[1] basis in accordance with RAG 4.08 and ensured that the capex costs are fully consistent with the capex costs reported in other tables within our 2018/19 APR and Regulatory Accounts.

Line 4J.12 – Maintaining the long term capability of the assets - infra

IRE is reported within Section A - Operating Expenditure line 4J.5.

Line 4J.13 – Maintaining the long term capability of the assets - non-infra

Spend in the first four years of the AMP is relatively high compared to historic precedent due to acceleration of the maintenance programmes to respond to the challenges of our AMP6 ODIs together with the impact of the reinvestment incurred in providing additional resilience to some of our key assets and processes. The costs reported have been developed on a principle use basis.

Line 4J.14 – Other capital expenditure - infra

Expenditure in this area is relatively high due to substantial expenditure on the "West Cumbria Future Strategy project" which is a major project to construct a pipeline and new water treatment facilities to provide additional water supplies from Thirlmere reservoir to the West Cumbria area.

Line 4J.15 – Other capital expenditure – non-infra

Non infrastructure enhancement has remained high as a number of high profile and high cost projects progress, particularly the Thirlmere West Cumbria future strategy.

[1] **Principle use** - Since the final determination was published Ofwat have provided revised guidance (RAG 2.06) on cost allocation principles. This sets out that capital expenditures and associated depreciation of assets should be reported in the service of principal use of that asset with recharges made to the other services that use the asset.

Line 4J.16 – Infrastructure network reinforcement

During the year we have implemented a number of new systems and processes to more effectively capture expenditure incurred on network reinforcement. The level of this cost in 2018/19 is higher than was reported in 2017/18 but is broadly in line with historic precedent and future expectations.

Line 4J.17 – Total gross capital expenditure excluding third party services

This is a sum of lines 12-15, for an explanation of variance see the individual line commentary above.

Line 4J.18 – Third party services

We have no capital expenditure included as third party services.

Line 4J.19 – Total gross capital expenditure

This is a sum of lines 12-15 and 18 for an explanation of variance see the individual line commentary above.

Line 4J.20 – Grants and contributions (price control)

We have populated this line to be consistent with APR Table 4D.

Line 4J.21 – Totex

This is a sum of lines 1-15, 18, 20 for an explanation of variance see the individual line commentary above.

Block C – Cash expenditure (exc. atypicals)

Line 4J.22 – Pension deficit recovery payments

Pension deficit recover costs vary significantly across different years.

Line 4J.23 – Other cash items

We have no costs included in other cash items.

Line 4J.24 – Totex including cash items

This is a sum of lines 21 to 23, for an explanation of variance see the individual line commentary above.

Block D – Atypical expenditure

Line 4J.25 Dry weather event (opex)

Line 4J.26 Dry weather event (IRE)

Line 4J.27 Dry weather event (Capex)

Expenditure in lines 4J.25-4J.27 is associated with the cost that we incurred in dealing with the impact of the extended hot and dry period that affected the North West during the summer of 2018. Work and expenditure reported in prior years for storm damage (associated with storm Desmond) have been completed.

Line 4J.28 GMP pension charge (opex)

The expenditure relates to the water service proportion of a £5.2m guaranteed minimum pensions equalisation charge which was incurred during the year.

Block E – Total expenditure

Line 4J.31 – Total expenditure

This is the sum of lines above, for an explanation of variance see the individual line commentary.

Table 4K – Atypical expenditure by business unit - Wholesale wastewater

Wholesale wastewater expenditure overview

As we set out in the commentary to our 2018 submission, total expenditure levels in the first three years of AMP6 was above the values assumed within the PR14 final determination. The key reason for the relative increase in expenditure over the first three years, is because we have chosen to accelerate our expenditure programme to enable us to target a better service level for customers, improve performance against our outcomes and to help to secure future efficiency savings.

During 2018/19, we incurred or committed to approximately £80m to manage the impacts of the hot and dry summer and to ensure that we did not need to implement a temporary use ban. We have also committed to investing an additional £100m to provide a flying start towards the tougher performance requirements that are likely to be set for a number of our AMP7 performance commitments. Despite these two changes we still expect to outperform the allowed wholesale totex by c£100m, on a like for like and outturn basis.

Since the final determination was published Ofwat have provided revised guidance (RAG 2.07) on cost allocation principles. This sets out that capital expenditures and associated depreciation of assets should be reported in the service of principal use of that asset with recharges made to the other services that use the asset.

Block A – Operating expenditure

Line 4K.1 – Power

Our power expenditure rises due to inflation and asset growth off set by efficiencies to reduce gross consumption and targeted lower cost time of usage.

Line 4K.2 – Income generated as negative expenditure

This line contains the ROC income from CHP generation and gas to grid at our wastewater treatment works.

Line 4K.3 – Discharge consents

Charges have grown this year due to an increase in the discharge licence fees from the Environment Agency.

Line 4K.4 – Bulk discharge

We have no bulk supply or bulk discharge costs.

Line 4K.5 – Other operating expenditure - Renewals expensed in year (Infrastructure)

There has been an increased level of activity and expenditure in the wastewater network to secure AMP6 outcome delivery incentive performance requirements. Expenditure levels increased in FY19 mainly due to the maintenance impact of a number of major infrastructure enhancement projects.

Line 4K.6 – Other operating expenditure - Renewals expensed in year (Non-Infrastructure)

We have not included any expenditure within this line.

Line 4K.7 – Other operating expenditure excluding renewals

Although the number reported is similar to last year it includes a small commercial settlement relating to a historic claim.

Line 4K.8 – Local authority rates and Cumulo

The underlying value of rates that we pay to local authorities continues to grow a little in line with the investments that we make to our wastewater asset base. Reported values in each year fluctuate predominantly due to the impact of price increases, accruals as well as adjustments for refunds and back charges. We received a rates rebate this financial year.

Line 4K.9 – Total operating expenditure (excluding third party services)

This is a calculated line.

Line 4K.10 – Third party services

We recover costs from third parties that damaged our assets, when we are able to trace and bill that party. Charges are designed to recover the costs of the repair only.

Line 4K.11 – Total operating expenditure

This is a calculated line.

Block B – Capital expenditure (exc. atypicals)

To develop the capex values reported within this table we have, presented expenditure on a principle use[2] basis in accordance with RAG 4.08 and ensured that the capex costs align with the capex costs reported in other tables within our 2017/18 APR and Regulatory Accounts.

Line 4K.12 – Maintaining the long-term capability of the assets - infra

IRE is reported within Section A - Operating Expenditure line 4J.5.

Line 4K.13 – Maintaining the long-term capability of the assets - non-infra

Spend in the first three years of the AMP is relatively high compared to historic precedent due to the acceleration of the maintenance programmes to respond to the challenges of our AMP6 ODIs, the impact of the reinvestment incurred in providing additional resilience to some of our key assets and processes and the maintenance expenditure associated with major enhancement projects at Davyhulme WwTW and Oldham WwTW. Spend reduced in 2018/19 reflecting the completion of a number of major schemes. The costs reported for the AMP6 period for this line have been developed on a principle use basis. This has had the net effect of moving expenditure from the water to wastewater service.

Line 4K.14 – Other capital expenditure – infra

Expenditure levels are heavily dependent upon the nature and scale of the enhancement programmes, expenditure levels.

Line 4K.15 – Other capital expenditure – non-infra

Expenditure levels reported against this line are also dependent upon the nature and scale of the enhancement programmes.

Line 4K.16 – Infrastructure network reinforcement

During the year we have implemented a number of new systems and processes to more effectively capture expenditure incurred on network reinforcement. The level of this cost in 2018/19 is higher than was reported in 2017/18 but is broadly in line with historic precedent and future expectations.

[2] **Principle use** - Since the final determination was published Ofwat have provided revised guidance (RAG 2.06) on cost allocation principles. This sets out that capital expenditures and associated depreciation of assets should be reported in the service of principal use of that asset with recharges made to the other services that use the asset.

Line 4K.17 – Total gross capital expenditure excluding third party services

This is a calculated line.

Line 4K.18 – Third party services

We have no capital expenditure included as third party services.

Line 4K.19 – Total gross capital expenditure

This is a calculated line.

Line 4K.20 – Grants and contributions

We have populated this line to be consistent with APR Table 4E.

Line 4K.21 – Totex (calculated line)

This is a calculated line.

Block C – Cash expenditure

Line 4K.22 – Pension deficit recovery payments

Pension deficit recovery costs vary significantly across different years.

Line 4K.23 – Other cash items

We have no costs in other cash items.

Line 4K.24 – Totex including cash items (calculated line)

This is a calculated line.

Block D – Atypical expenditure

Line 4K.25 GMP pension charge

The expenditure relates to the wastewater service proportion of a £5.2m guaranteed minimum pensions equalisation charge which was incurred during the year.

Block E – Total expenditure

Line 4K.31 – Total expenditure

This is a calculated line.

Table 4L – Enhancement expenditure by purpose – Wholesale water

Wholesale water enhancement expenditure overview

Every project in our capital expenditure programme is recorded on our corporate SAP system. Each project is proportionally allocated to purpose category drivers reflecting the percentage split of investment between purpose category drivers. For example if an enhancement project also has a maintenance element this will have at least two investment category mappings (enhancement and maintenance).

The investment category which is the principal driver for the project is assigned as the "prime" driver for the project (this is usually, but not always, the category with the highest proportion of the total spend).

In completing this table, we have adopted a three-stage process, which is in accordance with our previous August submissions: -

1. Expenditure has been allocated on a proportional basis by "capital expenditure" purpose category to identify the total enhancement expenditure associated with each project
2. Any supply demand enhancement is allocated to a supply demand line (line 4L.20 or 4L.21)
3. Any quality enhancement expenditure has been allocated on a prime quality driver basis (i.e. all enhancement expenditure has been allocated to a single driver even where that project addresses multiple enhancement drivers).

A summary of the expenditure within each line of this table is set out below, with the project level allocation to the key programmes set out below the line-by-line commentary.

Block A – Enhancement expenditure by purpose – Wholesale water

Line 4L.1 – NEP - Making ecological improvements at abstractions (habitats directive, SSSi, BAPs)

This line has been populated with capital expenditure linked to programmes that are driven by statutory obligations agreed with the Environment Agency and included in the National Environment Programme. The annual variances in expenditure are due to the different programmes of work ramping up during the AMP6 period. There are four key legislative drivers in AMP6: -

- Safeguard zones
- Water Framework Directive
- Eels and Elvers regulations
- Habitats Directive

Expenditure in the earlier part of AMP6 is driven by investigations and preparatory work with expenditure levels increasing in the later years of the AMP when the majority of the programme is fully mobilised.

Line 4L.2 – NEP – Eels Regulations (measures at intakes)

There is no expenditure associated with Eels regulations.

Line 4L.3 – NEP – Invasive Non Native Species

There is no expenditure associated with invasive non-native species.

Line 4L.4 – Addressing low pressure

There is no expenditure associated with low pressure.

Line 4.L5 – Improving taste/odour/colour

The expenditure allocated to this line is primarily focussed on mains and large diameter trunk main (LDTM) cleaning to reduce customer contacts for discolouration. During 2018/19 spend levels increased due to a scheme on the Vyrnwy aqueduct and other LDTM sliplining and cleaning activity.

Line 4.L6 – Meeting lead standards

We have a small amount of investment in this area which focuses on continuing to optimise our phosphate dosing, education campaigns, addressing the lead risk in public buildings and trials such as lining of lead pipes through to the customer tap.

Line 4L.7 – Supply side enhancements to the supply/demand balance (dry year critical/peak conditions)
Line 4L.8 – Supply side enhancements to the supply/demand balance (dry year annual average conditions)
Line 4L.9 – Demand side enhancements to the supply/demand balance (dry year critical/peak conditions)
Line 4L.10 – Demand side enhancements to the supply/demand balance (dry year annual average conditions)

In line with the approach taken in our PR14 business plan, we have reported all supply demand expenditure in these lines, including our work to resolve the forecast critical period and dry year supply demand deficit in West Cumbria, completion of our multi-AMP Southport strategy and network enhancements to supply major new developments in the region.

There are no new demand side measures or supply side measures for the AMP6 period. However, work is ongoing to maintain the current enhanced levels of water efficiency and leakage activities and as part of the interim measures in West Cumbria, we have committed to reduce leakage as far as possible within the West Cumbria resource zone to reduce abstraction from Ennerdale Water. Work continues to progress the Thirlmere Transfer scheme to provide alternative supplies for West Cumbria in 2022.

We have delivered a suite of interim measures in the West Cumbria resource zone to reduce abstraction from Ennerdale Water as much as possible. This is an environmental driver and so some of the measures (e.g. Summergrove scheme and South Egremont boreholes at enhanced capacities, potentially up to 14 Ml/d in future) do not result in a supply or demand side benefit. We consider that the Ml/d unit reported on lines 20 to 23 of table 4Q, does not reflect work that is currently underway to claim supply-demand benefits in future years or future AMPs.

From 2017/18 onwards West Cumbria Future Strategy is accounted for under 4L.9 with only minor supply side expenditure being allocated to line 4L.7. No expenditure has been allocated to lines 8 and 10.

Line 4L.11 – New developments

Our expenditure reflects the length of new mains reported within the properties table. We have invested more against this line in FY18 than was forecast at PR14. This reflects the higher than anticipated activity levels.

Line 4L.12 – New connection element of new development (CPs, meters)

Capital investment in this area varies to reflect changes in the pace of development.

Line 4L.13 – Investment to address raw water deterioration (THM, nitrates, Crypto, pesticides, others)

This line includes expenditure for projects at treatment works for pesticides, nickel, taste and odour, manganese removal and concessionary supplies. The spend profile is now reducing as projects complete. The following projects have DWI support and are the main investment included in this line: -

- Oswestry WTW (Regulation 28 Notice for pesticides)
- Wayoh WTW (Regulation 28 Notice for pesticides)

Line 4L.14 – Resilience

Although we are undertaking a significant amount of work to improve the resilience of our asset base this is usually being undertaken as part of projects with other cost drivers and as such only a relatively low amount of expenditure is directly allocated to this line.

Line 4L.15 – SEMD

This line includes expenditure required to comply with security enhancement obligations under the Security and Emergency Measures Direction (SEMD).

Line 4L.16 – NEP – Drinking Water protected Areas (schemes)

We have incurred no expenditure associated with drinking water protected areas this year.

Line 4L.17 – NEP – Water framework directive measure

This line includes expenditure required to comply with the water framework directive.

Line 4L.18 – NEP – Investigations

We have incurred no expenditure associated with NEP investigations.

Line 4L.19 – Improvements to river flows

We have incurred no expenditure associated with river improvements this year.

Line 4L.20 - Metering (excluding cost of providing metering to new service connections) for meters requested by optants

Uptake levels and associated expenditure for meter optants is below that assumed at PR14. This is because the PR14 target was based on predictions in customer behaviour using the UKWIR econometric opting model, which have not materialised. The level of customer demand for free water meters, although varying year on year is at much lower levels than forecasted at PR14.

Line 4L.21 – Metering - Metering (excluding cost of providing metering to new service connections) meters introduced by companies

We have not included any capital expenditure against this line.

Line 4L.22 – Metering - Metering (excluding cost of providing metering to new service connections) other

We have not included any capital expenditure against this line.

Additional lines

Line 4L.23 – Concessionary supplies

This lines includes expenditure on concessionary supplies.

Line 4L.24 – Dry Weather

This lines includes enhancement expenditure associated with the extreme dry weather in the summer of 2018.

Lines 4L.25 – 32 Other capital expenditure purpose

We have not included any capital expenditure against these lines.

Line 4L.33 – Total enhancement capital expenditure

This line is a sum of the lines above see above line commentaries for more information.

Table 4M – Enhancement expenditure by purpose - Wastewater

Every project in our capital expenditure programme is recorded on our corporate SAP system. Each project is proportionally allocated to purpose category drivers reflecting the percentage split of investment between purpose category drivers. For example if an enhancement project also has a maintenance element this will have at least two investment category mappings (enhancement and maintenance).

The investment category which is the principal driver for the project is assigned as the "prime" driver for the project (this is usually, but not always, the category with the highest proportion of the total spend).

In completing this table, we have adopted a three-stage process, which is in accordance with our previous August submissions: -

1. Expenditure has been allocated on a proportional basis by "capital expenditure" purpose category to identify the total enhancement expenditure associated with each project
2. Any supply demand enhancement is allocated to a supply demand line (line 4M.24 + 4M.25)
3. Any quality enhancement expenditure has been allocated on a prime quality driver basis (i.e. all enhancement expenditure has been allocated to a single driver even where that project addresses multiple enhancement drivers).

A summary of the expenditure within each line of this table is set out below, with the project level allocation to the key programmes set out below the line-by-line commentary.

Block A – Enhancement capital expenditure by purpose

Line 4M.1 – First time sewerage

We have reported a small amount of spend this year against this line. We have completed one scheme at Lenchfold, Rossendale, which connected a small number of properties to the wastewater network. This is reflected in Table 4R lines 1 and 2.

Line 4M.2 – Sludge enhancement (quality)

The significant expenditure reported in previous years has now reduced due to the completion of projects at Leigh and Burnley.

Line 4M.3 – Sludge enhancement (growth)

We have reported no sludge enhancement against growth.

Line 4M.4 – NEP – Conservation drivers

We have reported no conservation driver expenditure.

Line 4M.5 – NEP – Eels regulations (measures at outfalls)

We have reported no Eels regulations expenditure.

Line 4M.6 – NEP – Event Duration Monitoring (EDM) at intermittent discharges

In AMP6 we have a significant programme of EDM projects, which will see over 2,000 monitors installed on our assets. Due to the large number and small size of the projects we report the same value in the in-year and cumulative tables.

Line 4M.7 – NEP – Flow monitoring at sewage treatment works

We have reported no expenditure in this line.

Line 4M.8 – NEP – Monitoring of pass forward flows at CSOs

We have a programme of CSO monitoring. Due to the small size of the projects we report the same value in the in-year and cumulative tables.

Line 4M.9 – Schemes to increase flow to full treatment

We have reported no expenditure in this line.

Line 4M.10 – Schemes to increase storm tank capacity

We have a major programme of works reported in this line, with the schemes at Anchorsholme (1,500m3), and Preston WwTW (40,300m3) completing in the years, as reported in Table 4U Line 22.

Line 4M.11 – NEP – Storage schemes to reduce spill frequency at CSO's, storm tanks, etc.

This has been and remains a major investment driver for AMP6 with large numbers of schemes being implemented. This line does not include for projects that will reduce spill frequencies at CSOs, storm tanks etc. as a result of extensions to long sea outfalls or increased FTFT.

Line 4M.12 – NEP – Chemical removal pilot/ investigations / options appraisal

This is generally a low-level cost driver with work being undertaken on the chemical investigation Programme (CIP).

Line 4M.13 – NEP – National phosphorus removal technology appraisal

We do not have any projects with this driver.

Line 4M.14 – NEP – Groundwater schemes

We do not have any projects that have a prime groundwater driver.

Line 4M.15 – NEP - Investigations

This is relatively low costs driver, with expenditure being driven by the specific programmes of work within the Chemicals investigation programme.

Line 4M.16 – NEP – Nutrients (N removal)

We do not have any projects that have a prime nitrogen removal driver.

Line 4M.17 – NEP – Nutrients (P removal at activated sludge STW's)

This has been and remains a major investment driver for us. This year the projects at Northwich, Irlam, Ambleside and Windermere were completed. The scale of P removal has a major impact on the cost in delivering and subsequently operating the projects.

Line 4M.18 – NEP – Nutrients (P removal at filter bed STW's)

This has been and remains a major investment driver for us. This year the projects at Nantwich, Garstang, Outgate and Barton were completed. The scale of P removal has a major impact on the cost in delivering and subsequently operating the projects.

Line 4M.19 – NEP – Reduction in sanitary parameters

This is a substantial investment driver including "no deterioration" projects. This year the schemes at Crewe, Horwich, Colne, Failsworth and Kendall were completed.

Line 4M.20 – NEP – UV disinfection (or similar)

We made significant investment in this area during AMP5, with work in the year at Kendall WwTW.

Line 4M.21 – NEP – Discharge relocation

Expenditure has varied reflecting the delivery of the programme, which is predominantly completed.

Line 4M.22 – NEP – Flow 1 schemes

We do not have any projects that have a prime Flow 1 driver.

Line 4M.23 – Odour

Although we continue to invest in odour control assets as part of new enhancement schemes or via maintenance of existing equipment, the level of expenditure on specific odour control schemes has reduced over time as issues have been addressed.

Line 4M.24 – New development and growth

Capital investment in new development and growth in sewerage services varying to reflect changes in the pace and location of development. We have invested more against this line in FY19 than was forecast at PR14. This reflects the higher than anticipated activity levels.

Line 4M.25 – Growth at sewage treatment works (excluding sludge treatment)

Expenditure in recent years has been substantial mainly due to specific enhancement work being required at some major works for example at Davyhulme WwTW. This year the projects at Dearham WwTW, Silloth WwTW, Winsford WwTW, Endmoor WwTW, Bootle WwTW, Barton WwTW, Sandbach WwTW, Cuddington and Oakmere have been completed.

Line 4M.26 – Resilience

Although we invest in providing increased resilience to our asset base, this investment typically forms part of other enhancement schemes, with assets being constructed to meet increased resilience expectations or through maintenance programmes where existing assets are replaced with new and more resilient assets. As such we have not delivered any enhancement projects whose prime driver is resilience.

Line 4M.27 – SEMD

This has generally been a relatively low level cost driver in the wastewater service, with no expenditure in FY19.

Line 4M.28 – Reduced risk of flooding for property

In AMP6 the focus of the flooding programme has moved to addressing incidents caused by flooding other causes events, mainly through targeted maintenance activity, rather than through specific projects to reduce the risk of hydraulic sewer flooding.

Line 4M.29 – Transferred private sewers and pumping stations

Due to the large number and small size of the projects we report the same value in the in-year and cumulative tables.

Additional lines

We have added three lines to the table, which have been significant AMP6 costs drivers.

Line 4M.30 – NEP phase 5 WFD schemes - treatment, increased storage or investigations

This line covers expenditure on WFD schemes, which are now completed and only minimal spend has been recorded against this line in 2018/19.

Line 4M.31 – NEP phase 5 WFD schemes – treatment, increased storage or investigations

This has been and remains a major investment driver for us. This year we completed the schemes at Morecambe, Rabycote, Chorley, Blackburn, Darwen and Anchorsholme (including the work at Manchester Square and Chatsworth Avenue pumping stations).

Line 4M.32 WINEP / NEP chemical removal schemes

Although spend was recorded against thisline in previous year no spend was allocated to the line during 2018/19.

Line 4M.45 – Total enhancement capital expenditure

This is a calculated line.

Table 4N – Sewage treatment functional expenditure

The number of large works has remains at 64.

Lines 4N.1 – 4N.5 – Direct costs of STW size bands 1 – 5 and General and support costs of STWs in size bands 1 – 5 and Functional expenditure of STWs in size bands 1 – 5

For size band one – five we have allocated the expenditure based on manpower.

Line 4N.6 General & support costs of STWs in size bands 1 to 5

Following clarification in RAG 4.08 costs for scientific services, other business activities and exception items have been included in this line to meet the requirements of functional expenditure.

Line 4N.7 Functional expenditure of STWs in size bands 1 to 5

This is a calculated line.

Line 4N.8 – Service charges for STWs in size band 6

Charges have grown this year due to an increase in the discharge licence fees following the charges reform by the Environment Agency.

Line 4N.9 – Estimated terminal pumping station costs size band 6 works

These are estimated costs, based on power and a proportional allocation of maintenance costs.

Line 4N.10 – Other direct costs of STWs in in size band 6

This line includes power, income treated as negative expenditure, employment costs, hired and contracted services, materials and consumables and other direct costs.

Line 4N.11 – Direct costs of STWs in size band 6

This is a calculated line.

Line 4N.12 – General and support costs of STWs in size band 6

Following clarification in RAG 4.08 costs for scientific services, other business activities and exception items have been included in this line to meet the requirements of functional expenditure.

Line 4N.13 – Functional expenditure of STWs in size band 6

This is a calculated line.

Line 4N.14 – Total operating expenditure (excluding third party services)

This is a calculated line.

Table 4O – Large sewage treatment works – Wholesale wastewater

The number of large works has remained at 64 this financial year.

Block A – Sewage treatment works explanatory variables

Line 4O.1 – Works name

This is standard information linking the works to the EA consent. Meols WwTW appears both as Meols WwTW (North Wirral) and North Wirral (Meols) therefore data has only been entered for one of these works.

Line 4O.2 – Classification of treatment works

For this data to be used for comparative purposes the Ofwat WwTW classifications need to be applied consistently across all companies. Without consistency data cannot be meaningfully compared.

The table below highlights the changes in treatment classification this financial year and the reason for the change.

WwTW name	Reason for change
Congleton	Has a phosphate consent, the classification has been changed to reflect this; the works is now TB2

Line 4O.3 – Population equivalent of total load received

In order for this to be used for comparative purposes assurance would be required that every company is calculating PE in a consistent manner.

The table below highlights the significant changes in population equivalent of total load received (>5% change).

WwTW name	Reason for change
Burnley	Small increase in domestic population, with a significant reduction in trade effluent loads
Colne	Significant reduction in trade effluent
Congleton	Significant increase in trade effluent coupled with a small increase in domestic population
Eccles	Redistribution of Greater Manchester non-resident population
Glossop	Significant reduction in trade effluent
Salford	Redistribution of Greater Manchester non-resident population
Tyldesley	Significant reduction in trade effluent
Walton Le Dale	Significant increase in trade effluent
Westhougton	Small increase in domestic population, with a significant increase in trade effluent loads

Line 4O.4 – 4O.7 Suspended solids consent, BOD_5 consent, Ammonia consent and Phosphorus consent

This is standard information linking the works to the Environment Agency consent and needs to be considered in conjunction with operating costs. An understanding of the removal rates that need to be achieved to meet a consent is required if a true comparison between WwTW performance and operating costs are to be made.

The table below highlights the significant changes in consents made this financial year.

WwTW name	Reason for change
Blackburn	New phosphate consent of 1mg/l
Carlisle	Has a reduced phosphate consent of 2mg/l
Crewe	Has a new consent of 2mg/l
Darwen	Has a new consent of 2mg/l

Line 4O.8 – UV consent

This is standard information linking the works to the EA consent and needs to be identified in conjunction with operating costs. We have a significant number of smaller WwTW, which have a UV consent, these are not currently considered in any of these tables. Throughout AMP6 we will see the introduction of an even greater number of inland works with a UV consent across all size bands.

The table below highlights the changes made to UV consents this year.

WwTW name	Reason for change
Skelmersdale	For the first time this year we have included a limit in for Skelmersdale WwTW. This WwTW shares a UV facility with Wigan WwTW located within the curtilage of Wigan WwTW. We had considered this to be a different facility in previous submissions. However, as a result of our checks against methodology and definitions we believe that this consent should be recorded against both WwTW facilities not just where it is physically located.

Line 4O.9 – Load received by STW

This is a calculated line. See population equivalent line for additional details of changes.

Line 4.O10 – Flow passed to full treatment

This is standard information linking the works to the EA consent and needs to be considered in conjunction with operating costs. During the last financial year we experienced a prolonged period of extremely dry weather in the North West of England. As a result we record lower overall flows at the vast majority of our WwTW due to the lower volumes of surface water and highway drainage received in to our network. Works in more urbanised areas are more susceptible to the reduction given the nature of the catchment.

The significant (>10%) changes in flow when compared to the previous years' data are noted in the table below;

WwTW name	Reason for change
Barrow in Furness	Weather related reduction in flow.
Birkenhead	The meter at Birkenhead was found to be faulty and needed to be replaced (this has been completed). We believe that the flow that was recorded was too high. We have removed the erroneous data and included the revised figure of 56,578 instead. We believe that this is more representative.
Blackburn	Weather related reduction in flow.
Carlisle	Weather related reduction in flow.

WwTW name	Reason for change
Congleton	Issues reported last year in recording data have now been resolved, therefore we have seen a relative increase in flows this FY.
Davyhulme	Flow measurements issues reported last year have been resolved. Therefore this years' data is more reliable but have been impacted by dry weather conditions.
Glossop	Weather related reduction in flow.
Hazel Grove	Issued identified with flow recorder. The works is in the process of being re-certified. Once complete data accuracy should be improved.
Hyndburn	Issues identified with flow recorder, which have now been resolved, but required some intervention in year. This has impacted on data quality.
Morecambe	Weather related reduction in flow.
Oldham	New flow meters have been installed as part of the capital project. However, these are still being commissioned as data is not consistent, which has impacted on data quality.
Rochdale	Weather related reduction in flow.
Runcorn	Issues identified with flow recorder, which have now been resolved, but required some intervention in year. This has impacted on data quality.
Salford	Weather related reduction in flow.
St Helens	Flow measurements issues reported last year have been resolved. Therefore this years' data is more reliable but have been impacted by dry weather conditions.
Stockport	Weather related reduction in flow.
Walton Le Dale	Weather related reduction in flow.
Warrington North	Improvements made to flow measurement on site have improved this years' data quality.
Warrington South	Issues identified with flow recorder, which have now been resolved, but required some intervention in year. This has impacted on data quality.
West Houghton	Communications issue caused external problem with network infrastructure, which have now been resolved, but required some intervention in year. This has impacted on data quality.
Widnes	Weather related reduction in flow.
Wigan	Issues identified with flow recorder, which have now been resolved, but required some intervention in year. This has impacted on data quality.
Winsford	Weather related reduction in flow.

Block B – Operating expenditure

Line 4O.11 – Service charges

Charges have grown this year due to an increase in the discharge licence fees following the charges reform by the Environment Agency.

Line 4O.12 – Estimated terminal pumping expenditure

These are estimated costs, based on power and a proportional allocation of maintenance costs.

Line 4O.13 – Other direct expenditure

This line includes power, income treated as negative expenditure, employment costs, hired and contracted services, materials and consumables and other direct costs.

Line 4O.14 – Total direct expenditure

This is a calculated line.

Line 4O.15 – General and support expenditure

Operating costs vary year on year and can be influenced by many factors please refer to table 4K for further comments. Following clarification in RAG 4.08 costs for scientific services, other business activities and exception items have been included in this line to meet the requirements of functional expenditure.

Line 4O.16 – Functional expenditure

This is a calculated line.

Table 4P – Non-financial data for WR, WT, WD – Wholesale water

Block A – Water Resources

Line 4P.1 – Proportion of distribution input derived from impounding reservoirs

The proportion of distribution input varies from year to year depending on weather, demand and asset outages. This year production from WTWs supplied by impounding reservoirs decreased, predominantly Oswestry WTW due to a major capital project. To maintain supplies during the dry weather period in summer 2018 we reduced distribution input from impounding reservoirs.

Line 4P.2 – Proportion of distribution input derived from pumped storage reservoirs

We have not currently classed any of our reservoirs as pumped storage reservoirs therefore the number is zero.

Line 4P.3 – Proportion of distribution input derived from river abstractions and

Line 4P.4 – Proportion of distribution input derived from boreholes, excluding managed aquifer recharge (MAR) water supply schemes

The proportion of distribution input varies from year to year depending on weather, demand and asset outages. Production from WTWs supplied by river and borehole abstractions increased this year, predominantly due to the outage at Oswestry WTW but also to maintain supplies during the extended period of dry weather in summer 2018.

Line 4P.5 – Proportion of distribution input derived from artificial recharge (AR) water supply schemes

We do not currently have any of these schemes therefore the number reported is zero.

Line 4P.6 – Proportion of distribution input derived from aquifer storage and recovery (ASR) water supply schemes

We do not currently have any of these schemes therefore the number is zero.

Line 4P.7 – Proportion of distribution input derived from saline abstractions

We do not currently have any of these schemes therefore the number is zero.

Line 4P.8 – Proportion of distribution input derived from water reuse schemes

We do not currently have any of these schemes therefore the number is zero.

Line 4P.9 – Number of impounding reservoirs

The number of sources varies from year to year depending on weather, demand and asset outages. This year we brought a number of standby impounding reservoirs into supply due to the extended period of dry weather in summer 2018. We also changed the operation of two impounding reservoirs so they pumped to another reservoir temporarily so we could not count them as a separate source in accordance with the reporting guidance.

As per the Ofwat guidance for line 13: -

- A source is defined as an independent raw water supply that directly supplies a treatment works.
- Standby or mothballed sources from which no water has been obtained in the year should not be included.
  We have also used the previous Table 12 June Return reporting requirements (January 2011) to report the number of impounding reservoirs.

- If a treatment works receives water from a reservoir that has been filled by another reservoir then this is classified as one reservoir source.
- Reservoirs used only to regulate river flows have not been included in the source numbers. We own and operate a number of cascade reservoir systems where water is transferred between reservoirs but from which there is only one abstraction point to the water treatment works. River regulation reservoirs have also been excluded. The number of impounding reservoirs reported is therefore significantly lower than the actual number of impounding reservoirs that we operate and maintain in order to maintain supplies to customers. In terms of developing a suitable cost driver for totex models, it should be recognised that the costs of operating and maintaining a reservoir and its catchment land would not be expected to be significantly different whether reservoirs were in a cascade or each supplying a water treatment works directly.

Line 4P.10 – Number of pumped storage reservoirs

We have not currently classed any of our reservoirs as pumped storage reservoirs therefore the number is zero.

Our understanding is that there are a number of ways to define a pumped storage reservoir. We have a number of reservoirs which are similar to pumped storage reservoirs, but do not meet our interpretation of the definition set out by Ofwat. These include: -

- Storage reservoirs which are gravity fed from a river intake but which are remote from the supply source.
- Storage reservoirs which receive a mix of pumped and gravity supply.
- Storage reservoirs which receive either pumped or non-pumped potable water which will then need re-treating before supply to customers.
- Impounding reservoirs with natural inflow supplemented by a pumped supply.

Line 4P.11 – Number of river abstractions

The number of sources can vary from year to year depending on weather, demand and asset outages, however for 2018/19 the number remains the same as last year.

Line 4P.12 – Number of ground water sources, excluding managed aquifer recharge (MAR) water supply schemes

The number of boreholes used in a year can change significantly from year to year depending on weather, demand and asset outages. During the period of extended dry weather in summer 2018 we brought into operation a number of standby boreholes that were not operated last year to meet increase demand.

Based on the definition of a source that has been used in line 4P.16 as “an independent raw water supply to a treatment works” all boreholes which have been used in the report year have been included. In accordance to the Ofwat cost capture table clarification we have aggregated the figures where there are multiple boreholes on a single site e.g. counted these as a single source.

The number of boreholes reported is disproportionately high when compared to the number of impounding reservoirs as we have a number of reservoir cascade systems where water is only abstracted from one of the reservoirs in the group. The totex costs of maintaining and operating a chain of impounding reservoirs would be expected to be significantly higher than the costs of an individual borehole.

Line 4P.13 – Number of artificial recharge (AR) water supply schemes

We do not currently have any of these schemes therefore the number is zero.

Line 4P.14 – Number of aquifer storage and recovery (AR) water supply schemes

We do not currently have any of these schemes therefore the number is zero.

Line 4P.15 – Number of saline abstraction schemes

We do not currently have any of these schemes therefore the number is zero.

Line 4P.16 – Total number of sources

This equals the sum of lines 4P.9 to 4P.15.

We have reported the total number of sources as per the definition for line 13 and the historic Table 12 June Return reporting requirements (January 2011). This defines: -

- A source is defined as an independent raw water supply to a treatment works.
- Standby and mothballed sources have not been included.
- If a treatment works receives water from a reservoir that has been filled by another reservoir then this is classified as one reservoir.
- Reservoirs used only to regulate river flows have not been included in the source numbers.
- Bank side storage and non-impounding reservoirs have not been included as sources in their own right. The sources of water filling these reservoirs have been included in the source numbers.
- Multiple boreholes on a single site have been counted as one ground water source.

This approach does not reflect the true number of sources which we operate in order to maintain supplies to customers. This is because we have a number of reservoir cascade systems where water is transferred from one reservoir to another but only abstracted from one reservoir in the group and also a number of non-impounding reservoirs from which water is abstracted. These reservoirs incur costs for operation and maintenance but are not included in the total number of sources.

Line 4P.17 – Number of saline abstraction schemes

We do not currently have any of these schemes therefore the number is zero.

Line 4P.18 – Total number of water reservoirs used for holding raw water (including impounding reservoirs, pumped storage and bank side storage)

One reservoir was incorrectly classified as a raw water reservoir however audit checks identified it is actually used to receive filter wash water from the treatment process therefore has been re-classified as a treatment asset.

Line 4.P19 – Total capacity of water reservoirs used for holding raw water (including impounding reservoirs, pumped storage and bank side storage)

The change in capacity is the result of the classification changes described in the commentary for Line 18.

Line 4.P20 – Total number of intake and source pumping stations

Line 4.P21 – Total number of raw water transfer pumping stations

Line 4.P22 – Total capacity of intake and source pumping stations

Line 4.P23 – Total capacity of raw water transfer pumping stations

Following the publication of 2017/18 APR and submission of the business plan we received query UUW-IAP-CA-014 from Ofwat which provided further guidance on the allocation of pumping stations. In our response to the query we changed the numbers of intake and source pumping stations and raw water transfer

pumping stations reported. Last year we allocated pumping stations on a "principal use" basis to seek to align pumping station numbers with pumping head and expenditure. In response to the Ofwat query we allocated pumping stations, which serve a dual intake and raw water transport purpose, to the most upstream service (intake/source). Adopting this guidance increases the reported number of intake pumping stations and reduces the number of raw water transport pumping stations.

Line 4P.24 – Total length of raw water mains and conveyors

In 2017 we reported non-potable and partially treated main for treatment mains in this line, although they were separated out and reported separately in 2018. As part of this process approximately 30km of main was not picked up in last year's report, which have been re-included this year.

Lines 4.P25 and 4.P26 – Average pumping head – resources and raw water transport

Water resources pumping is influenced by the hydrological conditions, as more water must be pumped in drier years to protect water resources and the environment. Summer 2018 saw an exceptionally dry weather over the North West region. This has had a notable effect on raw water abstraction and raw water transport pumping head to meet demand and to move raw water regionally. Pumping at Windermere and Ullswater was more than double pumping in 2017/18 at both sites.

Treatment head has been less effected as the majority of major supplying works are gravity supply systems, with pumped raw water supplies.

The reduction in distribution pumping down to reductions in pumped volumes at key sites.

- There has been reduced pumped flow through Huntington WTW this year.
- This year to support Oswestry outage and Huntington low flows the West East link main has mainly supplied water from Bury to Prescot (gravity). Last year there was a lot of pumping in the opposite direction.

Lines 4.P27 Total length of raw and pre-treated (non-potable) water transport mains

In 2017/18 the Raw Water Mains and Conveyors line was reported as two; one capturing non-potable or partially treated water delivered to customers, the other capturing non-potable and partially treated water delivered to water treatment works. The value has decreased compared with the combined value of the two lines reported last year due to refreshed customer information. Three non-potable customers are no longer on the register and one new customer has been added.

Lines 4.P28 Water resource capacity (measured using water resources yield)

The total capacity company forecast is based on the summation of the individual capacities for each of the UU water resource zones. These are provided below:

Individual water resource zones forecast for (2018/19)

- Integrated Water Resource Zone (2257.58 Ml/d)
- Carlisle Water Resource Zone (36.25 Ml/d)
- West Cumbria Water Resource Zone (53.54 Ml/d)
- North Eden Water Resource Zone (8.74 Ml/d)
- Barepot Water Resource Zone (34.10 Ml/d)

There are no immediate planned changes to sources (e.g. abstraction licence revocations) in all zones except West Cumbria on completion of the Thirlmere transfer into West Cumbria scheme by 2020-21. The capacities in the other zones will only vary going forward because of the predicted climate change impact throughout the planning period. In West Cumbria a number of sources will no longer be used from 2020-21 onwards, and therefore the capacity will be significantly reduced from that time.

Following submission of the PR19 business plan we have updated our water resource capacity based on updated deployable output values from the revised draft WRMP tables which affect the impact of climate change. There are no immediate planned changes to sources (e.g. abstraction licence revocations) in all zones except West Cumbria on completion of the Thirlmere transfer into West Cumbria scheme by 2020-21. We forecast the capacities in the other zones going forward will only vary because of the predicted climate change impact throughout the planning period. In West Cumbria a number of sources will no longer be used from 2020-21 onwards, and therefore the capacity will be significantly reduced from that time.

Block B – Water Treatment

Lines 4P.29 to 42 – Total water treated by works type and size

Usually there are relatively small changes in distribution input (DI) from year to year dependent on demand within local networks, irrespective of any changes in number of works in each category. However, due to an unprecedented period of dry weather in the summer of 2018, there was a significant increase in demand that increased the regional daily average DI increased by about 40 Ml/d.

A number of the upland impounding reservoirs (typically SW3 & SW5 category sites) saw a serious drop in levels and DI from the works was reduced or stopped altogether because of this. The biggest drop was at Hodder WTW. To compensate for the reduction, other sites had to increase their DI, most notably the groundwater sources. The largest increases were at Franklaw and Huntington WTWs, to support regional supplies. Franklaw, whilst a SW5 site, has the option to use local boreholes as an alternative source to the more usual Thirlmere IR source or River Wyre, and these were used in 2018/19.

Lines 32 (SW3). The increase in production from Oswestry and Ulpha WTWs due to drought demand partly accounts for the latest increase. (See also NOTE below on pages 6/7 about Lostock DI.)

Lines 33 (SW4). The slight decrease in DI for 2018/19 is due to the reduction in flow for Prescot and Townsend Fold WTWs because of the dry weather event.

Lines 36 (GW simple disinfection) and Lines 38 & 53 (GW2). The increase from 2017/18 to 2018/19 can be accounted for by an increase in borehole DI to support the dry weather event in 2018.

Lines 40 (GW4). The increase from 2016/17 to 2017/18 to 2018/19 can be explained by increased output from Royal Oak WTW (taking over from Blundell House, GW2) and an increase in DI from Simmonds Hill WTW. The increase in 2018/19 is due to an increase in DI from Lightshaw WTW during the dry weather event.

Line 41 (GW5) There are 3 works in this category. The increase in 2018/19 is due to a significant increase in DI from these ground water sources during the dry weather event.

Line 4P.43 – Total water treated at more than one type of works

A significant volume of treated water from Watchgate WTWs is retreated at three separate aqueduct take off points, Martholme WTWs, Townsend Fold WTW and Woodgate Hill WTWs. There is little change in the

water treated at more than one works. The small change compared with last year is down to an increase in groundwater sources during the dry weather to support a reduction in surface water sites.

Lines 4P.44 to 57 – Total number of WTW by works size and type

There are relatively small changes in distribution input from year to year dependent on demand, irrespective of changes in number of works in each category. The majority of water treatment works categories have remained stable across the three year period, however there have been a few changes mainly as a result of mobile PAC dosing location changes.

Line 4P.58 – Number of treatment works requiring remedial action because of raw water deterioration

The number of water treatment works requiring remedial action due to raw water deterioration varies from one year to the next.
Completion reports have been submitted for the following schemes early and will be claimed in FY18/19.

- UUT3235 Hurleston – pesticides 30/06/2018 and resubmitted 31/01/2019 (Was FY19/20 - 30/03/2020)
- UUT3236 Huntington and Sutton Hall pesticides 30/06/2018 and resubmitted 31/01/2019 (Was FY19/20 - 30/03/2020)

There was one remaining output planned FY18/19. UUT3477 Vyrnwy Notice – Oswestry WTW due 31/12/2018. This has not been completed and the target date has moved to 31/07/2019 and is expected in FY19/20.

Line 4P.59 – Zonal population receiving water treated with orthophosphate

We believe that a better measure would be to remain with the original line that was proposed by Ofwat (proportion of water treated with orthophosphate) rather than zonal population. If the number is being used to calculate cost then it makes sense for the number to represent the volume of phosphate being used rather than the amount of people being supplied. For example a small area that does not receive water that is phosphate dosed may only have 10 properties but if one of those properties is a large industrial user then the new measure would indicate a higher coverage of phosphate dose than is reality.

There has been no real change in the area of coverage with phosphate dose in FY19. The apparent increase in population receiving orthophosphate is down to a change in the source population figures. Population is aligned with that used in WRMP and PR19 and is based on ONS data from Edge Analytics. This has been calculated using 2019 mid-year population projections.

Line 4P.60 – Average pumping head - treatment

Water resources pumping is influenced by the hydrological conditions, as more water must be pumped in drier years to protect water resources and the environment. The summer of 2018 saw an exceptionally dry weather over the North West region. Supplies were maximised across all sites. This has had a notable effect on raw water abstraction and raw water transport pumping head to meet demand and to move raw water regionally. Treatment head also increase but is less effected as the majority of major supplying works are gravity supply systems, with pumped raw water supplies. Hence the increase in treatment head is less than the increase in raw water abstraction and transport.

Block C - Water Distribution

Line 4P.61 Total length of potable mains

There are small movements in the km of mains reported each year as new mains are installed and other mains are abandoned.

Line 4P.62 – Total length of potable mains relined

Over the past five years we have not relined any of our water mains using spray lining techniques.

Line 4P.63 – Total length of potable mains renewed

The report year total of 13.9km is lower than the forecast of 21.5km submitted in our PR19 Final Business Plan and less than that reported for the previous year. Mains renewal activity reduced as a result of the dry weather period delaying a number of scheduled mains improvement projects into future years.
The Fylde-Lytham scheme was predominantly completed (7.6km delivered in FY18) in the previous year with just 136m installed in 2018/19. In addition, a section of the Stainburn to Cornhow main (2.2km) on the West Cumbria scheme previously expected to be slip-lined, was cleaning using the ice pigging technique which reduced the reportable outputs against this line.

Line 4P.64 – Total length of new potable mains

The report year total of 214.8km is slightly higher than the forecast of 208.0km submitted in our PR19 Final Business Plan. This is as a result of higher levels of new development activity than previously forecast.
New mains activity increased by 9% from the previous year, due to continuing growth in new developments. In addition, 26.0km of new potable main associated with the West Cumbria (Thirlmere Transfer) scheme was also installed in the year, which was a 10km increase from the previous year with the scheme ahead of schedule.

Line 4P.65 – Potable water mains (≤320mm)

Line 4P.66 – Potable water mains >320mm ≤ 450mm

Line 4P.67 – Potable water mains >450mm ≤ 610mm

Line 4P.68 – Potable water mains >610mm

The total length of potable water mains by size band has remained broadly similar. The length of smaller mains is expected to continue growing as more homes are built. The construction of a new supply network connecting West Cumbria to Thirlmere Reservoir will increase the length of larger mains.

Line 4P.69 – Capacity of booster pumping stations

This capacity measure may not be a good explanator of cost - many small pumping stations would have a higher cost than a single large asset.

Capacity has changed in-line with the movement of pumps to different price controls. In 2017/18 we reported 534 booster pumping stations. Between submission of our 2017/18 APR and RR19 submission there has been a review of the pumps and their allocation prompted by an OFWAT clarification following PR19 submission. The 524 booster pumping stations reported for 2018/19 aligns with the revised WN2 submitted to OFWAT in October 2019.

Compared with the number of reported booster stations at 2017/18 there has been a net reduction of 10.

- +9 additional pumps have been added (2017/18 added to data records)

- -8 pumps have been confirmed as abandoned
- +1 pumps transferred from abstraction to water distribution
- -14 water distribution transferred to abstraction
- +2 raw water transport transferred to water distribution.

Line 4P.70 – Capacity of service reservoirs

This capacity measure may not be a good explanator of cost - many small reservoirs have a higher unit cost than a single large asset.

Although we have commission some new service reservoirs this year we expect in the long term the number will decrease slightly. We are completing an enhanced programme of service reservoir inspection and cleaning. This has identified a number of sites that are in poor condition and abandonment is the best solution. When a service reservoir requires significant investment, replacement with a pumping station sometimes offers a lower whole life cost. There is therefore a slow but steady increase in the number and capacity of pumping stations.

Line 4P.71 – Capacity of water towers

As with pumping stations and service reservoirs, we do not currently consider this measure to be a good explanator of cost. In particular, it is the case that many small towers have a higher unit cost than a single large asset. The capacity of water towers has remained consistent across the four years and we would expect the value to remain reasonably consistent in the coming years.

Line 4P.72 – Distribution input

The increase in distribution input compared with last year can largely attributed to the impact of the extended dry weather event on household consumption, however increases in other components have also played a role.

Line 4P.73 – Water delivered (non-potable)

There is a decrease in the water delivered (non-potable) over the reporting period.

Line 4P.74 – Water delivered (potable)

There is an increase in the water delivered (potable) over the reporting period. This increase can be related to an increase in overall consumption.

Line 4P.75 – Water delivered (billed measured households)

Measured household water delivered has increased regionally. The increase is in line with historical trend and expected due to new properties and meter optants. There is also increase in the underlying value measured per household consumption.

Line 4P.76 – Water delivered (billed measured non-households)

There has been a slight increase in billed measured non-household, but it is broadly in line with last years reported value.

Line 4P.77 – Total leakage

We have outperformed our regulatory leakage target of 462.7 Ml/d by 6.7 Ml/d, which puts us into the reward dead band. 2018/19 has been a very challenging year for leakage management. The continuing impact of the intense freeze-thaw event in March, followed by the extended period of dry weather through the summer meant that we experienced increased leakage levels across multiple District Metered Areas.

We actively monitor leakage levels and highlighted the potential risks to performance early in the year. This allowed an early action plan to be developed and implemented, with performance against this plan being monitored and the plan adapted throughout the year. To support this plan, we built on existing baseline leakage control activities with:

- Additional internal and contract detection resources, working overtime (including weekend working);
- An increased number of repair gangs (at times, we were operating with double our 'normal' level);
- Targeted trunk main leakage surveys, including the use of leakage sniffer dogs and satellite imagery;
- The installation of an increased number of mobile acoustic loggers, as well as multiple fixed loggers, in our network to detect leaks that wouldn't be found using traditional manual techniques.

Line 4P.78 – Distribution losses

Distribution losses were broadly aligned with last year's with a small increase associated with the aftermath of the freeze thaw followed by an extended period of dry weather.

Line 4P.79 – Water taken unbilled

Within this line we have included the total water which is taken unbilled (whether legally or illegally). Water that we have used for mains tests, flushing, washouts, running to waste, or has been incurred through burst mains or other leakage has been excluded. There is an increase of 10.6 Ml/d in the value of water taken illegally unbilled. This is partially caused by a further increase in the number of void properties, and is being investigated, as there has been an increase from the long term level of void properties in the last two reporting years.

Line 4P.80 – Number of lead communication pipes

Reduction in the number of lead communications pipes in-line with the number replaced and claimed as water outputs.

Line 4P.81 – Number of galvanised iron communication pipes

Ongoing work to update GIS data has resulted in an increase compared to last year.

Line 4P.82 – Number of other communication pipes

The small increase compared to last year is in-line with anticipated connection growth and movement of Lead pipes to other materials.

Line 4P.83 – Number of booster pumping stations

This may be a weak potential explanator of cost. Measures relating to the scale and complexity of the distribution network would appear to be better as they are stronger exogenous cost drivers.

We are seeing an increasing trend in this area due to a higher number of pumps. Over recent years, smaller service reservoirs have been abandoned and replaced with pumping stations.

In 2017/18 we reported 534 booster pumping stations. Between submission of our 2017/18 APR and RR19 submission there has been a review of the pumps and their allocation prompted by an OFWAT clarification following PR19 submission. The 524 booster pumping stations reported for 2018/19 aligns with the revised WN2 submitted to OFWAT in October 2019.

Compared with the number of reported booster stations at 2017/18 there has been a net reduction of 10.

- +9 additional pumps have been added (2017/18 added to data records)

- -8 pumps have been confirmed as abandoned
- +1 pumps transferred from abstraction to water distribution
- -14 water distribution transferred to abstraction
- +2 raw water transport transferred to water distribution.

Line 4P.84 – Total number of service reservoirs

Although we have commission some new service reservoirs this year we expect in the long term the number will decrease slightly. We are completing an enhanced programme of service reservoir inspection and cleaning. This has identified a number of sites that are in poor condition and abandonment is the best solution. When a service reservoir requires significant investment, replacement with a pumping station sometimes offers a lower whole life cost. There is therefore a slow but steady increase in the number and capacity of pumping stations.

Water towers have not been included in this number as these are reported separately in line 4P.80.

Line 4P.85 – Number of water towers

Measures relating to the scale and complexity of the distribution network would appear to be better as they are stronger exogenous cost drivers.

There has been no change in the number of water towers.

Lines 4P.86 to 4P.93 – Total length of mains laid or structurally refurbished by age band

The mains length in each category is relatively stable across the three year period with only slight variation due to improvements in the records (including the implementation of a new geographical information system in FY14). There has been a slight increase in the number of mains laid between 1961 and 1980. This can be attributed to updated GIS data; for example, mains with previously unverified characteristics (i.e. laid date and diameters) have now become verified. The post 2001 category shows a more marked increase as newly laid mains continue to contribute to this category.

The trend five years shows the pattern that would be expected with fewer older mains as many of these have now been replaced with newer mains. There are however two noticeable exceptions: -

- Fewer mains were laid between 1941 and 1960, this corresponds with the Second World War and subsequent recovery
- More mains were laid in the 1981 to 2000 period, this corresponds with our significant NW90 programme which replaced cast iron mains.

We are currently investing in a significant scheme in West Cumbria which will see changes in the treatment and distribution of water to customers in West Cumbria: this will increase the length of mains in future years.

Line 4P.94 – Average pumping head – treated water distribution

Water resources pumping is influenced by the hydrological conditions, as more water must be pumped in drier years to protect water resources and the environment. The summer of 2018 saw exceptionally dry weather over the North West region. Supplies were maximised across all sites. This has had a notable effect on Raw water abstraction and Raw water transport pumping head to meet demand and to move raw water

regionally. However we experienced a reduction in distribution pumping down to reductions in pumped volumes at key sites.

- Huntington WTW – reduced throughput, hence much reduced pumped flow in the year.
- WELM – flow has been mainly from Bury to Prescot (gravity) this year to support Oswestry outage and Huntington low flows. Last year there was a lot of pumping in the opposite direction.

Block D – Water Treatment Works Band Disclosure

Lines 4P.95 – 4P.110 Water Treatment Works by size band and Proportion of DI by size band

There has been no change to the number of water treatment works in the different size bands compared to last year. The percentage of distribution input (DI) from different size band works changes slightly from year to year dependent on demand within local networks.

Table 4Q – Non financial data - Properties and population and other – Wholesale water

Block A - Properties and population

Line 4Q.1 – Residential properties billed for measured water (external meter)

Line 4Q.2 – Residential properties billed for measured water (not external meter)

The number of metered residential properties has increased consistently with the number of meter optants and due to new house building, we expect this increase to continue during the AMP6 period.

Line 4Q.3 – Business properties billed measured water

There has been a decrease in billed measured business properties since FY17 partly due to an increase in the number of empty premises on the billing system. The number of business properties at FY19 year end is based on the number of Service Points in the Central Market Operating System. UU Wholesale are in regular discussion with relevant retailers to address this issue.

Line 4Q.4 Residential properties for unmeasured water

There has been a reduction in the number of residential properties billed for unmeasured water primarily due to the number of free meter optants.

Line 4Q.5 – Business properties billed for unmeasured water

There has been a reduction in number of business properties billed for unmeasured water partly as the result of an increase in the number of empty premises on the billing system. The number of business properties at FY19 year end is based on the number of Service Points in the Central Market Operating System. UU Wholesale are in regular discussion with relevant retailers to address this issue.

Line 4Q.6 – Total business properties connected at year end

The number of non-household properties has increased slightly since 2017/18.

Line 4Q.7 – Total residential connected properties at year end

Improved confidence in the housing sector is reflected in the increased number of new properties connected for the period FY14 to FY19. The increased volume of new properties connected for this period exceeded the original forecast target.

Line 4Q.8 – Total connected properties at year end

This line is a sum of lines 4Q.6 and 4Q.7 see variance explanation for these lines.

Line 4Q.9 – Number of residential meters renewed

There has been an increase in the number of residential renewals.

Line 4Q.10 – Number of business meters renewed

There is a reduction in the number of business renewals compared to last year because of a reduction in demand for business meter exchanges.

Line 4.Q11 – Number of meter optants

There has been a reduction in the number of residential renewals. We received a total of 47,868 applications in 2017/18 compared to 44,629 in 2018/19. The main reason for the difference is the timing of the annual unmeasured bills. In 2018 the first bills were sent on 19 January compared to 7 February in 2017. This change, meant we fitted a significant number of meters in 2017/18 which were effectively brought forward from 2018/19. The number of free meters fitted remains significantly under target.

Lower household bill increases are thought to be a contributing factor to this lower take up. Our meter target was based on historical performance and predictions in customer behaviour using the UKWIR econometric opting model. This also included 18,000 installations facilitated by additional pipework alterations or policy charges plus 25,000 from a targeted campaign to customers in financial hardship. To address the lower than expected meter uptake we have initiated a number of actions.

The free meter option has been promoted on both the front and back of all envelopes for 2018/19 unmeasured bills; circa 1.9m bills were sent out to our unmeasured customers during February and March. A pilot is currently being developed by UU Domestic Retail which involves a "Price Promise" for customers who have a meter installed. This will cap the customer's charges at the rate they would pay on Rateable Value based charges but would allow them to pay the metered charges if these are less. If this pilot is effective it could then be rolled out to a wider customer base.

Line 4Q.12 – Number of selective meters installed

We do not currently selectively meter properties.

Lines 4Q.13 and 4Q.14 – Total number of new business and residential connections

Continued confidence in the housing sector has contributed towards the increased volume of newly connected properties.

Included in the 2018/19 total are 3,834 properties reported by customers contacting United Utilities to setup their accounts, or properties identified during site audits, that have not been reported to the Developer Services team by Self-Lay Providers in a timely manner.

In addition we have seen a high volume of properties connected to large apartment blocks in FY2018/19, resulting in 5,042 additional properties being reported when compared to the same period in 2017/18.

Line 4Q.15 – Total population served

The increase in population of 0.37% is within the historical range. There is some movement between the water resource zones (no material impact on total value reported), which will be in part population movement or different rates of growth, and the yearly update of the water supply zones.

Line 4Q.16 – Number of business meters (billed properties)

Line 4Q.17 – Number of residential meters (billed properties)

This may be a relatively small cost driver.

Line 4Q.18 – Company area

We have reported the company area served by the water business. The reported number is consistent with last year.

Block B - Other

Line 4Q19 – Number of lead communication pipes replaced for water quality

The number of lead communication pipes replaced increased this year and was above that forecast in the PR19 business plan. We intend to continue reducing the number of customers with lead communication pipes.

Line 4Q.20 – Total supply side enhancements to the supply demand balance (dry year critical/peak conditions)
Line 4Q.21 – Total supply side enhancements to the supply demand balance (dry year annual average conditions)

Our new groundwater supply scheme at South Egremont to offset sustainability reductions at Ennerdale Water was originally designed to supply 6.4 Ml/d. This scheme was to address the need to reduce abstraction from Ennerdale Water following an Environment Agency review of abstraction licences to comply with the EU Habitats Directive.

However, following implementation of an Environmental Damage Notice at Ennerdale, there is significant benefit to customers and the environment of greater supply capability. The boreholes at South Egremont are one of several interim measures in the 2015 Water Resources Management Plan. This, along with the Summergrove rezoning scheme and enhanced water efficiency and leakage activity, make up the suite of interim measures aimed to reduce abstraction from Ennerdale Water until the Thirlmere Transfer Scheme is delivered. Whilst there are supply-side benefits associated with the boreholes, the driver behind the other interim measures is environmental to reduce Ennerdale Water abstraction, and so there aren't supply-side benefits associated with the schemes.

Pumping tests showed that groundwater abstractions can be sustainably maintained at higher levels for periods of time, and in 2013 the South Egremont scheme was re-designed for 11 Ml/d. However, a revised mode of operation has been agreed, with borehole output limited to 4 Ml/d in normal conditions (and only operated at 11 Ml/d when Ennerdale Water is below drought trigger 2). This together with associated operational changes at Crummock Water has led to a WAFU reduction of 3.1 Ml/d, offsetting the original scheme benefit of 3 Ml/d in the overall supply-demand balance.

Line 4Q.22 – Total demand side enhancements to the supply demand balance (dry year critical/peak conditions)
Line 4Q.23 – Total demand side enhancements to the supply demand balance (dry year annual average conditions)

There are no new demand side measures or supply side measures for the AMP6 period. However, work is ongoing to maintain the current enhanced levels of water efficiency and leakage activities, and as part of the interim measures in West Cumbria we have committed to reduce leakage as far as possible within the West Cumbria resource zone to reduce abstraction from Ennerdale Water. Work continues to progress the Thirlmere Transfer scheme to provide alternative supplies for West Cumbria in 2022.

When looking at the change in West Cumbria leakage from FY18 to FY19 this manifests as a negative value. However, the reported value in this line is zero as there no defined demand-side options included for AMP6 in the 2016 Water Resources Management Plan. The drivers behind the suite of interim measures in West Cumbria is environmental, to reduce abstraction from Ennerdale Water until delivery of the Thirlmere Transfer scheme.

For all the four lines above we consider that the Ml/d unit does not reflect the work that is currently underway to claim supply-demand benefits in future years/AMPs, for example the Thirlmere Transfer scheme.

Lines 4Q.24, 4Q.25, 4Q.26 – Energy consumption – wholesale, network+ and water resources

The total consumption of energy (electricity and natural gas) this year was 339.6 GWh. This shows a major increase to 2018/19 of 295.1 GWh. This major reason for the increase in energy consumption was the extended period of dry weather.

1) There was an increase in raw water abstraction and transport pumping as we maximised groundwater sources to meet the increase in demand and manage surface water levels.
2) Energy consumption associated with treatment was higher because of the increased throughput.
3) Additional distribution pumping to maintain supplies and reservoir levels through the summer.

Line 4Q.27 – Mean Zonal Compliance

Mean zonal compliance measures performance against 39 water quality standards. Performance this year at 99.93% fell short of the performance commitment of 100% compliance which is challenging, not least due to the influence of customer internal plumbing on several water quality parameters. In 2018, we have seen a significant increase in the number of lead exceedances in comparison to 2017. This can, in part, be attributed to higher water temperatures this summer which increases lead solubility. To maintain supplies during the period of extended dry weather in the summer a number of operational actions were undertaken at our WTWs, SRs and on our water mains network which resulted in a potential increase in mobilisation of deposits within the network impacting mean zonal compliance.

In December 2018, a sample taken from a small WSZ with only 10 properties (domestic and business) exceeded the regulatory standard for lead and nickel, this result had a significant impact (-0.02%) on the overall score for calendar year 2018. The WSZ receives a bulk supply from Severn Trent and due to its small population has a sampling frequency of 1 per annum, so any failure has a disproportionate impact on the metric. Without these failures the Company would have achieved 99.95%.

Line 4Q.28 – Compliance Risk Index

This compliance risk index score reported is a provisional estimate we are awaiting confirmation of the final score from DWI. We have experienced a deterioration in performance compared to 2017 performance of 1.283. This decline in performance can be attributed to an increase in the number of infringements during 2018 compared to 2017 including a significant increase in the number of lead exceedances. This can, in part, be attributed to higher water temperatures this summer which increases lead solubility. To maintain supplies during the period of extended dry weather in the summer a number of operational actions were undertaken at our WTWs, SRs and on our water mains network which resulted in a potential increase in mobilisation of deposits within the network impacting mean zonal compliance.

The company has an action plan in place to drive water quality improvement which will improve performance against our AMP7 ODIs and the Compliance Risk Index.

Line 4Q.29 – Event Risk Index

This event risk index score reported is a provisional estimate we are awaiting confirmation of the final score from DWI. There have been 31 events reported to the DWI in 2018, significantly less than the 42 events reported during 2017. The Company has interpreted the seriousness score and assigned common reportable event types with a relevant score, based on the guidance document provided by DWI to estimate the event risk score. This is the first year we have reported the ERI in the APR and there is a degree of subjectivity

when assessing the Event Risk Index score therefore the final DWI even risk score could differ from that reported.

The metric is particularly volatile as it is heavily dependent on the type of incident that occurs, the location and number of properties potentially impacted and the duration of the event. For example an event at a large WTW that supplies a significant population will have a much larger score than the same event at a smaller WTW.

Line 4Q.30 – Volume of Leakage above or below the sustainable economic level

Total leakage has risen in FY18 compared to FY17, as a result of a more extreme winter event, with a freeze-thaw occurring in March 2018. However despite this increase, over the last four financial years total leakage has remained significantly below the economic level.
We have followed the guidance when calculating this value, although we believe that using ELL would better reflect the cost company has to bear to maintain leakage at this, significantly lower than economic, level.

Table 4R – Non-financial data - Wastewater network and sludge

We support the collection of the wastewater network data as we consider it to be defined, reportable and potentially useful for cost assessment, although it is imperative that each company reports to consistent definitions.

However, it is important to consider the confidence grades applied and the use of inferred information within any of the datasets provided. This year we have continued with our data improvement project, which is improving the accuracy of our inferred data, on both the existing and ex private sewer network, where the use of inferred data could have substantial impacts upon the data being reported by different companies. This project also aimed to improve the general quality of the network data that we are submitting.

Network performance can be influenced by other factors such as rainfall levels, run off rates and population density or level of urbanisation, which are not considered in this data set.

Block A – Wastewater network

Line 4R.1 – Connectable properties served by s101A schemes completed in the report year

The number of first time sewerage projects can vary depending on the number of applications that are received from customers. We have completed one scheme this financial year Lenchfold, which has connected four properties.

Line 4.R2 – Number of s101A schemes completed in the report year

We have completed one scheme Lenchfold this financial year.

Line 4R.3 & 4R.4 – Total pumping station capacity and number of network stations

We extract pumping station numbers and capacity from our corporate management system. Pumping station data has checked and verified as part of our data improvement project by operational and asset management teams. We have made additional checks as we moved data on to a sap based system; this has removed any duplicate or decommissioned assets and helped to confirm pump capacity.

We have continued our data improvement and checking programme this resulted in an increase in both the number of stations and capacity that we have reported. The increases in capacity and number of stations are predominantly as a result of; we had not previously included the pumps from Liverpool WwTW terminal pumping station in previous submissions; and a small number of stations adopted through the S.104 adoption process and the continuing identification of private pumping stations that have now transferred in to our ownership through S.105a. We will continue with our data improvement programme in to FY20.

Line 4R.5 – Total number of sewer blockages

The numbers of blockages that impact our network has increased slightly this year on both our existing and transferred network. We are continuing to apply our targeted operating model, which focuses on reducing incident numbers and the impact that they have on customers. Our reactive resolution vehicles and the equipment that they carry are key to this, as they are helping to identify the root cause of problems so that we can resolve incidents first time. We are also analysis risk so that we can proactively identify network issues before they have an impact on customers.

A consistent methodology would need to be applied across all companies for this data to be effectively used for cost models.

Line 4R.6 – Total number of gravity sewer collapses

This year we seen numbers of collapses slightly increase. Over recent years we have enhanced the use of CCTV surveys and fully utilised our programme to identify structural defects and sewer deformations, this has enabled us to proactively repair sewers, reducing the impact that collapses have on our customers.

Line 4R.7 – Total number of sewer rising main bursts/collapses

The number of collapses varies across the period, however, our performance has been reasonably stable over the last few years. We naturally see a fluctuation in performance in rising mains due to the level of operational technology and innovation that is available for rising main assets. We plan to continue our research to consider post incident materials testing following rising mains bursts, we hope this could be used to identify those assets where repeat failure of the rising main is likely and enable better planning of refurbishment and replacement schemes.

Due to the relatively low expenditure likely to be associated with rising main bursts/collapses over time we believe that other explanatory factors are more significant in explaining costs for models with limited degrees of freedom.

Line 4R.8 – Number of combined sewer overflows

Our profile of overflows changes over time. Increases in the number of overflows can be as a result of the adoption of previously private assets or the discovery and permitting of previously unknown/unpermitted assets. Decreases occur when assets are closed and also from the discovery that some assets do not exist (the permits for these assets are then surrendered). If multiple overflows are present at one location, the overflow numbers have been included within this line. Over AMP6 we are installing a significant number of event duration monitors on these assets. The information gathered from these monitors may drive future investment.

Line 4.R9 – Number of emergency overflows

Our profile of overflows changes over time. Increases in the number of overflows can be as a result of the adoption of previously private assets or the discovery and permitting of previously unknown/unpermitted assets. Decreases occur when assets are closed and from the discovery that some assets do not exist (the permits for these assets are then surrendered). If multiple overflows are present at one location, the overflow numbers have been included within Line 8. If this factor were to be used in benchmarking models then the most up to date values (i.e. current year) should be used as a basis for forecasting for future activity rather than a trend based on historic changes.

Line 4R.10 – Number of settled storm overflows

Our profile of overflows changes over time. Increases in the number of overflows can be as a result of the adoption of previously private assets or the discovery and permitting of previously unknown/unpermitted assets. Decreases occur when assets are closed and also from the discovery that some assets do not exist (the permits for these assets are then surrendered). If multiple overflows are present at one location, the overflow numbers have been included within line 8. If this factor were to be used in benchmarking models

then the most up to date values (i.e. current year) should be used as a basis for forecasting for future activity rather than a trend based on historic changes.

Line 4R.11– Sewer age profile

The numbers of sewers constructed after 2001 grows steadily each year. We found an error in the last two years of data reported, in that it was the in year figure and not the cumulative position. The table below contains the corrected values.

Year	Length
2016/17	753
2017/18	795

Line 4R.12 – Volume of trade effluent

There is minimal variance in the volume of trade effluent across this period, although we have seen a small decrease (2%) this year. We believe that this is as a result of the change in the way that trade effluent values are captured. Retailers are now responsible for meter readings of trade effluent customers in the market. We have seen that the data provided for some traders has not been updated on previous year's data. We do not believe that this line is required for cost comparison models as the flows and loads for significant works are accounted for elsewhere in the tables.

Line 4R.13 – Volume of wastewater receiving treatment at sewage treatment works

This line includes all flows not just domestic flows. We have seen a reduction in flows this year. This is as a result of the extremely dry weather experienced in the North West of England last summer. We received very little rain during this period and therefor experienced a reduction in both surface water and highway drainage flows.

The quality of the data provided for this table has increased across this AMP as we install more flow recording devices at our WwTW. Where a site is not MCERT'd we have estimated the flow based on the information we have available in relation to P.E and flow. This estimation is reflected in the confidence grade.

We do not believe that this should be used for comparative purposes, as it does not include losses from the network and it assumes a similar coverage of MCERT'd works across all companies. This measure does not consider the variability in dry weather flows and flow to full treatment and the potential costs in dealing with a significant range in flows.

Line 4R.14 – Length of gravity sewers rehabilitated

The length of gravity sewer rehabilitated varies across the five year period. This is as would be expected as our strategies and work banks are variable across the AMP. This trend is consistent with previous AMP's. We have seen a reduction in the lengths rehabilitated this financial year.

We do not believe that this should be used a cost driver because it is a small dataset.

Line 4R.15 – Length of rising mains replaced or structurally refurbished

We currently maintain our rising mains on a reactive basis. We classify refurbishment of a rising main when we have replaced or re-lined a length of rising main to increase the expected lifespan of that asset. We have not refurbished any rising mains this financial year. This line does not include any new lengths of rising main constructed.

We do not believe that this should be used for cost comparative purposes, as companies may be working to inconsistent definitions of structural refurbishment.

Line 4R.16 – 4R.21 – Length of foul (only), surface water, combined public sewers, rising mains, total length of other wastewater network pipework and total length of "legacy" public sewers as at 31 March and Line 4R.22 – Length of formerly private sewers and lateral drains (s105A sewers)

We have continued with our data improvement project this financial year. The project has focused on improving the quality of our sewer records, particularly those records that are inferred. As a result of this we have again seen a very small increase in our total sewer length this year.

Note - In response to a post submission query from Ofwat we subsequently reassessed our inferred length of formerly private sewers (line 22) and increased the length from 35,847 Km to 36,565 Km.

We have included in our figures for the first time this year the Great Culvert, Wirral and the Mepas outfalls. These assets are not owned by UU but are leased. Under the conditions of the leases we are responsible for operation and maintaining these assets. We could not correctly operate our wastewater facilities and both Birkenhead and Liverpool without these assets.

Block B – Sludge

We use our Regional Sludge Operational Management (RSOM) system as the primary source of measuring sludge production.

Line 4R.23 – Total sewage sludge produced treated by incumbents

This financial year we have seen a small increase in the volume of raw sludge that we have produced. This is as a result of a small increase in population, an increase in the trade effluent loads that we have received and an increase in the number of WwTW that have a phosphate consent. The FY19 figure is predominantly a measured number for digester feed using our RSOM system. A small number of sites were not measured fully by RSOMS so estimates have been included for these sites, by applying a back calculation. We have added to this figure a raw sludge production number for the sludge that we lime treat. Both figures exclude any inbound sludge trading and is constrained to the sludge produced within our region. It excludes the volume of lime addition, grit and screenings from sewage treatment and excludes grit and screenings arising from sludge treatment.

It excludes our sludge that is treated using lime by a 3rd party contractor, detailed in line 24.

Line 4R.24 – Total sewage sludge produced treated by 3rd party sludge service provider

This figure is a raw sludge production number and excludes any inbound sludge trading and is constrained to the sludge produced within our region. It excludes the volume of lime addition, grit and screenings from sewerage treatment and excludes grit and screenings arising from sludge treatment. The volume of sludge has increased slightly this year. Through FY19 the regional system has been impacted by asset failures at key

production sites, the most impactful asset failure has been steam boiler failures at Manchester Bioresource Centre (MBC). The loss of steam boilers at MBC has reduced treatment capacity. As a result of this we have moved more sludge around the region and have had an increased reliance on third party contractors (including moving some sludge out of region to Severn Trent for treatment and disposal).

Line 4R.25 – Total sewage sludge produced

This is a calculated line.

Line 4R.26 Total sewage sludge produced from non-appointed liquid waste treatment

This is the first year that this figure has been reported, and is a small volume of our overall sludge production figure.

Line 4R.27 – Percentage of sludge produced and treated at a site of STW and STC co-location

We have interpreted the line to include all co-located indigenous sludge production and indigenous sludge from physically separate sites connected by pipeline where any sludge treatment activity takes place and where that site has the appropriate Biosolids Approval Scheme (BAS) accreditation. Our number has significantly reduced this year as in previous years we have also included sludge dewatering and sludge thickening sites in too. The revised definition in this years' tables would suggest that a different approach is more appropriate. We have assumed that disposal means by the best environmental and economic best practice as an outlet i.e. agricultural disposal rather than any means of disposal possible such as reclamation or disposal to landfill.

Line 4R.28 – Total sewage sludge disposed by incumbents

Volumes of sludge disposed have increased significantly this financial year. The dry weather that we have experienced this year has enabled us to dispose of more sludge to land. We have taken the opportunity to empty some of our operational storage facilities. Through FY19 the regional system has been impacted by asset failures at key production sites, the most impactful asset failure has been steam boiler failures at Manchester Bioresource Centre (MBC). The loss of steam boilers at MBC has reduced treatment capacity. As a result of this we have moved more sludge around and disposed on to land.

Line 4R.29 – Total sewage sludge disposed by 3rd party sludge service provider

We have disposed of more sludge via third parties this year. As previously described asset failures at key treatment and disposal sites have resulted in a reduced throughput at our facilities. We have engaged the services to third parties to ensure that we could adequately and correctly dispose of our sludge.

Line 4R.30 – Total sewage sludge disposed

This is a calculated line.

Line 4R.31 – Total measure of intersiting 'work' done by pipeline

The work done by pipeline has been calculated using the total tonnes dry solids moved from each start site to end location. The total volume was then multiplied by the distance in one direction to give the total work done.

We have interpreted the line to include all intersiting 'work' done by pipeline that transports both raw and treated sludge, one way only. For clarity in the future this line could be split into two pipelines:

- Total measure of raw sludge intersiting 'work' done by pipeline

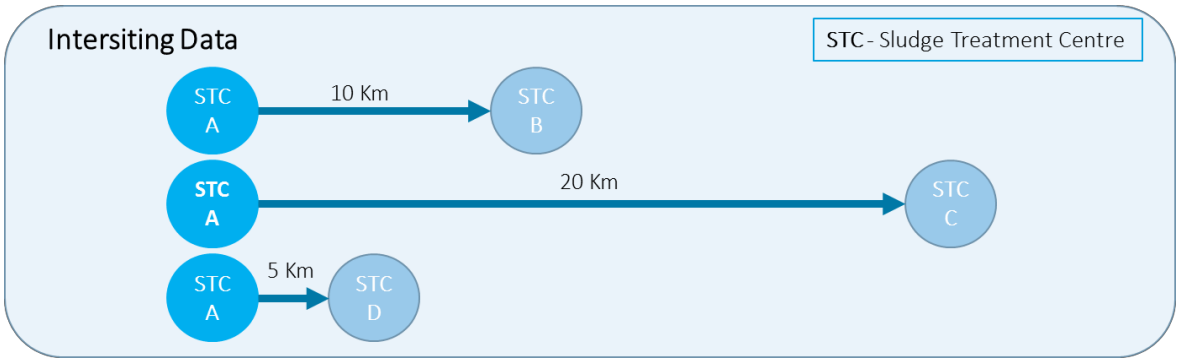
- Total measure of treated sludge intersiting ‘work’ done by pipeline

Line 4R.32 – Total measure of intersiting ‘work’ done by tanker

We have interpreted the line to include all treated and untreated liquid sludge intersiting ‘work’ done as a liquid sludge, one way only.
The total work done via tanker has been calculated by:

- Calculating the total tTDS for each route
- Calculating the distance travelled in one direction
- The total distance for each route is then multiplied by the total tTDS
- The regional total is a sum of all of the routes

The diagram summarises this:



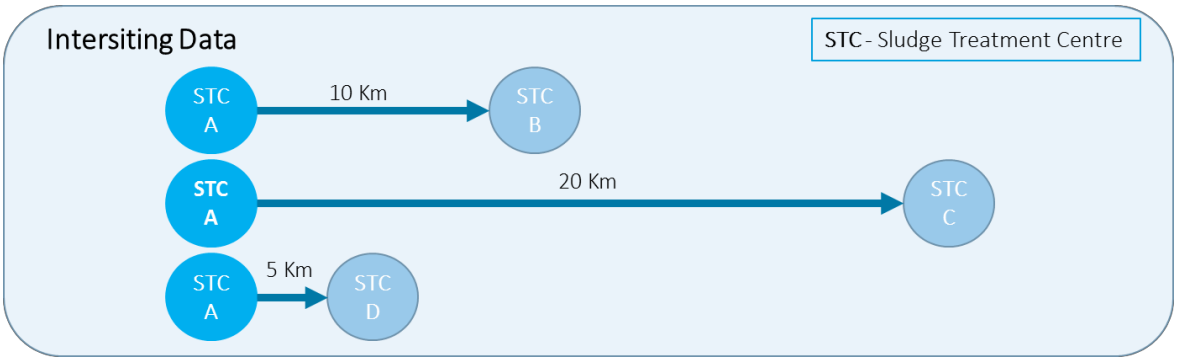
This figure is measured.
Sludge to land transport activity is excluded as this is captured under sludge disposal.

The figure that we have reported is higher than the last financial year. We have produced more sludge this year as we have seen a small rise in reported figures for both population and trade effluent discharges. Increased asset downtime has resulted in sludge being transported from site as a raw liquid sludge rather than as a thickened sludge.

Line 4R.33 – Total measure of intersiting ‘work’ done by truck

We have interpreted this line to include all untreated and treated sludge as a solid (cake) intersiting ‘work’ done, one way only. All of this work is all raw sludge cake movements.
The total work done via truck has been calculated by:

- Calculating the total tTDS for each route
- Calculating the distance travelled in one direction
- The total distance for each route is then multiplied by the total tTDS
- The regional total is a sum of all of the routes The diagram below summarises this:



Sludge to land transport activity is excluded as this is captured under sludge disposal. This financial year in order to mitigate for operational failures at some of our STCs we have deployed temporary centrifuges. This has increased the volumes of thickened sludge that we produce and transport via truck. To ensure that all of our sludge meets strict compliance guidelines we have stored sludge at strategic sludge storage facilities; this has in turn increased the volume of sludge that we have moved by truck.

Line 4R.34 – Total measure of intersiting 'work' done (all forms of transportation)

This is a calculated line.

Line 4R.35 – Total measure of intersiting 'work' by tanker (by volume tanker)

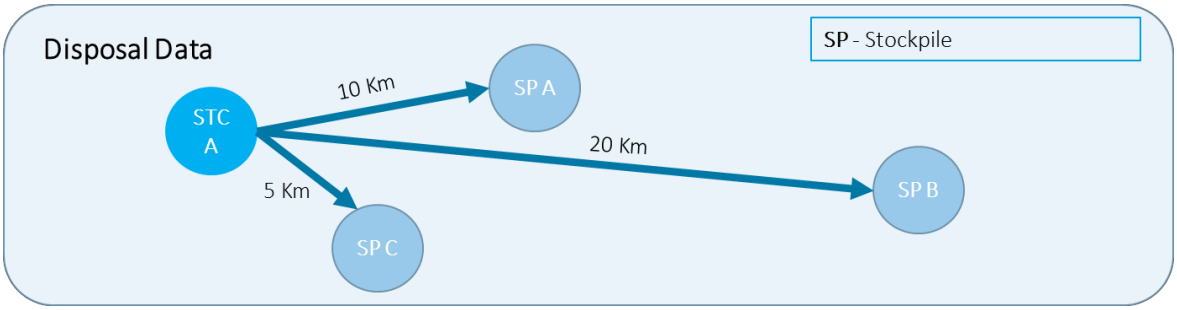
The figure that we have reported is higher than the last financial year. We have produced more sludge this year as we have seen a small rise in reported figures for both population and trade effluent discharges. Operational issues have resulted in sludge being transported from site as a raw liquid sludge rather than as a thickened sludge.

Line 4R.36 – Total measure of 'work' done in sludge disposal operations by pipeline

We do not dispose of any sludge by pipeline.

Line 4R.37 – Total measure of 'work' done in sludge disposal operations by tanker

The figures have been calculated from measured tTDS and distance travelled as recorded on our vehicles. The diagram below summarises how we have calculated this:

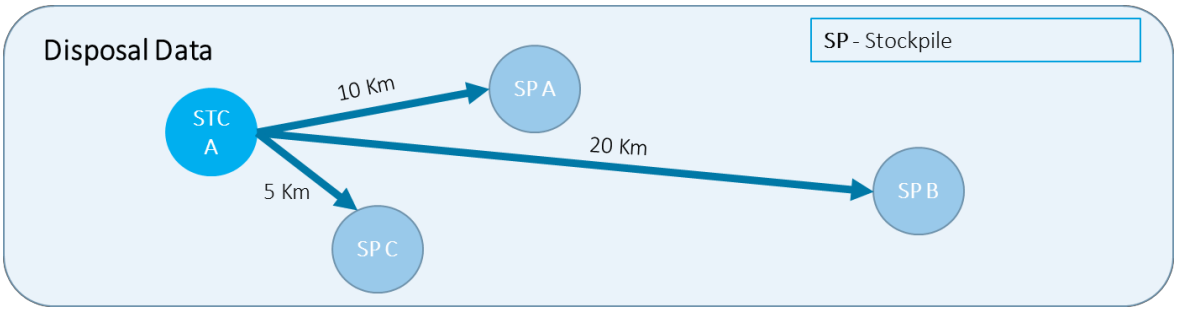


As can be seen from the trend in our numbers we are steadily reducing the volumes of sludge that we dispose of by tanker; this year we have not disposed of any sludge by tanker.

Line 4R.38 – Total measure of 'work' done in sludge disposal operations by truck

From FY17 onwards our vehicles have been able to record distances on board to automatically calculate distances travelled.

- This diagram below summarises how we have calculated the volumes of sludge disposed by truck:



Volumes disposed of by truck have significantly increased this financial year. This is because;

- We have produced more sludge this financial year
- We are incinerating les sludge at Shell Green
- We have emptied and disposed of sludge that was being held in lagoons at a number of our WwTW
- Some minor process failures at STC occurred, reducing the sludge quality standard produced. In order to appropriately dispose of the lower quality sludge we have had to transport it further away.
- We have disposed of more sludge to restoration, which is further away

Line 4R.39 – Total measure of 'work' done in sludge disposal operations (all forms of transportation)

This is a calculated line.

Line 4R.40 – Total measure of 'work' done by tanker in sludge disposal operations (by volume transported)

As can be seen in our figures we have not disposed of any sludge this year by tanker.

Line 4R.41 – Chemical P sludge as percentage of sludge produced at STW's

The percentage reported has increased this year. We have seen an increase in population, trade effluent loads and the number of treatment works with both P consents and tightened P consents.

Table 4S – Non-financial data - Sewage Treatment

There have been a number of changes this FY to the number of works that we operate and the size band that these works are in. This then changes the distribution of these works across consent categories. We have also continued with our data improvement and review project this has also identified some additional changes. This year we have particularly focused on the smaller WwTW. The table below highlights all of the changes identified (see large works table for changes in sizeband 6 works);

Works Name	Previous data	New data
New works		
Arden road	New works	1
Heron Lane	New works	1
Kennel Bank	New works	1
Runcorn Road	New works	1
South View septic tank	New works	1
Closed works		
Papcastle	SB	Closed
Brigham	SB	Closed
Sizeband increases		
Bulkeley	1	2
Cockermouth	4	5
Dalston	3	4
Dent	1	2
Duddon	2	3
Grindleton	2	3
Prospect & Oughterside	2	3
Warwick Bridge	3	4
Sizeband decreases		
Stavely	4	3
Kingsley	5	4
Non UU responsibility		
Betchton	1	Non UU
Sealand Green	1	Non UU
Consent changes		
Nantwich	0	1mg/l
Data review		
Antrobus	SB	P
Appleby	SB	TB2
Aston Lane No3	SB	P
Aston Lane No9	SB	P
Barrow Nook	SB	TB1

Works Name	Previous data	New data
Bispham Green	SAS	TA1
Brampton Carlisle	SAS	TA2
Burnley Higher Timberhill	SB	P
Calthwaite	SAS	TB2
Caton	SB	TB1
Cornhow	P	SB
Ferry House	SB	P
Holmes Chapel	SB	TB1
Fords Lane Mow Cop	SB	P
Halton West Lune	SB	SAS
Hapton	SB	P
Hassall	SB	P
Holly Grove	SB	P
Langwathby	SB	TB2
Oakmere	TB2	SB
Sandbach	SB	TB2
Shap	SAS	TA2
Swettenham	SB	P
Yew Tree Cottage (Melling)	SB	P

Block A Load received at sewage treatment works

Lines 4S.1 – 4S.7 – Load received at sewage treatment works in size bands 1-6 and total load

Load received is a good comparator between WwTW. However, it is important that each company is calculating load using the same methodology.

Line 4S.8 – Load received by trade effluent customers at treatment works

It is important to understand the loads that we receive from trade customers. These loads can be difficult to treat and can significantly increase costs at a WwTW. Again, a consistent method to calculate load is needed between companies.

Block B Number of sewage treatment works

Lines 4S.9 – 4S.15 – Number of sewage treatment works in size band 1 – 6 and total number of works

Number of works is a good comparator between WwTW. However, it must be used in conjunction with consent, load and WwTW classification information.

This is standard information linking the works to the Environment Agency consent and needs to be considered in conjunction with operating costs. In AMP6 we will start to see the introduction of lower P consents at our works, with the lowest being 0.25mg/l at Windermere WwTW. The industry has accepted that consents can go as low as 0.5mg/l in AMP6 for P however, we have accepted three limits tighter than this in Cumbria in recognition of the sensitive environments they discharge to (Grasmere 0.4mg/l, Cleator 0.4mg/l and Windermere 0.25mg/l). The costs at these works may increase because of these particularly low P consents.

In AMP7 it is likely that there will be a requirement for some plants to remove priority substances (subject to the outcome of the CIP2 collaborative R and D project).

Line 4S.16 – Current population equivalent served by STWs

The PE served by our works continues to steadily grow year on year.

Lines 4S.17 – 4S.25 Current population equivalent served by:

- **discharge relocation schemes,**
- **filter bed STWs with tightened/new P consents,**
- **activated sludge STWs with tightened/new P consents,**
- **groundwater protection schemes,**
- **STWs with a Flow1 driver scheme,**
- **STWs with tightened/new N consents,**
- **tightened/new sanitary parameter consents and STWs with tightened/new UV consents**

Further details of the projects delivered can be found in the APR commentary.

Line 4S.25 – Population equivalent treatment capacity enhancement

Population equivalent (PE) enhancement at a WwTW does not reflect the scale of the impact of a new development on wastewater infrastructure. It also discounts any investment made on the wastewater network to incorporate growth and new development. PE as a measure of investment can only be reviewed against a baseline PE from which the improvements have been made at individual WwTWs. This information is available and can give an indication of the impact on that particular WwTW but many other variables influence the cost and scope of a project such as the current headroom, the sensitivity of the watercourse, the current size, age and reliability of the individual process units, the availability of land for expansion etc. The design criteria also has assumptions associated with PE (occupancy rates, water use, infiltration etc.) that can reduce confidence in the capacity enhancement accurately reflecting the PE it can accommodate.

UU's ODI is potentially more representative of the impact of our investment. Baseline Km have already been calculated based on the contribution to that stretch of watercourse by that asset, so our investment at this site to accommodate a new development will definitely result in that watercourse being protected from the impact.

Despite this change in outcome for measuring supply demand investment the PE enhancement is useful in assessing trends of investment in relation to new development. Over time, we are able to understand whether more investment was required specifically for this purpose, or whether other project enhancements and resilience measures have reduced the need.

Table 4T – Non-financial data - Sludge treatment

Block A – Sludge treatment process

This table has been populated on the basis of the STC capability not the product that is produced.

Line 4T.1 – % sludge untreated

As a result of operational issues at some of our STC we have seen an increase in untreated sludge volumes. Some of this sludge was traded out of region to a neighbouring Water and Wastewater company for treatment and disposal.

Line 4T2 – % sludge treatment process – raw sludge liming

In order to continue to appropriately treat sludge during increased asset downtime some of our sludge treatment centres we have deployed temporary sludge liming facilities. As we are BAS accredited these liming facilities are now operated in-house.

Line 4T.3 – % sludge treatment process – conventional AD

The volumes of sludge that we treat using conventional processes remains relatively constant.

Line 4T.4 – % sludge treatment process – advanced AD

The volume if sludge that we treat using advanced processes remains relatively constant.

Line 4T.5 – % sludge treatment process – incineration of raw sludge

We do not use this treatment process.

Line 4T.6 – % sludge treatment process – incineration of digested sludge

We do not use sludge incinerator as a method of treatment. This line is not aligned to RAG4.08 as incineration of digested sludge is a disposal activity. We have reported the digested sludge incineration activity in line 4T.14.

Line 4T.7 – % sludge treatment process – phyto-conditioning/composting

We do not use this treatment process.

Line 4T.8 – % sludge treatment process – other (specify)

All of our sludge treatment processes have been included above.

Line 4T.9 – % sludge treatment process – Total

This is a calculated line.

Block B – (un-incinerated) sludge disposal route

Line 4T.10 – % sludge disposal route – landfill, raw

We have not used this disposal route.

Line 4T.11 – % sludge disposal route – landfill, partly treated

We have not used this disposal route.

Line 4T.12 – % sludge disposal route – land restoration/reclamation

We have interpreted the line to be calculated from a treated sludge figure. We have seen an increase in the volumes of sludge disposed to restoration. This is as a result of operational failure and some of our key sites (discussed earlier) and because we are disposing of some of the historic sludge from strategic sludge lagoons.

Line 4T.13 – % sludge disposal route – sludge disposed to farmland

We have interpreted the line to be calculated from a treated sludge figure (regardless of origin i.e. sludge traded in has been included in scope). We have interpreted this line to include the volume of lime addition, where relevant, as this is the physical volume of material actually disposed. We have disposed of more sludge to farmland this year as a result of increased downtime at our incinerator. The favourable dry weather conditions have allowed us to dispose of some of the sludge that was being held in temporary storage.

Line 4T.14 – % sludge disposal route – Other (specify)

We have calculated the volumes of digested sludge disposed via incineration from line 6 here as a treated sludge figure rather than a sludge produced figure.

We have excluded ash volumes produced from our incineration process from this table as it is not requested.

Continued operational issues at Shell Green has reduced the volume of sludge that we disposed of this financial year using our incinerator.

Line 4T.15 – % sludge disposal route – Total

This is a calculated line.

Table 4U – Non financial data - Properties, population and other – Wholesale wastewater

Block A – Properties and population

Line 4U.1 – Residential properties connected during the year

The number of properties connected continues to grow steadily each year.

Line 4U.2 – Business properties connected during the year

The number of Business connections continues to grow steadily each year.

Line 4U.3 – Residential properties billed unmeasured sewage

The number of unmetered Residential has decreased broadly in line with the number of meter optants.

Line 4U. 4 – Residential properties billed measured sewage

The number of metered residential has increased consistently with the number of meter optants and the number of new Residential connections.

Line 4U.5 – Residential properties billed for sewage

This is a calculated line.

Line 4U.6 – Business properties billed unmeasured sewage

The number of unmetered Business has decreased this year.

Line 4U.7 – Business properties billed measured sewage

The number of metered Business has decreased this year but we have seen an increase in the number of void properties.

Line 4U.8 – Business properties billed for sewage

This is a calculated line.

Line 4U.9 – Void properties

The number of Void properties remained stable until FY14. Since FY15 there has been an increase in voids, primarily because we have carried out a review of properties marked as occupied on our systems, but where the name of the occupier was unknown. If we have been unable to determine the identity of the customer then we would no longer raise bills in the name of "the occupier" and would report the property as Void. This replicates the definition and practice included in the Ofwat best practice revenue recognition accounting policy as set out in Appendix 3 of RAG 3.07, issued in February 2013. It also brings our revenue recognition accounting policy in line with other Water Companies. The numbers of voids continues to increase this year. We are continuing to work with retailers to ensure that occupied properties are correctly billed.

Line 4U.10 – Total number of properties

This is a calculated line

Line 4U.11 – Resident population

Population is useful for comparative purposes, however, it is important that all companies use the same methodology for estimating populations and expected growth rates. It is also import to consider population density as we believe that this will vary significantly both within and between companies and may influence opex and capex costs.

Our populations are steadily rising year on year. This growth is a combination of expected regional growth and an improvement in data quality as a result of improvements to the accuracy of the drainage area mapping data used to assign population.

Line 4U.12 – Non-resident population

The number of non-residents continues to grow steadily. This data has a lower confidence grade as it is an extrapolation from a small data set.

Block B – Other

Lines 4U.13 – 4U.15 – Energy consumption – wholesale, Energy consumption – network + and Energy consumption - sludge

These measures may be relatively poor potential explanators of cost as they will capture factors that are wholly under management control e.g. amounts of telemetry, and so cannot be considered to be entirely exogenous.

We believe that the water electricity consumption dataset is complete as this has been based on meter point administration number (MPAN) references. In previous years we undertook a desk based exercise to split the electricity consumption by water resources and network plus. Further work has been completed to categorise MPAN numbers by upstream service enabling us to produce a more accurate allocation based on site consumption. This change in methodology accounts for a greater proportion of energy costs being allocated to sludge.

Diesel consumption (associated with energy generation) accounts for a very small proportion of energy consumption and has not been included in the energy consumption figures, because the data is not currently available.

Line 4U.16 – Population resident in National Parks, SSSIs and Areas of Outstanding Natural Beauty (AONB)

We have calculated the population that resides within areas of special designation. The population within these areas has slightly reduced this year. There have been some changes to the address base data that we use that may contribute to the reduction. Some properties have been classified as holiday lets, which were previously classed as residential. The location on some properties has been updated, which now locates them just outside the boundary.

Line 4U.17 – Total sewerage catchment area

We have been reviewing data held within GIS which records the drainage areas around our WwTW and Ww assets. This review has resulted in a small reduction in the area of wastewater catchment recorded.

Line 4U.18 – Designated bathing waters

We currently have 30 designated bathing waters in our region. There currently no consultations for the designation of additional bathing waters, however there has been a consultation on the de-designation of the bathing water at Allonby South, we anticipate a decision on this consultation prior to the 2019 bathing season. There is the potential for additional designation of bathing waters particularly as open water swimming becomes more popular and we predict that over time more lakes will become designated bathing waters. We will treat newly designated bathing waters in the same manner promoting improvements where appropriate and supported by customers, to ensure our assets are not preventing bathing waters achieving excellent status by 2040.

The current population equivalent served by wastewater assets that have been upgraded due to bathing waters investment is 1.9 million. These have received significant upgrades to reduce the risk of bacteria or viruses reaching these sensitive locations. This is a significant proportion of the population. Although there is a reduction in the number of designated bathing waters, the shellfish beds and the requirement to protect them remains. Therefore there will not be a reduction in operational costs due to the de-designation of bathing waters.

There remains a significant gap between the performance of bathing waters in the North West when compared with the rest of England which may result in the need for further investment. Customer insight and research into their views is key to whether enhancement beyond the current minimum sufficient standard is required. During AMP7 we will be carrying out partnership and catchment investigations to further investigate potential improvements. It is crucial that we ensure we maintain the performance of our assets to secure the resilience of these bathing waters in protecting the public health of our customers.

Line 4U.19 – Number of intermittent discharge sites with event duration monitoring

We will continue to deliver our substantial programme of monitor installations over the remainder of the AMP6 period.

Line 4U.20 – Number of monitors for flow monitoring at STWs

We have installed one flow monitor this financial year, at Motherby WwTW.

Line 4U.21 – Number of odour related complaints

Numbers of odour related complaints remains reasonably constant. A small error was located in last years reported figure, 70 complaints had incorrectly coded and should be 1,906. The dry weather experienced over the past year has resulted in a small increase in odour complaints about our network assets.

Line 4U.22 – Volume of storage provided at CSOs, storm tanks, etc. to meet spill frequency objectives

We believe that volume of storage provided to meet spill frequency can be a good indicator for financial models as long as all companies apply a consistent definition. It must be noted that the solution provided to respond to an NEP driver may be different between companies and the scale of the programme of work may vary. This may lead to the construction of alternative processes, which provide the same benefits without the need for significant storage. We have delivered three schemes this year which have provided additional storage volume to meet spill frequency objectives: Anchorsholme (1,500m3), Preston WwTW (40,300m3) and Chatsworth Avenue / Manchester Square (4,000m3).

Line 4U.23 – Total volume of network storage

The volume on network storage continues to grow steadily as we build and adopt assets. This year we have included in our figures for the first time this year the Great Culvert, Wirral and the Mepas outfalls. These assets are not owned by UU but are leased. Under the conditions of the leases we are responsible for operation and maintaining these assets. We could not correctly operate our wastewater facilities and both Birkenhead and Liverpool without these assets.

Table 4V – Operating cost analysis – Water resources

Block A – Opex analysis

Water resource cost analysis

Line 4V.1 – Power

All energy costs including climate change levy and the carbon reduction commitment are included in this line. Any costs saving from power generated internally is netted off these costs. Where possible costs are allocated down to supply point level and therefore the associated asset class within the Water resources price control. In comparison to FY18 power costs have increased which is mainly attributable to the dry weather event in FY19.

Line 4V.2 – Income treated as negative expenditure

Income received from Renewable Obligation Certificates, Gas Exports and Electricity Exports. There is minimal value allocated to Water Resources as this primarily only relates to generation at one site.

Line 4.V3 - Abstraction charges/ discharge consents

Total cost of abstraction charges and service charges from the Environment Agency (EA), Canal & River Trust and Severn Trent (service charge for use of Vyrnwy). For EA abstraction charges the costs are individually listed by each licence and therefore the associated Water Resource asset types, using this information, a percentage of total cost for each water resource category is calculated. This is a new cost line in Table 4V within RR19. In RR18, Abstraction Charges was included within Line 7 - Other operating expenditure excluding renewals – Direct. On a comparable basis the costs have remained similar between RR18 and RR19 with the exception of inflation.

Line 4.V4 – Bulk supplies

We do not incur costs in this area

Lines 4V.5 – Renewals expensed in year (infrastructure)

We have allocated the IRE expenditure shown on Table 4D against impounding reservoirs. This is a new cost line in Table 4V within RR19. In RR18, Renewals expensed in year (infrastructure) was included within Line 7 - Other operating expenditure excluding renewals – Direct. On a comparable basis the costs have reduced in line with our Impounding Reservoir programme.

Lines 4V.6 – Renewals expensed in year (non infrastructure)

We have not included any expenditure within this line.

Line 4V.7 - Other operating expenditure excluding renewals – direct

Overall cost reduction due to the inclusion of Abstraction Charges and IRE reported in this line in FY18. In FY19, these are reported separately on Lines 3 & 5. This results in a cost increase to FY19 primarily as a result of the dry weather event of FY19.

Line 4V.8 - Other operating expenditure excluding renewals – indirect

We have no comments on this line.

Line 4V.9 - Total functional expenditure

This is the sum of lines 1-8.

Line 4V.10 - Local authority and Cumulo rates

The allocation of cost is based on PR09 data for GMEAV. Given the large GMEAV of most water resource assets any variation between asset types would be minimal as a result. There is an increase in FY19 primarily as a result of a refund received in FY18 proportionately allocated to Water Resources as well as an inflationary rise on the overall cost of rates.

Line 4V.11 - Total operating expenditure (excluding 3rd party)

This is the sum of lines 9 and 10.

Line 4V.12 – Depreciation

The reduction in depreciation is due to lower accelerated depreciation in FY19, and more assets coming out of life than being commissioned in the year.

Line 4V.13 - Total operating costs (excluding 3rd party)

This is the sum of lines 11 and 12.

Block B – Other expenditure - wholesale water

Line 4V.14 – Employment costs – directly attributable

The gross salaries and wages for all employees directly attributable to the water service are included in this line. Costs have increased within FY19 primarily as a result of change in the allocation between direct and indirectly attributable methodology.

Line 4V.15 – Employment costs – indirectly attributed

The gross salaries and wages for all employees indirectly attributable to the water service are included in this line. Costs have decreased within FY19 primarily as a result of change in the allocation between direct and indirectly attributable methodology.

Line 4V.16 – Number FTEs – directly attributed

The number of FTEs has increased within FY19 primarily as a result of change in the allocation between direct and indirectly attributable methodology. However the underlying FTE number has remained reasonably constant over the last four years.

Line 4V.17 – Number FTEs - indirectly attributed

The number of FTEs has increased within FY19 primarily as a result of change in the allocation between direct and indirectly attributable methodology. However the underlying FTE number has remained reasonably constant over the last four years.

Line 4V.18 – Costs associated with Traffic Management Act

Costs this year include permit and administrative costs associated with the permit (manpower and system) and show an underlying increase in line with additional Highways Authorities adopting permit schemes as well as additional activity related to dry weather activity in FY19.

Block C – Service charges

Line 4V.19 – Canal & River Trust abstraction charges/ discharge consents

The costs associated with Canal & River Trust service charges and is 100% allocated to Raw Water Abstraction. This relates to the abstraction of Water from Llangollen Canal.

Line 4V.20– Environment Agency abstraction charges/ discharge consents

Environment Agency (EA) service charges / discharge consents are directly linked based upon data linked back to individual permits and consents. The EA service charge is allocated to Raw Water Abstraction and the Discharge Consent cost is allocated to Water Treatment.

Line 4V.21 – Other abstraction charges/ discharge consents

This line relates to service charge paid to Severn Trent for abstraction of water from Vyrnwy.

Line 4V.22 – Statutory water softening

We do not incur costs associated with statutory water softening.

Table 4W – Operating cost analysis – sludge transport, treatment and disposal

Sludge treatment opex by treatment type and Sludge disposal route

In block A sludge transport the pipeline column in negligible. Our main sludge pipeline, the Mersey Valley Sludge Pipeline transports treated sludge and so we have included costs associated with this pipeline in the sludge treatment other column in block B.

Costs for our incinerator at Shell Green are included in block C sludge disposal other.

Lines 4W.1, 4W.14 and 4W.27 – Power

All energy costs including climate change levy and the carbon reduction commitment are included in this line. Any costs saving from power generated internally is netted off these costs.

Lines 4W.2, 4W.15 and 4W.28 – Income treated as negative expenditure

This line contains income from renewables generation, bioresource products and back generation to The National Grid.

Lines 4W.3, 4W.16 and 4W.29– Discharge consents

Charges have grown this year due to an increase in the discharge licence fees following the charges reform by the Environment Agency.

Lines 4W4, 4W.17 and 4W.30 – Bulk supply

We have no comments on this line.

Lines 4W.5, 4W.18 and 4W.31 – Renewals expensed in year (infrastructure)

We have allocated the IRE expenditure shown on Table 4E across the more detailed treatment category breakdown within table 4W. No IRE expenditure is incurred in sludge transport or disposal, with the expenditure incurred in sludge treatment being on our treated sludge pipeline and allocated to the Incineration of digested Sludge column.

Lines 4W.6, 4W.19 and 4W.32 – Renewals expensed in year (non infrastructure)

We have not included any expenditure within this line.

Lines 4W.7, 4W.20 and 4W.33 – Other operating expenditure excluding renewals – direct

We have no comments on this line.

Lines 4W.8, 4W.21 and 4W.34 – Other operating expenditure excluding renewals – indirect

We have no comments on this line.

Lines 4W.9, 4W.22 and 4W.35 – Total functional expenditure

These are calculated lines.

Lines 4W.10, 4W.23 and 4W.36 – Local authority and Cumulo rates

We have no comments on this line.

Lines 4W.11, 4W.24 4W.37 – Total operating costs (excluding 3rd party)

These are calculated lines.

Lines 4W12, 4W 25 4W.38 – Depreciation

Line 12 Sludge Transport depreciation is included in the table for the first time. The sludge pipeline column includes costs relating to raw sludge pipelines. The costs for the Mersey Valley Sludge Pipeline, which transports treated sludge, is included in the sludge treatment other column.

Line 25 Sludge Treatment depreciation has increased in the year largely due to the high value of commissioning in the year including depreciation of the new Regional Sludge Operations Management System and new sludge processes at Leigh Wastewater Treatment Works.

Line 38 Sludge Disposal depreciation. This line includes depreciation for the Shell Green incinerator in the 'Other' column. Although line 25 includes a column for incineration of digested sludge, RAG 4.07 requires that costs of treated sludge incineration be classified as Sludge Disposal. These costs have therefore been included in the sludge disposal other column.

Lines 4W13, 4W 26 4W.39 – Total operating costs (excluding 3rd party)

These are calculated lines.

Line 4W.40 – Employment costs – directly attributable

The gross salaries and wages for all employees directly attributable to the wastewater service are included in this line.

Line 4W.41 – Employment costs – indirectly attributed

The gross salaries and wages for all employees indirectly attributable to the wastewater service are included in this line.

Line 4W.42 – Number FTEs – directly attributed

The number of FTEs has remained reasonably constant over the last four years.

Line 4W.43 – Number FTEs - indirectly attributed

The FTEs all employees indirectly attributable to the wastewater service are included in this line.

Line 4W.44 – Costs associated with Traffic Management Act

Costs this year include permit and administrative costs associated with the permit (manpower and system).

Line 4W.45 – Costs associated with Industrial Emissions Directive (IED)

Although IED came in to law, Water Companies as a whole appealed the regulations and therefore the IED permits are in abeyance. We are currently operating without prejudice under EPR (PPC) we have included the costs of PPC compliance as this will form part of the IED requirements. The reported costs for PPC monitoring and reporting include the permit fees and manpower costs only. The PR19 data table submission and the IED Special factor claim will include additional costs for maintenance, power and fees for new permits. Subsequent APR tables will be populated on the same basis as the PR19 submission. We do not believe that the PPC costs are representative of IED costs. Should the decision by DEFRA uphold the changes in regulations then we will faced with circa 33 sites needing significant investment to bring them up

to IED compliance and ongoing maintenance, monitoring and reporting costs. We have incurred a small amount of legal costs associated with preparing and submitting the appeals but these are not reported here.

Line 4W.46 – Canal and River Trust service charges and discharge consents

These lines will reconcile back to table 4E discharge consents.

Line 4W.47 – Environment Agency service charges/discharge consents

These lines will reconcile back to table 4E discharge consents.

Line 4W.48 – Other service charges/permits

These lines will reconcile back to table 4E discharge consents.

Bidding Activity: Bioresources market

Assurance

We have followed detailed and documented methodologies in populating bidding activity: bioresources market table and the data has been subject to review by internal subject matter experts and an external audit.

One issue we have identified in completing bidding activity is that a number of definitions appear to be open to interpretation and this may result in inconsistent methodologies between WaSC's.

Bidding activity

We have a standard set of criteria that are used to appraise bids from third parties;

- Applicant background
- Financial standing
- Capability
- Experience
- Customer service
- Environment and sustainability
- Health and safety
- Quality
- Business continuity
- Good standing

These criteria are applied to ensure that we engage with suppliers who can provide competent, compliant and resilient services that deliver best value to our customers.

We undertake regular market testing exercises to benchmark the performance of our current service delivery functions (both internal and third party). In the current reporting period we tendered for inter-works tankering, the outcome of which increased the number of suppliers from 13 to 15, all of which are on five year contracts.

Market share

We currently outsource a significant proportion of our production line, including inter-works transportation and agricultural recycling services.

With respect to treatment, we have engaged in short term trading with Severn Trent with a number of our South Cheshire sites exporting liquid sludge to their Strongford treatment facility in Stoke-on-Trent. We are also exploring an opportunity to engage in a long term raw cake export agreement to Strongford in AMP7. In addition to Severn Trent, we are actively negotiating with other neighbouring water companies to establish 'spot trade' contracts for contingency management. Finally, we have some liming undertaken by a third party in Cumbria, however this is planned to cease within the next reporting period as digestion capacity becomes available.

Going forward we anticipate that more sludge will be treated externally if the market can provide better value for our customers. Initially we believe this will be through trading with other WaSC's until the market matures and interest develops from third parties (i.e. Other Organic Waste companies).

Risks, issues and barriers

We believe the existing markets relating to transportation and recycling are well established and there are high levels of engagement. However this level of engagement has not yet been reflected in the market for treatment, which at present is largely confined to trading between WaSC's or exporting to liming companies (an established industry outlet).

Although we were one of the first WaSC's to publish Market Information in October 2017 we have not received any substantive offers from third parties to provide treatment services. Despite the compelling arguments for a convergence between sludge and Other Organic Waste (OOW) markets, we believe the complex regulatory landscape is acting as a barrier to this occurring. Environmental legislation has not evolved to reflect the increasing alignment between OOW and sludge markets with the mutually exclusive Sludge Use in Agriculture regulations and Publicly Available Specification (PAS) specifications acting as a deterrent to co-digestion.

In addition to the environmental obstacles, there are other significant barriers to new entrants looking to treat sludge. For example, it is commonplace within comparable sectors – such as municipal waste or food AD – to commit to long term agreements which give commercial operators the financial security to invest in treatment facilities. However, the current AMP cycle makes it difficult for WaSC's to commit beyond a five year horizon.

With respect to sludge trading, our experience to date suggests that there are two significant challenges to overcome.

Firstly, across the sector there appears to be a shortage of spare digestion capacity which is constraining potential opportunities to trade and most WaSC's are seeking to export rather than import. As companies drive for greater efficiencies in AMP7 it is likely that available capacity will become even more limited.

Secondly, where trades seem viable from a geographic perspective (i.e. a shorter distance to a neighbouring WaSC's treatment facility), we have found that in some instances the 'gate fee' we are being quoted is greater than the efficiency associated with reduced transportation, making the overall trade more expensive than treating indigenously.

Engagement activities/initiatives

We are keen to embrace the market and our AMP7 delivery model is premised on an increased utilisation of third parties to deliver elements of our production line, especially in relation to treatment.

We have interrogated and modelled the Market Information published by WaSC's and where potential trading opportunities have been identified we have proactively engaged with the relevant parties. We are actively trading with one neighbouring WaSC and exploring trading opportunities with three others. We have also sought to widen our thinking beyond trading and are exploring more strategic partnering going forward, such as investment in common assets, sharing of land banks and co-ordination of planned shutdowns to ensure capacity resilience across the combined asset bases.

From a procurement perspective we have undertaken a tendering exercise for inter-works tankering, resulting in contracts being awarded to a number of new suppliers. We have also undertaken an extensive market testing exercise with an external consultancy to identify the most efficient way of delivering our services. The output of this activity will lead to further engagement with the market to support delivery of a new operating model.

We are also utilising United Utilities' Innovation Lab to engage with third parties in identifying novel and pioneering solutions which can transform the way Bioresource Services are delivered. The Innovation Lab

has allowed us to reach out beyond our traditional supply chain to engage with a new demographic of companies – such as entrepreneurial start-ups and SME's – providing them with a platform to share their ideas and supporting them in development of commercial solutions.

We have also noted the recent creation of an organic waste trading platform called 'BioTrading' by Veolia. We are engaging with BioTrading to identify whether there may be an opportunity for us to utilise this platform to trade sludge with third parties.

Finally, we are active members of the Anaerobic Digestion and Biogas Association (ADBA) which provides us with an opportunity to engage with the wider AD market (i.e. Other Organic Waste sector) to identify mutually beneficial opportunities.