NORTHUMBRIAN WATER living water | ESSEX&SUFFOLK WATER living water

DATA ASSURANCE SUMMARY

2019/20

ABOUT THIS DOCUMENT

We publish a range of information about our services and performance, including how we are performing against the commitments we made in our 2015-2020 Business Plan. This helps to provide our customers and stakeholders with assurance that we are delivering what they have told us they need and want from Northumbrian Water and Essex & Suffolk Water.

It is important that we have robust assurance arrangements in place to make sure this information is accurate, clear and transparent. This is essential to building and maintaining a high level of trust and confidence with our customers and stakeholders.

In March 2019, following consultation with customers and stakeholders, we published our **Assurance Plan for 2020/21**. Consistent with guidance from our economic regulator, Ofwat, this document firstly assessed any strengths, risks and weaknesses associated with either meeting our obligations and commitments, or providing information of appropriate quality. It then detailed the checks, or assurance, we planned to put in place to address these risks and make sure we remain on track.

A significant proportion of this assurance is targeted at making sure that information that we publish in our **Annual Performance Report (APR)** is of appropriate quality. This assurance update sits alongside our APR and provides a summary of the outcome of this assurance.

CONTENTS

SUMMARY OF OUR ASSURANCE APPROACH

This section describes how our governance and assurance arrangements are used to make sure the information we provide can be trusted.

The diagram on **page 6** illustrates the tiers of assurance within this framework, including:

Board Oversight

The Board has ownership of the arrangements for governance and assurance of regulatory submissions and reporting. This is monitored and controlled through the Board's Audit Committee and Risk & Compliance Sub-committee, which report regularly to the Board.

Risk Management

We use a data risk assessment, and a strengths, risks and weaknesses review, to determine levels of risk and target assurance activity. This is a robust and mature process and is embedded within the company's risk activity. The Board sets the tone for risk management, determines the appropriate risk appetite, monitors the management of fundamental risk and approves major decisions affecting the company's risk profile.

Management Assurance

Our Executive Leadership Team (ELT) implements the Board's strategies and closely monitors performance. This includes making sure sufficient and suitable resources (human and financial) are applied to scrutinise performance and identify and manage risk. It also makes sure there is appropriate assignment of responsibilities, corporate structures and reporting lines and accountabilities, supported by annual positive assurances on systems and controls.

Business Assurance

We have many teams that are separate from the operational activities which monitor, capture and manage the data we report, for example, Intelligence and Analytics, Information Systems Security, and Health, Safety, Environment and Quality.

This also includes our Internal Audit Team. Accountable directly to the Audit Committee, the team provides strong, independent assurance. As such their remit sits across this tier and the following one.

Independent Assurance

Our business assurance teams are supplemented with external specialist providers where we require technical and/or external assurance.

In November 2017, we appointed PricewaterhouseCoopers LLP (PwC) as our external technical assurers. PwC's assurance practice is the largest in the UK and will provide both leadership and industry leading best practice when it comes to delivering assurance activities.

We engaged PwC to carry out technical assurance work on various non-financial performance areas for our Annual Performance Reporting 2019/20.

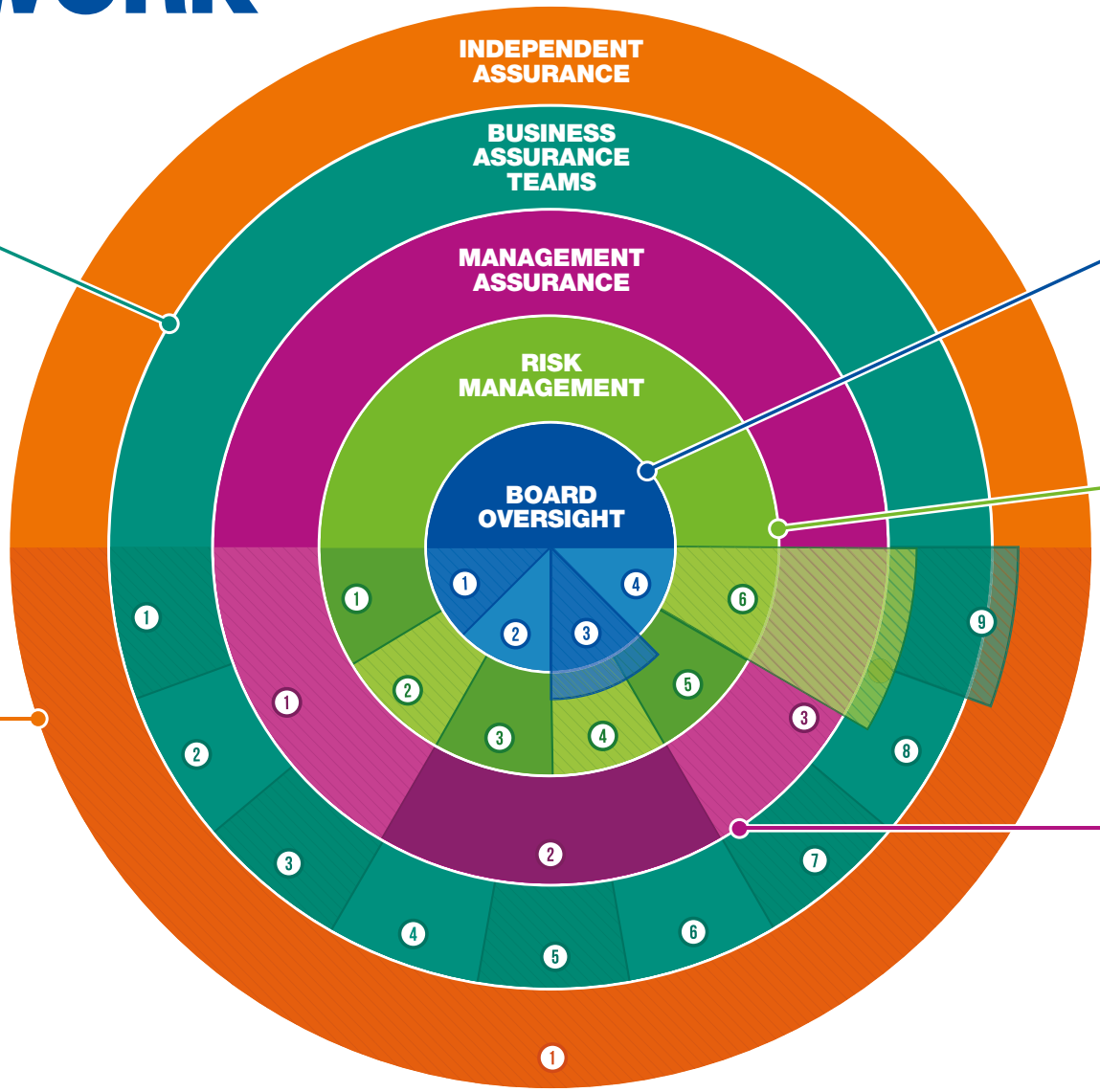
PwC has carried out work as a limited assurance engagement in accordance with the International Standard on Assurance Engagements 3000 (Revised) ["ISAE 3000"], issued by the International Auditing and Assurance Standards Board.

The scope and conclusions from PwC's assurance activities on our Annual Performance Report for 2019/20 can be found in this Data Assurance Summary, on **page 24**.

Our Independent financial auditors, Deloitte, have audited the Regulatory Accounting Statements in our APR for the year ended 31 March 2020. This comprises the regulatory financial reporting tables 1A to 1E plus lines 1 to 9, 13, 19 and 21 to 23 of table 1F and the regulatory price review and other segmental reporting tables.

Deloitte's audit work is in accordance with International Standards on Auditing (UK), including ISA (UK) 800, and applicable law and having regard to the guidance contained in ICAEW Technical Release Tech 02/16 AFF 'Reporting to Regulators on Regulatory Accounts' issued by the Institute of Chartered Accounts in England and Wales. Their full report can be found in the Annual Performance Report **here**.

ASSURANCE FRAMEWORK



BUSINESS ASSURANCE TEAMS

1. Health, Safety, Environment and Quality
2. Intelligence and Analytics
3. Economic Regulation
4. Wastewater Compliance
5. Water Quality
6. Business Continuity
7. Scientific Services Accreditation Team
8. Information Systems Security
9. Internal Audit

INDEPENDENT ASSURANCE

1. Numerous external assurance providers including the likes of:
   - Deloitte (financial auditor)
   - AFNOR (external accreditation
   - KPMG (internal audit co-source partner)
   - PwC External Technical Auditor - regulatory reporting

BOARD OVERSIGHT

1. Board
2. Remuneration Committee
3. Risk & Compliance Committee
4. Audit Committee

RISK MANAGEMENT

1. Strategic Risk Model
2. Corporate Risk Model (supported by a strong risk management framework)
3. Detailed Risk Model
4. Data Risk Model
5. Risk Champions
6. Assurance Forum

MANAGEMENT ASSURANCE

1. Departmental Compliance Programmes
2. Executive Leadership Team and its sub-groups
3. Systems Controls

Figure 1: Our Assurance Framework

This assurance framework was applied to our 2015-2020 Business Plan and enabled our Board to satisfy itself that the information associated with the development of our performance commitments was robust.

The same framework applies to the information needed to report our performance against these commitments. A critical part of this framework is our approach to risk which includes the following steps:

- Understanding how data for each measure of success is managed from the point at which it is collected in the field, through the way it is collated in order to appear on a final report.

- Applying a formal risk assessment to each measure of success. This reviews:
    - The likelihood of a reporting error due to the complexity of a performance measure and the manner in which the data is collected.
    - The impact should an error occur, particularly with regard to customers' trust and confidence, financial incentives and our reputation.
    - Checks and balances, in the form of data quality controls are used to mitigate risks. These controls may be procedural, audit based, or built into our IT systems. We review the effectiveness of these controls as part of our risk assessment and they are rated as good, acceptable or ineffective.

OUR APPROACH TO IDENTIFYING STRENGTHS, RISKS AND WEAKNESSES

Our approach to identifying strengths, risks and weaknesses is based on an internal review and external engagement.

INTERNAL REVIEW

We conduct an internal review to identify any risks associated with providing information of appropriate quality or meeting our performance commitments. The results of previous assurance and audit activities are a valuable input into this exercise, as are robust processes to track progress against delivery of our performance commitments that highlight the need to make further interventions as and when required.

This is further strengthened by the Board and Audit Committee, which have reviewed our assessment of strengths, risks and weaknesses and Draft Assurance Plan. Our external partner, PricewaterhouseCoopers (PwC), has provided independent input to this review to make sure our approach is consistent with best practice. Feedback from all these parties has been reflected in this document.

As a regulated business, we have a duty to operate within a framework that aligns the interests of our customers, stakeholders and shareholders with statutory duties. Through Acts of Parliament and European Directives, legislation is in place covering all areas of our business including water supply, sewerage services, drinking water quality, environmental standards, customer service, flood and drought protection as well as the welfare of our employees and customers.

We review and monitor compliance with these obligations on a regular basis and report each year in our **Annual Performance Report** that the company has a full understanding of, and is meeting, its obligations. This requires our Board to confirm that it has satisfied itself that the company has sufficient processes and internal systems of control to fully meet those obligations.

EXTERNAL REVIEW

CONTINUOUS CUSTOMER AND STAKEHOLDER ENGAGEMENT

The relationships we have with our customers and key stakeholders are very important. We actively engage with them to provide assurance that we are meeting expectations and to maintain trust and confidence. Our key stakeholders in this context are:

- **Our Customers.**
- **The Water Forum (Customer Challenge Groups).**
- **CCW – The voice for water consumers.**
- **Ofwat.**
- **The Drinking Water Inspectorate (DWI).**
- **The Environment Agency (EA).**
- **Natural England.**
- **Local Authorities.**
- **Business and Environmental Groups.**
- **Regional, Trade and National Media.**
- **Elected Representatives, Members of Parliament and Political Parties.**
- **Government Departments.**

Engagement is achieved through regular conversations and performance review meetings with these stakeholders; understanding their expectations relating to performance, data reporting and communications, while being open to constructive feedback.

Our customers are at the heart of everything we do, the services we provide are essential for life and wellbeing, and our customers should always have trust and confidence in what we do.
Assurance that we are delivering the services that our customers and stakeholders need and want begins with an extensive programme of customer research, participation and engagement to gain insights about their views and priorities.

We continually engage with our customers and stakeholders to assure them that we are meeting their expectations and to maintain their trust and confidence. Our goal is to give every single customer the opportunity to have a strong voice and engage with us, with at least two million customers participating by 2025.

We carry out a programme of bespoke research and engagement activity around strategic aspects of service, including operations, inclusivity, charges and the future. This is complemented by regular customer research activity to understand trends in satisfaction, monitor the success of campaigns and understand our customers' priorities.

Our innovative customer research, participation and engagement programme for our 2015-20 Business Plan was planned around three phases of gathering customer insights.

The insight and valuable feedback we received through our engagement helped us shape our 2020-2025 Business Plan, so that it is high quality, ambitious and innovative.

Having multiple communication channels open for our customers is important, in order to make it easy for customers to talk to us. Supporting this is our website, **www.welivewater.co.uk**, which provides information on our performance in a customer friendly way, telling our stories alongside facts and figures on performance. We also require assurance that we are providing great customer service in line with our 'Unrivalled Customer Experience Strategy' and Inclusivity Strategy.

Benchmarking ourselves against others is a key part of making sure that we are delivering the right services, in particular helping to identify any areas where we may need to improve, or to adopt any best practices from elsewhere in the industry, or beyond.

Effective benchmarking is only possible if robust comparative information is available. We took an active and leading role in the development of the industry's strategic dashboard, which makes it easy for customers and stakeholders to view industry comparative performance information. We signpost our customers and stakeholders to the strategic dashboard from **www.welivewater.co.uk**.

We make full use of this comparative information as part of our engagement activities, enabling our customers and stakeholders to provide a more informed view of their future requirements. Feedback from our customer and stakeholder research and engagement, alongside other insight, is provided to our Board, ELT and Water Forum on a regular basis. Our ELT and Independent Non-Executive Directors are regular attendees at customer engagement events and Water Forum meetings.

The Water Forum is the name of our Customer Challenge Group, who are an independent group of industry regulators, subject experts and independent members.

"We very much welcome the opportunity to provide robust, year-round challenge to the Company about how it is engaging with and performing for its customers, and how its plans and strategies are delivering the outcomes that customers have said are important to them."
Melanie Laws, Water Forum Chair

SPECIFIC ENGAGEMENT FINDINGS FOR OUR 2020/21 ASSURANCE PLAN

OUR CUSTOMERS

Our Consultation on Strengths, Risks and Weaknesses and Draft Assurance Plan was published 0n 30 November 2019 and closed on 10 January 2020. We also published a summarised version on our **www.welivewater.co.uk** websites.

We were delighted to receive more than 6,500 responses from our customers containing rich qualitative insights, as well as quantitative feedback.

86%
of respondents were confident that the information we publish will be correct and true.

91%
of respondents said our plans to be a company you can trust are clear.

86%
of respondents didn't think anything else needed to be added to the draft plan.

Where customers thought that there was something missing from our Draft Assurance Plan, we asked them what was missing. The main feedback from customers was that:

- We needed to be clearer about how our charges are set and how we ensure they are fair on those who are financially struggling. In response, we provided links to that additional information in our Final Assurance Plan 2020/21.
- Some customers wanted more detail on our policies, procedures and performance. In response, we added web links to where that information can be found.

The comments that we received from customers that related to operational matters have been shared within the company so that we can improve service.

OUR STAKEHOLDERS

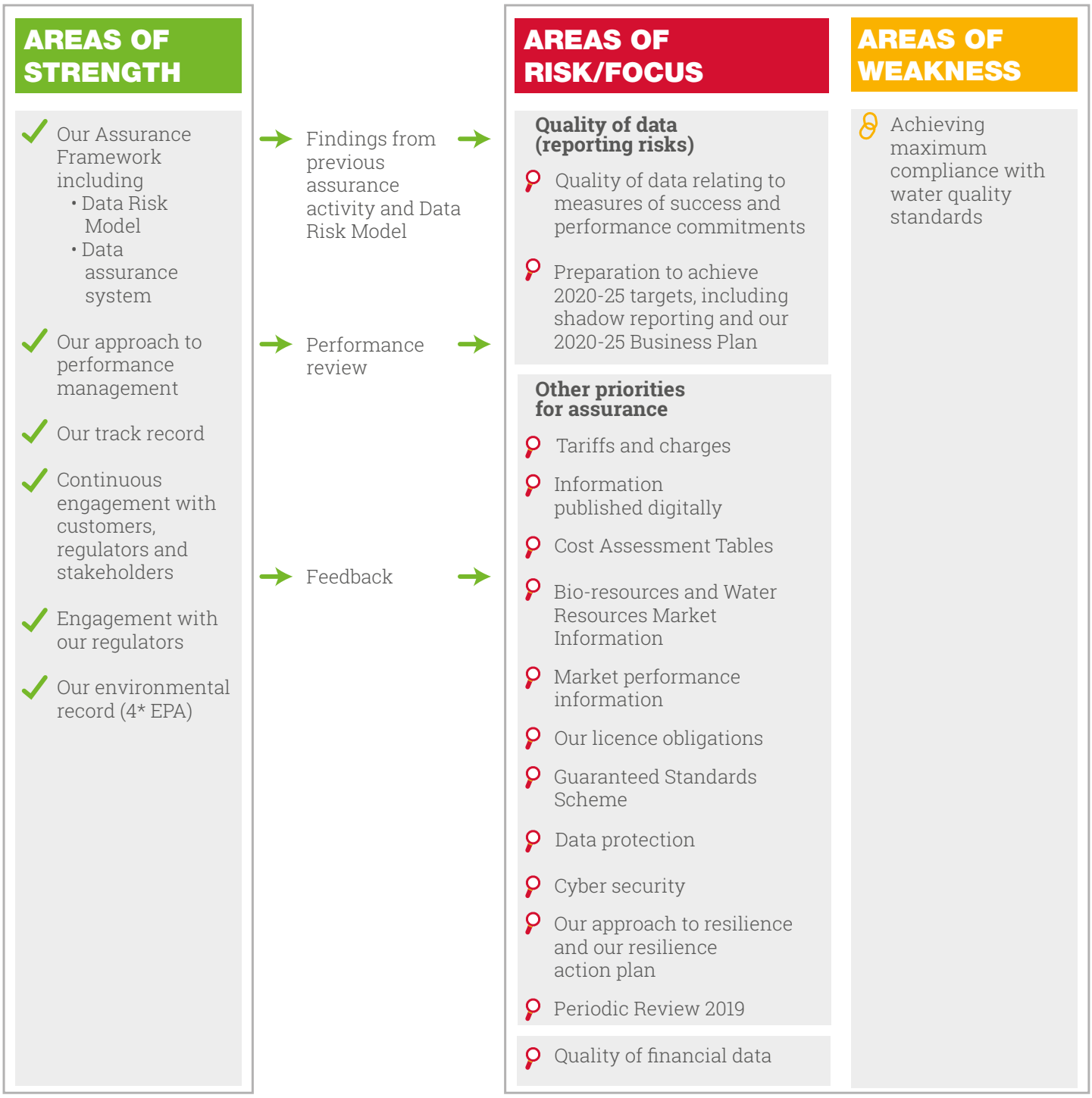
The majority of our engagement with stakeholders is carried out on a continuous basis, through regular and ongoing conversations and performance reviews. In addition to this we actively consulted with our key stakeholders to seek feedback on our Consultation on Strengths, Risks and Weaknesses and Draft Assurance Plan. The feedback that we received was positive.

OUR STRENGTHS, RISKS AND WEAKNESSES

OUR STRENGTHS, RISKS AND WEAKNESSES

The figure below summarises our assessment of strengths, risks and weaknesses associated with providing quality information and delivering on our regulatory obligations and the performance commitments we made to our customers and stakeholders as part of our 2015-20 Business Plan.

Figure 2: How we assess areas of strength, risk and weakness



Our Assurance Plan 2020/21 shares full details of our Strengths, Risks and Weaknesses. The remainder of this document focuses on our priorities for Data Assurance.

The following tables focus on the assurance activity we planned to carry out to make sure we are adequately managing data assurance and that the information published in our **Annual Performance Report** is of appropriate quality. The right hand column indicates the assurance actually carried out and the findings.

To be completely transparent and open, we have included a section on the financial reporting assurance that is applied to our Annual Performance Report and Regulatory Accounts by Deloitte.

Our **Final Assurance Plan** sets out in detail our risk based approach for assuring this data, including a breakdown of specific assurance activities for each measure of success, along with assurance providers. Details are provided in the following Data Assurance Summary tables.

QUALITY OF DATA RELATING TO MEASURES OF SUCCESS AND PERFORMANCE COMMITMENTS

Areas of risk	Planned assurance activity 2019/20 (applied to 2018/19 performance)	Completed	Assurance Findings / Response
DRINKING WATER QUALITY COMPLIANCE This is our overall drinking water quality compliance based on 39 water quality parameters determined by the Drinking Water Inspectorate.	• Robust quality assurance procedures audited by our QA Team. • External assessment of above processes to retain UKAS certificate. • PwC to confirm understanding of the reporting process for this area by performing interviews, walkthroughs and evidence inspection. • PwC will ascertain how regulatory guidance has been interpreted and assess whether it is appropriate. • Test procedures carried out by PwC will agree data back to underlying systems as well a sample testing to verify that it has been appropriately measured, recorded, collated and reported. Testing will take into account the accuracy and completeness of the reported data	✓ ✓ ✓ ✓ ✓	• PwC performed independent assurance procedures in relation to specific Drinking Water Quality annual performance information. • The independent assurance report, including the assurance opinion, can be found on **page 24**.
INTERRUPTIONS TO WATER SUPPLY This measure is calculated using the total duration of all water supply interruptions of more than three hours, divided by the number of properties the company supplies, to give an average interruption time in minutes and seconds per year. The measure includes planned interruptions, unplanned interruptions and interruptions caused by the actions of third parties, for Example resulting from a power cut. The measure will be assessed on the company's regulatory year performance.	• Our Internal Audit Team will confirm understanding of the reporting process for interruptions to supply by performing interviews, walkthroughs and evidence inspection. • Our Internal Audit Team will ascertain how regulatory guidance for reporting interruptions to supply has been interpreted and assess whether it is appropriate. • Test procedures by our Internal Audit Team will agree data back to underlying systems as well as sample testing to verify that it has been appropriately measured, recorded, collated and reported. Testing will take into account the accuracy and completeness of the reported data. • Our Internal Audit Team will also audit progress against revised reporting guidance due to be introduced from 2020-2021 onwards. The review in 2018/19 will assess whether we are on track to meet 2020 targets (glide path approach to meeting future reporting requirements).	✓ ✓ ✓ ✓	• Our Internal Audit Team carried out a system audit and reviewed final year end performance data. No material issues were found. • Our Internal Audit Team has worked closely with the reporting Team to ensure we are compliant with new guidance due to be introduced from 1 April 2020.
POLLUTION INCIDENTS This measure is the number of category 3 pollution, attributable to our operations. It includes the number of category 3 pollution events from a discharge or escape of a pollutant from the company's water and sewerage assets affecting rivers or coastal waters	• PwC to confirm understanding of the reporting process for pollution incidents by performing interviews, walkthroughs and evidence inspection. • PwC will ascertain how regulatory guidance for pollution incidents have been interpreted and assess whether it is appropriate. • Test procedures by PwC will agree data back to underlying systems as well a sample testing to verify that it has been appropriately measured, recorded, collated and reported. Testing will take into account the accuracy and completeness of the reported data.	✓ ✓ ✓	• PwC performed independent assurance procedures in relation to specific Drinking Water Quality annual performance information. • The independent assurance report, including the assurance opinion, can be found on **page 24.**

Areas of risk	Planned assurance activity 2020/21 (applied to 2019/20 performance)	Completed	Assurance Findings / Response
SEWER FLOODING Includes internal and external flooding and repeat flooding. These measures track the number of properties that have been affected by an escape of sewage from the company's sewerage network.	• Our Internal Audit Team will confirm understanding of the reporting process for sewer flooding by performing interviews, walkthroughs and evidence inspection. • Internal Audit will ascertain how regulatory guidance for sewer flooding has been interpreted and assess whether it is appropriate. • Test procedures by our Internal Audit Team will agree data back to underlying systems as well as sample testing to verify that it has been appropriately measured, recorded, collated and reported. Testing will take into account the accuracy and completeness of the reported data. • Our Internal Audit Team will audit progress against revised reporting guidance due to be introduced from 2020-2021 onwards. The review in 2018/19 will assess whether we are on track to meet 2020 targets (glide path approach to meeting future reporting requirements). • We will continue to participate fully in ongoing industry wide work to improve consistency of reporting for this metric.	✓ ✓ ✓ ✓ ✓	• Our Internal Audit Team carried out a system audit and successfully reviewed final year end performance data. No inconsistencies were identified in the data. • Our Internal Audit Team has worked closely with the reporting Team to ensure we are compliant with new guidance due to be introduced from 1 April 2020.
SATISFACTION WITH TASTE AND ODOUR OF TAP WATER This is the number of complaints received from customers because they are dissatisfied with the taste or odour of their tap water. The measure matches Drinking Water Inspectorate reporting guidance.	• Our Internal Audit Team will confirm understanding of the reporting process for this area by performing interviews, walkthroughs and evidence inspection. • Internal Audit will ascertain how regulatory guidance has been interpreted and assess whether it is appropriate. • Test procedures by our Internal Audit Team will agree data back to underlying systems as well as sample testing to verify that it has been appropriately measured, recorded, collated and reported. Testing will take into account the accuracy and completeness of the reported data.	✓ ✓ ✓	• Our Internal Audit Team found no material issues or exceptions in the data reported from the recording system.
DISCOLOURED WATER COMPLAINTS This is the number of complaints received from customers because they are dissatisfied with the appearance of their water because it is discoloured, described as black, orange or brown.	• Our Internal Audit Team will confirm understanding of the reporting process for this area by performing interviews, walkthroughs and evidence inspection. • Internal Audit will ascertain how regulatory guidance has been interpreted and assess whether it is appropriate. • Test procedures by our Internal Audit Team will agree data back to underlying systems as well as sample testing to verify that it has been appropriately measured, recorded, collated and reported. Testing will take into account the accuracy and completeness of the reported data.	✓ ✓ ✓	• Our Internal Audit Team found no material issues or exceptions in the data reported from the recording system.

Areas of risk	Planned assurance activity 2020/21 (applied to 2019/20 performance)	Completed	Assurance Findings / Response
SEWER COLLAPSES This measure counts the number of collapsed sewers that we experience. We report separately on collapses relating to assets which transferred into water company ownership in October 2011.	• Our Internal Audit Team will confirm understanding of the sewer collapses reporting process by performing interviews, walkthroughs and evidence inspection. • Internal Audit will ascertain how regulatory guidance for sewer collapses has been interpreted and assess whether it is appropriate. • Test procedures by our Internal Audit Team will agree data back to underlying systems as well as sample testing to verify that it has been appropriately measured, recorded, collated and reported. Testing will take into account the accuracy and completeness of the reported data.	✓ ✓ ✓	• Our Internal Audit Team found no material issues or exceptions in the data reported from the recording system.
SEWAGE TREATMENT WORKS DISCHARGE COMPLIANCE This is a measure of the effectiveness of our Sewage Treatment Works to treat wastewater to an appropriate standard before it is returned to the environment, as stipulated in Environment Agency consents.	• PwC to confirm understanding of the reporting process for this area by performing interviews, walkthroughs and evidence inspection. • PwC will ascertain how regulatory guidance has been interpreted and assess whether it is appropriate. • Test procedures by PwC will agree data back to underlying systems as well as sample testing to verify that it has been appropriately measured, recorded, collated and reported. Testing will take into account the accuracy and completeness of the reported data. • In light of the investigations by Ofwat into Southern Water's failings in relation to their management, operation and performance of its wastewater treatment works, we are confident that the strong safeguards in place at NWL would prevent and such misconduct occurring here. Our Internal Audit Team will conduct assurance work in respect of current wastewater treatment works sampling regime to ensure compliance.	✓ ✓ ✓ ✓	• PwC performed independent assurance procedures in relation to specific Sewage Treatment Works Discharge Compliance and annual performance information. • The independent assurance report, including PwC's assurance opinion, can be found on **page 24**.
BATHING WATER COMPLIANCE This is the number of designated bathing waters that meet the regulatory 'sufficient' standard based on the results of the independent testing of seawater by the Environment Agency during the bathing water season.	• No additional assurance is planned at this stage by our Internal Audit Team other than to check the final designated bathing water numbers as reported by the Environment Agency.	✓	• No issues were identified when verifying the final designated bathing water numbers against those reported independently by the Environment Agency.
LEAKAGE The measure is based on the volume of water leaking from the company's water supply assets. The annual average is applied to give a figure for mega litres per day (Ml/d). It includes any uncontrolled losses between water treatment works and customers' internal stop taps. It does not include customers' internal plumbing losses.	• PwC will confirm understanding of the leakage reporting process by performing interviews, walkthroughs and evidence inspection. • PwC will ascertain how regulatory guidance for leakage has been interpreted and assess whether it is appropriate. • Test procedures by PwC will agree data back to underlying systems as well as sample testing to verify that it has been appropriately measured, recorded, collated and reported. Testing will take into account the accuracy and completeness of the reported data.	✓ ✓ ✓	• PwC performed independent assurance procedures in relation to specific Sewage Treatment Works Discharge Compliance and annual performance information. • The independent assurance report, including PwC's assurance opinion, can be found on **page 24.**

Areas of risk	Planned assurance activity 2020/21 (applied to 2019/20 performance)	Completed	Assurance Findings / Response
PROPERTIES EXPERIENCING POOR WATER PRESSURE The measure is the number of properties regularly experiencing water pressure below the minimum standard.	• Our Internal Audit Team will confirm understanding of the poor water pressure reporting process by performing interviews, walkthroughs and evidence inspection. • Internal Audit will ascertain how regulatory guidance for poor water pressure has been interpreted and assess whether it is appropriate. • Test procedures by our Internal Audit Team will agree data back to underlying systems as well as sample testing to verify that it has been appropriately measured, recorded, collated and reported. Testing will take into account the accuracy and completeness of the reported data.	✓ ✓ ✓	• Our Internal Audit Team found no material issues or exceptions in the data reported from the recording system.
WATER MAINS BURSTS This is the annual number of water mains bursts and is determined by the number of completed repairs to burst water mains.	• Our Internal Audit Team will confirm understanding of the water mains bursts reporting process by performing interviews, walkthroughs and evidence inspection. • Internal Audit will ascertain how regulatory guidance for water mains bursts has been interpreted and assess whether it is appropriate. • Test procedures by our Internal Audit Team will agree data back to underlying systems as well as sample testing to verify that it has been appropriately measured, recorded, collated and reported. Testing will take into account the accuracy and completeness of the reported data.	✓ ✓ ✓	• Our Internal Audit Team found no material issues or exceptions in the data reported from the recording system.
CUSTOMER SURVEYS This includes surveys undertaken by CCW and other independent bodies A number of surveys are conducted that ask customers independently about their overall satisfaction with the service the company provides. • Overall customer satisfaction. • Keeping customers informed. • Domestic customer satisfaction (Net Promoter Score). • Value for money (water services). • Value for money (sewerage services).	• Our Internal Audit Team will verify customer survey numbers used for publishing are consistent with the customer surveys carried out by our accredited external organisations and recognised industry bodies (e.g. CCWater).	✓	• Our Internal Audit Team will verify customer survey numbers used for publishing are consistent with the customer surveys carried out by our accredited external organisations and recognised industry bodies (e.g. CCWater).
GREENHOUSE GAS EMISSIONS This is a measure of the annual amount of operational greenhouse gas emissions the company produces based on the Carbon Accounting Workbook. It is reported in kilotonnes of carbon dioxide equivalent (ktCO2e). From April 2019, there is a requirement for all larger UK companies to report publically on their global energy use and carbon emissions within their Directors' Report. Known as Streamlined Energy & Carbon Reporting (SECR), this new requirement has been implemented by the Department for Business, Energy and Industrial Strategy (BEIS).	• Our Internal Audit Team will confirm understanding of the reporting process by performing interviews, walkthroughs and evidence inspection. • Internal Audit will ascertain how the guidance has been interpreted and assess whether it is appropriate. • Test procedures by our Internal Audit Team will agree data back to underlying systems as well as sample testing to verify that it has been appropriately measured, recorded, collated and reported. Testing will take into account the accuracy and completeness of the reported data. • We are working with our external partners to ensure we will be compliant with SECR reporting requirements from 1 April 2019 onwards.	✓ ✓ ✓ ✓	• In the Final Determination to Companies dated December 2019, it was confirmed that assurance was to be provided externally by third party. • This means that for operational carbon it includes that for all data collection relating to greenhouse gas emissions is compliant with the international carbon reporting standard (ISO 14064 Part 1) and a third part assure this. • In line with CEMARS programme we have successfully met the scheme requirements and been recommended certification to CEMARS. • The audit report findings can be found on **page 85** of this assurance summary.

Areas of risk	Planned assurance activity 2020/21 (applied to 2019/20 performance)	Completed	Assurance Findings / Response
OUTCOME DELIVERY INCENTIVE CALCULATION Calculation of rewards or penalties for performance commitments which have financial incentives attached.	• Our Internal Audit Team will audit the calculation inputs and outputs from our internal ODI model and ensure consistency with Ofwat Table 3A. • For reporting year 2019/20, we will include final penalty/reward calculations for the full period 2016/16 to 2019/20.	✓ ✓	• Our Internal Audit team verified that the outputs from our ODI model were consistent with Ofwat Table 3a. This included a review of the penalty / reward areas. • There were no issues identified.
ANNUAL ENVIRONMENTAL REPORT The company is committed to publishing an independent annual review of its environmental performance which was originally undertaken by The Corporate Responsibility Groups (CRAGs). Full responsibility was formally transferred to our Water Forum in 2016 which ensured an independent review of our social and environmental activity is maintained going forward.	• The Water Forum will continue to be actively involved and seek to understand and constructively challenge our plans. • The Water Forum will review our activities and performance and report back on them in our environmental report (known as "Our Contribution"). • Our Internal Audit Team will also provide verification on data included in the report to ensure consistency across our external publications.	✓ ✓ ✓	• Our Water Forum have been able to challenge our thinking and be actively involved in seeing and interacting with many examples of our environmental, social and economic projects and initiatives. • Our Water Forum full review is described in our annual report called "Our Contribution" which can be accessed via **this link**..
2020-25 READINESS In September 2018, companies published their business plans for the 2020-25 period. These set out their proposed service and investment levels for the period. Our business plan contains a new suite of performance commitments and outcome delivery incentives, which will replace the current set of 2015-20 performance commitments. Many of the performance commitments contain metrics that are included within our existing measures, however, there are also a number of new metrics and measures that we will be required to deliver and to report our progress against. To ensure that we are able to report future performance against these new metrics in a reliable, accurate and transparent way, we will implement a process alongside our existing reporting processes to ensure we are ready for 2020-25 reporting from the start.	• This is a new area of risk for inclusion in our Draft Assurance Plan. We want to incorporate our new performance commitnments for 2020-155 into existing regulatory reporting processes. • It will be important that clear guidance for the measures are in place and understood at all levels of the business. • Any issues associated with production or delivery of the performance commitments needs to be independently reviewed and action plans put in place to resolve recommendations made from this process. • Both PwC and our Internal Audit Team will confirm understanding of the new guidance and new processes to ensure we are compliant with reporting of the performance commitments from April 2020.	✓ ✓ ✓ ✓	• Our Internal Audit Team have liaised in discussions with our Economic Regulation team to scope initial work required to ensure we are compliant with reporting requirements for the common performed commitments post 1 April 2020. • New reporting guidance received in April have been briefed and discussed with reporting teams in the business to ensure they fully understand what is required for reporting going forward and allow our systems and reporting tools to be in place in readiness. • Our data risk model is being used to allocate assurance of the new metrics between PwC and Internal Audit teams. This enables our audit teams to understand the reporting guidance in their allocated areas and be ready to work with teams during the reporting year.
SHADOW REPORTING Companies have been working together, co-ordinated by Water UK and supported by Ofwat, to develop consistent definitions and reporting guidance for a number of metrics to help inform the setting of outcome performance commitments from 2020 onwards. These include: • Leakage • Supply Interruptions • Mains Bursts • Unplanned Outage • Per Capita Consumption • Risk of severe restrictions in a drought • Internal sewer flooding incidents • External sewer flooding incidents • Sewer Collapses • Risk of sewer flooding in a storm • C-MeX • D-MeX Information has been collected alongside APR reporting since 2017 through "shadow" (i.e. "unpublished") reporting and the data has been subjected to the same level of assurance as other regulatory reporting areas. Companies are expected to demonstrate full compliance with the new reporting guidance by the end of March 2020 in order to commence regulatory reporting as from 1 April 2020.	• Both PwC and our Internal Audit Team will confirm understanding of the reporting processes for "Shadow Reporting" metrics. This will include performing interviews, walkthroughs and evidence inspection. • PwC and our Internal Audit Team will ascertain how regulatory guidance has been interpreted and assess whether it is appropriate. • Test procedures will agree data back to underlying systems as well as sample testing to verify that it has been appropriately measured, recorded, collated and reported. Testing will take into account the accuracy and completeness of the reported data.	✓ ✓ ✓	• PwC and Internal Audit Teams reviewed shadow reporting guidelines and held meetings with reporting teams to understand reporting processes. • PwC and Internal Audit Teams tested the application of the shadow reporting guidelines to the new metrics and confirmed appropriateness. • PwC and Internal Audit Teams performed independent assurance procedures in relation to Shadow Reporting metrics.

OTHER RISKS

Areas of risk	Planned assurance activity 2020/21 (applied to 2019/20 performance)	Completed	Assurance Findings / Response
TARIFFS AND CHARGES The bills paid by our customers and the wholesale charges paid by non-household customers in both our areas of supply are determined by the tariffs and charges published in January and February each year. We are required to publish our tariffs and charges to comply with our legal obligations. These set out the company's charges for the services we provide and the terms and conditions of those charges.	• Our governance and assurance processes for setting 2020/21 charges will follow a similar approach to previous years with our internal Charges Steering Group (CSG) being responsible for overseeing the charges setting process. • We have engaged Ernst & Young to build a new tariff model incorporating new price controls that we intend to use for 2020/21 tariff setting. The model will be assured by our external partner and the model assumptions reviewed by our CSG. • Our Internal Audit Team will provide assurance of allowed revenue and charge multiplier inputs as well as the final 2020/21 charges publication of average bill information. • Compliance with legal and regulatory obligations will be reported to the Board.	✓ ✓ ✓ ✓	• Reviews of our tariffs and charges production were followed as per the timetable set out and approval was provided by our Charges Steering Group and Board. • Assurance checks by an Independent firm of accountants were performed as set out in our programme. • Assurance checks of allowed revenue and • charge multiplier inputs by our Internal Audit Team resulted in no exceptions being reported.
INFORMATION PUBLISHED DIGITALLY The information we publish on our websites helps to inform our customers and stakeholders of the many services we provide and how we are performing. We want our information to be accurate and reliable and ensure that it is easy for customers and stakeholders to access the documents that they are interested in. As we make some major changes to our websites over the next year or so we will incorporate good governance and assurance procedures as well as making sure that the website content is easy to read and understand for our customers and stakeholders.	• Following launch of our newly developed websites in October 2019, our Internal Audit Team will provide assurance on the new processes and procedures in place.	✓	• Our newly designed websites have been allowed time to embed and our Internal Audit Team has had meetings with the web team to discuss and advise on digital standards, strategies and policies. This is ongoing liaison work to help improve our websites.

Areas of risk	Planned assurance activity 2020/21 (applied to 2019/20 performance)	Completed	Assurance Findings / Response
COST ASSESSMENT TABLES Since 2016, we have provided cost assessment tables to Ofwat which cover all aspects of performance, including financial and operational metrics. The cost assessment information helps inform Ofwat's cost modelling for the PR19 process. Our approach to providing governance and assurance to the cost assessment tables follows the same process as we currently have in place for annual performance reporting.	• Both PwC and our Internal Audit Team will confirm understanding of the reporting process for this area by performing interviews, walkthroughs and evidence inspection. • PwC and our Internal Audit Team will ascertain how regulatory guidance has been interpreted and assess whether it is appropriate. • Test procedures will agree data back to underlying systems as well as sample testing to verify that it has been appropriately measured, recorded, collated and reported. Testing will take into account the accuracy and completeness of the reported data. • We will follow up on the recommendations made by PwC to improve the quality of the information reported from our asset records where areas of risk were highlighted last year. We anticipate marked improvement in our asset information through our ongoing intelligent asset management (iam) programme. The iam programme aims to help us become consistently leading in asset management by having better quality, more reliable and readily available data so that we can make better, faster and more proactive decisions. • During 2019/20 improvements have been made in cleansing data from legacy systems. This has also included site surveys to confirm and collect additional information about our assets where gaps exist e.g. capacities, flows etc. • Our Internal Audit Team are monitoring this progress to help improve the reporting of this data going forward.	✓ ✓ ✓ ✓ ✓ ✓	• Audit programmes are allocated to both PwC and our Internal Audit team in line with our Data Risk model. This helps inform the choice of assurance provider for each item of data in the Cost Assessment Tables. • PwC and our Internal Audit team confirmed understanding of the reporting processes for their agreed audit programmes by performing interviews, walkthroughs and evidence inspection. • This was followed by performing test procedures to agree data back to underlying systems and undertaking sample testing to verify that data had been appropriately measured, recorded, collated and reported. • Confidence grades provide a reasoned basis for us to qualify the reliability and accuracy of the data we publish and helps us identify areas where our data is of a high standard and to have action plans in place to improve data where it falls below the standard confidence grade level. We work with the reporting teams to improve the data going forward where these fall below the standard level. We collected these internally as they are not required by OFWAT. • Working closely with the iam programme has delivered some improvements in the quality of our asset data but further collaboration will be needed to improve our data going forward.
BIORESOURCES AND WATER RESOURCES MARKET INFORMATION In 2015-16, Ofwat carried out analysis and consulted on a regulatory approach designed to promote market development in Bioresources (also known as sludge) and Water Resources activities. Since then, companies are required to provide Ofwat with standardised and defined information to enable potential market participants to identify opportunities to supply services in these areas. We publish market information so that stakeholders can have trust and confidence in the information and to reflect current market status.	• Both PwC and our Internal Audit Team will confirm understanding of the reporting process for Bioresources (Internal Audit) and water resources market information (PwC). This will include performing interviews, walkthroughs and evidence inspection. • PwC and our Internal Audit Team will ascertain how regulatory guidance has been interpreted and assess whether it is appropriate. • Test procedures will agree data back to underlying systems as well as sample testing to verify that it has been appropriately measured, recorded, collated and reported. Testing will take into account the accuracy and completeness of the reported data.	✓ ✓ ✓	• Our audit programme for these reporting areas allow both PwC and our Internal Audit team to undertake reviews in their respective areas of responsibility. • As part of their ongoing programme PwC performed independent assurance procedures in relation to Bioresources market activity'. The independent assurance report, including the assurance opinion, can be found on page xx. • Assurance checks of the Water Resources Market Information by our Internal Audit Team found no material issues or exceptions.

Areas of risk	Planned assurance activity 2020/21 (applied to 2019/20 performance)	Completed	Assurance Findings / Response
MARKET PERFORMANCE FRAMEWORK (MPF) The Market Performance Framework (MPF) is intended to provide confidence to trading parties and the Market Operator (MOSL) that they and their peers are complying with their obligations. The MPF consists of a number of elements that monitor and report performance against a range of pre-defined standards and timescales. These standards are the Market Performance Standards (MPS) and the Operational Performance Standards (OPS). The MPS measure both retailer and wholesaler performance, whilst the OPS solely measures wholesaler performance. We are required to submit a number of key performance indicators to the market operator MOSL who then publish the information on their website. The information is used by retailers, Ofwat and MOSL to ensure service to all customers in the market is compliant.	• Our Internal Audit Team will confirm understanding of the reporting process for this area by performing interviews, walkthroughs and evidence inspection. • Our Internal Audit Team will ascertain how regulatory guidance has been interpreted and assess whether it is appropriate. • Test procedures by Internal Audit will agree data back to underlying systems as well as sample testing to verify that it has been appropriately measured, recorded, collated and reported. Testing will take into account the accuracy and completeness of the reported data.	✓ ✓ ✓	• Our Internal Audit Team carried out an audit of the key controls and processes in place within our Wholesale Operations and Compliance Teams. This looked at the effectiveness of processing retailer requests and performance reporting to ensure we meet market framework compliance. • The findings from the audit were shared with our Audit Committee and recommendations made will be monitored through to completion and reported back to management.
LICENCE OBLIGATIONS As part of our Risk and Compliance Statement we must ensure we have a full understanding of and are meeting all of our relevant statutory license and regulatory obligations. We must also ensure that there are sufficient processes and internal systems of control to fully meet those obligations and have appropriate systems and processes in place to allow us to identify, manage and review key risks.	• Our Internal Audit Team will review the systems and processes in place to ensure obligations are being met. • Our assurance process includes review and approval by our Executive Leadership Team members.	✓ ✓	• A review of the licence obligations have been reviewed by senior managers and approved by Executive Leadership Team members to ensure compliance. • Our Internal Audit Team provided assurance to the process to ensure reviews also have taken place in line with the programme and provided feedback where required.
GUARANTEED STANDARDS SCHEME (GSS) Customers of water and sewerage companies are entitled to guarantee minimum standards of service, as laid down by the Government. These are set out in the Water Supply and Sewerage Services (Customer Service Standards) Regulations 2008 (the GSS Regulations). Where a company fails to meet a standard then it is required to make a specified payment to the customer affected. The scheme applies to all customers of water and sewerage companies. Following Ofwat's 'Out in the Cold' review of water companies' performance in response to 'Beast from the East', they expressed concern that the compensation customers were getting was not enough. Ofwat made recommendations designed to address these concerns and expected companies to reflect them when setting their own compensation schemes. We have acted on the recommendations made by Ofwat and have implemented changes to our GSS payments with effect from 1 October 2019. This involves changes to our systems for recording failures and the automation of payments to customers.	• Our Internal Audit Team will confirm understanding of the GSS reporting processes by performing interviews, walkthroughs and evidence inspection. • Internal Audit will ascertain how GSS guidance has been interpreted and assess whether it is appropriate. • Test procedures by our Internal Audit Team will agree data back to underlying systems as well as sample testing to verify that it has been appropriately measured, recorded, collated and reported. Testing will take into account the accuracy and completeness of the reported data.	✓ ✓ ✓	• Our Internal Audit Team carried out a review of GSS compliance. This forms part of their annual audit programme and covers areas such as customer contact, complaints and supply interruptions. • Results from this year's review have highlighted recommendations to improve the service we provide to our customers. We report these to the GSS Compliance Group and Audit Committee and agreed actions will be monitored until completion by our Internal Audit Team.

Areas of risk	Planned assurance activity 2020/21 (applied to 2019/20 performance)	Completed	Assurance Findings / Response
CYBER SECURITY This measure was highlighted by customers that they would like to know more about. This risk already appears on out Corporate 'Risk' register but iis also included here to demonstrate our commitment to providing assurance in a very important area. We take the threat of cyber security extremely seriously and we are committed to ensuring we manage our systems securely.	• We liaise closely with the DWI and National Cyber Security Council (NCSC) to confirm that our strategy and risk mitigation is proportionate to the new and emerging threats we face. • We will regularly check and test our security controls and educate employees about potential attempts they may face to manipulate them into divulging confidential or personal information. • We continue to enhance our technical security solutions, including implementing new controls where improvement is identified. Our priorities for enhancing security take into account the ever changing external threats to our business, legislation, and technology landscape. • We will continue to focus on employee awareness of cyber security. Ensuring all our employees receive robust and up to date training embeds cyber security across the business.	✓ ✓ ✓ ✓	• We have liaised with DWI to enhance the security of our operational infrastructure. Our NIS-D reports have been submitted and reviewed by the DWI and this remains one of our top priorities going forward. • Our security posture across all three domains (technical, people and process) have been enhanced in line with compliance of ISO27001. • We have had external audits and independent security testing has been undertaken. Findings from these have been risk assessed and acted upon accordingly. • We continue to place significant focus on employee awareness and deliver cyber security and data protection training across the entire business.
DATA PROTECTION This measure was also highlighted by customers as a concern. Information about our customers and employees (personal data) is one of our most valuable assets. We include data protection as a Corporate 'Risk' and are committed to protecting privacy rights.	• Our Information Access Team will continue to work closely with teams across the business to ensure processes and procedures are implemented with privacy in mind. They will also carry out 'spot' audits to ensure compliance. • By continuing to use Privacy Impact Assessments, we will maintain good visibility of our data processing. • Content security tools also provide the visibility we need to protect personal data. • We will continue to focus on employee awareness of data protection. Ensuring all employees receive robust and up to date training embeds data protection across the business.	✓ ✓ ✓ ✓	• The Information Access Team ensured strong links are built with teams across the business. This has included adding extra Data Protection Champions in departments, regular slots on leadership team meetings and monthly newsletters for teams to ensure privacy regularly on the agenda. Spot audits this year have focussed on the implementation and understanding of the companies secure desk policy in high risk areas. • Privacy Impact Assessments have been undertaken where required across the business to ensure privacy is considered and privacy by design takes place where necessary. • We continue to invest in technical security controls to ensure personal data is kept secure • All employees receive robust and up to date training and refreshers. In addition, we have started to build upon our e-learning bespoke training to include additional modules for our customer facing teams.
RESILIENCE Resilience is the ability to cope with, and recover from, disruption, and anticipate trends and variability in order to maintain services for people and protect the natural environment, now and in the future.	• We will progress implementation of our resilience action plan. • We intend to appoint a Chief Resilience and Sustainability Officer who will lead on developing and implementing our resilience strategy. • Assurance against resilience risks will be strengthened through delivery of our resilience action plan.	**In progress** **In progress** **In progress**	• Recruitment of a Chief Resilience and Sustainability Officer and deliver of our action plan is in progress.

QUALITY OF FINANCIAL DATA

For completeness, we have also described below the assurance that our financial auditors,Deloitte, have provided on our Annual Report and Financial Statements and elements of our Annual Performance Report (APR).

Areas of risk	Planned assurance activity 2020/21 (applied to 2019/20 performance)	Completed	Assurance Findings / Response
ANNUAL REPORT AND FINANCIAL STATEMENTS We have a legal obligation, under the Companies Act, for our Annual Report and Financial Statements to be externally audited. This is to ensure that they are properly prepared in accordance with Generally Accepted Accounting Principles and the Companies Act and that they represent a true and fair view of our financial position and profits.	• Deloitte will audit and express an opinion on the financial statements in accordance with applicable law and International Standards on Auditing (UK and Ireland).	✓	• Deloitte carried out their audit and reported their findings to our Audit Committee. • They produced an unqualified audit opinion which can be found in the Annual Performance Report and Financial Statements on our websites.
REGULATORY ACCOUNTING STATEMENTS We have a requirement under our Instrument of Appointment and Ofwat's Regulatory Accounting Guidelines, for the Regulatory Financial Statements in the APR to be externally audited. This covers: • The regulatory policies and disclosures. • Regulatory Financial Statements (tables 1A to 1E). • Table 1F Statement of Financial Flows (lines 1 to 9, 13, 19 and 21 to 23) • Appointed business taxation. • Price review and other segmental reporting (tables 2A to 2J). • Transactions with associated.	• Deloitte will audit and express an opinion on the financial statements in accordance with applicable law and International Standards of Auditing (UK and Ireland).	✓	• Deloitte carried out their audit and reported their findings to our Audit Committee. • They produced an unqualified audit opinion which can be found in the Annual Performance Report and Financial Statements on our websites.
ADDITIONAL REGULATORY INFORMATION We report additional regulatory information in tables 4A to 4I of the APR. This includes: • Non-financial information on households billed and volumes of water produced. • Additional analysis of totex and unit costs. • Key financial metrics. Agreed upon procedures have also been carried out on line 10 to 12, 14 to 18 and 20 of Table 1F.	• Deloitte will carry out agreed upon procedures which broadly comprise confirming that the information contained in the tables has been calculated in a consistent manner with Ofwat's Regulatory Accounting Guidelines, agreeing information back to supporting documentation and verifying the accuracy of calculations. • For tables 4D to 4F Deloitte will also confirm that the information has been prepared in accordance with the Company's accounting separation methodology.	✓ ✓	• Deloitte carried out the agreed procedures. No exceptions were noted.
STATEMENT OF SUFFICIENCY OF FINANCIAL RESOURCES We have a requirement, under our Instrument of Appointment, to submit a certificate from the Directors stating that we have available sufficient financial resources and facilities to allow us to carry out our regulated activities for at least 12 months and sufficient management resources to enable us to carry out our functions.	• Deloitte will carry out the agreed procedures. • Deloitte will review the statement of sufficiency of financial resources and identify any inconsistencies between the statement and information obtained during its audit of the Regulatory Financial Statements.	✓ ✓	• Deloitte carried out the agreed procedures. • They confirmed that no matters had come to their attention to indicate any inconsistency between this Statement and information obtained during the course of their audit work on the Regulatory Financial Statements, in respect of financial resources.
FINANCIAL RESILIENCE We have a requirement, under Ofwat's Regulatory Accounting Guidelines, to produce a long term viability statement, confirming that the Company is financially viable over the longer term. This includes stress testing our forward looking financial plans under a number of adverse scenarios. Our viability statement can be found in the Annual Report and Financial Statements on our websites.	• Deloitte will carry out agreed upon procedures to review the impact of the stress test scenarios on the Company's financial plan and key financial ratios.	✓	• Deloitte carried out the agreed procedures. No exceptions were noted.

Independent Limited Assurance Report to the Directors of Northumbrian Water Limited

The Board of Directors of Northumbrian Water Limited engaged us to provide limited assurance on the selected information described below and set out in Northumbrian Water Limited's Annual Performance Report for the year ended 31 March 2020, and associated cost assessment bioresources tables.

Disclaimer

- PwC accepts no liability (including liability for negligence) to each recipient in relation to PwC's report. The report is provided to each recipient for information purposes only. If a recipient relies on PwC's report, it does so entirely at its own risk;
- No recipient will bring a claim against PwC which relates to the access to the report by a recipient;
- Neither PwC's report, nor information obtained from it, may be made available to anyone else without PwC's prior written consent, except where required by law or regulation;
- PwC's report was prepared with Northumbrian Water Limited's interests in mind. It was not prepared with any recipient's interests in mind or for its use. PwC's report is not a substitute for any enquiries that a recipient should make. PwC's report is based on historical information. Any projection of such information or PwC's opinion or views thereon to future periods is subject to the risk that changes may occur after the report is issued. For these reasons, such projection of information to future periods would be inappropriate;
- PwC will be entitled to the benefit of and to enforce these terms; and
- These terms and any dispute arising from them, whether contractual or non-contractual, are subject to English law and the exclusive jurisdiction of English courts.

Our conclusion

Based on the procedures we have performed and the evidence we have obtained, nothing has come to our attention that causes us to believe that the Selected Information for the year ended 31 March 2020 has not been prepared, in all material respects, in accordance with the Reporting Criteria.

This conclusion is to be read in the context of what we say in the remainder of our report.

Selected Information

The scope of our work was limited to assurance over information in Northumbrian Water Limited's Annual Performance Report for the year ended 31 March 2020, and associated cost assessment and bioresources tables, https://www.nwg.co.uk/about-us/nwl/how-we-are-performing/annual-performance-report/, labelled with the reference and titles listed in columns 1 and 2 of the table in Appendix 1 (the "Selected Information"). The Reporting Criteria against which it was assessed is in Appendix 1.

Our assurance does not extend to information in respect of earlier periods or to any other information included in the Annual Performance Report, and associated cost assessment and bioresources tables.

Professional standards applied and level of assurance

We performed a limited assurance engagement in accordance with International Standard on Assurance Engagements 3000 (Revised) 'Assurance Engagements other than Audits and Reviews of Historical Financial Information' issued by the International Auditing and Assurance Standards Board. A limited assurance engagement is substantially less in scope than a reasonable assurance engagement in relation to both the risk assessment procedures, including an understanding of internal control, and the procedures performed in response to the assessed risks.

Our Independence and Quality Control

We applied the Institute of Chartered Accountants in England and Wales (ICAEW) Code of Ethics, which includes independence and other requirements founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality and professional behaviour, and it is at least as demanding as Parts A and B of the IESBA code.

We apply International Standard on Quality Control (UK) 1 and accordingly maintain a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements

Our work was carried out by an independent team with experience in the water industry and assurance.

Understanding reporting and measurement methodologies

The Selected Information needs to be read and understood together with the Reporting Criteria, which Northumbrian Water Limited is solely responsible for selecting and applying. The absence of a significant body of established practice on which to draw to evaluate and measure non-financial information allows for different, but acceptable, measurement techniques and can affect comparability between entities and over time. The Reporting Criteria used for the reporting of the Selected Information are as at 31 March 2020.

Work done

We are required to plan and perform our work in order to consider the risk of material misstatement of the Selected Information. In doing so, we:

- made enquiries of Northumbrian Water Limited's management, including those responsible for compiling the Annual Performance Report, and cost assessment and bioresources tables as a whole;
- made enquiries of staff charged with preparing and reviewing specific data points or data tables for inclusion within the Annual Performance Report, and cost assessment and bioresources tables; evaluated the design of the key structures, systems, processes and controls for managing, recording and reporting the Selected Information;
- performed limited substantive testing on a selective basis of the Selected Information to test that data had been appropriately measured, recorded, collated and reported; and
- considered the disclosure and presentation of the Selected Information.

Our testing procedures included, but were not limited to:

- Re-performing calculations performed by management based on central records;
- Inspecting detailed breakdowns of each of the data points recorded within the Selected Information;
- Obtaining and inspecting underlying documentary evidence on a sample basis;
- Visiting a sample of Sewage Treatment Works and Sludge Treatment Centres;
- Inspecting corporate systems which store data relevant to the Selected Information;

The maintenance and integrity of Northumbrian Water Limited's website is the responsibility of the Directors; the work carried out by us does not involve consideration of these matters and, accordingly, we accept no responsibility for any changes that may have occurred to the reported Selected Information or Reporting Criteria when presented on Northumbrian Water Limited's website.

- Checking for consistency between data points with common inputs; and
- Inspecting third party or publicly available data and tracing this back to Northumbrian Water Limited's records.

Northumbrian Water Limited's responsibilities

The Directors of Northumbrian Water Limited are responsible for:

- designing, implementing and maintaining internal controls over information relevant to the preparation of the Selected Information that is free from material misstatement, whether due to fraud or error;
- establishing objective Reporting Criteria for preparing the Selected Information;
- measuring and reporting the Selected Information based on the Reporting Criteria; and
- the content of the Annual Performance Report for the year ended 31 March 2020, and cost assessment and bioresources tables.

Our responsibilities

We are responsible for:

- planning and performing the engagement to obtain limited assurance about whether the Selected Information is free from material misstatement, whether due to fraud or error;
- forming an independent conclusion, based on the procedures we have performed and the evidence we have obtained; and
- reporting our conclusion to the Directors of Northumbrian Water Limited.

This report, including our conclusions, has been prepared solely for the Board of Directors of Northumbrian Water Limited in accordance with the agreement between us, to assist the Directors in reporting on annual performance. We permit this report to be disclosed in the Annual Performance Report for the year ended 31 March 2020, to assist the Directors in responding to their governance responsibilities by obtaining an independent assurance report in connection with the Selected Information. To the fullest extent permitted by law, we do not accept or assume responsibility to anyone other than the Board of Directors and Northumbrian Water Limited for our work or this report except where terms are expressly agreed between us in writing.

PricewaterhouseCoopers LLP

PricewaterhouseCoopers LLP
Chartered Accountants
Cambridge
10 July 2020

NORTHUMBRIAN WATER living water | ESSEX&SUFFOLK WATER living water

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APPENDIX 1

NORTHUMBRIAN WATER LIMITED APR REPORTING CRITERIA 2019/20

Dr

Appendix 1

Northumbrian Water Limited (NWL) has prepared selected information within its Annual Performance Report (APR) and cost assessment tables in accordance with the following reporting criteria. This reporting criteria has been based upon and informed by Ofwat published guidance to support water companies with reporting associated with their APR and Cost Assessment tables reporting, namely:

- RAG 2.07 - Guideline for classification of costs across the price controls (November 2017);
- RAG 4.08 - Guideline for the table definitions in the annual performance report (March 2019);
- RAG 4.08 - Appendix 2 (Water resources further guidance) (January 2019);
- Final price control determination notice: company-specific appendix – Northumbrian Water, Setting price controls for 2015-20 (December 2014); and
- APR-2019-20-Tables-Final- Publication-Version.xlsx

Where necessary, NWL have expanded upon this Ofwat published guidance to create reporting criteria that satisfy the requirements of International Standard of Assurance Engagements (ISAE) 3000 revised, which also serves to provide clarity how it has applied the standard Ofwat guidance the specific circumstances of its business and its network.

Unless specified within the reporting criteria, all data has been reported for the regulatory reporting year (1 April x-1 – 31 March x).

Dr

Reference and Title of the Selected Information		Unit of measure	Northumbrian Water Limited's reporting criteria
Reference	**Title**		
W-B2	Overall drinking water compliance	Percentage (%)	The three-year rolling average for mean zonal percentage compliance which is a measure of water quality. The measure is the mean of the company's performance for the calendar years 2017, 2018 and 2019 and is expressed as the percentage compliance and is based on the calendar year (1 January 2019 - 31 December 2020). The measure is determined by the Drinking Water Inspectorate and Water Supply Regulations 2016, as set out in the following guidance: http://www.legislation.gov.uk/uksi/2016/614/contents http://dwi.defra.gov.uk/about/annual-report/calculating-indices.pdf The measure is calculated as follows: **Compliance percentage for all sites / Total no. of sites** The compliance percentage for each site is calculated as follows: **((No. of samples per site in the year - No. of failures per site in the year) / No. of samples per site in the year) x 100** ▪ A site is defined as an individual supply point (i.e. a customer tap) around the whole of NWL's potable distribution network. ▪ A sample is defined as a water quality sample in line with the Water Supply Regulations 2016, as set out in the guidance in the link above, which tests the concentration of each parameter in scope. This is performed under a UKAS accredited process. A failure is defined as a level of concentration of a parameter in a sample that falls out with the acceptable level as defined in the Water Supply Regulations 2016. The water quality sampling programme covers the geographical region that NWL supplies with water, as stipulated by the Drinking Water Inspectorate guidance. The sampling programme is agreed with the Drinking Water Inspectorate at the beginning of the calendar year. The compliance percentage is based on the results of the planned water quality samples only. All 39 parameters, as set out in the Water Supply Regulations 2016, are in scope.

Dr

W-C4	Leakage (Ml/d) Northumbrian area	Megalitres per day (Ml/d)	This measure covers NWL's North East water supply region only, i.e. it does not include its Essex and Suffolk region. Total leakage measures the volume of water that is lost across the water distribution network when delivering it from water treatment works to customer properties, including customer supply pipe leakage. It does not include internal plumbing losses (leaks that occur on the customer side of their stop tap). The total leakage is made up of the annual average Minimum Night Flow Leakage, Reservoir Losses and supply pipe leakage. *Note: trunk mains losses are included in the Minimum Night Flow Leakage and do not need to be calculated separately.* Minimum Night Flow Leakage is a measure of District Meter Area ('DMA') flow during the night when consumption is expected to be at its lowest, and therefore any residual flow after Legitimate Night Use ('LNU') is likely to be leakage. Minimum Night Flow Leakage is calculated as follows: DMA night flow - LNU x Hour to Day Factor ▪ LNU is an average allowance per property based on per capita consumption data and calculated for different property types (measured, unmeasured, household and non-household). The LNU rate is multiplied by the number of properties of the corresponding type within each DMA to derive a litres per hour value to deduct from night flow. ▪ on survey data collected and reported by a third party. The allowance is calculated for each Water Resource Zones and property types (measured, unmeasured, household and non-household). The LNU rate is multiplied by the number of properties of the corresponding type within each Water Resource Zone to derive a litres per hour value to deduct from night flow. ▪ DMA night flow is measured by DMA "in" and "out" flow meters. ▪ The Hour to Day Factor is applied to account for reduced flow as a result of reducing water pressure within DMAs during night time. The pressure is reduced to protect the distribution area from bursts as a result of lower demand during the night. Customer supply pipe losses are defined as leakage from customers' pipes between the highway boundary and the customer's stop tap. To estimate, NWL have analysed reported leaks for different property types (measured, unmeasured, household and non-household), and monitored a sample of properties to calculate the average supply pipe leakage, which is multiplied by the number of properties of each type to determine total supply pipe leakage. Service reservoir losses have been estimated by measuring the change in depth of reservoir levels for a sample period of time to calculate the volume of water lost over that period. It is reported as a post Maximum Likelihood Estimation (MLE) figure (a statistical method used to normalise differences identified when a water company calculates their water balance (distribution input compared to water consumption + leakage) through the use of confidence intervals).

Dr

W-C5	W-C5: Leakage (Ml/d) Essex & Suffolk area	Megalitres per day (Ml/d)	This measure covers NWL's Essex and Suffolk water supply region only, i.e. it does not include its North East region. Total leakage measures the volume of water that is lost across the water distribution network when delivering it from water treatment works to customer properties, including customer supply pipe leakage. It does not include internal plumbing losses (leaks that occur on the customer side of their stop tap). The total leakage is made up of the annual average Minimum Night Flow Leakage, Reservoir Losses and supply pipe leakage. *Note: trunk mains losses are included in the Minimum Night Flow Leakage and do not need to be calculated separately.* Minimum Night Flow Leakage is a measure of District Meter Area ('DMA') flow during the night when consumption is expected to be at its lowest, and therefore any residual flow after Legitimate Night Use ('LNU') is likely to be leakage. Minimum Night Flow Leakage is calculated as follows: DMA night flow - LNU x Hour to Day Factor ▪ LNU is an average allowance per property based on per capita consumption data and calculated for different property types (measured, unmeasured, household and non-household). The LNU rate is multiplied by the number of properties of the corresponding type within each DMA to derive a litres per hour value to deduct from night flow. ▪ on survey data collected and reported by a third party. The allowance is calculated for each Water Resource Zones and property types (measured, unmeasured, household and non-household). The LNU rate is multiplied by the number of properties of the corresponding type within each Water Resource Zone to derive a litres per hour value to deduct from night flow. ▪ DMA night flow is measured by DMA "in" and "out" flow meters. ▪ The Hour to Day Factor is applied to account for reduced flow as a result of reducing water pressure within DMAs during night time. The pressure is reduced to protect the distribution area from bursts as a result of lower demand during the night. Customer supply pipe losses are defined as leakage from customers' pipes between the highway boundary and the customer's stop tap. To estimate, NWL have analysed reported leaks for different property types (measured, unmeasured, household and non-household), and monitored a sample of properties to calculate the average supply pipe leakage, which is multiplied by the number of properties of each type to determine total supply pipe leakage. Service reservoir losses have been estimated by measuring the change in depth of reservoir levels for a sample period of time to calculate the volume of water lost over that period. It is reported as a post Maximum Likelihood Estimation (MLE) figure (a statistical method used to normalise differences identified when a water company calculates their water balance (distribution input compared to water consumption + leakage) through the use of confidence intervals).
S-C1	Sewage treatment works discharge compliance	Number	The three-year rolling average of the number of sewage treatment works discharge compliance failures (as reported by the Environment Agency) the company has had for the calendar years 2017, 2018 and 2019. This measure is the wastewater treatment works compliance with the Water Resources Act (WRA) and the Urban Waste Water Treatment Regulations (UWWTW) is the mean of the company's performance for the calendar years 2017, 2018 and 2019. It is a measure of the capability of the company's wastewater treatment works to treat and dispose of wastewater in line with the company's discharge permit conditions and is reported as the total number of failed samples: ▪ A failed sample is defined as a level of concentration of a parameter in a sample that falls out with the acceptable level as defined in the individual wastewater treatment work permit. ▪ A sample is defined as a wastewater quality sample in line with the Environment Agency guidance, as set out in the links below. The samples are tested for the concentration of a range of parameters as set out the individual permits for each wastewater treatment works. The samples are taken at the designated sampling point at each wastewater treatment works and are carried under a UKAS accredited process. The measure includes compliance with all numeric consents. The measure of success excludes non-sanitary failures (that is, failures not related to sewage, such as industrial chemicals, metals or hazardous substances and technical breaches (for example a sample that has failed because it has been collected from the wrong location or where a sample was taken but it did not have the correct characterises to perform sampling procedures upon it so no result was achieved). The measure is governed by guidance and regulations issued by the Environment Agency which can be found in the following links: ▪ https://www.gov.uk/government/publications/water-companies-operator-self-monitoring-osm-environmental-permits/water-companies-operator-self-monitoring-osm-environmental-permits; and ▪ https://www.gov.uk/government/publications/waste-water-treatment-works-treatment-monitoring-and-compliance-limits/waste-water-treatment-works-treatment-monitoring-and-compliance-limits The wastewater sampling programme covers the geographical region that NWL supplies with wastewater, as stipulated by the Environment Agency guidance. The sampling programme is agreed with the Environment Agency at the beginning of the calendar year. Further information over boundaries is set out in the Environment Agency guidance links provided.

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S-C2	Pollution incidents (category 3)	Number	The three-year rolling average of the number of category 3 pollution events (as reported by the Environment Agency) the company have caused for the calendar years 2017, 2018 and 2019. It includes pollution failures on all assets, water and wastewater, being the total number of category 3 pollution events from a discharge or escape of a pollutant from the company's water and sewerage assets affecting rivers or coastal waters (defined by Environment Agency guidance 16_02, version 6). Per the Environment Agency, a category 3 pollution incident is one that has a 'minor, or minimal impact or effect on the environment, people and/or property'. Further information can be found in the following Environment Agency guidance: https://www.ofwat.gov.uk/wp-content/uploads/2017/12/20171129-Incidents-and-their-classification-the-Common-Incident-Classification-Scheme-CICS-23.09.16.pdf Category 1, 2 and 4 incidents are excluded from the measure. The definitions of these are also set out in the Environment Agency guidance link.

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3C.1	Abstraction site	Text	The name of the abstraction site (which has been designated by the Environment Agency as an eligible abstraction site to be included in the Abstraction Incentive Mechanism (AIM)). This can be anonymised if it is necessary for national security reasons. NWL only have one abstraction site (Ormesby Broad) that is in scope for this measure.
3C.3	AIM performance	Number	The AIM performance in Ml (megalitres) for the current reporting year is calculated as follows: A = (F-T) * P where: A = AIM performance in Ml F = average daily abstraction (Ml/d) during period when flows are at or below the trigger threshold T = baseline average daily abstraction (Ml/d) during period when flows are at or below the trigger threshold P = length of period (d) when flows are at or below the trigger threshold NWL only have one abstraction site (Ormesby Broad) that is in scope for this measure. If the conditions to trigger AIM have not been met then N/A should be reported.
3C.4	Normalised AIM performance	Number	The normalised AIM performance for the current reporting year is calculated as follows: nA = A / (T * P) where: nA = Normalised AIM performance A = AIM performance in Ml T = baseline average daily abstraction (Ml/d) during period when flows are at or below the trigger threshold P = length of period (d) when flows are at or below the trigger threshold NWL only have one abstraction site (Ormesby Broad) that is in scope for this measure. If the conditions to trigger AIM have not been met then N/A should be reported.

3C.5	Cumulative AIM performance 2016-17 onwards	Number	Cumulative AIM performance in Ml for the years 2016-17 onwards. For the purposes of the reporting for the year ended 31 March 2020, this is the sum of AIM performance for the years 2016-17 – 2019-20 inclusive. Ai+Aii+Aiii..... where: Ai = AIM performance in Ml in year i Aii = AIM performance in Ml in year iI etc. NWL only have one abstraction site (Ormesby Broad) that is in scope for this measure.
3C.6	Cumulative Normalised AIM performance 2016-17 onwards	Number	Cumulative normalised AIM performance for the years 2016-17 onwards. For the purposes of the reporting for the year ended 31 March 2020, this is calculated for the years 2016-17 – 2019-20 inclusive. ΣA / (T * ΣP) Where: ΣA = Ai+Aii+Aiii....., Ai = AIM performance in Ml in year i T = baseline average daily abstraction (Ml/d) during period when flows are at or below the trigger threshold ΣP = Pi+Pii+Piii....., Pi = length of period (d) when flows are at or below the trigger threshold in year i NWL only have one abstraction site (Ormesby Broad) that is in scope for this measure.
4A.1	Number of void households ('000s)	Number of households ('000s)	Average (mean) total number of household (residential) properties, within the supply area, which are connected for either a water service only, a wastewater service only or both services but do not receive a charge, as there are no occupants. This should not include properties that do not receive a bill because it would be uneconomical to do so. Note that a property connected for both services that is not occupied, only counts as one void property. This is calculated by determining the number of unoccupied residential properties in every month of the reporting year and dividing by 12. This number is split into different components, namely: **Unmeasured:** The number of void properties where the property is unmeasured (no meter to record volumes of water and/or wastewater used). **Measured:** The number of void properties where the property is unmeasured (a meter is present to record volumes of water and/or wastewater used). This measure covers all void household properties across NWL's network where they provide water and wastewater services.

4A.2	Per capita consumption (unmeasured households excluding supply pipe leakage)	Litres per head per day (l/h/d)	Estimated per capita (person) consumption measures the average amount of water used by each person each day and excludes supply pipe leakage, which is defined as leakage from customers' pipes between the highway boundary and the customer's stop tap. This number is split into different components, namely: **Unmeasured:** Unmetered household consumption is estimated through monitoring consumption at a sample of properties to calculate per capita consumption and multiplying this by the population of unmeasured properties to identify total water delivered to billed unmeasured properties; **Measured:** Metered household consumption is calculated using average daily consumer meter readings, adjusted for Meter Under-Registration. Meter Under-Registration is an adjustment made to metered household consumption to account for the error rate in consumption meters during periods of higher flows and has been obtained through studies conducted by NWL to determine an estimation of its calculation. Both are reported as a post Maximum Likelihood Estimation (MLE) figure (a statistical method used to normalise differences identified when a water company calculates their water balance (distribution input compared to water consumption + leakage) through the use of confidence intervals. This measure covers all household properties across NWL's network where they provide water services.
4A.3	Bulk supply export	Megalitres per day (Ml/d)	This number is split into different components, namely: **Water:** Volume of water (treated and untreated) exported to other companies in bulk supplies by the appointed (statutory) business. A bulk supply export in this context is the transfer of treated or untreated water to another water company's network from NWL's network such that the receiving water company can treat (if necessary) and distribute this water and deliver it to their customers through their distribution network. This measure covers all bulk supply exports across NWL's network where they provide water services to customers. **Wastewater:** Volume of wastewater exported to other companies in bulk supplies by the appointed (statutory) business. A bulk supply export in this context is the transfer of wastewater to another water company's network from NWL's network such that the receiving water company can treat the wastewater to produce, treat and dispose of the sludge. This measure covers all bulk supply exports across NWL's network where they provide wastewater services to customers.

4A.4	Bulk supply import	Megalitres per day (Ml/d)	This number is split into different components, namely: **Water:** Volume of water (treated and untreated) imported from other companies in bulk supplies by the appointed (statutory) business. A bulk supply import in this context is the transfer of treated or untreated water from another water company's network to NWL's network such that NWL can treat (if necessary) and distribute this water and deliver it to its customers through its distribution network. This measure covers all bulk supply imports across NWL's network where they provide water services to customers. **Wastewater:** Volume of wastewater imported from other companies in bulk supplies by the appointed (statutory) business. A bulk supply export in this context is the transfer of wastewater from another water company's network to NWL's network such that NWL can treat the wastewater to produce, treat and dispose of the sludge. Tankered waste volumes, which is a non-appointed activity (waste that NWL are not statutory required to treat so have special agreements with customers to treat, this does not include Trade Effluent that is considered "appointed" waste), should not be included in this line. "Cross border" imports of sludge that was produced through another water company's wastewater treatment processes but NWL go on to treat the sludge further prior to disposal are also excluded as this is sludge at the point NWL receive it, rather than wastewater. This measure covers all bulk supply imports across NWL's network where they provide wastewater services to customers.
4A.5	Distribution input	Megalitres per day (Ml/d)	Distribution input is the average (mean) volume of potable (drinkable) water entering the distribution system. It is calculated as follows: **Works output + Imports – Exports.** Works output is the volume of treated water that enters the company's potable water distribution system from treatment works. Imports refers to any treated water imported from another nearby water company. Exports refers to any treated water exported to a nearby water company. It is reported as a post Maximum Likelihood Estimation (MLE) figure (a statistical method used to normalise differences identified when a water company calculates their water balance (distribution input compared to water consumption + leakage) through the use of confidence intervals. This measure covers all distribution input generated across NWL's appointed region.
4D.25	Licenced volume available	Megalitres (Ml)	The total volume of raw water (water found in the environment that has not been treated) that is licenced to be abstracted from all water sources (reservoirs (impounding and pumped storage), rivers and boreholes) within the reporting year. This should equal the total licenced volume of water available to abstract, not the actual volume abstracted within the reporting period. This measure covers all licenced volume available across NWL's appointed region.
4D.25	Volume abstracted	Megalitres (Ml)	The total volume of water that is abstracted from the environment, from all water sources (reservoirs (impounding and pumped storage, rivers and boreholes) within the reporting year measured in Ml. NWL only include the volume of water that is abstracted to be treated at a Water Treatment Works. Water that is abstracted from one asset and transferred to another asset is excluded so avoid double counting the actual volume of water that is abstracted from the environment and enters Water Treatment Works for processing. This measure covers all volumes of raw water abstracted from the environment that meets the definition above across NWL's appointed region.

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4D.25	Volume transported	Megalitres (Ml)	The total volume of raw water (water found in the environment that has not been treated) that is transported through assets defined as being included within the 'Raw water transport price control unit' as described by RAG 4.08 Appendix 2, that is from the boundaries of the abstraction site (a water source i.e. reservoirs (impounding and pumped storage), rivers and boreholes) to a treatment works, raw water storage facility, or to customers who require untreated or non-potable water (including third party water companies). Where a water abstraction site and water treatment works are co-located on the same site, then the raw water effectively 'by-passes' the raw water transport stage and would not be included. This measure covers all raw water transported that meets the definition above across NWL's appointed region.
4D.25	Average volume stored	Megalitres (Ml)	The average (mean) volume of raw water (water found in the environment that has not been treated) stored in raw water storage facilities (defined as being within 'Raw water storage price control unit' as described by RAG 4.08 Appendix 2) prior to either entering a Water Treatment Works (WTW) for treatment, entering further raw water transport to another raw water asset, is delivered to an end customer, or is delivered to a third party water company. Actual volumes should be used where possible and volumes measured at least monthly. If actual volume data is unavailable, it is assumed that they are storing 80% of their full capacity at any one time. This measure covers all treated water stored that meets the definition above across NWL's appointed region.
4D.25	Distribution input volume (water treatment)	Megalitres (Ml)	Distribution input (water treatment) is the total volume of water that entered all Water Treatment Works (WTWs) to be treated so that is can enter the potable water network for distribution to customers' properties within the reporting year. This differs from Distribution Input reported elsewhere (4P.72) which is the volume of water that has *actually* been treated by WTWs, rather than in this instance the volume of water that enters the WTWs *to* be treated. This measure covers all distribution input generated across NWL's appointed region.
4D.25	Distribution input volume (Treated water distribution)	Megalitres (Ml)	Distribution input is the total volume of potable (drinkable) water entering the distribution system. It is calculated as follows: **Works output + Imports – Exports.** Works output is the volume of treated water that enters the company's potable water distribution system from treatment works. Imports refers to any treated water imported from another nearby water company. Exports refers to any treated water exported to a nearby water company. This differs from Distribution Input reported elsewhere (4P.72) because this is reported pre Maximum Likelihood Estimation (MLE). This measure covers all distribution input generated across NWL's appointed region.
4D.27	Population	Number of people (000's)	Total resident population served in billed households with measured and unmeasured water and billed non-households supplied with measured and unmeasured water. This should equal 4Q.15. This measure covers the total population across NWL's appointed region.

4E.25	Volume collected (Foul)	Megalitres (Ml)	This measures the total volume of wastewater received into the company's Sewage Treatment Works from customers' properties (foul sewage) during the reporting year. It is calculated by assuming that 95% of water delivered to properties is returned through the sewage network (i.e. 5% is not returned due to cooking, drinking gardening etc.). 95% is an industry standard figure to apply in this scenario. This measure covers all foul wastewater collected across NWL's appointed region.
4E.25	Volume collected (Surface drainage water)	Megalitres (Ml)	This measures the total volume of surface water received into the company's Sewage Treatment Works from exterior areas of customers' properties during the reporting year. It is calculated as 65% of the remaining total water collected balance once foul sewage has been deducted. Total sewage is the total volume of sewage that is recorded as entering all Sewage Treatment Works across the network. This measure covers all surface drainage wastewater collected across NWL's appointed region.
4E.25	Volume collected (Highway drainage)	Megalitres (Ml)	This measures the collection of surface water that runs off roads and pavements and is received into the company's Sewage Treatment Works. It is calculated as 65% of the remaining total water collected balance once foul sewage has been deducted. Total sewage is the total volume of sewage that is recorded as entering all Sewage Treatment Works across the network. This measure covers all highway drainage wastewater collected across NWL's appointed region.
4E.25	Biochemical Oxygen Demand (BOD) (Sewage treatment and disposal)	Tonnes	The total pollution load in tonnes BOD/year that is discharged to the sewerage system. Biochemical Oxygen Demand (BOD) = 'Biochemical Oxygen Demand", this measures the quantity of biodegradable organic matter contained in water. This should be calculated including both resident and non-resident populations. This measure covers all sewage treatment works across NWL's appointed region.
4E.25	Biochemical Oxygen Demand (BOD) (Import sludge liquor treatment)	Tonnes	The total pollution load in tonnes BOD/year that is discharged to the sewerage system from treating liquor that has been generated from the sludge treatment process. This occurs when sludge goes through further treatment at a sludge treatment centre and additional liquor is obtained from it that is returned to a sewage treatment works to be retreated. Biochemical Oxygen Demand (BOD) = 'Biochemical Oxygen Demand", this measures the quantity of biodegradable organic matter contained in water. This should be calculated including both resident and non-resident populations. This measure covers all plants where liquor is derived from the sludge treatment process and returned to the sewage treatment works for further processing across NWL's appointed region.
4E.25	Volume transported	Metres cubed (m^3)	The total volume of sludge that is transported from sewage treatment works (a plant where wastewater (sewage) is treated to discharge to the water to the environment and the by-product sludge is produced) to sludge treatment centres (a plant where sludge receives further treatment to make it ready for final disposal). This measure covers all movements of sludge that meet the definition above across NWL's appointed region.

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4E.25	Dried solid mass treated	Total tonnes dried solids (ttds)	The total volume of sewage sludge produced during the report year. This line should equal the reporting of 4R.25 (Total sludge produced). This is a measure of all the untreated sewage sludge (primary, secondary, tertiary) produced by in-area wastewater treatment processes in the report year which is either treated by the incumbent, a 3rd part serviced provider or remains untreated prior to disposal. Grit and screenings removed through preliminary treatment processes should be excluded. Cross-border imports should be excluded. Primary sludge is a result of the capture of suspended solids and organics in the primary treatment process. Secondary sludge has a lower biogas potential because the microorganisms in the secondary treatment process have consumed most of their energy content leaving behind mainly inert biomass. Tertiary sludge is sludge that has had the phosphates and nitrates from the water supply removed. A managed contractor is defined as a company that is acting under NWL's direction and NWL remain responsible for the process. A 3rd party sludge service provider is a company that NWL engage to treat and/or dispose of sludge on their behalf and are not managed by NWL, i.e. they do so in a manner the 3rd party chooses and take on this responsibility. This measure covers all treatment of sludge that meet the definition above across NWL's appointed region.
4E.25	Dried solid mass disposed	Total tonnes dried solids (ttds)	This is the total for all sewage sludge disposed during the reporting year and should include disposal to farmland, landfill, incineration, composting and other routes. This line should equal the reporting of 4R.30 (Total sludge disposed). The total amount of sewage sludge treated and disposed of during the report year by the incumbent and 3rd party sludge service providers expressed in thousands of tonnes of dry solids of sludge. This should include recycling to farmland (irrespective of whether spreading is undertaken by the 3rd party service provider or the farmer) and disposal to landfill, incineration, land restoration/ reclamation, composting and other routes. This may be different from sewage sludge produced due to: - quantities of lime used in lime treated sludge, - losses of volatile solids in the treatment process, and - changes in the amount of sludge stockpiled at sludge treatment centres. A managed contractor is defined as a company that is acting under NWL's direction and NWL remain responsible for the process. A 3rd party sludge service provider is a company that NWL engage to treat and/or dispose of sludge on their behalf and are not managed by NWL, i.e. they do so in a manner the 3rd party chooses and take on this responsibility. This measure covers all disposal of sludge that meet the definition above across NWL's appointed region.
4E.27	Population	Number of people ('000s)	Total resident population connected to the sewage system in billed households. This should equal 4U.11. This measure covers the total population across NWL's appointed region.

4O.1	Works name	Text	Name of sewage treatment works. The reporting is restricted to large sewage treatment works only operated by NWL. A large sewage treatment works is defined as one that is above size band 5 (>1,500kg BOD5/day). The calculation of whether a sewage treatment works meets the definition of "large" should be calculated using resident population only, i.e. it should not be calculated using the non-resident population also. Non-resident population is defined as the holiday and tourist population connected to the sewerage system (note that this does not include daily commuters or day visitors). *BOD5 = '5-day Biochemical Oxygen Demand', t*his measures the quantity of biodegradable organic matter contained in water. *Note: the line is received pre-populated by Ofwat with the names of 25 treatment works. NWL have calculated whether these 25 meet the definition of "large" and identified that four of them (Belmont, Consett, Berwick and Hexham) do not however, as the table is received pre-populated they are retained within the reported cost assessment table but the remaining data lines (4O.2 – 4O.10) within this table are not completed.* *NWL has also calculated the size banding of its other 389 sewage treatment works and calculated that none of these meet the definition of large and as such do not require reporting within table 4O.*
4O.2	Classification of treatment works	Text	Classification of treatment works, according to the following Ofwat classification definitions: P = Primary treatment (Includes works whose treatment methods are restricted to primary treatment (screening, comminution, maceration, grit and detritus removal, pre-aeration and grease removal, storm tanks, plus primary sedimentation, including where assisted by the addition of chemicals e.g. Clariflow)); SAS = Secondary Activated Sludge (As primary, plus works whose treatment methods include activated sludge (including diffused air aeration, coarse bubble aeration, mechanical aeration, oxygen injection, submerged filters) and other equivalent techniques including deep shaft process, extended aeration (single, double and triple ditches) and biological aerated filters as secondary treatment); SB = Secondary Biological (As primary, plus works whose treatment methods include rotating biological contactors and biological filtration (including conventional filtration, high rate filtration, alternating double filtration and double filtration), root zone treatment (where used as a secondary treatment stage); TA1 = Tertiary A1 (Works with a secondary activated sludge process whose treatment methods also include prolonged settlement in conventional lagoons or raft lagoons, irrigation over grassland, constructed wetlands, root zone treatment (where used as a tertiary stage), drum filters, microstrainers, slow sand filters, tertiary nitrifying filters, wedge wire clarifiers or Clariflow installed in humus tanks, where used as a tertiary treatment stage); TA2 = Tertiary A2 (Works with a secondary activated sludge process whose treatment methods also include rapid-gravity sand filters, moving bed filters, pressure filters, nutrient control using physico-chemical and biological methods, disinfection, hard COD and colour removal, where used as a tertiary treatment stage); TB1 = Tertiary B1 (Works with a secondary stage biological process whose treatment methods also include prolonged settlement in conventional lagoons or raft lagoons, irrigation over grassland, constructed wetlands, root zone treatment (where used as a tertiary stage), drum filters, microstrainers, slow sand filters, tertiary nitrifying filters, wedge wire clarifiers or Clariflow installed in humus tanks, where used as a tertiary treatment stage); TB2 = Tertiary B2 (Works with a secondary biological process whose treatment methods also include rapid gravity sand filters, moving bed filters, pressure filters, nutrient control using physico-chemical and biological methods, disinfection, hard Chemical Oxygen Demand (COD) and colour removal, where used as a tertiary treatment stage). Where a works' load is split into two treatment streams, the works should be reported in this line as the higher of the two proportions. For example, a works with a split of 60% Secondary Activated Sludge and 40% Secondary Biological should be classed as Secondary Activated Sludge (SAS) in this line. This data line is completed for all 21 large sewage treatment works operated by NWL. See 4O.1 for more details.

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4O.3	Population equivalent of total load received	Number of people ('000s)	The average (mean) equivalent population of the total load received by the treatment works during the report year. Total load will be comprised of both resident and non-resident population loads. This is calculated by determining the population equivalent of the total load received on the basis of a contribution of 60g BOD5 per head of equivalent population per day. Resident population is defined as all households and businesses whom NWL provide wastewater services to. Non-resident population is defined as the holiday and tourist population connected to the sewerage system (note that this does not include daily commuters or day visitors). *BOD5 = '5-day Biochemical Oxygen Demand',* this measures the quantity of biodegradable organic matter contained in water. This data line is completed for all 21 large sewage treatment works operated by NWL. See 4O.1 for more details.
4O.4	Suspended solids consent	Milligrams per litre (mg/l)	The value of the effluent consent standard (95%ile) with respect to suspended solids. An effluent consent is a legal document that each sewage treatment works obtains detailing the parameters in which they must work to when treating sewage. Suspended solids are a measure of the particles in the treated effluent. The figure reported must be as determined by the Environment Agency as stated in the sewage treatment works consent and not a company's own assessment of the consent standard. This data line is completed for all 21 large sewage treatment works operated by NWL. See 4O.1 for more details.
4O.5	BOD5 consent	Milligrams per litre (mg/l)	The value of the effluent consent standard (95%ile) with respect to BOD5. An effluent consent is a legal document that each sewage treatment works obtains detailing the parameters in which they must work to when treating sewage. This measures the quantity of biodegradable organic matter contained in water. The figure reported must be as determined by the Environment Agency as stated in the sewage treatment works consent and not a company's own assessment of the consent standard. *BOD5 = '5-day Biochemical Oxygen Demand',* this measures the quantity of biodegradable organic matter contained in water. This data line is completed for all 21 large sewage treatment works operated by NWL. See 4O.1 for more details.
4O.6	Ammonia consent	Milligrams per litre (mg/l)	The value of the effluent consent standard (95%ile) with respect to ammonia. An effluent consent is a legal document that each sewage treatment works obtains detailing the parameters in which they must work to when treating sewage. Ammonia is a colourless gas, which is a compound of nitrogen and hydrogen with the formula NH3. The figure reported must be as determined by the Environment Agency as stated in the sewage treatment works consent and not a company's own assessment of the consent standard. This data line is completed for all 21 large sewage treatment works operated by NWL. See 4O.1 for more details. *Note: Not all sewage treatment works' consents contain a threshold for ammonia. Where they do not contain this threshold, N/A is reported.*

4O.7	Phosphorus consent	Milligrams per litre (mg/l)	The value of the effluent consent standard with respect to phosphorus (annual mean). An effluent consent is a legal document that each sewage treatment works obtains detailing the parameters in which they must work to when treating sewage. Phosphorus is a chemical element of atomic number 15, a poisonous non-metal which is highly reactive. The figure reported must be as determined by the Environment Agency as stated in the sewage treatment works consent and not a company's own assessment of the consent standard. This data line is completed for all 21 large sewage treatment works operated by NWL. See 4O.1 for more details. *Note: Not all sewage treatment works' consents contain a threshold for phosphorus. Where they do not contain this threshold, N/A is reported.*
4O.8	UV consent	Milliwatts per square centimetre ($mW/s/cm^2$)	The value of the consent process standard with respect to intensity of Ultraviolet irradiation. An effluent consent is a legal document that each sewage treatment works obtains detailing the parameters in which they must work to when treating sewage. Ultraviolet irradiation is the projection of ultraviolet light from a generator which is a by product of the water treatment process. The figure reported must be as determined by the Environment Agency as stated in the sewage treatment works consent and not a company's own assessment of the consent standard. This data line is completed for all 21 large sewage treatment works operated by NWL. See 4O.1 for more details. *Note: Not all sewage treatment works' consents contain a threshold for ultraviolet irradiation. Where they do not contain this threshold, N/A is reported.*
4O.9	Load received by STW	Kilograms 5-day Biological Oxygen Demand per day ($kgBOD_5/d$)	The average daily organic load (in $kgBOD_5/d$) received by the treatment works during the report year. Calculated on the basis of a contribution of 60g BOD5 per head of equivalent population per day, population being the resident (household and non-household) and non-resident (transient residents, e.g. holidaymakers) populations. Calculated values should agree with those reported in 4S.6. BOD5 = '5-day Biochemical Oxygen Demand", this measures the quantity of biodegradable organic matter contained in water. This data line is completed for all 21 large sewage treatment works operated by NWL. See 4O.1 for more details.
4O.10	Flow passed to full treatment	Cubic meters per day (m^3/d)	The average (mean) daily flow passed to full treatment at the treatment works during the report year. This calculates the average volume of sewage water that is received and fully treated through the sewage treatment works process per day. Typically a sewage treatment works is sized to take a 'flow to full treatment' value which is set as an industry standard at a multiple of incoming components figures which would be expected to be sufficiently higher than the peak dry weather flow of any catchment to ensure that all sewage receives adequate treatment. This data line is completed for all 21 large sewage treatment works operated by NWL. See 4O.1 for more details.

4P.1	Proportion of distribution input derived from impounding reservoirs	Percentage (%)	The proportion of potable (drinkable) water that entered the distribution system (distribution input) derived from impounding (gravity fed) reservoirs, including bulk supply. An impounding reservoir is one that has a natural catchment so is filled from the environment, i.e. water does not need to be pumped into the reservoir for it maintain its volume of available water. A bulk supply is the transfer of raw water from another water company's network into NWL's network such that NWL can treat this water prior to it entering its water distribution network. Bulk supplies should be allocated as per the nature of the source from which they are received by NWL, e.g. when water is transferred to NWL from an impounding reservoir from another water company through a bulk supply arrangement, then the volume of distribution input obtained from that bulk should be allocated to "Proportion of distribution input derived from impounding reservoirs". This measure includes all distribution input that is derived from impounding reservoirs (as per the definition above) across NWL's appointed region.
4P.2	Proportion of distribution input derived from pumped storage reservoirs	Percentage (%)	The proportion of potable (drinkable) water that entered the distribution system (distribution input) derived from pumped storage reservoirs including bulk supply. A pumped storage reservoir is one that obtains the majority of its water from it being pumped into the reservoir from a river, i.e. it does not receive the majority of its water as natural catchment from the environment. Pumped storage reservoirs received an element of gravity flow. If this flow makes a material contribution (>20%) to the volume of the reservoir the distribution input from this source should be allocated proportionally between the two reservoir types. A bulk supply is the transfer of raw water from another water company's network into NWL's network such that NWL can treat this water prior to it entering its water distribution network. Bulk supplies should be allocated as per the nature of the source from which they are received by NWL, e.g. when water is transferred to NWL from an impounding reservoir from another water company through a bulk supply arrangement, then the volume of distribution input obtained from that bulk should be allocated to "Proportion of distribution input derived from impounding reservoirs". This measure includes all distribution input that is derived from pumped storage reservoirs (as per the definition above) across NWL's appointed region.
4P.3	Proportion of distribution input derived from river abstractions	Percentage (%)	The proportion of potable (drinkable) water that entered the distribution system (distribution input) derived from river abstractions including bulk supply. River abstraction is the process of abstracting water directly from a river. A bulk supply is the transfer of raw water from another water company's network into NWL's network such that NWL can treat this water prior to it entering its water distribution network. Bulk supplies should be allocated as per the nature of the source from which they are received by NWL, e.g. when water is transferred to NWL from an impounding reservoir from another water company through a bulk supply arrangement, then the volume of distribution input obtained from that bulk should be allocated to "Proportion of distribution input derived from impounding reservoirs". This measure includes all distribution input that is derived from rivers (as per the definition above) across NWL's appointed region.
4P.4	Proportion of distribution input derived from groundwater works, excluding managed aquifer recharge (MAR) water supply schemes	Percentage (%)	Proportion of potable (drinkable) water that entered the distribution system (distribution input) derived from groundwater works including bulk supply but excluding managed aquifer recharge (MAR) water supply schemes. Groundwater is water that is found underground beneath the Earth's surface and abstracted using boreholes. Managed aquifer recharge (MAR) describes the intentional recharge (and storage) of water into an aquifer for subsequent recovery or for environmental benefits. A bulk supply is the transfer of raw water from another water company's network into NWL's network such that NWL can treat this water prior to it entering its water distribution network. Bulk supplies should be allocated as per the nature of the source from which they are received by NWL, e.g. when water is transferred to NWL from an impounding reservoir from another water company through a bulk supply arrangement, then the volume of distribution input obtained from that bulk should be allocated to "Proportion of distribution input derived from impounding reservoirs". This measure includes all distribution input that is derived from MAR schemes (as per the definition above) across NWL's appointed region.

4P.5	Proportion of distribution input derived from artificial recharge (AR) water supply schemes	Percentage (%)	Proportion of potable (drinkable) water that entered the distribution system (distribution input) derived from artificial recharge (AR) supply schemes including bulk supply. Artificial recharge schemes are a subset of managed aquifer recharge (MAR) schemes, which functions by recharging an aquifer before or after abstraction. Artificial recharge (AR) is the process of injecting (or recharging) water into the ground in a controlled way, by means of special recharge walls. The water abstracted is not necessarily the water that has been recharged, so the water can be of natural quality and require more complex treatment. This excludes aquifer storage and recovery (ASR) water supply schemes. These are a subset of managed aquifer recharge (MAR) schemes, which functions by recharging an aquifer, storing that water and maintaining its quality. A bulk supply is the transfer of raw water from another water company's network into NWL's network such that NWL can treat this water prior to it entering its water distribution network. Bulk supplies should be allocated as per the nature of the source from which they are received by NWL, e.g. when water is transferred to NWL from an impounding reservoir from another water company through a bulk supply arrangement, then the volume of distribution input obtained from that bulk should be allocated to "Proportion of distribution input derived from impounding reservoirs". This measure includes all distribution input that is derived from AR schemes (as per the definition above) across NWL's appointed region.
4P.6	Proportion of distribution input derived from aquifer storage and recovery (ASR) water supply schemes	Percentage (%)	Proportion of potable (drinkable) water that entered the distribution system (distribution input) derived from aquifer storage and recovery (ASR) supply schemes including bulk supply. Aquifer storage and recovery (ASR) schemes are a subset of managed aquifer recharge (MAR) schemes, which functions by recharging an aquifer, storing that water and maintaining its quality. Aquifer storage and recovery (ASR) is the direct injection of surface water supplies such as potable (drinkable) water, reclaimed water, or river into an aquifer for later recovery and use. The aim is to enable simple and less costly treatment of the re-abstracted water, and that the water recharged is predominantly the water that is re- abstracted. This excludes artificial recharge (AR) water supply schemes. This excludes artificial recharge (AR) water supply schemes. These are a subset of managed aquifer recharge (MAR) schemes, which functions by recharging an aquifer before or after abstraction. A bulk supply is the transfer of raw water from another water company's network into NWL's network such that NWL can treat this water prior to it entering its water distribution network. Bulk supplies should be allocated as per the nature of the source from which they are received by NWL, e.g. when water is transferred to NWL from an impounding reservoir from another water company through a bulk supply arrangement, then the volume of distribution input obtained from that bulk should be allocated to "Proportion of distribution input derived from impounding reservoirs". This measure includes all distribution input that is derived from ASR schemes (as per the definition above) across NWL's appointed region.
4P.7	Proportion of distribution input from saline abstractions	Percentage (%)	Proportion of potable (drinkable) water that entered the distribution system (distribution input) derived from saline abstractions including bulk supply. Saline abstraction is the process of abstracting salt water and making fit to enter the distribution system. A bulk supply is the transfer of raw water from another water company's network into NWL's network such that NWL can treat this water prior to it entering its water distribution network. Bulk supplies should be allocated as per the nature of the source from which they are received by NWL, e.g. when water is transferred to NWL from an impounding reservoir from another water company through a bulk supply arrangement, then the volume of distribution input obtained from that bulk should be allocated to "Proportion of distribution input derived from impounding reservoirs". This measure includes all distribution input that is derived from saline abstraction (as per the definition above) across NWL's appointed region.
4P.8	Proportion of distribution input from water reuse schemes	Percentage (%)	Proportion of potable (drinkable) water that entered the distribution system (distribution input) derived from reuse schemes. Water reuse schemes are where effluent discharged from a Sewage Treatment Works (STW) is not returned to the environment but goes directly to a Water Treatment Works (WTW) for processing. This measure includes all water reuse schemes (as per the definition above) across NWL's appointed region. *Note: NWL do not include reuse schemes whereby the treated water from a Sewage Treatment Works is discharged into a river to increase the volume of available water in that river to be abstracted downstream by a Water Treatment Works.*

4P.9	Number of impounding reservoirs	Number	Number of sources of impounding (gravity fed) reservoirs. An impounding reservoir is one that has is natural catchment so is filled from the environment, i.e. water does not need to be pumped into the reservoir for it maintain its volume of available water. A source is defined as an independent raw water supply that directly supplies a treatment works, such as impounding reservoirs, river abstractions and groundwater work. Standby (emergency supplies) or mothballed (contains a mothballing pump) sources from which no water has been obtained in the year should not be included. *Note: NWL only report reservoirs that directly supply a treatment works with water and do not include those from which water is abstracted and fed into another water resource asset for the water to be abstracted from to supply a treatment works. For example, a reservoir which feeds into a river and from that river water is abstracted into a water treatment works, the upstream reservoir would be excluded from the reporting.* This measure includes all impounding reservoirs (as per the definition above) across NWL's appointed region.
4P.10	Number of pumped storage reservoirs	Number	Number of sources of pumped storage (i.e. not fed by gravity) reservoirs. A pumped storage reservoir is one that obtains the majority of its water from it being pumped into the reservoir from a river, i.e. it does not receive the majority of its water as natural catchment from the environment. Pumped storage reservoirs will receive an element of gravity flow. The source should be allocated according to the type of flow that delivers the larger part of the reservoir's input. For example, if 60% of the reservoir's volume is pumped river water the source should be counted as a pumped storage source. A source is defined as an independent raw water supply that directly supplies a treatment works, such as impounding reservoirs, river abstractions and groundwater works. Standby (emergency supplies) or mothballed (contains a mothballing pump) sources from which no water has been obtained in the year should not be included. *Note: NWL only report reservoirs that directly supply a treatment works with water and do not include those from which water is abstracted and fed into another water resource asset for the water to be abstracted from to supply a treatment works. For example, a reservoir which feeds into a river and from that river water is abstracted into a water treatment works, the upstream reservoir would be excluded from the reporting.* This measure includes all pumped storage reservoirs (as per the definition above) across NWL's appointed region.
4P.11	Number of river abstractions	Number	Number of sources of river abstractions. River abstraction is the process of removing water from rivers. A source is defined as an independent raw water supply that directly supplies a treatment works, such as impounding reservoirs, river abstractions and groundwater works. Standby (emergency supplies) or mothballed (contains a mothballing pump) sources from which no water has been obtained in the year should not be included. *Note: NWL only report rivers that directly supply a treatment works with water and do not include those from which water is abstracted and fed into another water resource asset for the water to be abstracted from to supply a treatment works. For example, a river which feeds into a reservoir and from that reservoir water is abstracted into a water treatment works, the upstream river would be excluded from the reporting.* This measure includes all river abstractions (as per the definition above) across NWL's appointed region.
4P.12	Number of groundwater works, excluding managed aquifer recharge (MAR) water supply schemes	Number	Number of sources of groundwater works, excluding managed aquifer recharge (MAR) water supply schemes. Groundwater works abstract water that is found underground beneath the Earth's surface using boreholes. A source is defined as an independent raw water supply that directly supplies a treatment works, such as impounding reservoirs, river abstractions and groundwater works. Standby (emergency supplies) or mothballed (contains a mothballing pump) sources from which no water has been obtained in the year should not be included. Managed aquifer recharge (MAR) describes the intentional recharge (and storage) of water into an aquifer for subsequent recovery or for environmental benefits. This measure includes all MAR schemes (as per the definition above) across NWL's appointed region.

4P.13	Number of artificial recharge (AR) water supply schemes	Number	Number of sources of artificial recharge (AR) water supply schemes. Artificial recharge schemes are a subset of managed aquifer recharge (MAR) schemes, which functions by recharging an aquifer before or after abstraction. Artificial recharge (AR) is the process of injecting (or recharging) water into the ground in a controlled way, by means of special recharge walls. The water abstracted is not necessarily the water that has been recharged, so the water can be of natural quality and require more complex treatment. This excludes aquifer storage and recovery (ASR) water supply schemes. These are a subset of managed aquifer recharge (MAR) schemes, which functions by recharging an aquifer, storing that water and maintaining its quality. A source is defined as an independent raw water supply that directly supplies a treatment works, such as impounding reservoirs, river abstractions and groundwater works. Standby (emergency supplies) or mothballed (contains a mothballing pump) sources from which no water has been obtained in the year should not be included. This measure includes all AR schemes (as per the definition above) across NWL's appointed region.
4P.14	Number of aquifer storage and recovery (ASR) water supply schemes	Number	Number of sources of aquifer storage and recovery (ASR) water supply schemes. Aquifer storage and recovery (ASR) schemes are a subset of managed aquifer recharge (MAR) schemes, which functions by recharging an aquifer, storing that water and maintaining its quality. Aquifer storage and recovery (ASR) is the direct injection of surface water supplies such as potable (drinkable) water, reclaimed water, or river into an aquifer for later recovery and use. The aim is to enable simple and less costly treatment of the re-abstracted water, and that the water recharged is predominantly the water that is re- abstracted. This excludes artificial recharge (AR) water supply schemes. This excludes artificial recharge (AR) water supply schemes. These are a subset of managed aquifer recharge (MAR) schemes, which functions by recharging an aquifer before or after abstraction. A source is defined as an independent raw water supply that directly supplies a treatment works, such as impounding reservoirs, river abstractions and groundwater works. Standby (emergency supplies) or mothballed (contains a mothballing pump) sources from which no water has been obtained in the year should not be included. This measure includes all ASR schemes (as per the definition above) across NWL's appointed region.
4P.15	Number of saline abstraction schemes	Number	Total number of sources of saline abstraction schemes. Saline abstraction is the process of abstracting salt water and making fit to enter the distribution system. A source is defined as an independent raw water supply that directly supplies a treatment works, such as impounding reservoirs, river abstractions and groundwater works. Standby (emergency supplies) or mothballed (contains a mothballing pump) sources from which no water has been obtained in the year should not be included. This measure includes all saline abstraction schemes (as per the definition above) across NWL's appointed region.
4P.16	Total number of sources	Number	The total number of sources operated by a company. This should equal the sum of lines 4P.9 to 4P.15 A source is defined as an independent raw water supply that directly supplies a treatment works, such as impounding reservoirs, river abstractions and groundwater works. Standby or mothballed sources from which no water has been obtained in the year should not be included.
4P.17	Number of reuse schemes	Number	Total number of reuse schemes. Do not include in number of sources (line 4P.16). Water reuse schemes are where effluent discharged from a Sewage Treatment Works (STW) is not returned to the environment but goes directly to a Water Treatment Works (WTW) for processing. *Note: NWL do not include reuse schemes whereby the treated water from a Sewage Treatment Works is discharged into a river to increase the volume of available water in that river to be abstracted downstream by a Water Treatment Works.* This measure includes all water reuse schemes (as per the definition above) across NWL's appointed region.

4P.18	Total number of water reservoirs	Number	All reservoirs used for holding raw water. This line shall include impounding (gravity fed) reservoirs, pumped storage reservoirs (one where the water is pumped from a river to fill them) and bankside storage facilities (where water is pumped or siphoned from a nearby river, other reservoir to be stored for future use). This line includes, but is not limited to, those reservoirs reported in 4P.9 (Number of impounding reservoirs) and 4P.10 (Number of pumped storage reservoirs) so it does not equal 4P.16 less 4P.11 to 4P.15 inclusive because it includes bankside storage and reservoirs that do not directly supply a treatment works with water but are upstream of those that do. This measure includes all water reservoirs (as per the definition above) across NWL's appointed region.
4P.19	Total capacity of water reservoirs	Megalitres (Ml)	Total design/construction capacity (measured in megalitres) of all reservoirs used for holding raw water (4P.18). This line shall include impounding (gravity fed) reservoirs, pumped storage reservoirs (one where the water is pumped from a river to fill them) and bank side storage facilities (where water is pumped or siphoned from a nearby river). This measure includes all water reservoirs (as per the definition above) across NWL's appointed region.
4P.20	Total number of intake and source pumping stations	Number	The total number of surface water (water on the Earth's surface) intake and groundwater (water found beneath the Earth's surface) intake pumping stations associated with potable (drinkable), non-potable (non-drinkable) and raw water (water found in the environment that has not been treated) systems. Intake and source pumping stations abstract water directly from a source which can be an impounding reservoir, pumped storage reservoir, river or groundwater works and are included within the 'Raw water abstraction price control unit' as described by RAG 4.08 Appendix 2. For the avoidance of doubt, this is the number of sites as opposed to the number of individual pumps. Decommissioned assets have been excluded from reporting. NWL have defined a decommissioned asset as one that cannot be returned to service within six months from being identified as needed, and the asset is not awaiting planned work or identified for capital investment within the current Asset Management Period (AMP), then the site is deemed to be abandoned. This does not preclude the possibility of an asset being identified as required at some future date and therefore included in future regulatory return. This measure includes all intake and source pumping stations (as per the definition above) across NWL's appointed region.
4P.21	Total number of raw water transfer stations	Number	Total number of raw water (water found in the environment that has not been treated) transfer stations. Raw water transfer stations transfer raw water from its abstraction source through the raw water transport network to a Water Treatment Works (WTW), a raw water storage facility, or to customers that require non-potable (non-drinkable) water (including third party water companies) and are included within the 'Raw water transport price control unit' as described by RAG 4.08 Appendix 2. For the avoidance of doubt, this is the number of sites as opposed to the number of individual pumps. Decommissioned assets have been excluded from reporting. NWL have defined a decommissioned asset as one that cannot be returned to service within six months from being identified as needed, and the asset is not awaiting planned work or identified for capital investment within the current Asset Management Period (AMP), then the site is deemed to be abandoned. This does not preclude the possibility of an asset being identified as required at some future date and therefore included in future regulatory return. This measure includes all raw water transfer stations (as per the definition above) across NWL's appointed region.

4P.22	Total capacity of intake and source pumping stations	Kilowatts (kW)	Total capacity of all abstraction pumpsets, (duty, assist and standby irrespective of the number that may be working at any one time) associated with raw water (water found in the environment that has not been treated) abstraction. A duty pump covers daily requirements. An assist pump is one where each pump is sized for 50% of the estimated flow rate required and a standby pump is a backup pump in the event of duty pump failing. For the avoidance of doubt, the capacity of all individual pumps at the sites reported in 4P.20 should be included. This measure includes all intake and source pumping stations (as per the definition above) across NWL's appointed region.
4P.23	Total capacity of raw water transfer pumping stations	Kilowatts (kW)	Total capacity of all raw water transfer pumpsets, (duty, assist and standby - irrespective of the number that may be working at any one time) associated with raw water transfer. A duty pump covers daily requirements. An assist pump is one where each pump is sized for 50% of the estimated flow rate required and a standby pump is a backup pump in the event of duty pump failing. For the avoidance of doubt, the capacity of all individual pumps at the sites reported in 4P.21 should be included. This measure includes all raw water transfer stations (as per the definition above) across NWL's appointed region.
4P.25	Average pumping head – raw water abstraction	Mean head per day (M.hd)	Average pumping head for the raw water abstraction business unit, the pumpsets reported in 4P.20. Average pumping head is measured as the sum of the annual mean head (defined as the average delivery pressure minus the average suction pressure when the pump is operating, or the height the water is lifted) multiplied by the total measured volume of water pumped entering the raw water abstraction price control unit, as defined in RAG 4.08, divided by the total volume of water entering the raw water abstraction price control, as defined in RAG 4.08, whether it has been pumped or gravitated (moved by gravity). This is calculated using actual pumping head rather than the rating of the pumps.
4P.26	Average pumping head – raw water transport	Mean head per day (M.hd)	Average pumping head for the raw water transport business unit, the pumpsets reported in 4P.21. Average pumping head is measured as the sum of the annual mean head (defined as the average delivery pressure minus the average suction pressure when the pump is operating, or the height the water is lifted) multiplied by the total measured volume of water pumped entering the raw water transport price control unit, as defined in RAG 4.08, divided by the total volume of water entering the raw water transport price control unit, as defined in RAG 4.08, whether it has been pumped or gravitated (moved by gravity). This is calculated using actual pumping head rather than the rating of the pumps.

4P.28	Water resources capacity (measured using water resources yield)	Megalitres per day (Ml/d)	The company level water resources capacity, which should be the sum of all company water resource zones (WRZs) across all its licensed areas. This is the average volume of water available from the environment (dependent on the level of service and planning period) and constrained by water resources control assets. These will be assets that provide water for raw water abstraction and includes boreholes, reservoirs (impounding and pumped storage) and river abstraction assets. Assets that sit outside of the water resources control assets boundary, for example, the water treatment capacity of the Water Treatment Works (WTW), will not influence the reporting of water resources yield. Capacity is measured in terms of water resources yield which captures the average volume of water available from the environment and constrained by water resources control assets. The abstraction asset capacities are fixed values regardless of the assumptions made. Therefore, water resources yield is constrained by: - the company's agreed level of service (the return period of drought resilience and frequency of restriction implementation); - the company's agreed planning period (the period over which the amount of water available is measured e.g. dry year annual average); - the baseline hydrological/hydrogeological (source) yield; - the abstraction licence availability; and - the raw water abstraction asset capacities (e.g. abstraction pumps). In simple terms, where there is one raw water source, one abstraction licence, and one abstraction asset - the water resources yield, and therefore the capacity, will be the lowest of the flow rates (volume per unit time) that can be achieved across each of those three components using the company's level of service and planning period scenario(s) (i.e. the lower of, source yield - the amount available from the environment, the limit set in the abstraction licence or the physical capacity of the asset used for abstraction).
4P.60	Average pumping head – water treatment	Mean head per day (M.hd)	Average pumping head for the water treatment business unit (water received from the raw water transport process and treated to make potable (drinkable) water. Average pumping head is measured as the sum of the annual mean head (defined as the average delivery pressure minus the average suction pressure when the pump is operating, or the height the water is lifted) multiplied by the total measured volume of water pumped entering the water treatment transport price control unit, as defined in RAG 4.08, divided by the total volume of water entering the water treatment price control unit, as defined in RAG 4.08, whether it has been pumped or gravitated (moved by gravity). This is calculated using actual pumping head rather than the rating of the pumps.
4P.69	Capacity of booster pumping stations	Kilowatts (kW)	Total capacity of all treated (drinking) water pumpsets, (duty, assist and standby irrespective of the number that may be working at any one time) associated with treated water (drinkable) distribution. A duty pump covers daily requirements. An assist pump is one where each pump is sized for 50% of the estimated flow rate required and a standby pump is a backup pump in the event of duty pump failing. For the avoidance of doubt, the capacity of all individual pumps at the sites reported in 4P.83 should be included. This measure includes all booster pumping stations (as per the definition above) across NWL's appointed region.
4P.70	Capacity of service reservoirs	Megalitres (Ml)	The installed design/constructed capacity of treated (drinkable) water service reservoirs (reservoirs used to store treated water prior to being delivered to customers' properties) within the water supply system including treated water reservoirs at water treatment works and any secondary disinfection plant on reservoir sites. Include break pressure tanks. Exclude decommissioned assets. For the avoidance of doubt, the capacity of all individual compartments at the service reservoirs reported in 4P.84 should be included. This measure includes all service reservoirs (as per the definition above) across NWL's appointed region.

4P.71	Capacity of water towers	Megalitres (Ml)	The installed design/constructed capacity of treated (drinkable) water storage towers (towers used to store treated water prior to being delivered to customers' properties) within the water supply system. Exclude decommissioned assets. This measure includes all water towers (as per the definition above) across NWL's appointed region.
4P.72	Distribution input	Megalitres per day (Ml/d)	Distribution input is the average (mean) volume of potable (drinkable) water entering the distribution system. It is calculated as follows: **Works output + Imports – Exports.** Works output is the volume of treated water that enters the company's potable water distribution system from treatment works. Imports refers to any treated water imported from another nearby water company. Exports refers to any treated water exported to a nearby water company. It is reported as a post Maximum Likelihood Estimation (MLE) figure (a statistical method used to normalise differences identified when a water company calculates their water balance (distribution input compared to water consumption + leakage) through the use of confidence intervals). This measure covers all distribution input generated across NWL's appointed region.
4P.73	Water delivered (non-potable)	Megalitres per day (Ml/d)	Average (mean) volume non-potable (non-drinkable) water supplied as part of the appointed business. Include all non-potable water charged at standard and non-standard rates. It is reported as a post Maximum Likelihood Estimation (MLE) figure (a statistical method used to normalise differences identified when a water company calculates their water balance (distribution input compared to water consumption + leakage) through the use of confidence intervals). This measure includes all water delivered (non-potable) (as per the definition above) across NWL's appointed region.
4P.74	Water delivered (potable)	Megalitres per day (Ml/d)	Average (mean) volume potable (drinkable) water supplied as part of the appointed business. This includes: a) the average volume of water delivered for billed measured (metered) residential and businesses; b) the estimated volume of water delivered for billed unmeasured (unmetered) residential and businesses. This is estimated through monitoring consumption at a sample of properties to calculate per capita consumption and multiplying this by the population of unmeasured properties to identify total water delivered to billed unmeasured properties; c) supply pipe leakage (water leaked from customer owned pipes); d) meter under registration for water delivered which is measured (a measure of the volume of water used that is not reported by meters); e) unbilled water taken legally for legitimate purposes (public supplies for which no charge is made e.g. some sewer flushing etc., uncharged church supplies, fire training and fire-fighting supplies where these are not charged irrespective of whether or not they are metered). This excludes volumes associated with leakage allowance rebates to metered customers; and f) water taken illegally providing it is based on actual occurrences using sound and auditable identification and recording procedures (if not this should be treated as distribution losses and excluded from this line). It is reported as a post Maximum Likelihood Estimation (MLE) figure (a statistical method used to normalise differences identified when a water company calculates their water balance (distribution input compared to water consumption + leakage) through the use of confidence intervals). This measure includes all water delivered (potable) (as per the definition above) across NWL's appointed region.

4P.75	Water delivered (billed residential properties)	Megalitres per day (Ml/d)	Average (mean) volume of water delivered to residential properties which is measured (metered). This is to include supply pipe leakage (any loss of water from the underground supply pipe) and meter under-registration (where meters fail to record all usage). Additional meters fitted to measured residential properties for ancillary supplies (e.g. external hosepipes) which are non-commercial are to be included, as should any fitted to unmeasured (unmetered) residential properties if this is how revenue is allocated. Exclude miscellaneous use (Distribution system operational use, water taken legally unbilled and water taken illegally unbilled). It is reported as a post Maximum Likelihood Estimation (MLE) figure (a statistical method used to normalise differences identified when a water company calculates their water balance (distribution input compared to water consumption + leakage) through the use of confidence intervals). This measure includes all water delivered (billed residential properties) (as per the definition above) across NWL's appointed region.
4P.76	Water delivered (billed measured businesses)	Megalitres per day (Ml/d)	Average (mean) volume of water delivered to businesses which is measured (metered). This is to include supply pipe leakage (any loss of water from customer owned pipes) and meter under-registration (a measure of the volume of water used that is not reported by meters). Additional meters fitted to measured businesses for ancillary supplies (e.g. external hosepipes) which are non-commercial are to be included, as should any fitted to unmeasured (unmetered) businesses if this is how revenue is allocated. Exclude miscellaneous use (Distribution system operational use, water taken legally unbilled and water taken illegally unbilled). It is reported as a post Maximum Likelihood Estimation (MLE) figure (a statistical method used to normalise differences identified when a water company calculates their water balance (distribution input compared to water consumption + leakage) through the use of confidence intervals). This measure includes all water delivered (billed measured businesses) (as per the definition above) across NWL's appointed region.
4P.77	Total leakage	Megalitres per day (Ml/d)	Total leakage measures the volume of water that is lost across the water distribution network when delivering it from water treatment works to customer properties, including customer supply pipe leakage. It does not include internal plumbing losses (leaks that occur on the customer side of their stop tap). The total leakage is made up of the annual average Minimum Night Flow Leakage, Reservoir Losses and supply pipe leakage. *Note: trunk mains losses are included in the Minimum Night Flow Leakage and do not need to be calculated separately.* Minimum Night Flow Leakage is a measure of District Meter Area ('DMA') flow during the night when consumption is expected to be at its lowest, and therefore any residual flow after Legitimate Night Use ('LNU') is likely to be leakage. Minimum Night Flow Leakage is calculated as follows: DMA night flow - LNU x Hour to Day Factor ▪ LNU is an average allowance per property based on per capita consumption data and calculated for different property types (measured, unmeasured, household and non-household). The LNU rate is multiplied by the number of properties of the corresponding type within each DMA to derive a litres per hour value to deduct from night flow. ▪ on survey data collected and reported by a third party. The allowance is calculated for each Water Resource Zones and property types (measured, unmeasured, household and non-household). The LNU rate is multiplied by the number of properties of the corresponding type within each Water Resource Zone to derive a litres per hour value to deduct from night flow. ▪ DMA night flow is measured by DMA "in" and "out" flow meters. ▪ The Hour to Day Factor is applied to account for reduced flow as a result of reducing water pressure within DMAs during night time. The pressure is reduced to protect the distribution area from bursts as a result of lower demand during the night. Customer supply pipe losses are defined as leakage from customers' pipes between the highway boundary and the customer's stop tap. To estimate, NWL have analysed reported leaks for different property types (measured, unmeasured, household and non-household), and monitored a sample of properties to calculate the average supply pipe leakage, which is multiplied by the number of properties of each type to determine total supply pipe leakage. Service reservoir losses have been estimated by measuring the change in depth of reservoir levels for a sample period of time to calculate the volume of water lost over that period. It is reported as a post Maximum Likelihood Estimation (MLE) figure (a statistical method used to normalise differences identified when a water company calculates their water balance (distribution input compared to water consumption + leakage) through the use of confidence intervals). This measure includes all leakage (as per the definition above) across NWL's appointed region.

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4P.78	Distribution losses	Megalitres per day (Ml/d)	Distribution losses represent the losses on the company's potable (drinkable) water distribution system and so excludes supply pipe leakage (any loss of water from customer owned pipes). This is calculated as 4P.77 (Total leakage) – supply pipe losses. It is reported as a post Maximum Likelihood Estimation (MLE) figure (a statistical method used to normalise differences identified when a water company calculates their water balance (distribution input compared to water consumption + leakage) through the use of confidence intervals. This measure includes all distribution losses (as per the definition above) across NWL's appointed region.
4P.79	Water taken unbilled	Megalitres per day (Ml/d)	Total water taken unbilled (whether legally or illegally). This includes water used by the company for mains tests, flushing, washouts, running to waste, or incurred through burst mains or other leakage should be excluded. Unbilled water taken legally is water taken for legitimate purposes (public supplies for which no charge is made e.g. some sewer flushing etc., uncharged church supplies, fire training and fire-fighting supplies where these are not charged irrespective of whether or not they are metered). This excludes volumes associated with leakage allowance rebates to metered customers. Water taken illegally is water that has not legally been obtained from the treated water distribution system. It should be included providing it is based on actual occurrences using sound and auditable identification and recording procedures (if not this should be treated as distribution losses and excluded from this line). These are calculated through either actual measures of the volume of water taken unbilled, and through studies conducted by NWL to estimate the volume of water taken unbilled through various activities. It is reported as a post Maximum Likelihood Estimation (MLE) figure (a statistical method used to normalise differences identified when a water company calculates their water balance (distribution input compared to water consumption + leakage) through the use of confidence intervals). This measure includes all water taken unbilled (as per the definition above) across NWL's appointed region.
4P.83	Number of booster pumping stations	Number	Total number of booster pumping stations. Booster pumping stations distribute treated (drinkable) water across the distribution system from a Water Treatment Works (WTW) to a customers and new appointees. This includes those relating to peak network capacity provision (assist pumps) and those designed to provide resilience and back up for pump failure (standby pumps). A duty pump covers daily requirements. An assist pump is one where each pump is sized for 50% of the estimated flow rate required and a standby pump is a backup pump in the event of duty pump failing. For the avoidance of doubt, this is the number of sites as opposed to the number of individual pumps. It also does not include single property booster pumps. Decommissioned assets have been excluded from reporting. NWL have defined a decommissioned asset as one that cannot be returned to service within six months from being identified as needed, and the asset is not awaiting planned work or identified for capital investment within the current Asset Management Period (AMP), then the site is deemed to be abandoned. This does not preclude the possibility of an asset being identified as required at some future date and therefore included in future regulatory return. This measure includes all booster pumping stations (as per the definition above) across NWL's appointed region.

4P.84	Total number of service reservoirs	Number	The number of treated water service reservoirs (reservoirs used to store treated water prior to being delivered to customers' properties) within the water supply system including treated water reservoirs at water treatment works and any secondary disinfection plant on reservoir sites. Include break pressure tanks. Exclude decommissioned assets. A single structure divided into separate cells counts as one reservoir. NWL have defined a decommissioned asset as one that cannot be returned to service within six months from being identified as needed, and the asset is not awaiting planned work or identified for capital investment within the current Asset Management Period (AMP), then the site is deemed to be abandoned. This does not preclude the possibility of an asset being identified as required at some future date and therefore included in future regulatory return. This measure includes all service reservoirs (as per the definition above) across NWL's appointed region.
4P.85	Number of water towers	Number	The number of treated water service towers (towers used to store treated water prior to being delivered) within the water supply system. Exclude decommissioned assets. NWL have defined a decommissioned asset as one that cannot be returned to service within six months from being identified as needed, and the asset is not awaiting planned work or identified for capital investment within the current Asset Management Period (AMP), then the site is deemed to be abandoned. This does not preclude the possibility of an asset being identified as required at some future date and therefore included in future regulatory return. This measure includes all water towers (as per the definition above) across NWL's appointed region.
4P.94	Average pumping head – treated water distribution	Mean head per day (m.hd)	Average pumping head for the treated water distribution business unit, the pump sets reported in 4P.83. Average pumping head is measured as the sum of the annual mean head (defined as the average delivery pressure minus the average suction pressure when the pump is operating, or the height the water is lifted) multiplied by the total measured volume of water pumped entering the treated water distribution price control unit, as defined in RAG 4.08, divided by the total volume of water entering the treated water distribution price control unit, as defined in RAG 4.08, whether it has been pumped or gravitated (moved by gravity). This is calculated using actual pumping head rather than the rating of the pumps.
4Q.1	Residential properties billed for measured water (external meter)	'000s properties	Average (mean) number of billed metered residential properties with external meters who NWL supply water to across its appointed region. An external meter is one located underground on the customer's underground supply pipe. Closeness to the property boundary is not important. Exclude void properties (properties connected to the sewerage system but do not receive a charge as there are no occupants). This is calculated by determining the number of residential properties billed for measured water with an external meter in every month of the reporting year (1 April x-1 – 21 April x) and dividing by 13.
4Q.2	Residential properties billed for measured water (not external meter)	'000s properties	Average (mean) number of billed metered residential properties (not externally metered) who NWL supply water to across its appointed region. An internal meter is one located inside the customer's property or attached to the property at above ground level in a box or cabinet. All other meters should be classed as external. Exclude void properties (properties connected to the sewerage system but do not receive a charge as there are no occupants). This is calculated by determining the number of residential properties billed for measured water with an external meter in every month of the reporting year (1 April x-1 – 21 April x) and dividing by 13.

4Q.3	Business properties billed measured water	'000s properties	Average (mean) number of business properties billed for measured (both internal and external meters) who NWL supply water to across its appointed region. Exclude void properties (properties connected to the sewerage system but do not receive a charge as there are no occupants). An external meter is one located underground on the customer's underground supply pipe. An internal meter is one located inside the customer's property or attached to the property at above ground level in a box or cabinet. This is calculated by determining the number of businesses properties billed for measured water (with either an internal or external meter) in every month of the reporting year and dividing by 12.
4Q.4	Residential properties billed for unmeasured water	'000s properties	Average (mean) number of residential properties billed unmeasured (unmetered) who NWL supply water to across its appointed region. Exclude void properties (properties connected to the sewerage system but do not receive a charge as there are no occupants). This is calculated by determining the number of residential properties billed for measured water with an external meter in every month of the reporting year (1 April x-1 – 21 April x) and dividing by 13.
4Q.5	Business billed unmeasured water	'000s properties	Average (mean) number of businesses billed unmeasured (unmetered) who NWL supply water to across its appointed region. Exclude void properties (properties connected to the sewerage system but do not receive a charge as there are no occupants). This is calculated by determining the number of residential properties billed for measured water with an external meter in every month of the reporting year (1 April x-1 – 21 April x) and dividing by 13.
4Q.6	Total business connected properties at year end	'000s properties	The total number of business properties connected to the water distribution system at the end of the report year across its appointed region. This must include properties which are connected but not necessarily billed (for example, temporarily unoccupied, or "void") but should exclude properties which have been permanently disconnected. A group of properties supplied by a single connection should be counted as several properties. They should only be treated as a single property if a single bill covers the whole property.
4Q.7	Total residential properties connected properties at year end	'000s properties	The total number of residential properties connected to the water distribution system at the end of the report year across its appointed region. This must include properties which are connected but not necessarily billed (for example, temporarily unoccupied, or "void") but should exclude properties which have been permanently disconnected. A group of properties supplied by a single connection should be counted as several properties. They should only be treated as a single property if a single bill covers the whole property.
4Q.8	Total connected properties at year end	'000s properties	The total number of properties (residential and business) connected to the water distribution system at the end of the report year across its appointed region. This must include properties which are connected but not billed (for example, temporarily unoccupied, or "void") but should exclude properties which have been permanently disconnected. A group of properties supplied by a single connection should be counted as several properties. They should only be treated as a single property if a single bill covers the whole property. This should be the sum of the number of properties reported across 4Q.6 and 4Q.7.

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4Q.13	Total number of new business properties connections	'000s properties	Total number of new business connections to the company's area of supply for water distribution during the report year across its appointed region. This will cover the number of new business properties added within the reporting year that were previously not connected for water supply. This excludes separation of common services (where one supply has been broken into multiple supplies), or other reconnections (reconnecting a supply to the network that was previously connected but had been disconnected for a period of time).
4Q.14	Total number of new household connections	'000s properties	Total number of new residential connections to the company's area of supply for water distribution during the report year across its appointed region. This will cover the number of new residential properties added within the report year that were previously not connected for water supply. This excludes separation of common services, or other reconnections.
4Q.15	Total population served	'000s people	Total resident population served across the company's area of supply for water distribution. This should include billed households supplied with unmeasured and measured water and billed business supplied with unmeasured and measured water.
4Q.16	Number of business meters (billed properties)	'000s properties	The total number of business meters at billed properties who NWL supply water to across its appointed region. Exclude void properties and meters at properties that are charged on an unmeasured basis. This may differ from the number of business properties if a single property has multiple meters. This is calculated by determining the number of residential properties billed for measured water with an external meter in every month of the reporting year (1 April x-1 – 21 April x) and dividing by 13.
4Q.17	Number of residential meters (billed properties)	'000s properties	The total number of residential meters at billed properties who NWL supply water to across its appointed region. Exclude void properties and meters at properties that are charged on an unmeasured basis. This may differ from the number of residential properties if a single property has multiple meters. To calculate this figure, NWL make the assumption that every billed measured residential property only has one meter so therefore this number equals the sum of 4Q.1 (Residential properties billed for measured water (external meter)) and 4Q.2 (Residential properties billed for measured water (not external meter)).
4Q.20	Total supply side enhancements to the supply demand balance (dry year critical / peak conditions)	Megalitres per day (Ml/d)	Incremental supply side improvements delivered during the reporting year to the dry year critical / peak period supply demand balance as at the start of the reporting year. The reported value should account for all water resource zones. Where dry year critical / peak conditions have not been presented in the company's current Water Resource Management Plan (WRMP) for a specific zone, the dry year annual average conditions should be substituted. Supply side enhancements are changes made to NWL's water supply network that increase the volume of water than can be supplied across its network and should include all resource and production options. Interpretation of resource and production options, dry year critical period and dry year annual average should align with Defra water resources management plan guidance.

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4Q.21	Total supply side enhancements to the supply demand balance (dry year annual average conditions)	Megalitres per day (Ml/d)	Incremental supply side improvements delivered during the reporting year to the dry year annual average supply demand balance as at the start of the reporting year. The reported value should account for all water resource zones. Supply side enhancements are changes made to NWL's water supply network that increase the volume of water than can be supplied across its network and should include all resource and production options. Interpretation of resource and production options, dry year critical period and dry year annual average should align with Defra water resources management plan guidance.
4Q.22	Total demand side enhancements to the supply demand balance (dry year critical / peak conditions)	Megalitres per day (Ml/d)	Incremental demand side improvements delivered during the reporting year to the dry year critical / peak period supply demand balance as at the start of the reporting year. The reported value should account for all water resource zones. Where dry year critical / peak conditions have not been presented in the current WRMP for a specific zone, the dry year annual average conditions should be substituted. Demand side enhancements are interventions that NWL have made that reduce the demand for water across their water supply region and should include all distribution and customer side options. This could include, but is not limited to, water use education programmes and installation of water saving devices. Interpretation of resource and production options, dry year critical period and dry year annual average should align with Defra water resources management plan guidance. Demand side enhancements should be reported as a positive number.
4Q.23	Total demand side enhancements to the supply demand balance (dry year annual average conditions)	Megalitres per day (Ml/d)	Incremental demand side improvements delivered during the reporting year to the dry year annual average period supply demand balance as at the start of the reporting year. The reported value should account for all water resource zones. Demand side enhancements are interventions that NWL have made that reduce the demand for water across their water supply region and should include all distribution and customer side options. Interpretation of resource and production options, dry year critical period and dry year annual average should align with Defra water resources management plan guidance. Demand side enhancements should be reported as a positive number.

4Q.27	Mean Zonal Compliance	%	This measure is the water quality measure for mean zonal percentage compliance. The measure is expressed as the percentage compliance and is based on the calendar year (1 January 2019 - 31 December 2020). The measure is determined by the Drinking Water Inspectorate and Water Supply Regulations 2016, as set out in the following guidance: http://www.legislation.gov.uk/uksi/2016/614/contents http://dwi.defra.gov.uk/about/annual-report/calculating-indices.pdf The measure is calculated as follows: **Compliance percentage for all sites / Total no. of sites** The compliance percentage for each site is calculated as follows: **((No. of samples per site in the year - No. of failures per site in the year) / No. of samples per site in the year) x 100** ▪ A site is defined as an individual supply point (i.e. a customer tap) around the whole of NWL's potable distribution network. ▪ A sample is defined as a water quality sample in line with the Water Supply Regulations 2016, as set out in the guidance in the link above, which tests the concentration of each parameter in scope. This is performed under a UKAS accredited process. A failure is defined as a level of concentration of a parameter in a sample that falls out with the acceptable level as defined in the Water Supply Regulations 2016. The water quality sampling programme covers the geographical region that NWL supplies with water, as stipulated by the Drinking Water Inspectorate guidance. The sampling programme is agreed with the Drinking Water Inspectorate at the beginning of the calendar year. The compliance percentage is based on the results of the planned water quality samples only. All 39 parameters, as set out in the Water Supply Regulations 2016, are in scope.
4Q.28	Compliance Risk Index	Number	The compliance risk index (CRI) from the regulatory sampling programme, based on current regulations and standards (including the tightening of the lead standard in 2013) as reported to the Drinking Water Inspectorate (DWI). The measure is based on up to 55 parameters which are determined by the DWI, where data is obtained through sampling. Each sampling failure is given a CRI score depending on sampling point: ● Water supply zones = parameter score x assessment score x population affected (the population within the water supply zone impacted) / total company population served; ● Supply point and treatment works = parameter score x assessment score x volume supplied (m^3/day) (by that supply point / treatment works impacted) / total daily volume supplied by the company (m^3/day); or ● Service reservoirs = parameter score x assessment score x reservoir capacity (m^3) (of the service reservoir impacted) / total service reservoir capacity of the company (m^3); where ● parameter score is based on the scoring matrix as defined by the DWI in their CRI guidance dated August 2018; and ● assessment score provided by the DWI. The measure is the company's performance for the calendar year and is the sum of the individual CRI scores received throughout the reporting period. Calendar year performance 2019 will be reported. The water quality sampling programme covers the geographical region that NWL supplies with water, as stipulated by the Drinking Water Inspectorate guidance. The sampling programme is agreed with the Drinking Water Inspectorate at the beginning of the calendar year. The compliance percentage is based on the results of the planned water quality samples only. All 55 parameters, as set out in the Water Supply Regulations 2016, are in scope.

4Q.29	Event Risk Index	Number	The event risk index (ERI) is a Drinking Water Inspectorate DWI measure of reportable events. Individual events are provided a score by the DWI using the following formula: **ERI = (seriousness x assessment outcome x impact) / total population served by the company;** where seriousness, assessment outcome and impact are determined by the DWI using their ERI guidance dated August 2018. The measure is the company's performance for the calendar year and is the sum of the individual ERI scores received throughout the reporting period. Calendar year performance 2019 will be reported. The measure covers the geographical region that NWL supplies with water, as stipulated by the Drinking Water Inspectorate guidance.
4Q.30	Volume of Leakage above or below the Sustainable Economic Level	Megalitres per day (Ml/d)	The variance between actual leakage (the volume of water leaking from the company's water supply assets as reported in 4P.77) and the sustainable economic level of leakage (where leakage is equal to the natural rate of rise). Leakage below the economic level will have a negative value.
4R.3	Total pumping station capacity	Kilowatts (kW)	Total installed pumping capacity of all sewage pumping stations (including standby pumps). Include foul (residential and business waste), combined (highways and surface drainage), stormwater and terminal (final pump prior to treatment) pumping stations. Exclude inter-stage pumping within a sewage treatment works or sludge treatment centre. Report capacity of all installed pumps (irrespective of the number that may be working at any one time). For the avoidance of doubt, the capacity of all individual pumps at the sites reported in 4R.4 should be included. This measure includes all sewage pumping stations (as per the definition above) across NWL's appointed region.
4R.4	Number of network pumping stations	Number	Total number of pumping stations on the sewerage (wastewater) network as at the end of the reporting year. Pumping stations transferred into the incumbent's ownership by the end of the reporting year as a result of schemes made by the Secretary of State / Welsh Ministers under the Water Industry (Schemes for Adoption of Private Sewers) Regulations 2011 should be included. For the avoidance of doubt, this is the number of sites as opposed to the number of individual pumps. This measure includes all sewage pumping stations (as per the definition above) across NWL's appointed region.

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4R.23	Total sewage sludge produced, treated by incumbents	Total tonnes dry solids per year (ttds/ year)	This is a measure of all the untreated sewage sludge (primary, secondary, tertiary) produced by in-area wastewater treatment processes in the report year which is either treated by the incumbent or remains untreated prior to disposal. Grit and screenings removed through preliminary treatment processes should be excluded. Cross-border imports should be excluded. Primary sludge is a result of the capture of suspended solids and organics in the primary treatment process. Secondary sludge has a lower biogas potential because the microorganisms in the secondary treatment process have consumed most of their energy content leaving behind mainly inert biomass. Tertiary sludge is sludge that has had the phosphates and nitrates from the water supply removed. Sludge treated by managed contractors should be included; sludge treated by separate 3rd party service providers should be reported in 4R.24 (Total sewage sludge produced, treated by 3rd party sludge service provider). A managed contractor is defined as a company that is acting under NWL's direction and NWL remain responsible for the process. A 3rd party sludge service provider is a company that NWL engage to treat and/or dispose of sludge on their behalf and are not managed by NWL, i.e. they do so in a manner the 3rd party chooses and take on this responsibility. All sludge produced by all NWL in-area wastewater treatment processes which is either treated by the incumbent or remains untreated prior to disposal in the report year should be included in the reporting for this measure. It should not include sludge imported "cross border" that was produced through another water company's wastewater treatment processes but NWL go on to treat the sludge further prior to disposal; and sludge produced by 3rd party sludge service providers.
4R.24	Total sewage sludge produced, treated by 3rd party sludge service provider	Total tonnes dry solids per year (ttds/ year)	This is a measure of all the untreated sewage sludge (primary, secondary, tertiary) produced by in-area wastewater treatment processes in the report year which is treated by a 3rd party sludge service provider. Grit and screenings removed through preliminary treatment processes should be excluded. Cross-border imports should be excluded. Primary sludge is a result of the capture of suspended solids and organics in the primary treatment process. Secondary sludge has a lower biogas potential because the microorganisms in the secondary treatment process have consumed most of their energy content leaving behind mainly inert biomass. Tertiary sludge is sludge that has had the phosphates and nitrates from the water supply removed. Sludge treated by managed contractors (as opposed to separate 3rd party service providers) should be excluded; instead it should be reported in 4R.23 (Total sewage sludge produced, treated by incumbents). A managed contractor is defined as a company that is acting under NWL's direction and NWL remain responsible for the process. A 3rd party sludge service provider is a company that NWL engage to treat and/or dispose of sludge on their behalf and are not managed by NWL, i.e. they do so in a manner the 3rd party chooses and take on this responsibility. All sludge produced by all NWL in-area wastewater treatment processes which is treated by a 3rd party sludge provider in the report year should be included in the reporting for this measure. It should not include sludge imported "cross border" that was produced through another water company's wastewater treatment processes but NWL go on to treat the sludge further prior to disposal; and sludge treated by NWL themselves and by managed contracts.
4R.25	Total sewage sludge produced	Total tonnes dry solids per year (ttds/ year)	To be entered as the sum of 4R.23 (Total sewage sludge produced, treated by incumbents) and 4R.24 (Total sewage sludge produced, treated by 3rd party sludge service provider). A managed contractor is defined as a company that is acting under NWL's direction and NWL remain responsible for the process. A 3rd party sludge service provider is a company that NWL engage to treat and/or dispose of sludge on their behalf and are not managed by NWL, i.e. they do so in a manner the 3rd party chooses and take on this responsibility. All sludge produced by all NWL in-area wastewater treatment processes which is either treated by the incumbent, remains untreated prior to disposal, or treated by a 3rd party sludge provider in the report year should be included in the reporting for this measure. It should not include sludge imported "cross border" that was produced through another water company's wastewater treatment processes but NWL go on to treat the sludge further prior to disposal.

4R.26	Total sewage sludge produced from non-appointed liquid waste treatment	Total tonnes dry solids per year (ttds/ year)	This is an estimate of all the untreated sewage sludge (primary, secondary, tertiary) produced by in-area wastewater treatment processes in the report year, and which is produced as a result of treating non-appointed liquid wastes (waste that NWL are not statutory required to treat so have special agreements with customers to treat, this does not include Trade Effluent that is consider "appointed" waste) through appointed wastewater treatment assets (assets that NWL operate to achieve their statutory requirements). Because this sludge is generated at in-area wastewater treatment sites, this quantity is included in the total for 4R.25. Cross-border imports should be excluded. To calculate, flower readers record the volume of liquid received from non-appointed customers, or measured as it was offloaded at a sewage treatment works with the suspended solids measured to estimate the dry solids included within the material. All sludge produced by all NWL in-area wastewater treatment processes from non-appointed liquid waste in the report year should be included in the reporting for this measure. It should not include sludge imported "cross border" that was produced through another water company's wastewater treatment processes but NWL go on to treat the sludge further prior to disposal.
4R.27	Percentage of sludge produced and treated at a site of STW and STC co-location	Percentage (%)	The percentage of the sludge quantity reported in 4R.25 that is produced at co-located sites. For the purposes of this definition: i) "co-located" includes sites where the STC is physically separate but the sludge is transferred from a wastewater treatment site by pipeline; and ii) STC means any site where sludge is treated to a standard such that it can be recycled to the environment or disposed of without any further treatment. NWL have determined that sludge produced at sites where it is also treated through "dewatering" are considered to be co-location sites as the sludge produced at these sites is treated to a standard such that it can be recycled to the environment or disposed of without any further treatment but NWL choose to treat it further prior to disposal. All sludge produced by all NWL in-area wastewater treatment processes which is either treated by the incumbent, remains untreated prior to disposal, or treated by a 3rd party sludge provider in the report year should be included in the reporting for this measure. It should not include sludge imported "cross border" that was produced through another water company's wastewater treatment processes but NWL go on to treat the sludge further prior to disposal.
4R.28	Total sewage sludge disposed by incumbents	Total tonnes dry solids per year (ttds/ year)	The total amount of sewage sludge treated and disposed of during the report year by the incumbent. This should include disposal to farmland (irrespective of whether spreading is undertaken by the 3rd party service provider or the farmer), landfill, incineration, composting and other routes. This will be different from sewage sludge produced due to: - quantities of lime used in lime treated sludge, - losses of volatile solids in the treatment process, and - changes in the amount of stockpiled sludge. Sludge disposed of by managed contractors should be included; sludge disposed of by separate 3rd party service providers should be reported in 4R.29 (Total sewage sludge disposed by 3rd party sludge service provider). A managed contractor is defined as a company that is acting under NWL's direction and NWL remain responsible for the process. A 3rd party sludge service provider is a company that NWL engage to treat and/or dispose of sludge on their behalf and are not managed by NWL, i.e. they do so in a manner the 3rd party chooses and take on this responsibility. All sludge disposed by NWL themselves and by managed contractors in the report year should be included in the reporting for this measure. It should not include sludge disposed by 3rd party sludge service providers.

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4R.29	Total sewage sludge disposed by 3rd party sludge service provider	Total tonnes dry solids per year (ttds/ year)	The total amount of sewage sludge treated and disposed of during the report year by a 3rd party sludge service provider expressed in thousands of tonnes of dry solids of sludge. This should include recycling to farmland (irrespective of whether spreading is undertaken by the 3rd party service provider or the farmer) and disposal to landfill, incineration, land restoration/ reclamation, composting and other routes. This may be different from sewage sludge produced due to: - quantities of lime used in lime treated sludge, - losses of volatile solids in the treatment process, and - changes in the amount of sludge stockpiled at sludge treatment centres. Sludge disposed of by managed contractors (as opposed to separate 3rd party service providers) should be excluded; instead it should be reported in line 4R.28 (Total sewage sludge disposed by incumbents). A managed contractor is defined as a company that is acting under NWL's direction and NWL remain responsible for the process. A 3rd party sludge service provider is a company that NWL engage to treat and/or dispose of sludge on their behalf and are not managed by NWL, i.e. they do so in a manner the 3rd party chooses and take on this responsibility. All sludge disposed by a third party service provider in the report year should be included in the reporting for this measure. It should not include sludge disposed by NWL themselves and by managed contractors on their behalf.
4R.30	Total sewage sludge disposed	Total tonnes dry solids per year (ttds/ year)	To be entered as the sum of 4R.28 (Total sewage sludge disposed by incumbents) and 4R.29 (Total sewage sludge disposed by 3rd party sludge service provider). A managed contractor is defined as a company that is acting under NWL's direction and NWL remain responsible for the process. A 3rd party sludge service provider is a company that NWL engage to treat and/or dispose of sludge on their behalf and are not managed by NWL, i.e. they do so in a manner the 3rd party chooses and take on this responsibility. All sludge disposed by NWL themselves and by managed contractors, and by 3rd party sludge service providers in the report year should be included in the reporting for this measure.
4R.31	Total measure of intersiting 'work' done by pipeline	Total tonnes dry solids*kilometres travelled per year (ttds*km/year)	Total work done in intersiting sludge operations (moving sludge between sites where it was produced to where receives further treatment) by pipeline during the report year measured as the product of sludge mass (in thousand tonnes dry solids) multiplied by distance conveyed (in km). Based on actual length of pipeline from sludge holding tanks to Sludge Treatment Centre, not straight line distance. This measure should not include sludge transported between Sewage Treatment Works via a gravity sewer, the operating costs of which are allocated to Network+. It is calculated using the following formula: (km1*ttds1)+(km2*ttds2)+.....(kmN*ttdsN) All sludge produced by all NWL in-area wastewater treatment processes which is moved between sites by pipeline by either treated by the incumbent, remains untreated prior to disposal, or treated by a 3rd party sludge provider in the report year should be included in the reporting for this measure. It should exclude sludge that is moved between sites by truck and tanker.
4R.32	Total measure of intersiting 'work' done by tanker	Total tonnes dry solids*kilometres travelled per year (ttds*km/year)	Total work done in intersiting sludge operations (moving sludge between sites where it was produced to where receives further treatment) carried out by road tanker during the report year measured as the product of sludge mass (in thousand tonnes dry solids) multiplied by distance travelled (in km). Based on actual distance travelled from sludge holding tanks to Sludge Treatment Centre, not straight line distance. If actual road distances are not available, estimates of journey distance are used. Work done by other forms of transport of liquid sludge (e.g. tractors) should be included in this line. This measure should exclude the distance travelled by vehicles to the sewage treatment works to collect the sludge. It is calculated using the following formula: (km1*ttds1)+(km2*ttds2)+.....(kmN*ttdsN) All sludge produced by all NWL in-area wastewater treatment processes which is moved between sites by tanker by either treated by the incumbent, remains untreated prior to disposal, or treated by a 3rd party sludge provider in the report year should be included in the reporting for this measure. It should exclude sludge that is moved between sites by truck and pipeline.

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4R.33	Total measure of intersiting 'work' done by truck	Total tonnes dry solids*kilometres travelled per year (ttds*km/year)	Total work done in intersiting sludge operations (moving sludge between sites where it was produced to where receives further treatment) carried out by truck during the report year measured as the product of sludge mass (in thousand tonnes dry solids) multiplied by distance travelled (in km). Based on actual distance travelled from sludge holding tanks to Sludge Treatment Centre, not straight line distance. If actual road distances are not available, estimates of journey distance are used. This measure should exclude the distance travelled by vehicles to the sewage treatment works to collect the sludge. It is calculated using the following formula: (km1*ttds1)+(km2*ttds2)+.....(kmN*ttdsN) All sludge produced by all NWL in-area wastewater treatment processes which is moved between sites by truck by either treated by the incumbent, remains untreated prior to disposal, or treated by a 3rd party sludge provider in the report year should be included in the reporting for this measure. It should exclude sludge that is moved between sites by tanker and pipeline.
4R.34	Total measure of intersiting 'work' done (all forms of transportation)	Total tonnes dry solids*kilometres travelled per year (ttds*km/year)	To be entered as the sum of 4R.31 (Total measure of intersiting 'work' done by pipeline), 4R.32 (Total measure of intersiting 'work' done by tanker) and 4R.33 (Total measure of intersiting 'work' done by truck).
4R.35	Total measure of intersiting 'work' done by tanker (by volume transported)	Metres cubed*kilometres travelled per year (m^3*km/year)	Total work done in intersiting sludge operations (moving sludge between sites where it was produced to where receives further treatment) carried out by road tanker during the report year measured as the product of sludge volume (in m3) multiplied by distance travelled (in km) in transporting the sludge. Based on actual distance travelled from sludge holding tanks to Sludge Treatment Centre, not straight line distance. If actual road distances are not available, estimates of journey distance are used. Work done by other forms of transport of liquid sludge (e.g. tractors) should be included in this line. This measure should exclude the distance travelled by vehicles to the sewage treatment works to collect the sludge. No account should be taken of distance travelled by empty tankers. It is calculated using the following formula: (km1*ttds1)+(km2*ttds2)+.....(kmN*ttdsN) All sludge produced by all NWL in-area wastewater treatment processes which is moved between sites by tanker by either treated by the incumbent, remains untreated prior to disposal, or treated by a 3rd party sludge provider in the report year should be included in the reporting for this measure. It should exclude sludge that is moved between sites by truck and pipeline.
4R.36	Total measure of 'work' done in sludge disposal operations by pipeline	Total tonnes dry solids*kilometres travelled per year (ttds*km/year)	Total work done in sludge disposal operations carried out by pipeline (e.g. transport to an incinerator) during the report year measured as the product of sludge mass (in thousand tonnes dry solids) multiplied by distance travelled (in km). Based on actual distance travelled from the Sludge Treatment Centre to the landbank, landfill site, land reclamation site or incinerator as appropriate, not straight line distance. It is calculated using the following formula: (km1*ttds1)+(km2*ttds2)+.....(kmN*ttdsN) All sludge disposed by pipeline, whether by NWL themselves or by managed contractors on their behalf, and by 3rd party sludge service providers in the report year should be included in the reporting for this measure. It should exclude sludge that is disposed by truck and tanker.
4R.37	Total measure of 'work' done in sludge disposal operations by tanker	Total tonnes dry solids*kilometres travelled per year (ttds*km/year)	Total work done in sludge disposal operations carried out by road tanker during the report year measured as the product of sludge mass (in thousand tonnes dry solids) multiplied by distance travelled (in km). Based on actual distance travelled from the Sludge Treatment Centre to the landbank, landfill site or land reclamation site as appropriate, not straight line distance. If actual road distances are not available, estimates of journey distance are used. Work done by other forms of transport of liquid sludge (e.g. tractors) should be included in this line. This measure should exclude the distance travelled by vehicles to the sludge treatment centres to collect the sludge. It is calculated using the following formula: (km1*ttds1)+(km2*ttds2)+.....(kmN*ttdsN) All sludge disposed by tanker, whether by NWL themselves or by managed contractors on their behalf, and by 3rd party sludge service providers in the report year should be included in the reporting for this measure. It should exclude sludge that is disposed by truck and pipeline.

4R.38	Total measure of 'work' done in sludge disposal operations by truck	Total tonnes dry solids*kilometres travelled per year (ttds*km/year)	Total work done in sludge disposal operations carried out by truck during the report year measured as the product of sludge mass (in thousand tonnes dry solids) multiplied by distance travelled (in km). Based on actual distance travelled from the Sludge Treatment Centre to the landbank, landfill site or land reclamation site as appropriate, not straight line distance. If actual road distances are not available, estimates of journey distance are used. This measure should exclude the distance travelled by vehicles to the sludge treatment centres to collect the sludge. It is calculated using the following formula: (km1*ttds1)+(km2*ttds2)+.....(kmN*ttdsN) All sludge disposed by truck, whether by NWL themselves or by managed contractors on their behalf, and by 3rd party sludge service providers in the report year should be included in the reporting for this measure. It should exclude sludge that is disposed by tanker and pipeline.
4R.39	Total measure of 'work' done in sludge disposal operations (all forms of transportation)	Total tonnes dry solids*kilometres travelled per year (ttds*km/year)	The sum of lines 4R.36 (Total measure of 'work' done in sludge disposal operations by pipeline), 4R.37 (Total measure of 'work' done in sludge disposal operations by tanker), and 4R.38 (Total measure of 'work' done in sludge disposal operations by truck).
4R.40	Total measure of 'work' done by tanker in sludge disposal operations (by volume transported)	Metres cubed*kilometres travelled per year (m^3*km/year)	Total work done in sludge disposal operations carried out by road tanker during the report year measured as the product of sludge volume (in m3) multiplied by distance travelled (in km) in transporting the sludge. Based on actual distance travelled from the Sludge Treatment Centre to the landbank, landfill site or land reclamation site as appropriate, not straight line distance. If actual road distances are not available, estimates of journey distance are used. Work done by other forms of transport of liquid sludge (e.g. tractors) should be included in this line. No account should be taken of distance travelled by empty tankers. This measure should exclude the distance travelled by vehicles to the sludge treatment centres to collect the sludge. It is calculated using the following formula: (km1*ttds1)+(km2*ttds2)+.....(kmN*ttdsN) All sludge disposed by tanker, whether by NWL themselves or by managed contractors on their behalf, and by 3rd party sludge service providers in the report year should be included in the reporting for this measure. It should exclude sludge that is disposed by truck and pipeline.
4R.41	Chemical P sludge as percentage of sludge produced at STWs	Percentage (%)	The total quantity of sludge produced at wastewater treatment works which use chemical dosing for phosphorus removal expressed as a percentage of total sludge produced at all in area wastewater treatment works (i.e. 4R.25). All sludge produced by all NWL in-area wastewater treatment processes which is either treated by the incumbent, remains untreated prior to disposal, or treated by a 3rd party sludge provider in the report year which use chemical dosing for phosphorus removal should be included in the reporting for this measure. It should not include sludge imported “cross border” that was produced through another water company’s wastewater treatment processes but NWL go on to treat the sludge further prior to disposal.

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4S.1	Load received by STWs in size band 1	Kilograms 5-day Biological Oxygen Demand per day ($kgBOD_5/d$)	Average daily pollution loads in kilograms BOD5 received by sewage treatment works of size band 1 (<= 15 kilograms BOD5 per day). BOD5 = '5-day Biochemical Oxygen Demand", this measures the quantity of biodegradable organic matter contained in water. This should be calculated including both resident and non-resident populations. This number is split into different components, namely: **Treatment categories** – The Load received by STWs in size band 1 for each sewage treatment works category type (primary, Secondary Activated Sludge (SAS), Secondary Biological (SB), Tertiary A1 (TA1), Tertiary A2 (TA2), Tertiary B1 (TB1) and Tertiary B2 (TB2)). *For full definitions of these different treatment category type, see 4O.2.* **Phosphorus Consent conditions** - The Load received by STWs in size band 1 with varying phosphorus consent conditions (<=0.5mg/l, >0.5 to <=1mg/l, >1mg/l and no permit). For further understanding of phosphorus consents, see 4O.7. **Ammonia Consent conditions** - The Load received by STWs in size band 1 with varying ammonia consent conditions (<=1mg/l, >1 to <=3mg/l, >3 to <=10mg/l, >10mg/l, no permit). For further understanding of ammonia consents, see 4O.6. The reporting includes all sewage treatments works that NWL operate that are calculated to be 'size band 1'. The calculation of whether a sewage treatment works meets the definition of 'size band 1' should be calculated using resident population only, i.e. it should not be calculated using the non-resident population also. Non-resident population is defined as the holiday and tourist population connected to the sewerage system (note that this does not include daily commuters or day visitors). *Note: The band that a sewage treatment works sits in should be calculated excluding non-resident population but when calculating the load received by sewage treatment works within the band should include that from non-resident populations.*
4S.2	Load received by STWs in size band 2	Kilograms 5-day Biological Oxygen Demand per day ($kgBOD_5/d$)	Average daily pollution loads in kilograms BOD5 received by sewage treatment works of size band 2 (15-30 kilograms BOD5 per day). BOD5 = '5-day Biochemical Oxygen Demand", this measures the quantity of biodegradable organic matter contained in water. This should be calculated including both resident and non-resident populations. This number is split into different components, namely: **Treatment categories** – The Load received by STWs in size band 2 for each sewage treatment works category type (primary, Secondary Activated Sludge (SAS), Secondary Biological (SB), Tertiary A1 (TA1), Tertiary A2 (TA2), Tertiary B1 (TB1) and Tertiary B2 (TB2)). *For full definitions of these different treatment category type, see 4O.2.* **Phosphorus Consent conditions** - The Load received by STWs in size band 2 with varying phosphorus consent conditions (<=0.5mg/l, >0.5 to <=1mg/l, >1mg/l and no permit). For further understanding of phosphorus consents, see 4O.7. **Ammonia Consent conditions** - The Load received by STWs in size band 2 with varying ammonia consent conditions (<=1mg/l, >1 to <=3mg/l, >3 to <=10mg/l, >10mg/l, no permit). For further understanding of ammonia consents, see 4O.6. The reporting includes all sewage treatments works that NWL operate that are calculated to be 'size band 2'. The calculation of whether a sewage treatment works meets the definition of 'size band 2' should be calculated using resident population only, i.e. it should not be calculated using the non-resident population also. Non-resident population is defined as the holiday and tourist population connected to the sewerage system (note that this does not include daily commuters or day visitors). *Note: The band that a sewage treatment works sits in should be calculated excluding non-resident population but when calculating the load received by sewage treatment works within the band should include that from non-resident populations.*

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4S.3	Load received by STWs in size band 3	Kilograms 5-day Biological Oxygen Demand per day ($kgBOD_5/d$)	Average daily pollution loads in kilograms BOD5 received by sewage treatment works of size band 3 (30-120 kilograms BOD5 per day). BOD5 = '5-day Biochemical Oxygen Demand", this measures the quantity of biodegradable organic matter contained in water. This should be calculated including both resident and non-resident populations. This number is split into different components, namely: **Treatment categories** – The Load received by STWs in size band 3 for each sewage treatment works category type (primary, Secondary Activated Sludge (SAS), Secondary Biological (SB), Tertiary A1 (TA1), Tertiary A2 (TA2), Tertiary B1 (TB1) and Tertiary B2 (TB2)). *For full definitions of these different treatment category type, see 4O.2.* **Phosphorus Consent conditions** - The Load received by STWs in size band 3 with varying phosphorus consent conditions (<=0.5mg/l, >0.5 to <=1mg/l, >1mg/l and no permit). For further understanding of phosphorus consents, see 4O.7. **Ammonia Consent conditions** - The Load received by STWs in size band 3 with varying ammonia consent conditions (<=1mg/l, >1 to <=3mg/l, >3 to <=10mg/l, >10mg/l, no permit). For further understanding of ammonia consents, see 4O.6.easures the quantity of biodegradable organic matter contained in water. The reporting includes all sewage treatments works that NWL operate that are calculated to be 'size band 3'. The calculation of whether a sewage treatment works meets the definition of 'size band 3' should be calculated using resident population only, i.e. it should not be calculated using the non-resident population also. Non-resident population is defined as the holiday and tourist population connected to the sewerage system (note that this does not include daily commuters or day visitors). *Note: The band that a sewage treatment works sits in should be calculated excluding non-resident population but when calculating the load received by sewage treatment works within the band should include that from non-resident populations.*
4S.4	Load received by STWs in size band 4	Kilograms 5-day Biological Oxygen Demand per day ($kgBOD_5/d$)	Average daily pollution loads in kilograms BOD5 received by sewage treatment works of size band 4 (120-600 kilograms BOD5 per day). BOD5 = '5-day Biochemical Oxygen Demand", this measures the quantity of biodegradable organic matter contained in water. This should be calculated including both resident and non-resident populations. This number is split into different components, namely: **Treatment categories** – The Load received by STWs in size band 4 for each sewage treatment works category type (primary, Secondary Activated Sludge (SAS), Secondary Biological (SB), Tertiary A1 (TA1), Tertiary A2 (TA2), Tertiary B1 (TB1) and Tertiary B2 (TB2)). *For full definitions of these different treatment category type, see 4O.2.* **Phosphorus Consent conditions** - The Load received by STWs in size band 4 with varying phosphorus consent conditions (<=0.5mg/l, >0.5 to <=1mg/l, >1mg/l and no permit). For further understanding of phosphorus consents, see 4O.7. **Ammonia Consent conditions** - The Load received by STWs in size band 4 with varying ammonia consent conditions (<=1mg/l, >1 to <=3mg/l, >3 to <=10mg/l, >10mg/l, no permit). For further understanding of ammonia consents, see 4O.6.easures the quantity of biodegradable organic matter contained in water. The reporting includes all sewage treatments works that NWL operate that are calculated to be 'size band 4'. The calculation of whether a sewage treatment works meets the definition of 'size band 4' should be calculated using resident population only, i.e. it should not be calculated using the non-resident population also. Non-resident population is defined as the holiday and tourist population connected to the sewerage system (note that this does not include daily commuters or day visitors). *Note: The band that a sewage treatment works sits in should be calculated excluding non-resident population but when calculating the load received by sewage treatment works within the band should include that from non-resident populations.*

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4S.5	Load received by STWs in size band 5	Kilograms 5-day Biological Oxygen Demand per day ($kgBOD_5/d$)	Average daily pollution loads in kilograms BOD5 received by sewage treatment works of size band 5 (600-1,500 kilograms BOD5 per day). BOD5 = '5-day Biochemical Oxygen Demand", this measures the quantity of biodegradable organic matter contained in water. This should be calculated including both resident and non-resident populations. This number is split into different components, namely: **Treatment categories** – The Load received by STWs in size band 5 for each sewage treatment works category type (primary, Secondary Activated Sludge (SAS), Secondary Biological (SB), Tertiary A1 (TA1), Tertiary A2 (TA2), Tertiary B1 (TB1) and Tertiary B2 (TB2)). *For full definitions of these different treatment category type, see 4O.2.* **Phosphorus Consent conditions** - The Load received by STWs in size band 5 with varying phosphorus consent conditions (<=0.5mg/l, >0.5 to <=1mg/l, >1mg/l and no permit). For further understanding of phosphorus consents, see 4O.7. **Ammonia Consent conditions** - The Load received by STWs in size band 5 with varying ammonia consent conditions (<=1mg/l, >1 to <=3mg/l, >3 to <=10mg/l, >10mg/l, no permit). For further understanding of ammonia consents, see 4O.6.easures the quantity of biodegradable organic matter contained in water. The reporting includes all sewage treatments works that NWL operate that are calculated to be 'size band 5'. The calculation of whether a sewage treatment works meets the definition of 'size band 5' should be calculated using resident population only, i.e. it should not be calculated using the non-resident population also. Non-resident population is defined as the holiday and tourist population connected to the sewerage system (note that this does not include daily commuters or day visitors). *Note: The band that a sewage treatment works sits in should be calculated excluding non-resident population but when calculating the load received by sewage treatment works within the band should include that from non-resident populations.*
4S.6	Load received by STWs above size band 5	Kilograms 5-day Biological Oxygen Demand per day ($kgBOD_5/d$)	Average daily pollution loads in kilograms BOD5 received by sewage treatment works of size band 6 (>1,500 kilograms BOD5 per day). BOD5 = '5-day Biochemical Oxygen Demand", this measures the quantity of biodegradable organic matter contained in water. This should be calculated including both resident and non-resident populations. This number is split into different components, namely: **Treatment categories** – The Load received by STWs above size band 5 for each sewage treatment works category type (primary, Secondary Activated Sludge (SAS), Secondary Biological (SB), Tertiary A1 (TA1), Tertiary A2 (TA2), Tertiary B1 (TB1) and Tertiary B2 (TB2)). *For full definitions of these different treatment category type, see 4O.2.* **Phosphorus Consent conditions** - The Load received by STWs above size band 5 with varying phosphorus consent conditions (<=0.5mg/l, >0.5 to <=1mg/l, >1mg/l and no permit). For further understanding of phosphorus consents, see 4O.7. **Ammonia Consent conditions** - The Load received by STWs above size band 5 with varying ammonia consent conditions (<=1mg/l, >1 to <=3mg/l, >3 to <=10mg/l, >10mg/l, no permit). For further understanding of ammonia consents, see 4O.6.easures the quantity of biodegradable organic matter contained in water. Reported values should agree with those reported in 4O.9. The reporting includes all sewage treatments works that NWL operate that are calculated to 'above size band 5'. The calculation of whether a sewage treatment works meets the definition of 'above size band 5' should be calculated using resident population only, i.e. it should not be calculated using the non-resident population also. Non-resident population is defined as the holiday and tourist population connected to the sewerage system (note that this does not include daily commuters or day visitors). *Note: The band that a sewage treatment works sits in should be calculated excluding non-resident population but when calculating the load received by sewage treatment works within the band should include that from non-resident populations.*

4S.7	Total load received	Kilograms 5-day Biological Oxygen Demand per day ($kgBOD_5/d$)	Average daily pollution loads in kilograms BOD5 received by sewage treatment works of all sizes (sizes 1 – above size 5). BOD5 = '5-day Biochemical Oxygen Demand", this measures the quantity of biodegradable organic matter contained in water. This should be calculated including both resident and non-resident populations. This number is split into different components, namely: **Treatment categories** – The Load received by STWs above size band 5 for each sewage treatment works category type (primary, Secondary Activated Sludge (SAS), Secondary Biological (SB), Tertiary A1 (TA1), Tertiary A2 (TA2), Tertiary B1 (TB1) and Tertiary B2 (TB2)). *For full definitions of these different treatment category type, see 4O.2.* **Phosphorus Consent conditions** - The Load received by STWs above size band 5 with varying phosphorus consent conditions (<=0.5mg/l, >0.5 to <=1mg/l, >1mg/l and no permit). For further understanding of phosphorus consents, see 4O.7. **Ammonia Consent conditions** - The Load received by STWs above size band 5 with varying ammonia consent conditions (<=1mg/l, >1 to <=3mg/l, >3 to <=10mg/l, >10mg/l, no permit). For further understanding of ammonia consents, see 4O.6.easures the quantity of biodegradable organic matter contained in water. This is calculated as sum of 4S.1 (Load received by Sewage Treatment Works size band 1) to 4S.6 (Load received by Sewage Treatment Works above size band 5).
4S.8	Load received from trade effluent customers at treatment works	Kilograms 5-day Biological Oxygen Demand per day ($kgBOD_5/d$)	Average (mean) daily pollution load in kilograms BOD5 received by sewage treatment works of all sizes from trade effluent customers. BOD5 stands for '5-day Biochemical Oxygen Demand". This measures the quantity of biodegradable organic matter contained in water. Trade effluent customers are business which have obtained consents to discharge material other than standard waste into the sewage network. The reporting includes all load received from trade effluent customers at all sewage treatments works that NWL operate (size band 1 – to above size band 5).
4S.9	STWs in size band 1	number	Number of sewage treatment works of size band 1 (<= 15 kilograms BOD5 per day). BOD5 = '5-day Biochemical Oxygen Demand", this measures the quantity of biodegradable organic matter contained in water. This number is split into different components, namely: **Treatment categories** – The total number of STWs in size band 1 for each sewage treatment works category type (primary, Secondary Activated Sludge (SAS), Secondary Biological (SB), Tertiary A1 (TA1), Tertiary A2 (TA2), Tertiary B1 (TB1) and Tertiary B2 (TB2)). *For full definitions of these different treatment category type, see 4O.2.* **Phosphorus Consent conditions** - The total number of STWs in size band 1 with varying phosphorus consent conditions (<=0.5mg/l, >0.5 to <=1mg/l, >1mg/l and no permit). For further understanding of phosphorus consents, see 4O.7. **Ammonia Consent conditions** - The total number of STWs in size band 1 with varying ammonia consent conditions (<=1mg/l, >1 to <=3mg/l, >3 to <=10mg/l, >10mg/l, no permit). For further understanding of ammonia consents, see 4O.6. The reporting includes all sewage treatments works that NWL operate that are calculated to be 'size band 1'. The calculation of whether a sewage treatment works meets the definition of 'size band 1' should be calculated using resident population only, i.e. it should not be calculated using the non-resident population also. Non-resident population is defined as the holiday and tourist population connected to the sewerage system (note that this does not include daily commuters or day visitors).

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4S.10	STWs in size band 2	Number	Number of sewage treatment works of size band 2 (15-30 kilograms BOD5 per day). BOD5 = '5-day Biochemical Oxygen Demand", this measures the quantity of biodegradable organic matter contained in water. This number is split into different components, namely: **Treatment categories** – The total number of STWs in size band 1 for each sewage treatment works category type (primary, Secondary Activated Sludge (SAS), Secondary Biological (SB), Tertiary A1 (TA1), Tertiary A2 (TA2), Tertiary B1 (TB1) and Tertiary B2 (TB2)). *For full definitions of these different treatment category type, see 4O.2.* **Phosphorus Consent conditions** - The total number of STWs in size band 1 with varying phosphorus consent conditions (<=0.5mg/l, >0.5 to <=1mg/l, >1mg/l and no permit). For further understanding of phosphorus consents, see 4O.7. **Ammonia Consent conditions** - The total number of STWs in size band 1 with varying ammonia consent conditions (<=1mg/l, >1 to <=3mg/l, >3 to <=10mg/l, >10mg/l, no permit). For further understanding of ammonia consents, see 4O.6. The reporting includes all sewage treatments works that NWL operate that are calculated to be 'size band 2'. The calculation of whether a sewage treatment works meets the definition of 'size band 2' should be calculated using resident population only, i.e. it should not be calculated using the non-resident population also. Non-resident population is defined as the holiday and tourist population connected to the sewerage system (note that this does not include daily commuters or day visitors).
4S.11	STWs in size band 3	Number	Number of sewage treatment works of size band 3 (30-120 kilograms BOD5 per day). BOD5 = '5-day Biochemical Oxygen Demand", this measures the quantity of biodegradable organic matter contained in water. This number is split into different components, namely: **Treatment categories** – The total number of STWs in size band 3 for each sewage treatment works category type (primary, Secondary Activated Sludge (SAS), Secondary Biological (SB), Tertiary A1 (TA1), Tertiary A2 (TA2), Tertiary B1 (TB1) and Tertiary B2 (TB2)). *For full definitions of these different treatment category type, see 4O.2.* **Phosphorus Consent conditions** - The total number of STWs in size band 3 with varying phosphorus consent conditions (<=0.5mg/l, >0.5 to <=1mg/l, >1mg/l and no permit). For further understanding of phosphorus consents, see 4O.7. **Ammonia Consent conditions** - The total number of STWs in size band 3 with varying ammonia consent conditions (<=1mg/l, >1 to <=3mg/l, >3 to <=10mg/l, >10mg/l, no permit). For further understanding of ammonia consents, see 4O.6.easures the quantity of biodegradable organic matter contained in water. The reporting includes all sewage treatments works that NWL operate that are calculated to be 'size band 3'. The calculation of whether a sewage treatment works meets the definition of 'size band 3' should be calculated using resident population only, i.e. it should not be calculated using the non-resident population also. Non-resident population is defined as the holiday and tourist population connected to the sewerage system (note that this does not include daily commuters or day visitors).

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4S.12	STWs in size band 4	Number	Number of sewage treatment works of size band 4 (120-600 kilograms BOD5 per day). BOD5 = '5-day Biochemical Oxygen Demand", this measures the quantity of biodegradable organic matter contained in water. This number is split into different components, namely: **Treatment categories** – The total number of STWs in size band 4 for each sewage treatment works category type (primary, Secondary Activated Sludge (SAS), Secondary Biological (SB), Tertiary A1 (TA1), Tertiary A2 (TA2), Tertiary B1 (TB1) and Tertiary B2 (TB2)). *For full definitions of these different treatment category type, see 4O.2.* **Phosphorus Consent conditions** - The total number of STWs in size band 4 with varying phosphorus consent conditions (<=0.5mg/l, >0.5 to <=1mg/l, >1mg/l and no permit). For further understanding of phosphorus consents, see 4O.7. **Ammonia Consent conditions** - The total number of STWs in size band 4 with varying ammonia consent conditions (<=1mg/l, >1 to <=3mg/l, >3 to <=10mg/l, >10mg/l, no permit). For further understanding of ammonia consents, see 4O.6.easures the quantity of biodegradable organic matter contained in water. The reporting includes all sewage treatments works that NWL operate that are calculated to be 'size band 4'. The calculation of whether a sewage treatment works meets the definition of 'size band 4' should be calculated using resident population only, i.e. it should not be calculated using the non-resident population also. Non-resident population is defined as the holiday and tourist population connected to the sewerage system (note that this does not include daily commuters or day visitors).
4S.13	STWs in size band 5	Number	Number of sewage treatment works of size band 5 (600-1,500 kilograms BOD5 per day). BOD5 = '5-day Biochemical Oxygen Demand", this measures the quantity of biodegradable organic matter contained in water. This number is split into different components, namely: **Treatment categories** – The total number of STWs in size band 5 for each sewage treatment works category type (primary, Secondary Activated Sludge (SAS), Secondary Biological (SB), Tertiary A1 (TA1), Tertiary A2 (TA2), Tertiary B1 (TB1) and Tertiary B2 (TB2)). *For full definitions of these different treatment category type, see 4O.2.* **Phosphorus Consent conditions** - The total number of STWs in size band 5 with varying phosphorus consent conditions (<=0.5mg/l, >0.5 to <=1mg/l, >1mg/l and no permit). For further understanding of phosphorus consents, see 4O.7. **Ammonia Consent conditions** - The total number of STWs in size band 5 with varying ammonia consent conditions (<=1mg/l, >1 to <=3mg/l, >3 to <=10mg/l, >10mg/l, no permit). For further understanding of ammonia consents, see 4O.6.easures the quantity of biodegradable organic matter contained in water. The reporting includes all sewage treatments works that NWL operate that are calculated to be 'size band 5'. The calculation of whether a sewage treatment works meets the definition of 'size band 5' should be calculated using resident population only, i.e. it should not be calculated using the non-resident population also. Non-resident population is defined as the holiday and tourist population connected to the sewerage system (note that this does not include daily commuters or day visitors).

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4S.14	STWs above size band 5	Number	Number of sewage treatment works of size band above size band 5 (>1,500 kilograms BOD5 per day). BOD5 = '5-day Biochemical Oxygen Demand", this measures the quantity of biodegradable organic matter contained in water. This number is split into different components, namely: **Treatment categories** – The total number of STWs above size band 5 for each sewage treatment works category type (primary, Secondary Activated Sludge (SAS), Secondary Biological (SB), Tertiary A1 (TA1), Tertiary A2 (TA2), Tertiary B1 (TB1) and Tertiary B2 (TB2)). *For full definitions of these different treatment category type, see 4O.2.* **Phosphorus Consent conditions** - The total number of STWs above size band 5 with varying phosphorus consent conditions (<=0.5mg/l, >0.5 to <=1mg/l, >1mg/l and no permit). For further understanding of phosphorus consents, see 4O.7. **Ammonia Consent conditions** - The total number of STWs above size band 5 with varying ammonia consent conditions (<=1mg/l, >1 to <=3mg/l, >3 to <=10mg/l, >10mg/l, no permit). For further understanding of ammonia consents, see 4O.6.easures the quantity of biodegradable organic matter contained in water. The reporting includes all sewage treatments works that NWL operate that are calculated to 'above size band 5'. The calculation of whether a sewage treatment works meets the definition of 'above size band 5' should be calculated using resident population only, i.e. it should not be calculated using the non-resident population also. Non-resident population is defined as the holiday and tourist population connected to the sewerage system (note that this does not include daily commuters or day visitors).
4S.15	Total number of works	Number	Total number of sewage treatment works of all sizes. Calculated as sum of 4S.9 (Sewage Treatment Works in size band 1) to 4S.14 (Sewage Treatment Works above size band 5). This number is split into different components, namely: **Treatment categories** – The total number of STWs for each sewage treatment works category type (primary, Secondary Activated Sludge (SAS), Secondary Biological (SB), Tertiary A1 (TA1), Tertiary A2 (TA2), Tertiary B1 (TB1) and Tertiary B2 (TB2)). *For full definitions of these different treatment category type, see 4O.2.* **Phosphorus Consent conditions** - The total number of STWs with varying phosphorus consent conditions (<=0.5mg/l, >0.5 to <=1mg/l, >1mg/l and no permit). For further understanding of phosphorus consents, see 4O.7. **Ammonia Consent conditions** - The total number of STWs with varying ammonia consent conditions (<=1mg/l, >1 to <=3mg/l, >3 to <=10mg/l, >10mg/l, no permit). For further understanding of ammonia consents, see 4O.6.easures the quantity of biodegradable organic matter contained in water. The reporting includes all sewage treatments works that NWL operate (size band 1 – to above size band 5).
4S.16	Current population equivalent served by STWs	000s population equivalent	Population equivalent (resident) connected to sewage treatment works. Equivalent population should be calculated on the basis of 60 grams BOD5 per capita per day. Imported effluents should be included in calculation. No account should be taken of holiday (non-resident) population. BOD5 stands for '5-day Biochemical Oxygen Demand". This measures the quantity of biodegradable organic matter contained in water. Resident population includes non-household customers i.e. businesses but does not include non-resident population, e.g. holidaymakers. The reporting includes all sewage treatments works that NWL operate (size band 1 – to above size band 5).

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4S.17	Current population equivalent served by discharge relocation schemes	000s population equivalent	Population equivalent served by schemes to relocate the discharge to receiving waters, delivered in the report year and for which capital costs are reported in 4M.21. Equivalent population should be calculated on the basis of 60 grams BOD5 per capita per day. Exclude population equivalent served where the output has primarily been met through operating expenses rather than capital expenditure solutions. The reporting includes all sewage treatments works that NWL operate (size band 1 – to above size band 5). *Note: NWL have not delivered any discharge relocation schemes within the reporting year.*
4S.18	Current population equivalent served by filter bed STWs with tightened/new P consents	000s population equivalent	Population equivalent served by biological filter Sewage Treatment Works at which there are new or tightened consent conditions for phosphorus, delivered in the report year and for which capital costs are reported in 4M.18 (National Environment Programme – Reduction of sanitary parameters). Equivalent population should be calculated on the basis of 60 grams BOD5 per capita per day. Exclude population equivalent served where the output has primarily been met through operating expenses rather than capital expenditure solutions. The reporting includes all sewage treatments works that NWL operate (size band 1 – to above size band 5).
4S.19	Current population equivalent served by activated sludge STWs with tightened/new P consents	000s population equivalent	Population equivalent served by activated sludge Sewage Treatment Works at which there are new or tightened consent conditions for phosphorus, delivered in the report year and for which capital costs are reported in 4M.17. E Equivalent population should be calculated on the basis of 60 grams BOD5 per capita per day. Exclude population equivalent served where the output has primarily been met through operating expenses rather than capital expenditure solutions. The reporting includes all sewage treatments works that NWL operate (size band 1 – to above size band 5). *Note: NWL have not obtained any new or tightened consent conditions for phosphorus at activated sludge Sewage Treatment Works within the reporting year.*
4S.20	Current population equivalent served by groundwater protection schemes	000s population equivalent	Population equivalent served by schemes to deliver improvements driven by the European Union Groundwater Directive, delivered in the report and for which capital costs are reported in 4M.14. Equivalent population should be calculated on the basis of 60 grams BOD5 per capita per day. Exclude population equivalent served where the output has primarily been met through operating expenses rather than capital expenditure solutions. The reporting includes all sewage treatments works that NWL operate (size band 1 – to above size band 5). *Note: NWL have not delivered any groundwater protection schemes within the reporting year.*
4S.21	Current population equivalent served by STWs with a Flow1 driver scheme	000s population equivalent	Current population equivalent served by Sewage Treatment Works with a Flow1 driver code, delivered in the report and for which capital costs are reported in 4M.22. Equivalent population should be calculated on the basis of 60 grams BOD5 per capita per day. Exclude population equivalent served where the output has primarily been met through operating expenses rather than capital expenditure solutions. The reporting includes all sewage treatments works that NWL operate (size band 1 – to above size band 5). *Note: NWL have not delivered any Flow1 driver code schemes within the reporting year.*

4S.22	Current population equivalent served by STWs with tightened/new N consents	000s population equivalent	Population equivalent served by Sewage Treatment Works at which there are new or tightened consent conditions for nitrogen, delivered in the report and for which capital costs are reported in 4M.16. Equivalent population should be calculated on the basis of 60 grams BOD5 per capita per day. Exclude population equivalent served where the output has primarily been met through operating expenses rather than capital expenses solutions. The reporting includes all sewage treatments works that NWL operate (size band 1 – to above size band 5). *Note: NWL have not obtained any new or tightened consent conditions for nitrogen within the reporting year.*
4S.23	Current population equivalent served by STWs with tightened/new sanitary parameter consents	000s population equivalent	Population equivalent served by Sewage Treatment Works at which there are new or tightened consent conditions for one or more sanitary parameters, delivered in the report year and for which capital costs are reported in 4M.19. Equivalent population should be calculated on the basis of 60 grams BOD5 per capita per day. Exclude population equivalent served where the output has primarily been met through operating expenses rather than capital expenses solutions. The reporting includes all sewage treatments works that NWL operate (size band 1 – to above size band 5). *Note: NWL have not obtained any new or tightened consent conditions for one or more sanitary parameters within the reporting year.*
4S.24	Current population equivalent served by STWs with tightened/new UV consents	000s population equivalent	Population equivalent served by Sewage Treatment Works at which there are new or tightened consent conditions for microbiological parameters to meet the requirements of the European Union Shellfish Waters or revised Bathing Water Directives, delivered in the report year and for which capital costs are reported in 4M.20. Equivalent population should be calculated on the basis of 60 grams BOD5 per capita per day. Exclude population equivalent served where the output has primarily been met through operating expenses rather than capital expenses solutions. The reporting includes all sewage treatments works that NWL operate (size band 1 – to above size band 5). *Note: NWL have not obtained any new or tightened consent conditions for microbiological parameters within the reporting year.*
4S.25	Population equivalent treatment capacity enhancement	000s population equivalent	The increase in treatment capacity, from company action, measured in population equivalent. Equivalent population should be calculated on the basis of 60 grams BOD5 per capita per day. The increase must be measured from the previous year's capacity of existing sewage treatment works and the previous capacity at each works must be the higher of the then current design capacity or the company's revised understanding of actual capacity before the company's action. The reporting includes all sewage treatments works that NWL operate (size band 1 – to above size band 5). *Note: NWL initiated and materially completed a scheme to enhance the treatment capacity at Bakers Haugh STW during the 2018/19 reporting year, which contributed 9,370 population equivalent. The scheme was fully signed off during the 2019/20 reporting year but due it already being included in the reporting for the 2018/19 reporting, it has not been included in the reported figure for the reporting year 2019/20.*

4T.1	% Sludge - untreated	%	Percentage of sludge produced which is untreated prior to disposal. This measure calculates the percentage of total sludge produced by NWL in-area wastewater treatment processes in the report year that does not go on to have any further treatment prior to its disposal. This does not include grit and screenings that were removed through preliminary treatment processes. Cross border imports of sludge from another water company should also not be considered when calculating the percentage. This number is split into different components, namely: **By incumbent** – NWL themselves were responsible for the disposal of sludge; and **By 3rd party sludge service providers** – NWL contracted a 3rd party to dispose of the sludge on their behalf Sludge treated by managed contractors should be included within 'By incumbent'.
4T.2	% Sludge treatment process - raw sludge liming	%	Percentage of sludge produced which is untreated other than by liming. This measure calculates the percentage of total sludge produced by NWL in-area wastewater treatment processes in the report year that is treated by "liming" prior to its disposal. This does not include grit and screenings that were removed through preliminary treatment processes. Cross border imports of sludge from another water company should also not be considered when calculating the percentage. This number is split into different components, namely: **By incumbent** – NWL themselves were responsible for the disposal of sludge; and **By 3rd party sludge service providers** – NWL contracted a 3rd party to dispose of the sludge on their behalf Sludge treated by managed contractors should be included within 'By incumbent'.
4T.3	% Sludge treatment process - conventional AD	%	Percentage of sludge produced which is treated by conventional Anaerobic Digestion (with or without liming). This measure calculates the percentage of total sludge produced by NWL in-area wastewater treatment processes in the report year that is treated by conventional Anaerobic Digestion (with or without liming) prior to its disposal. This does not include grit and screenings that were removed through preliminary treatment processes. Cross border imports of sludge from another water company should also not be considered when calculating the percentage. This number is split into different components, namely: **By incumbent** – NWL themselves were responsible for the disposal of sludge; and **By 3rd party sludge service providers** – NWL contracted a 3rd party to dispose of the sludge on their behalf Sludge treated by managed contractors should be included within 'By incumbent'.

4T.4	% Sludge treatment process- advanced AD	%	Percentage of sludge produced which is treated by advanced Anaerobic Digestion (with or without liming). This measure calculates the percentage of total sludge produced by NWL in-area wastewater treatment processes in the report year that is treated by advanced Anaerobic Digestion (with or without liming) prior to its disposal. This does not include grit and screenings that were removed through preliminary treatment processes. Cross border imports of sludge from another water company should also not be considered when calculating the percentage. Advanced Anaerobic Digestion includes the following types: Thermal Hydrolysis Process, Enzymic Hydrolysis, two- stage + Publicly Available Specification 110 certified and Acid Phase Digestion. This number is split into different components, namely: **By incumbent** – NWL themselves were responsible for the disposal of sludge; and **By 3rd party sludge service providers** – NWL contracted a 3rd party to dispose of the sludge on their behalf Sludge treated by managed contractors should be included within 'By incumbent'.
4T.5	% Sludge treatment process - incineration of raw sludge	%	Percentage of sludge produced which is untreated other than by incineration. This measure calculates the percentage of total sludge produced by NWL in-area wastewater treatment processes in the report year that is treated by incineration. This does not include grit and screenings that were removed through preliminary treatment processes. Cross border imports of sludge from another water company should also not be considered when calculating the percentage. This number is split into different components, namely: **By incumbent** – NWL themselves were responsible for the disposal of sludge; and **By 3rd party sludge service providers** – NWL contracted a 3rd party to dispose of the sludge on their behalf Sludge treated by managed contractors should be included within 'By incumbent'.
4T.6	% Sludge treatment process - incineration of digested sludge	%	Percentage of sludge produced which is digested and then incinerated. This measure calculates the percentage of total sludge produced by NWL in-area wastewater treatment processes in the report year that is treated digestion and then incinerated. This does not include grit and screenings that were removed through preliminary treatment processes. Cross border imports of sludge from another water company should also not be considered when calculating the percentage. This number is split into different components, namely: **By incumbent** – NWL themselves were responsible for the disposal of sludge; and **By 3rd party sludge service providers** – NWL contracted a 3rd party to dispose of the sludge on their behalf Sludge treated by managed contractors should be included within 'By incumbent'.

4T.7	% Sludge treatment process - phyto-conditioning/composting	%	Percentage of sludge produced which is phyto- conditioned or composted. This measure calculates the percentage of total sludge produced by NWL in-area wastewater treatment processes in the report year that is treated by phyto- conditioning or composting prior to its disposal. This does not include grit and screenings that were removed through preliminary treatment processes. Cross border imports of sludge from another water company should also not be considered when calculating the percentage. This number is split into different components, namely: **By incumbent** – NWL themselves were responsible for the disposal of sludge; and **By 3rd party sludge service providers** – NWL contracted a 3rd party to dispose of the sludge on their behalf Sludge treated by managed contractors should be included within 'By incumbent'.
4T.8	% Sludge treatment process - other (specify)	%	Percentage of sludge produced by other treatment type(s) than those described in 4T.2 (% Sludge treatment process - raw sludge liming) to 4T.7 (% Sludge treatment process - phyto-conditioning/composting). This measure calculates the percentage of total sludge produced by NWL in-area wastewater treatment processes in the report year that is treated by other treatment types than those described in 4T.2 (% Sludge treatment process - raw sludge liming) to 4T.7 (% Sludge treatment process - phyto-conditioning/composting) prior to its disposal. This does not include grit and screenings that were removed through preliminary treatment processes. Cross border imports of sludge from another water company should also not be considered when calculating the percentage. This number is split into different components, namely: **By incumbent** – NWL themselves were responsible for the disposal of sludge; and **By 3rd party sludge service providers** – NWL contracted a 3rd party to dispose of the sludge on their behalf Sludge treated by managed contractors should be included within 'By incumbent'.
4T.9	% Sludge treatment process - Total	%	Calculated as the sum of lines 4T.1 (% Sludge – untreated) to 4T.8 (% Sludge treatment process - other (specify)). The totals for the incumbent and 3rd party service provider columns should sum to 100%. This number is split into different components, namely: **By incumbent** – NWL themselves were responsible for the disposal of sludge; and **By 3rd party sludge service providers** – NWL contracted a 3rd party to dispose of the sludge on their behalf Sludge treated by managed contractors should be included within 'By incumbent'.

4T.10	% Sludge disposal route - landfill, raw	%	Percentage of (un-incinerated) sludge by disposal route - landfill, raw. This measure calculates the percentage of total sludge disposed to landfill in its raw state (i.e. no further treatment of the sludge since its production), that was produced by NWL in-area wastewater treatment processes and cross border in the report year and has not been incinerated (i.e. included in the reporting for 4T.5 or 4T.6). This number is split into different components, namely: **By incumbent** – NWL themselves were responsible for the disposal of sludge; and **By 3rd party sludge service providers** – NWL contracted a 3rd party to dispose of the sludge on their behalf Sludge treated by managed contractors should be included within 'By incumbent'.
4T.11	% Sludge disposal route - landfill, partly treated	%	Percentage of (un-incinerated) sludge by disposal route - landfill, partly treated. This measure calculates the percentage of total sludge disposed to landfill that has been partly treated, that was produced by NWL in-area wastewater treatment processes and cross border imports in the report year and has not been incinerated (i.e. included in the reporting for 4T.5 or 4T.6). This number is split into different components, namely: **By incumbent** – NWL themselves were responsible for the disposal of sludge; and **By 3rd party sludge service providers** – NWL contracted a 3rd party to dispose of the sludge on their behalf Sludge treated by managed contractors should be included within 'By incumbent'.
4T.12	% Sludge disposal route - land restoration / reclamation	%	Percentage of (un-incinerated) sludge by disposal route - land restoration / reclamation. This measure calculates the percentage of total sludge disposed through land restoration or reclamation, that was produced by NWL in-area wastewater treatment processes and cross border imports in the report year and has not been incinerated (i.e. included in the reporting for 4T.5 or 4T.6). This number is split into different components, namely: **By incumbent** – NWL themselves were responsible for the disposal of sludge; and **By 3rd party sludge service providers** – NWL contracted a 3rd party to dispose of the sludge on their behalf Sludge treated by managed contractors should be included within 'By incumbent'.

4T.13	% Sludge disposal route - sludge recycled to farmland	%	Percentage of (un-incinerated) sludge by disposal route - sludge recycled to farmland. This measure calculates the percentage of total sludge disposed through recycling to farmland, that was produced by NWL in-area wastewater treatment processes and cross border imports in the report year and has not been incinerated (i.e. included in the reporting for 4T.5 or 4T.6). This number is split into different components, namely: **By incumbent** – NWL themselves were responsible for the disposal of sludge; and **By 3rd party sludge service providers** – NWL contracted a 3rd party to dispose of the sludge on their behalf Sludge treated by managed contractors should be included within 'By incumbent'.
4T.14	% Sludge disposal route - other (specify)	%	Percentage of (un-incinerated) sludge by disposal route - other (specify). This measure calculates the percentage of total sludge disposed through another route other than those described in 4T.10 (% Sludge disposal route - landfill, raw) to 4T.13 (% Sludge disposal route - sludge recycled to farmland), that was produced by NWL in-area wastewater treatment processes and cross border imports in the report year and has not been incinerated (i.e. included in the reporting for 4T.5 or 4T.6). This number is split into different components, namely: **By incumbent** – NWL themselves were responsible for the disposal of sludge; and **By 3rd party sludge service providers** – NWL contracted a 3rd party to dispose of the sludge on their behalf Sludge treated by managed contractors should be included within 'By incumbent'.
4T.15	% Sludge disposal route – Total	%	The totals for the incumbent and 3rd party service provider columns should sum to 100%. This number is split into different components, namely: **By incumbent** – NWL themselves were responsible for the disposal of sludge; and **By 3rd party sludge service providers** – NWL contracted a 3rd party to dispose of the sludge on their behalf Sludge treated by managed contractors should be included within 'By incumbent'.
4U.1	Residential properties connected during the year	'000s properties	The total number of new residential properties connected to the company's sewerage area for wastewater services during the report year. This is the number of new connections; disconnections and demolished properties should not be netted off.

4U.2	Business properties connected during the year	‘000s properties	The total number of new business properties connected to the company’s sewerage area for wastewater services during the report year. This is the number of new connections; disconnections and demolished properties should not be netted off.
4U.3	Residential properties billed unmeasured sewage	‘000s properties	Average (mean) number of residential properties billed for unmeasured (unmetered) sewerage within the undertaker’s area. Exclude void properties (properties connected to the sewerage system but do not receive a charge as there are no occupants). This is calculated by determining the number of residential properties billed for unmeasured sewage in every month of the reporting year and dividing by 12.
4U.4	Residential properties billed measured sewage	‘000s properties	Average (mean) number of residential properties billed for measured (metered) sewerage within the undertaker’s area. Exclude void properties (properties connected to the sewerage system but do not receive a charge as there are no occupants). Include residential properties billed for measured water supply where sewerage bills are based on value of water supplied. This is calculated by determining the number of residential properties billed for measured sewage in every month of the reporting year and dividing by 12.
4U.5	Residential properties billed for sewage	‘000s properties	Residential properties billed for sewerage. Calculated as the sum of 4U.3 (Residential properties billed unmeasured sewerage) and 4U.4 (Residential properties billed unmeasured sewerage).
4U.6	Business properties billed unmeasured sewage	‘000s properties	Average (mean) number of business properties billed for unmeasured (unmetered) sewerage. Exclude void properties (properties connected to the sewerage system but do not receive a charge as there are no occupants). This is calculated by determining the number of business properties billed for unmeasured sewage in every month of the reporting year and dividing by 12.
4U.7	Business properties billed measured sewage	‘000s properties	Average (mean) number of business properties billed for measured (metered) sewerage, including trade effluent customers (business which have obtained consents to discharge material other than standard waste into the sewage network). Exclude void properties (properties connected to the sewerage system but do not receive a charge as there are no occupants). This is calculated by determining the number of business properties billed for measured sewage in every month of the reporting year and dividing by 12.
4U.8	Business properties billed for sewage	‘000s properties	Average (mean) business properties billed for sewerage. Calculated as the sum of 4U.6 (Business properties billed unmeasured (unmetered) sewerage) and 4U.7 (Business properties billed measured (metered) sewerage).

4U.9	Void properties	‘000s properties	Average (mean) number of properties (residential and business) within the undertaker’s area which are connected to the sewerage system but do not receive a charge as there are no occupants. This should not include properties that do not receive a bill because it would be uneconomical to do so. This is calculated by determining the number of unoccupied residential properties that NWL provide wastewater services to in every month of the reporting year and dividing by 12.
4U.10	Number of properties		Total number of connected properties. This is calculated as the sum of 4U.5 (Residential properties billed for sewerage); 4U.8 (Business properties billed for sewerage) and 4U.9 (Void properties).
4U.11	Resident population	‘000s people	The annual average resident population connected to the sewerage system.
4U.12	Non-resident population	‘000s people	The annual average holiday and tourist population connected to the sewerage system. Do not include daily commuters or day visitors. This measure is calculated by obtaining a tourist board estimate of the number of bed spaces available for non-residents and assuming that there will be full occupancy of those bed spaces for eight months of the year and two thirds occupancy for four months of the year.
A1	Total number of contracts held with third party at the end of the financial year	Number	The number of current contracts held with third parties to provide a bioresources service (treatment, transport, recycling) at the end of the financial year. Where a contract covers more than one service (transport, treatment and/or recycling) companies should record this as a single contract but if there are two contracts in place with the same supplier to provider different services then these would be counted separately. Companies should not include contracts that they hold with joint ventures, associated companies or where they retain ownership of assets or equipment being used by contractors on their behalf.
A2	Total amount paid on contracts during the financial year	£000	The total amount paid to third parties on bioresources service contracts (treatment, transport, recycling) during the financial year. This is for all contracts. It includes any amount of money paid out on contracts that ended during the year.
A3	Number of different suppliers at the year end	Number	The number of different suppliers with contracts held with the company to provide a bioresources service (treatment, transport, recycling). A company’s own bioresources business should not be counted as a supplier. If two contracts are held with the same supplier to provide two different services (e.g. treatment and transport) then they would be counted as one supplier.

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A4	Number of contracts ended during the year	Number	The number of contracts held with third parties to provide a bioresources service (treatment, transport, recycling) that have either been terminated in the year or have come to the end of the contract.
A5	Number of contracts renewed during the year	Number	The number of contracts held with third parties renewed during the financial year to provide a bioresources service (treatment, transport, recycling).
A6	Number of new contracts that have been agreed during the year	Number	The number of new contracts with third parties that have been agreed during the financial year to provide a bioresources service (treatment, transport, recycling). This does not include renewed contracts reported in A5.
B1	Number of formal tenders you issued during the year	Number	The number of formal tenders issued during the financial year asking for bids by a third party to provide bioresources services.
B2	Total number of bids received on all your tenders	Number	Total number of bids received for all formal tenders issued during the year. For instance, if a company received 6 bids for one project, the company should count all six bids. For clarity, this has been done based on the bids received in the year, for tenders also issued in the year.
B3	Number of tenders you awarded during the year	Number	Number of contracts awarded during the year through the formal tendering process. The number of tenders awarded may be different from the number of formal tenders issued during the financial year, for example, differences may occur where the financial tender was issued the financial year before the contract was awarded, or where no bids were received for a tender.
C1	Number of offers made by a third party outside the formal tender process during the financial year	Number	The number of offers or bids received by the company outside of any formal tendering process. We expect that an offer of services would include some financial and contractual detail, similar to what might be provided through an ‘Expression of Interest’ in a tendering process. We do not expect a company to count every speculative contact made either in writing or by phone.

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C2	The number of successful offers	Number	The number of offers or bids that have resulted in a contract being agreed during the financial year.
D1	Total quantity of sludge produced in the performance of the company's functions as a sewerage undertaker	Total tonnes dry solids per year (ttds/ year)	Total quantity of sludge produced by the network plus function. This figure should be given as thousand tonnes of dry solids in the financial year and will agree to D2 + D3.
D2	Quantity of sludge treated in-house	Total tonnes dry solids per year (ttds/ year)	Thousand tonnes of dry solids treated in-house by your own bioresources business in the financial year and will agree to 4R.23. This is a measure of all the untreated sewage sludge (primary, secondary, tertiary) produced by in-area wastewater treatment processes in the report year which is either treated by the incumbent or remains untreated prior to disposal. Grit and screenings removed through preliminary treatment processes should be excluded. Cross-border imports should be excluded. Primary sludge is a result of the capture of suspended solids and organics in the primary treatment process. Secondary sludge has a lower biogas potential because the microorganisms in the secondary treatment process have consumed most of their energy content leaving behind mainly inert biomass. Tertiary sludge is sludge that has had the phosphates and nitrates from the water supply removed. Sludge treated by managed contractors should be included; sludge treated by separate 3rd party service providers should be reported in D3. A managed contractor is defined as a company that is acting under NWL's direction and NWL remain responsible for the process. A 3rd party sludge service provider is a company that NWL engage to treat and/or dispose of sludge on their behalf and are not managed by NWL, i.e. they do so in a manner the 3rd party chooses and take on this responsibility.
D3	Quantity of sludge treated by a third party	Total tonnes dry solids per year (ttds/ year)	This is a measure of all the untreated sewage sludge (primary, secondary, tertiary) produced by in-area wastewater treatment processes in the report year which is treated by a 3rd party sludge service provider. Grit and screenings removed through preliminary treatment processes should be excluded. Cross-border imports should be excluded. Primary sludge is a result of the capture of suspended solids and organics in the primary treatment process. Secondary sludge has a lower biogas potential because the microorganisms in the secondary treatment process have consumed most of their energy content leaving behind mainly inert biomass. Tertiary sludge is sludge that has had the phosphates and nitrates from the water supply removed. Sludge treated by managed contractors (as opposed to separate 3rd party service providers) should be excluded; instead it should be reported in D2. A managed contractor is defined as a company that is acting under NWL's direction and NWL remain responsible for the process. A 3rd party sludge service provider is a company that NWL engage to treat and/or dispose of sludge on their behalf and are not managed by NWL, i.e. they do so in a manner the 3rd party chooses and take on this responsibility.
D4	Number of contracts to provide sludge treatment	Number	The number of current contracts held with third parties to provide sludge treatment.

D5	Number of suppliers with contracts for sludge treatment	Number	The number of different third-party suppliers that hold contracts to treat sludge as at the end of the financial year. The company should not include its own bioresources business as a supplier.
E1	Total quantity of sludge transported by road	Total tonnes dry solids (ttds)	Total thousand tonnes dry solids of sludge transported by road. This includes sludge transported from the network plus function to the sludge treatment centre (STC) as well as sludge from the STC to either a disposal site or for recycling to land. This is calculated by adding E2 and E3. NWL have not included within the reporting quantities of sludge transported from sewage treatment works (A) to intermediary sludge treatment centres (B) where it undergoes dewatering treatment, prior to being transported again to the main sludge treatment centres (C) for final treatment ahead of disposal. This is to prevent "double counting" of the sludge when it moves from (A) – (B) – (C). Included within the reporting are: movements of sludge from sewage treatment works direct to main sludge treatment centres (A) – (C); movements of sludge from intermediary sludge treatment centres to main sludge treatment centres (B) – (C); and movements of sludge from main sludge treatment centres (once to treated) to farmland for disposal.
E2	Quantity of sludge transported by road in-house by your own bioresources service	Total tonnes dry solids (ttds)	Thousand tonnes of dry solids transported by your own bioresources business in the financial year. This includes sludge transported from the network plus function to the sludge treatment centre (STC) as well as sludge from the STC to either a disposal site or for recycling to land. NWL have not included within the reporting quantities of sludge transported from sewage treatment works (A) to intermediary sludge treatment centres (B) where it undergoes dewatering treatment, prior to being transported again to the main sludge treatment centres (C) for final treatment ahead of disposal. This is to prevent "double counting" of the sludge when it moves from (A) – (B) – (C). Included within the reporting are: movements of sludge from sewage treatment works direct to main sludge treatment centres (A) – (C); movements of sludge from intermediary sludge treatment centres to main sludge treatment centres (B) – (C); and movements of sludge from main sludge treatment centres (once to treated) to farmland for disposal. Sludge transported by managed contractors should be included; sludge treated by separate 3rd party service providers should be reported in E3. A managed contractor is defined as a company that is acting under NWL's direction and NWL remain responsible for the process. A 3rd party sludge service provider is a company that NWL engage to treat and/or dispose of sludge on their behalf and are not managed by NWL, i.e. they do so in a manner the 3rd party chooses and take on this responsibility.
E3	Quantity of sludge transported by road by a third party	Total tonnes dry solids (ttds)	Thousand tonnes of dry solids transported by a third party in the financial year. NWL have not included within the reporting quantities of sludge transported from sewage treatment works (A) to intermediary sludge treatment centres (B) where it undergoes dewatering treatment, prior to being transported again to the main sludge treatment centres (C) for final treatment ahead of disposal. This is to prevent "double counting" of the sludge when it moves from (A) – (B) – (C). Included within the reporting are: movements of sludge from sewage treatment works direct to main sludge treatment centres (A) – (C); movements of sludge from intermediary sludge treatment centres to main sludge treatment centres (B) – (C); and movements of sludge from main sludge treatment centres (once to treated) to farmland for disposal. Sludge transported by managed contractors (as opposed to separate 3rd party service providers) should be excluded; instead it should be reported in line F2. A managed contractor is defined as a company that is acting under NWL's direction and NWL remain responsible for the process. A 3rd party sludge service provider is a company that NWL engage to treat and/or dispose of sludge on their behalf and are not managed by NWL, i.e. they do so in a manner the 3rd party chooses and take on this responsibility.
E4	Number of contracts to provide sludge transport services	Number	The number of current contracts held with third parties to provide sludge transportation.

E5	Number of suppliers with contracts for sludge transportation	Number	The number of different third-party suppliers that hold contracts to transport sludge as at the end of the financial year. The company should not include its own bioresources business as a supplier.
F1	Total quantity of sludge recycled or disposed	Total tonnes dry solids (ttds)	Total thousand tonnes dry solids of sludge that is either disposed of or taken to land for recycling. This figure is reported in thousand tonnes dry solids for the financial year and will agree to 4R.30. A managed contractor is defined as a company that is acting under NWL's direction and NWL remain responsible for the process. A 3rd party sludge service provider is a company that NWL engage to treat and/or dispose of sludge on their behalf and are not managed by NWL, i.e. they do so in a manner the 3rd party chooses and take on this responsibility.
F2	Quantity of sludge recycled or disposed in-house by your own bioresources service	Total tonnes dry solids (ttds)	Thousand tonnes of dry solids disposed or recycled by your own bioresources business in the financial year and will agree to 4R.28. Sludge disposed of by managed contractors should be included; sludge disposed of by separate 3rd party service providers should be reported in F3. A managed contractor is defined as a company that is acting under NWL's direction and NWL remain responsible for the process. A 3rd party sludge service provider is a company that NWL engage to treat and/or dispose of sludge on their behalf and are not managed by NWL, i.e. they do so in a manner the 3rd party chooses and take on this responsibility.
F3	Quantity of sludge recycled by a third party	Total tonnes dry solids (ttds)	Thousand tonnes of dry solids disposed or recycled by a third party in the financial year and will agree to 4R.29. Sludge disposed of by managed contractors (as opposed to separate 3rd party service providers) should be excluded; instead it should be reported in line F2. A managed contractor is defined as a company that is acting under NWL's direction and NWL remain responsible for the process. A 3rd party sludge service provider is a company that NWL engage to treat and/or dispose of sludge on their behalf and are not managed by NWL, i.e. they do so in a manner the 3rd party chooses and take on this responsibility.
F4	Number of contracts held to provide sludge recycling or disposal services	Number	The number of current contracts held with third parties to provide sludge recycling or disposal services.
F5	Number of suppliers with contracts for sludge recycling or disposal	Number	The number of different third-party suppliers that hold contracts to dispose of or recycle sludge at the end of the financial year. The company should not include its own bioresources business as a supplier.

APPENDIX 2

CEMARS INDEPENDENT ASSURANCE STATEMENT FOR GREENHOUSE GAS EMISSIONS

Independent Assurance Statement

CEMARS®

Carbon & Energy Management And Reduction Scheme

TO THE DIRECTORS OF THE ENVIRO-MARK SOLUTIONS BOARD

Responsible Party: Northumbrian Water Limited

Registered address: Northumbria House, Abbey Road, Pity Me, Durham, DH1 5FJ

Inventory period: 01/04/2019 to 31/03/2020

Inventory report: EIR_1920_NW_CM_Org

Contract (client number sales database): -

We have reviewed the greenhouse gas emissions inventory report ("the inventory report") for the above named Responsible Party for the stated inventory period.

Board of Directors' Responsibilities (Responsible Party)

The Board of Directors of the Responsible Party is responsible for the preparation of an inventory report which gives a true and fair view of the greenhouse gas emissions of the Responsible Party in accordance with ISO 14064-1:2006 and the requirements of the Enviro-Mark Solutions CEMARS programme.

Verifiers' Responsibilities

It is our responsibility to express to you an independent opinion on the overall total reported GHG emissions, within the defined organisation boundary, as contained within the inventory report presented by the Board of Directors of the Responsible Party. Our verification was undertaken as agreed in the Contract which defines the scope, objectives, criteria and level of assurance of the verification.

Basis of Opinion

The subject matter contained in the inventory report is based on historical information for the stated inventory period. Our review was carried out in accordance with the criteria stated in ISO 14064-1:2006 and the CEMARS programme.

The verification included examination, on a test basis, of the evidence relevant to the information and data disclosed in the inventory report. It also included assessment of the assumptions and judgements made by the Responsible Party in the preparation of the inventory report.

We conducted our verification in accordance with ISO 14064-3:2006 and the requirements of the CEMARS Technical Requirements. We planned and performed our verification so as to obtain all the information and explanations which we considered necessary in order to provide us with sufficient evidence to obtain a limited level of assurance that the inventory report is free from material misstatements, whether caused by error or fraud. In forming our opinion we also evaluated the overall adequacy of the presentation of information and data in the inventory report.

Other than in our capacity as an independent verifier of the emissions inventory we have no relationship with or interests in the Responsible Party.

Responsible Party's greenhouse gas assertion (certification claim)

Northumbrian Water Limited meets the requirements of CEMARS® certification having measured its greenhouse gas emissions in accordance with ISO 14064-1:2006 and committed to managing and reducing its emissions in respect of the operational activities of its UK organisation.

Opinion

In our limited assurance opinion, we have no reason to believe that the Scope 1, 2, and mandatory Scope 3 emissions included in the inventory report:

• do not comply with ISO 14064-1:2006 and the requirements of the Enviro-Mark Solutions CEMARS programme; and
• do not provide a true and fair view of the emissions inventory of the Responsible Party for the stated inventory period.

This opinion is subject to the qualifications/limitations below:

Qualifications/Limitations

The net location based GHG emissions, in CAW13 include a reduction of -16,512.32tCO$_2$e. However, the RGGOs for this gas have been sold. The CAW13 methodology does not distinguish this and reports the same reductions as location based and market based for biogas gas exports. This query was raised with the Ricardo the CAW13 methodology developer and confirmed an error. The market based exported figure, where RGGOs have been sold should be 0 tCO$_2$e.

The renewable energy tariff fully meets CAW 13 requirements. With respect to WRI scope 2 good quality criteria the tariff has not been subject to an independent audit. Adequate evidence was provided against this criteria, with the exception that there is not yet evidence that REGOS have been retired for the reporting year. Due to COVID-19 restrictions a site visit was not possible for certification year.

Achieved level of assurance

Limited assurance Scope 1, 2 & mandatory Scope 3 total emissions.

Verified by:		**Authorised by:**	
Name:	Glenn Cargill	Name:	Stephen Smith
Position:	Lead Verifier	Position:	Technical Reviewer, Achilles
Verification firm:	Achilles		
Signature:		Signature:	
Date verification audit:	27/05/2020		
Date opinion expressed:	29/05/2020	Date:	04/06/2020

Audit Report

CEMARS® programme

Carbon & Energy Management And Reduction Scheme

Of organisation:

Northumbrian Water Limited

Lead Auditor:	Glenn Cargill
Verification firm:	Achilles
Lead Auditor email:	glenn.cargill@achilles.com
Client Contact:	Anthony Browne
Report date:	29/05/2020
Peer Review:	Stephen Smith

Audit objectives

The objective of the audit was to determine if the organisation's GHG:

- measurement (emissions data and calculations) meet(s) the criteria for the measure step.
- emissions management and reduction(s) meet(s) the criteria for the manage.

Audit criteria	ISO 14064 Part 1: 2006 ISO 14064 Part 3: 2006	Programme Technical Requirements Certification Mark Guide
Audit program	CEMARS	
Audit date	30/05/2020	
Total audit man-days offsite	5.00	
Reporting year	01/04/2019 to 31/03/2020	
Base year	01/04/2019 to 31/03/2020	
Consolidation methodology	Operational control.	
Materiality threshold	5%	
Emissions factor source	DEFRA 2019 emission factors	CAW 13 (05/02/2020) gross & net location based and market based emissions. This therefore includes the additional scope 3 activity of outsourced services emissions.
Certification scope claim	Northumbrian Water Limited meets the requirements of CEMARS® certification having measured its greenhouse gas emissions in accordance with ISO 14064-1:2006 and committed to managing and reducing its emissions in respect of the operational activities of its UK organisation.	
Registered Office Address	Northumbria House, Abbey Road, Pity Me, Durham, DH1 5FJ	
Audit type	Certification (verification associated with new certification or certification renewal)	

Audit findings

A full list of all mNCRs, NCRs & Obs raised during the audit is given in Appendix 1 - Findings Log.

The Findings log also provides the status of each of these findings, including any outstanding from the last audit. The following table provides a summary of this audits findings:

Type	Number raised
Non-Conformances	4
Minor Non-Conformances (mNCR)	4
Observations	0

CarbonReduction

Conclusion

Verified totals:

Emissions summary by scope	Location based	Market based	Units
Scope 1	59,243.70	59,243.70	tCO_2e
Scope 2	86,882.07	0.00	tCO_2e
Scope 3	9,999.66	2,623.52	tCO_2e
Scope 3 mandatory	8,289.36	913.22	*tCO_2e*
Scope 3 additional	1,710.30	1,710.30	*tCO_2e*
Scope 3 one-off	0.00	0.00	*tCO_2e*
Total gross inventory	**156,125.43**	**61,867.22**	**tCO_2e**
Total net inventory	**139,395.78**	**61,649.89**	**tCO_2e**
Emissions intensity:	**171.32**	**67.89**	**tCO_2e/£m**

[1] Not adjusted for inflation. See reduction calculator for adjusted values.

An assessment of materiality was made against the defined threshold. From this analysis it is concluded that:

- **The inventory is free from material error.**

Compliance with programme guidelines:

Verification was conducted in accordance with the Programme Verification Guidelines including ISO 14064-3:2006 and the Verification and Sampling Plan.

Criteria/documents	Status
Organisational boundaries:	Meets scheme requirements.
The Greenhouse Gas Emissions Inventory report:	Meets scheme requirements.
Emissions Management and Reduction Plan:	Meets scheme requirements.
Use of the programme logo:	Meets scheme requirements.
The requirement to maintain a complaints procedure:	Meets scheme requirements.

Data quality:

Using our internal Data Quality Assessment tool for analysing data against completeness and assumed uncertainty an inventory "quality" can be classified as follows:

- High
- Good
- Fair
- Poor

Based upon this assessment your inventory is classified as: **Good**

Assurance level provided

Based upon the data available and sampling undertaken the following level of assurance is provided:

- **Limited assurance Scope 1, 2 & mandatory Scope 3 total emissions.**

The above is based upon the following qualifications:

The net location based GHG emissions, in CAW13 include a reduction of -16,512.32tCO $_2$e. However, the RGGOs for this gas have been sold. The CAW13 methodology does not distinguish this and reports the same reductions as location based and market based for biogas gas exports. This query was raised with the Ricardo the CAW13 methodology developer and confirmed an error. The market based exported figure, where RGGOs have been sold should be 0 tCO $_2$e.

The renewable energy tariff fully meets CAW 13 requirements. With respect to WRI scope 2 good quality criteria the tariff has not been subject to an independent audit. Adequate evidence was provided against this criteria, with the exception that there is not yet evidence that REGOS have been retired for the reporting year. Due to COVID-19 restrictions a site visit was not possible for certification year.

Reductions made

The following percentage reduction have been made relative to the base year(s). Reductions are based upon a rolling five year average.

Reduction type	% reduction (5 year rolling average)	Units
% reduction in absolute scope 1 & 2 emissions:	N/A base year	tCO_2e
% reduction in scope 1, 2 & 3 emissions intensity (GDP adjusted):	N/A base year	tCO_2e/£m

Recommendation

Based upon the information given above:
Certification to CEMARS is recommended.

Additional notes or comments

Both stage 1 and stage 2 audits were conducted remotely due to Covid 19. As per CSOP904, limited assurance has been used.

In future reasonable assurance can be provided but would require a site visit to either Howdon or Bransands Waste Water Treatment Plants.

Please note there is a deadline for submission of final report package back to NWL of the 18th June 2020.

Notes to the report

1. The detailed audit findings and calculations are given in the verification plan & working papers associated with this audit. These contain proprietary verification methodologies and remain confidential.
2. The audit is based upon sampling and as such nonconformities may exist that have not yet been identified.
3. We have reviewed the company's GHG emissions inventory for the period. The inventory is based on historical information which is stated in accordance with the requirements of ISO 14064-1:2006 and CEMARS technical requirements.
4. The scope of the review was limited to personnel interview, analytical review procedures applied to GHG emissions data, and review of the input of data into the emissions inventory.
5. A non-conformance (NCR) indicates that the assessor has found a non-conformance with CEMARS audit criteria and requires you to take the appropriate corrective action and provide evidence of this correction. This may require resubmission of an updated Emissions Inventory Report, Emissions Management and Reduction Plan and Disclosure Statement.
6. A minor non conformance (mNCR) which the assessor has found which is not material to the outcome of the inventory, but to which a failure to address in the preparation of future CEMARS inventories could lead to a major Non-Conformance (NCR).
7. Observations made by your auditor are strongly advised but the actions are not required for the organisation to be recommended for CEMARS certification.
8. Neither the Verification firm or the auditor has any interest in the organisation, other than in our capacity as assurance providers. We have not carried out any work with this business prior to this review.
9. This report has been prepared solely for the use of the organisation and the carbonReduction programme as part of an application for CEMARS certification. It may be relied on solely by the organisation and the carbon Reduction programme for that purpose only. We does not accept or assume any responsibility to any person other than organisation in relation to the statements or findings expressed or implied in this report.
10. Any correspondence regarding this audit should be directed to your Lead Auditor.
11. A copy of this report has been circulated to the nominated client contact.

APPENDIX 1: AUDIT FINDINGS LOG

Date issued:	29/05/2020
Lead Verifier:	Glenn Cargill
Company issued to:	Northumbrian Water Limited

Findings marked **NCR** must be corrected before audit can be closed out, unless otherwise approved by the Certification Manager.

Findings marked **mNCR** is not required to be corrected for this verification, but it must be addressed/checked for your next inventory, or it may become a NCR. You may voluntarily correct a mNCR for completeness.

Findings marked **Obs** are observations or recommendations from the verifier which may be helpful to you but do not need to be acted upon.

Corrective actions are expected to be closed out within 10 working days of the audit.

Ref #	Open non-conformances from previous verification audit:	Status	Type	Comments / Agreed Corrective Actions/Evidence sighted to close out the issue where corrective action required.	Date closed	Ref. to programme Technical Requirement (for mNCRs & NCRs ONLY)
Ref #	Non-conformances & Requests for Further Information from this audit:	Status	Type	Comments / Agreed Corrective Actions/Evidence sighted to close out the issue where corrective action required.	Date closed	Ref. to programme Technical Requirement (for mNCRs & NCRs ONLY)
GAC1	Please provide an overview of assets	Closed	RFI		22/05/2020	
GAC2	Please provide a copy of the Kielder, Selset & Hury hydro generation agreements.	Closed	RFI	Note these are confidential.	22/05/2020	
GAC3	Please provide details of the Orsted tariff vs WRI scope 2 good quality criteria.	Closed	RFI	See GAC11		
GAC4	An incorrect market based emissions factor has been input into CAW electricity details, resulting in a material error.	Closed	NCR	Corrected in version 2_CAW_V13_UPDATED_18_05_20	22/05/2020	4.6 Emanage & GHG emission factors R29-32
GAC5	Please provide a completed GHG EIR & Appendix 1	Closed	RFI	Year on Appendix 1 needs updating currently reads 2008/9		
GAC6	Please update methodology statement to include data providers job titles.	Closed	RFI			
GAC7	Please provide written confirmation that no additional spend on outsource activities such as pumping.	Closed	RFI			
GAC8	A final turnover figure is not yet available. Please provide this is due course to allow a final carbon intensity figure to be produced.	Closed	mNCR	Financial tab included in Appendix 1.	29/05/2020	5.8 Reporting GHG reductions & data quality R71-72
GAC9	The methodology for estimation of outsource activities is not adequately documented to ensure long term consistency e.g. How sludge tankering Gemini data is used to provide an estimate of total outsource sludge tankering.	Closed	mNCR	Updated workbook "Outsourced_Emissions_26_05_2020" produced to define methodology.	26/05/2020	4.7 Scope & GHG emissions sources R33-41
GAC10	There is inadequate evidence available to exclude potential outsource contractors from spend categories: Sewerage contractors: £16.9M Other Ops Contractors: £7.7M Vehicle Hire & Drivers:1.5M	Closed	mNCR	Ref. Copy of Spend by Category by Supplier	27/05/2020	4.7 Scope & GHG emissions sources R33-41
GAC11	Evidence that the renewable Orsted electricity full meets the WRI scope 2 good quality criteria was not fully available; either in the form of an independent assessment of the tariff or in terms of positive confirmation that the required number of REGOS have been retired	Closed	mNCR	This only effects the optional market based report and should not withhold certification against the carbon reduction criteria. A full REGO report from the previous year was available which can demonstrate that the WRI scope 2 good quality criteria had been met, with the exception for REGO retirement. Orsted_REGO_Report_29_05_2020 confirms all WRI scope criteria met, however this years REGOS cannot be retired until post July via OFGEM process. Qualification added to confirm this and note the tariff has not been independently audited.	29/05/2020	4.7 Scope & GHG emissions sources R33-41
GAC12	There is a variance of over 4.7% between the reported and verified consumption of natural gas.	Closed	NCR	Natural Gas CHP export sewage sludge J241 was set to yes. Changed to "no" and corrects total.	27/05/2020	4.7 Scope & GHG emissions sources R33-41
GAC13	Biogas exported has not been included in the reported net emissions, which equates to a reduction of over 17,000tCO2e using CAW13 methodology	Closed	NCR	Pending Ricardo confirmation of methodology. Also CAW may have an error in that it does not allow of the sale of RGGOS for market based gas injection i.e. no reduction as RGGOs have been sold. Confirmed ref Fw CAW v13 Query and volume corrected to remove propane.	29/05/2020	4.7 Scope & GHG emissions sources R33-41
GAC14	A total of 1,459,471l of propane have been entered into CAW13 as combusted in sewage treatment and resulting in a emission of approx. 2,600tCO2e. The propane was used for gas injection and was not combusted.	Closed	NCR	Corrected on Elec_Gas_Data_29_05_2020 & GAS_OIL_LPG_26_05_2020 to split between grid injection & combustion.	29/05/2020	4.7 Scope & GHG emissions sources R33-41

CEMARS™
ISO 14064-1

Northumbrian Water Limited

Northumbrian Water Limited meets the requirements of CEMARS® certification having measured its greenhouse gas emissions in accordance with ISO 14064-1:2006 and committed to managing and reducing its emissions in respect of the operational activities of its UK organisation.

Belinda Mathers — Certifier

Company Address: Abbey Road, Pity Me, Durham, DH1 5FJ
Certificate Number: 2020062J
Date Issued: 16 June 2020
Valid until: 16 June 2021

Certified by Enviro-Mark Solutions Limited

This certificate should be read in association with the annual disclosure statement which is available at www.enviro-mark.com

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CEMARS is an annual certification programme and this certificate only remains valid with an annual surveillance audit.