Affinity Water: PR24 Business Plan Submission - Commentary

CW1: Totex analysis – water resources and water network+ (post frontier shift and real price effects) CW1a: Totex analysis – water resources and water network+

Table CW1 presents the forecast cost of our business plan for 2025 – 2030 following the application of frontier shift efficiencies and real price effects captured in table SUP11. The detail of the build-up of our base totex can be found in our commentary to table CW2, and the detail on our enhancement totex can be found in our commentary to table CW3. Third party services costs relate to our bulk supply to South East Water. We have reviewed the guidance and arrangements with South East Water and consider it no longer appropriate to recognise any third-party capital expenditure relating to this agreement, as the charge we make to South East Water includes a charge for the financing of these assets.

Our costs are attributed directly to the Business Unit and Price Control that they serve wherever possible. Where allocation of, for example, corporate overheads is required, this is done in accordance with the Regulatory Accounting Guidelines and on the same basis of preparation as our Annual Performance Report.

Developer Services costs on lines 1.3 and 1.10 are drawn directly from our Developer Services cost forecast in table DS2e and are discussed in AFW57 Part 8 Developer Services commentary. The associated Grants and Contributions are drawn from table DS1. We have made a change in accounting policy during 2023-24 related to our Developer Services activity, whereby all costs are recognised as capital expenditure and the only item recognised in our Income Statement is New Connection Charges. As a result, no Operating Expenditure relating to Developer Services activity is recognised in our plan.

We do not forecast any further Pension Deficit recovery payments post 2022-23, as our scheme is over 99% funded and the assets will be revalued during 2023-24 financial year. We do not forecast any other cash items or atypical expenditure during the 2025 – 2030 period.

Equity issuance costs are forecast in the 2026-27 financial year in base operating expenditure. They are split between the Water Resource and Treated Water Distribution by percentage of opening Regulatory Capital Value (RCV).

CW2: base expenditure analysis – water resources and water network+

CW2.1-15: Operating Expenditure, Service Charges and Location specific costs & obligations 2022-23 – 2024-25

Data for 2022-23 has been entered based on our published Annual Performance Report (APR) and matches Table 4J. For 2023-24 and 2024-25, we have entered our budget and forecast as approved by our Board. We forecast an overall increase in operating expenditure for the final two years of the 2020-2025 period, driven primarily by the increase in wholesale energy prices, which we forecast will increase faster than CPIH.

We expect our renewals activity to increase during the last two years of the current period, based on the volumes of work we are undertaking and the increased risk to our network from extreme weather driven by climate change. In our PR19 business plan we had proposed renewal of 46km of main in each year of AMP7. The reduced length in 2020-21 was due to Covid-19, both during lockdown itself (when all such work stopped) and post-lockdown due to difficulties in remobilisation of the contract, in particular the availability of contract gangs. In the subsequent period we have continually optimised our capital investment to ensure the greatest benefit or risk reduction can be achieved, reflecting the latest asset information and risk assessments. This has resulted in addition expenditure on other asset groups beyond that included within our PR19 business plan and a reduction in the total mains renewal expenditure.

We forecast a reduction in business rates following the receipt of our determination from the VOA in spring 2023.

2025-26 – 2029-30

For the period covered by our 2023 business plan submission, we undertook a detailed forecast of our operating expenditure. Apart from the changes to our reporting driven by the removal of developer services activity from the wholesale price controls, there are no other changes in methods or assumptions. Our forecast cost of equity issuance is included in our 'other operating expenditure' for 2026-27 and is split between the water resources and water network plus price controls on an RCV basis.

We carried out analysis on a 'top down' and 'bottom up' basis.

Our bottom-up forecast was developed during 2022-23 and takes into account the following key factors:

- Forecast water production & supply activity based on our published Water Resources Management Plan
- Forecast view of key input costs including energy, chemicals and abstraction licences, where we anticipate a small annual increase to support the delivery of the Environment Agency's work

- Our business cases and plans to deliver our package of performance commitments
- A stretching and ambitious efficiency target based on absorbing the upward cost pressures from both the current and future business plan periods.

Our operating costs are also subject to scrutiny and challenge on a monthly, quarterly and annual basis by our Executive and Board. We calibrated our bottom-up view of the costs required to run our business against a range of benchmarks and our own econometric modelling to arrive at an overall forecast for the coming period.

During the period to 2025 – 2030, we expect our costs to decrease in real terms year on year, driven primarily by our forecast of the wholesale price of energy and the delivery of efficiencies to absorb upward cost pressures. The higher costs in 'other operating expenditure' in 2026-27 are driven by the inclusion of our forecast costs of equity issuance.

We forecast renewal costs to remain at a higher level than experienced during 2020 – 2025, driven by our experience of the volumes of work required to deliver our commitments on supply interruptions and leakage and respond to the risks to our network driven by climate change. This will lead to a small increase in our costs associated with the provision of traffic management during the 2025 – 2030 period.

Our third-party costs relate to the provision of a bulk supply agreement, which we anticipate will remain flat over the 2025 – 2030 period, as our efficient operation of our system matches non-inflationary cost pressures.

CW3: Enhancement expenditure analysis – water resources and water network+

An explanation of whether any costs have been ***proportionally allocated between expenditure categories*** *in tables CW3 or* ***between enhancement and base expenditure****. Include details of how much has been subject to proportional allocation and which cost drivers have been used*

Data for 2022-23 matches our published APR for 2022-23. Our forecast expenditure for enhancement aligns to our published AMP7 enhancement action plan, originally published in March 2023, and updated following our quarterly progress meeting with Ofwat in August 2023. Our enhancement spend profile is higher in 2023-24 and 2024-25 than in prior years as we have fully mobilised our construction activities, with large schemes due to complete in 2024-25.

Some of the driver categories have changed from PR19 to PR24. Some of the PR19 drivers do not have directly equivalent categories for PR24. There are some codes that allowed expenditure at PR19 under "2020 – 2025", which do not exist in the PR24 categories. We have mapped AMP7 expenditure and forecasts from PR19 drivers to PR24 drivers per the following table.

PR19 driver	AMP7 projects / programmes	PR24 driver
P01.EA. Ecological improvements at abstractions	Biodiversity (excl. non-native invasive species)	Biodiversity and conservation; (WINEP/NEP) water capex
	River restoration	Water Framework Directive; (WINEP/NEP) water capex
P07.EA. Invasive non-native species	Biodiversity - non-native invasive species ONLY	Invasive Non Native Species; (WINEP/NEP) water capex
P13.EA. Water Framework Directive measures	Sustainability Reductions	Water Framework Directive; (WINEP/NEP) water capex
	Catchment Management (excl. investigations)	Water Framework Directive; (WINEP/NEP) water capex
P16.EA. Investigations	Abstraction Impact Assessments	Investigations; (WINEP/NEP) - multiple surveys, and/or monitoring locations, and/or complex modelling water capex
	Catchment Management - investigations ONLY	Investigations; (WINEP/NEP) - multiple surveys, and/or monitoring locations, and/or complex modelling water capex
P20.SD. Supply-side improvements delivering benefits in 2020-2025	Runley Wood	Supply-side improvements delivering benefits in 2025 – 2030; SDB capex
P23.SD. Demand-side improvements delivering benefits in 2020-2025 (excluding leakage and metering)	Behaviour Change / Demand Management	Demand-side improvements delivering benefits in 2025 – 2030 (excl leakage and metering); SDB capex
P32.SD. Supply demand balance improvements delivering benefits starting from 2026	S2040 Blackford to Ickenham trunk main	Supply-side improvements delivering benefits in 2025 – 2030; SDB capex
	S2040 Egham to Iver booster	Supply-side improvements delivering benefits in 2025 – 2030; SDB capex
	Sundon conditioning	Supply-side improvements delivering benefits in 2025 – 2030; SDB capex
P35.SD. Strategic regional water resources	SRO projects	Strategic regional resource solutions; SDB capex
P39.MR. New meters requested by existing customers (optants)	Optants	New meters requested by existing customers (optants); metering capex
P42.MR. New meters introduced by companies for existing customers	Universal metering	New meters introduced by companies for existing customers; metering capex
P52.OT. Meeting lead standards	Lead CPs	Lead communication pipes replaced or relined; enhancement capex
P55.OT. Addressing raw water deterioration	Oughton Head nitrate	Addressing raw water quality deterioration (grey solutions); enhancement capex

PR19 driver	AMP7 projects / programmes	PR24 driver
	Stansted nitrate	Addressing raw water quality deterioration (grey solutions); enhancement capex
	Iver surface works resilience	Addressing raw water quality deterioration (grey solutions); enhancement capex
	Egham surface works resilience	Addressing raw water quality deterioration (grey solutions); enhancement capex
P58.OT. Improvements to river flows	River Ivel	Water Framework Directive; (WINEP/NEP) water capex
P61.OT. Enhancing resilience to low probability high consequence events	S2040 Preston reservoir	Resilience; enhancement water capex
	S2040 Chaul End reservoir	Resilience; enhancement water capex
	Horsley Cross	Resilience; enhancement water capex

Proportionally allocated expenditure categories

The table below shows schemes with proportionally allocated expenditure categories:

Driver No.	1	%	2	%	3	%
WRMP - Connect 2050	Supply demand balance improvements delivering benefits starting from 2031;	84.2	Resilience;	15.8		
Lead	Lead communication pipes replaced or relined;	56	External lead supply pipes replaced or relined;	22	Internal lead supply pipes replaced or relined;	22
WINEP - Biodiversity	Biodiversity and conservation; (WINEP/NEP)	75	Invasive Non-Native Species; (WINEP/NEP)	25		

*Not including the smart metering programme, which is split into 8 driver expenditure categories, see below.

WRMP – Connect 2050

The allocation of the drivers for the Connect 2050 programme is based on the funding split between activities delivering supply demand improvements, which include interconnectors but delivering benefits in 2031 and resilience.

Lead

The lead enhancement programme is associated with the replacement of lead pipes where a concentration of 5-10 micrograms per litre of water is detected during random samples. This is less than the requirement for replacement activity set by DWI and Ofwat and is then classified as enhancement. The allocation of the enhancement costs reflects the expected/estimated replacement type proportions based on historical data.

WINEP – Biodiversity
The biodiversity scheme expenditure categories and allocations were based on the continuation of the AMP 7 activities and appropriate mapping from AMP 7 categories as above. Delivery of benefits for Biodiversity are not phased but step change expected.

Schemes split between base and enhancements:

Electric vehicles programme:
Our electric vehicles program (Net Zero) is split between base and enhancement including £0.3m as base capex maintaining non-infrastructure expenditure accounting for the difference in upfront costs of replacing the current diesel fleet with more expensive electric vehicles. The electric vehicles programme also has an enhancement capex expenditure of £3.48m in CW13, assigned to the greenhouse gas reduction cost driver, accounting for the construction of accelerated charging infrastructure key to the successful operation of the electric vehicle fleet and diesel mileage replacement in relation to greenhouse gas reduction. The enhancement opex is related to the difference in lease costs compared with existing diesel vehicle costs.

Our Smart metering programme:
There is an allocation of cost in base capex non infrastructure as well as within enhancement, however the costs in the enhancement expenditure does not include any meter or installation costs associated with replacing existing AMI with AMI meters or meters other than AMI type for properties inside or outside of the network for reactive replacement or optants programme. Only meters providing an uplift in technology.

The breakdown of the proposed allocation to each cost to the type of replacement is reflected in the different expenditure categories is as below.

	CAPEX %	OPEX %
New meters requested by existing customers (optants)	0.091	0.085
New meters introduced by companies for existing customers	25.199	23.478
New meters for existing customers - business	0.091	0.085
Replacement of existing basic meters with AMI meters for residential customers	55.151	51.385
Replacement of existing AMR meters with AMI meters for residential customers	9.052	8.434
Replacement of existing basic meters with AMI meters for business customers	6.964	6.488
Replacement of existing AMR meters with AMI meters for business customers	0.274	0.255
Smart Metering Infrastructure costs	3.178	9.791

An explanation of the reasons for using the additional lines.
No additional lines were used in CW3. However, in CW13 SRO cost driver is accounted for in Ofwat reference No. CW3.56 and CW3.57. The same cost driver for BVA does not appear as a reference in CW13 tables – and is then under the additional line 1 CW13.130 and CW13.131 in CW13 for capex and opex respectively.

If total operating and capital expenditure does not agree to table CW1 companies should provide a reconciliation so that the difference is explained.
A Frontier Shift/Real Price Effects check has been conducted on CW3 to ensure correlation with CW1.

Clear descriptions of where further commentary, related business cases or evidence for costs in this table are included elsewhere in the business plan.
Most of the business cases in enhancements are statutory through WRMP, WINEP and the DWI with the full support of customers on the preferred option and associated costs.

Further commentary can be found in the cost appendix (enhancements) section of the business plan AFW14 – enhancement case appendix, and in the business case documents, where the cost breakdown built from our PR24 unit costs database and selected cost drivers are located.

Further commentary on source data and evidence of costs
Cost-benefit analysis sheets have been developed for each enhancement business case, providing details on price control splits, cost drivers and any third-party contributions. Data tables are populated from Copperleaf exports. Business cases relating to each CBA sheets will provide further evidence on the cost's breakdown and origin. Costs are formulated using our unit cost database alongside third party data sources. Further information on evidence of costs can be found in AFW-12 Investment planning appendix

CW4: Raw water transport, raw water storage and water treatment

CW4.1 – Total number of balancing reservoirs

No changes are proposed which affect the number of balancing reservoirs over 2023 – 2025 and all of the period 2025 – 2030, so figures remain consistent with 2022-23 actual figures.

Changes from PR19 forecast - balancing reservoir lines were only introduced in 2020-21 so no previous forecast figures exist from PR19.

CW4.2 - Total volumetric capacity of balancing reservoirs

No changes are proposed which affect the volumetric capacity of balancing reservoirs over 2023 – 2025 and all of the period 2025 – 2030, so figures remain consistent with 2022-23 actual figures and are in line with CW4.1 above.

Changes from PR19 forecast - balancing reservoir lines were only introduced in 2020-21 so no previous forecast figures exist from PR19.

CW4.3 - Total number of raw water transport stations

No further changes are proposed beyond 2023-24 which affect the number of raw water transport stations over 2023 – 2025 and all of the period 2025 – 2030, so figures remain consistent with 2023-24 forecast. Chalfont St Giles site was reconfigured to go to Amersham for treatment whilst HS2 works were being carried out so in 2022-23 this became a raw water transport station and in 2023-24 it reverts to its original configuration.

Changes from PR19 forecast – 2022-23 figures were 2 higher than PR19 forecasts. This is due to Chalfont St Giles, Fulling Mill and Walton now being included and Rakeshole North being removed.

Wn1 / CW4 Line	2022-23	2023-24	2024-25
Total number of raw water transport pumping stations PR19	35	35	35
Total number of raw water transport pumping stations PR24	37	36	36
Total capacity of raw water transport pumping stations PR19	8031	8031	8031
Total capacity of raw water transport pumping stations PR24	8847	8781	8781

Chalfont St Giles was reconfigured to go to Amersham for treatment during HS2 works (2022-23)

Fulling Mill source was brought back into supply in 2018-19 after being switched off as part of AMP6 sustainability reductions in 2017-18, due to the Environmental Agency being concerned over potential flood risk.

Walton raw water pumps are now included as a raw water pumping station from 2021-22 onwards as the raw water reservoir has less than 15 days storage and is counted as a balancing reservoir.

Rakeshole North had turbidity issues and the water was no longer suitable to treat via UV at Rakeshole South and has not been operational since 2020-21.

CW4.4 - Total installed power capacity of raw water transport pumping stations

No further changes are proposed beyond 2023-24 which affect the installed power capacity of raw water transport stations over 2023 – 2025 and all of the period 2025 – 2030 so figures remain consistent with 2023-24 forecast and are in line with CW4.3 above.

Changes from PR19 forecast – these are in line with the changes documented in line CW4.3 above.

CW4.5 Total length of raw water transport mains and other conveyors - Raw water transport and storage

We are reporting 203.00km for 2022-23 aligning to the APR and are forecasting only a very small year-on-year increase in the length of qualifying raw water mains and other conveyors (tunnels) up to around 204.40km in 2029-30.

This slight year-on-year increase is expected to be driven by small increases in the length of raw water mains digitised on the Company's Geographic Information System (GIS) as our pipe records within Production Sites continue to be improved. Much of this additional meterage is expected to be connected with site washout arrangements which are not yet fully digitised within our water mains database.

Changes from PR19 forecast – This line was not present at PR19, so no comparison is available.

CW4.6 and CW4.49: Average Pumping Head

No changes are expected for 'Average pumping head – raw water transport' or 'Average pumping head ~ water treatment from 2022-23. There are no significant changes to pumping of the raw water network due to abstraction licence constraints and no investment plans in 2025 – 2030 to change this.

Pumping through water treatment is also not expected to see significant change with pumping post treatment impact by our investment plans. These changes are reflected in Average Pumping Head – Distribution.

Changes from PR19 forecast – total transport and treatment forecasts at PR19 were at an average of 33m for 2023 – 2025, we have revised these down slightly to 31m. This is due to changes in treatment processes at some sites including our HS2 impacted sites which changes the characteristics of the split between process units (abstraction, transport, treatment and distribution).

CW4.7 and CW4.50: Energy Consumption Raw Water Transport and Water Treatment

It should be noted that this commentary is also applicable to RES1.24 Energy consumption - water resources (MWh) and CW5.23: Energy Consumption – Treated Water Distribution

We are expecting significant upward pressure on energy consumption throughout 2025 – 2030. This is primarily due to our enhancement programme, including investment in our Connect 2050 programme and Egham and Iver DWI schemes. Each of these will involve new pumping and/or treatment assets, all requiring an increase in energy consumption. We are making energy efficiency interventions in 2025-26 to gain payback with the five-year regulatory period. Energy has been normalised against expected Distribution Input so as flow changes, we have forecast energy to change by the same proportion.

Small year on year reductions are expected in source energy due to fleet moving to electric vehicles, less reliance on white diesel for heating and generation, and a wider roll out of solar energy.

Significant year on year variations:

Year	2025-26	2026-27	2027-28	2028-29	2029-30
Total kWh	227,210,806	221,181,985	223,046,010	235,573,176	231,676,476
Direction	Down	Down	No significant change	Up	No significant change
Reason	Benefits from energy efficiency are realised and reduced flow through consumption reductions	Benefits from energy efficiency are realised	Increases in distribution energy from new boosters at Borehamwood offset by ongoing efficiency interventions on other lines	Connect 2050 implementations giving large increases in energy with new booster and pumping stations being commissioned	n/a

Data Quality: Data for electricity has used existing validated, billed volumes as a baseline, using a mix of bottom up and top-down estimations for energy efficiency. We have developed estimations for increases for our interventions using engineering estimations based on business cases for named schemes. Other energy sources have used existing billing data with assumptions built in for changing usage, for example switching to electric vehicles.

Changes from PR19 forecast – Forecasts for energy was only reported as either water resources or Network Plus, therefore the same commentary for raw water transport, treatment and distribution applies. Energy was forecast at an average of 180,758,400kWh at PR19 for 2023 – 2025, our forecast is now 245,490kWH. Energy is proportional to the water produced, our forecast for distribution input at PR19 was an average of 817.6Ml/d for 2023 – 2025 however this forecast is now 856.6Ml/d, therefore reflecting a higher energy requirement. Additionally, we are now required to move water further across our network than envisaged at PR19 meaning more energy is used in the transport of water. We have also introduced new energy intensive treatment processes, such as at our HS2 affected sites and our clarification plant at North Mymms.

CW4.8: Total number of raw water transport imports

We currently have one import that sits within this category from Thames Water where the supply is brought into our IVER treatment works via a tunnel. No changes are proposed which affect the number of raw water transport imports for 2023 – 2025 and all of the period 2025 – 2030, so figures remain consistent with 2022-23 actual figures.

Changes from PR19 forecast - forecasts for 2023 – 2025 remain consistent with PR19 forecasts.

CW4.9: Water imported from 3rd parties to raw water transport systems

For 2022-23 we are reporting 8.10 Ml/d as per APR. The forecast of this increases slightly in 2023-24 and 2024-25 to 9.4 Ml/d based on modelling of historic weather and utilisation. It is in line with the assumptions used to complete table PD6. The forecast for 2025 – 2030 returns to 2 Ml/d based on normal year forecasts by our control room and in line with our bulk agreement.

Changes from PR19 forecast - forecasts for 2023 – 2025 are higher than PR19 forecasts as we are planning work at our Iver Works that will require a higher volume from this import, in line with table PD6.

CW4.10: Total number of raw water transport exports

We do not currently have any exports that sit within this category and no changes are proposed which affect the number of raw water transport exports over 2023 – 2025 and all of the period 2025 – 2030, so figures remain consistent with 2022-23 actual figures.

Changes from PR19 forecast - forecasts for 2023 – 2025 remain consistent with PR19 forecasts.

CW4.11: Water exported to 3rd parties from raw water transport systems

For 2022-23 we are reporting 0.00 Ml/d as per APR. For 2023 – 2025 and 2025 – 2030 we are forecasting that this will remain as 0.00 Ml/d as we do not have any plans to export water to 3rd parties from raw water transport systems.

Changes from PR19 forecast - forecasts for 2023 – 2025 remain consistent with PR19 forecasts.

CW4.12: Total length of raw and pre-treated (non-potable) water transport mains for supplying customers - Raw water transport and storage

We are reporting 36.93km for 2022-23 this aligns to the APR and forecasting a decline in the length of qualifying raw water mains down to 24.14km by 2029-30.

The decrease in the length of raw water mains reflects several treatment upgrade projects due to be delivered over the next couple of years which will convert around 12.79km of existing raw water mains into potable water mains and therefore remove these mains from the raw water blending main component of this line.

These 12.79km of raw water mains expected to be converted into potable water mains are included in the CW6.1 potable mains length calculations.

There are no changes expected to the length of non-potable mains directly supplying customers component - this is forecast to remain at 5.46km.

Changes from PR19 forecast – This line has been split in two since PR19 (CW4.5 & CW4.12). Comparing the sum of these lines against the PR19 forecast shows very similar forecasts for 2023-24 and 2024-25: 240.00km (PR19) versus 234.35km and 227.54km.

CW4.13: All simple disinfection works - Number of works

No changes are proposed which affect the number of simple disinfection works over 2023 – 2025 and all of the period 2025 – 2030, so figures remain consistent with 2022-23 actual figures.

Changes from PR19 forecast – forecast figures for PR19 simple disinfection were 3 higher in 2022-23 compared to actual figures. Temple End had GAC installed after a pollution incident in 2021-22 and Wadesmill Road and Lighthouse both had GW classification upgraded to GW2 (super chlorination) due to both sites having chlorine dosing and a contact tank or main. Wadesmill Road changed to GW2 in 2021-22 and Lighthouse in 2022-23.

CW4.14: All simple disinfection works - Water treated

For 2022-23 we are reporting 0.00 Ml/d for surface water and 16.00 Ml/d for ground water as per the APR. As our total DI is reducing to 845.03 Ml/d by 2024-25, we are forecasting for groundwater will reduce to 14.84 Ml/d by 2024-25 and then decrease over AMP8 to 12.09 Ml/d in 2029-30, in line with the total DI reducing to 804 Ml/d by 2029-30.

We are forecasting that surface works will be 0.00 Ml/d for 2023 – 2025 and 2025 – 2030.

Changes from PR19 forecast – For PR19 we had forecast that our simple disinfection groundwater works would be around 3 to 5 Ml/d higher. This is because we had forecast a higher number of works as explained in CW4.13 and that PR19 DI forecast was lower than actual DI in AMP7.

CW4.15: W1 works - Number of works

We do not currently have any water treatment works that fall into this category and no changes are proposed which would impact on forecasts for this line.

Changes from PR19 forecast - forecasts for 2023 – 2025 remain consistent with PR19 forecast.

CW4.16: W1 works - Water treated

For 2022-23 we are reporting 0.00 Ml/d for surface water and 00.0 Ml/d for ground water as per APR. For 2023 – 2025 and 2025 – 2030 we are forecasting that this will remain as 0.00 Ml/d for both surface and ground water as we do not have any plans to have W1 treatment works.

Changes from PR19 forecast - forecasts for 2023 – 2025 remain consistent with PR19 forecast.

CW4.17: W2 works - Number of works

The number of GW2 works are due to reduce by one in 2023-24 as Stonecross moves from GW2 to GW4 with the addition of GAC.

The number of GW2 works are due to increase by one in 2025-26 as Runleywood (Greensands source) becomes operational.

Changes from PR19 forecast – forecast figures for PR19 included Runleywood (Greensands source) coming back into supply 2022-23. This project was delayed due to planning permission issues and to minimise risks associated with construction during Covid-19. This will therefore will now be completed by 2025-26. Further reviews of all treatment stages on site confirmed that Wadesmill Road & Lighthouse are GW2 works as reported in our APR22 and APR23 submissions (not GW as previously reported).

CW4.18: W2 works - Water treated

For 2022-23 we are reporting 0.00 Ml/d for surface water and 15.29 Ml/d for ground water as per APR. For 2023 – 2025 we are forecasting that ground water will reduce to 12.23 Ml/d in 2023-24 because of Stonecross changing from a GW2 to a GW4 site and in line with our overall reduction in total DI. In 2025 – 2030 we are forecasting that this will increase to 13.72 Ml/d in 2025-26 with the introduction of Runleywood (Greensands). The overall volume will then decrease to 12.84 Ml/d by the end of 2025 – 2030, in line with our overall reduction in total DI.

Changes from PR19 forecast – These are higher than those forecast in PR19 due the two sites Wadesmill Road and Lighthouse having changed to GW2 as explained in CW4.17 and that PR19 DI forecast was lower than actual DI in 2020 – 2025.

CW4.19: W3 works - Number of works

The number of SW3 works are due to increase by one in 2024-25 as Sundon conditioning plant with superchlorination will be included here following consultation with Ofwat. The treatment includes the addition of sodium hydroxide to increase the alkalinity of the imported treated water, followed by addition of carbon dioxide to reduce the pH back down to normal levels (without changing the alkalinity). This is to reduce the Larson-Skold index to below 0.8 and reduce the risk of corrosion of Grafham water on galvanised iron communication pipes in areas of our network not currently exposed to Grafham water.

The conditioning plant will also require the addition of sodium hypochlorite past the breakpoint to provide free chlorine residual, which is the residual disinfectant used for all our sources. This is to reduce the risk of taste complaints as Grafham water uses chloramine as residual disinfectant, which has a different taste. It is also required to minimise the risk of having no residual disinfectant left further down our network caused by the uncontrolled mixing of chloraminated water with free chlorine water.

This has been identified as the reason for past bacterial failures in the Harlow and Rye Hill area. The breakpoint chlorination requires time to take place and the solution will require a contact tank to ensure it is effective, and this is being achieved by modifying the existing reservoir, to serve a dual purpose of storage and chemical reaction.

Changes from PR19 forecast – Sundon treatment was not included in PR19 forecasts. Forecasts for PR19 included Stansted Nitrate removal in 2024-25 (changing from GW3 to GW4). Through the use of our Risk and Value Process, a better solution was developed to return Stansted into supply without the need to build a nitrate removal plant hence Stansted remains at GW3.

CW4.20: W3 works - Water treated

For 2022-23 we are reporting 0.00 Ml/d for surface water and 8.65 Ml/d for ground water as per APR. For 2023 – 2025 we are forecasting that ground water will reduce to 7.74 Ml/d by 2024-25 and then reduce over 2025 – 2030 to 6.54 Ml/d by 2029-30, in line with our overall reduction in total DI.

For surface water we are forecasting 0.00 Ml/d for 2023 – 2025 and all of the period 2025 – 2030. Whilst we forecasting to have a single surface water site in line CW4.19-W3 works - Number of works from 2024-25, the Sundon site is already included as an import as an SW5 for the water treated lines so all volume for this site is accounted for in CW4.24 - W5 works - Water treated.

Changes from PR19 forecast – These figures have not materially changed.

CW4.21: W4 works - Number of works

The number of GW4 works are due to increase by one in 2023-24 as Stonecross moves to GW4 from GW2 with the addition of GAC, Chalfont St Giles site is reincluded as GW4 (after reverting to its original configuration following HS2 works), using the existing treatment on site, Wheathampstead also moves from GW4 to GW5 with the addition of ion exchange.

The number of GW4 works are due to decrease by one in 2024-25 as Hart Lane moves from GW4 to GW5 with the addition of UV. One treatment works (Hunton Bridge) has additional treatment added for iron removal, but the treatment type remains GW4 as higher-level treatment is already present on site.

The number of GW4 works remains at 56 in 2025-26 are due to decrease by a further two in 2025-26 as Periwinkle Lane and Runleywood (Chalk source) cease abstraction (and therefore treatment) as part of sustainability reductions and Amersham and Northmoor return to GW4 following the removal of the membranes following the completion of HS2 works.

The number of GW4 works are due to decrease by a further one in 2026-27 as Kingsdown moves from GW4 to GW5 with the addition of ion exchange.

The number of GW4 works are due to increase by one in 2027-28 as Blackford source becomes operational with additional treatment on site.

The number of GW4 works are due to decrease by a further two in 2028-29 as Bowring and Broome both move from GW4 to GW5 with the addition of GAC for Bowring and ion exchange for Boome.

Changes from PR19 forecast – Chartridge and Chesham ceased abstraction in August 2020 as a voluntary sustainability reduction. It was agreed with the Environmental Agency to cease abstraction early at both these groundwater sites so this was delivered earlier than the PR19 forecast of December 2024. Clandon was taken out of service during the period 2020 – 2025 due to water quality deterioration. A review of disinfection risks to our Dour sites in July 2022 resulted in Lighthouse not requiring an upgrade to the current disinfection process. This was a BASE scheme in PR19 (hence discretionary), subject to our risk review process. Lighthouse therefore does not change to GW4 in 2024-25. Stonecross GAC was not in the PR19 forecast; it was installed as a result of increasing solvents due to low groundwater levels during summer months.

CW4.22: W4 works - Water treated

For 2022-23 we are reporting 0.00 Ml/d for surface water and 305.35 Ml/d for ground water as per APR. For 2023 – 2025 we are forecasting that ground water will reduce to 252.2 Ml/d by 2024-25, most of this reduction in volume is due to Hart Lane moving from a GW4 to a GW5 works. This then decreases again in 2025-26 to 230.09 Ml/d as our Periwinkle and Runleywood (Chalk) sites are removed from operation. This increases again in 2027-28 to 235.5 Ml/d as Blackford is brought back into service, and then reduces the following year (2028-29) when Bowring and Broome are upgraded from GW4 to GW5 sites with 2029-30 forecast to be 223.51 Ml/d. Reductions in volumes are also due to the overall reduction in total DI.

For surface water we are forecasting 0.00 Ml/d for 2023 – 2025 and all of the period 2025 – 2030.

Changes from PR19 forecast – This is higher than the PR19 forecast as a result of Stonecross changing to a GW4 and Chalfont St Giles being turned on again and that PR19 DI forecast was lower than actual DI in AMP7.

CW4.23: W5 works - Number of works

The number of GW5 works are due to increase by one in 2023-24 as Wheathampstead moves to GW5 from GW4 with the addition of ion exchange. Two treatment works (Egham, Iver) both have addition of UV in 2023-24 but treatment type remains unchanged at SW5 as higher-level treatment is already present on site.

The number of GW5 works are due to increase by one in 2024-25 as Hart Lane moves to GW5 from GW4 with the addition of UV.

The number of GW5 works are due to decrease by one in 2025-26 as Oughtonhead source comes back into supply with the addition of ion exchange and Amersham and Northmoor return to GW4 following the removal of membranes.

The number of GW5 works are due to increase by one again in 2026-27 as Kingsdown moves to GW5 from GW4 with the addition of ion exchange.

The number of SW5 works remain the same in 2027-28, one treatment works (Iver) has additional RGF treatment added but the treatment type remains SW5 as higher-level treatment is already present on site.

The number of GW5 works are due to increase by two in 2028-29 as Bowring and Broome both move to GW5 from GW4 with the addition of GAC for Bowring and ion exchange for Broome.

Changes from PR19 forecast – Although the addition of UV at Egham and Iver was not accounted for this was under a DWI notice which came after PR19. The treatment type still remains SW5 as higher-level treatment is already present on site. Amersham and Northmoor will now remain at GW5 until the end of AMP7 as part of HS2 works. West Hyde will remain at GW5 for 2023 – 2025 and all of the period 2025 – 2030 due to iron and turbidity at this site. Weathampstead moves to GW5 from GW4 in 2023-24 which is later than previously forecast due to DWI approval required for chromium removal resin. Broome Nitrate removal has been delayed to 2025 – 2030 instead of end of 2020 – 2025, due to a reducing trend in nitrates at the beginning of 2020 – 2025. Kensworth Lynch was downgraded from GW5 to GW4 after GAC was decommissioned. Chalfont St Giles was historically classified as GW5 instead of GW4 due to amazon filters initially being classified as membranes and then revised to the equivalent of RGFs.

CW4.24: W5 works - Water treated

For 2022-23 we are reporting 394.74 Ml/d for surface water and 208.77 Ml/d for ground water as per APR. For 2023 – 2025 we are forecasting the ground water to reduce slightly to 208.18 Ml/d in 2024-25 due to our overall reduction in total DI despite Hart Lane being upgraded to a GW5. In 2025 – 2030 we are forecasting a reduction to 198.03 Ml/d in 2025-26 as a result of our distribution input reducing and then this volume continues to reduce to 189.94 Ml/d by 2029-30.

We are forecasting our surface water to decrease by the end of 2020 – 2025 to 369.52 Ml/d due to our overall reduction in total DI. In 2025 – 2030 we are forecasting this volume to increase in 2025-26 to 391.25 Ml/d as we bring our Sundon treatment works online as we are planning to import more water from Grafham. This volume then reduces to 380.45 Ml/d by 2029-30, in line with our overall reduction in total DI.

Changes from PR19 forecast – Both the surface water and groundwater volumes are significantly higher than we had forecast at PR19, which is a result of our overall distribution input being much higher now than we had forecasted at the time.

CW4.25: W6 works - Number of works

We do not currently have any water treatment works that fall into this category and no changes are proposed which would impact on forecasts for this line.

Changes from PR19 forecast - forecasts for 2023 – 2025 remain consistent with PR19 forecasts.

CW4.26: W6 works - Water treated

For 2022-23 we are reporting 0.00 Ml/d for surface water and 0.00 Ml/d for ground water as per APR. For 2020 – 2025 and 2025 – 2030 we are forecasting that this will remain as 0.00 Ml/d for both surface and ground water as we do not have any plans to have W6 treatment works.

Changes from PR19 forecast - forecasts for 2023 – 2025 remain consistent with PR19 forecasts.

CW4.27: WTWs in size band 1 - Number of works

For 2022-23 we are reporting 23 works as per APR. For 2023-24 we are forecasting a reduction of 4 works in Band 1. This is because Clandon and Chartridge have been removed from service and Holmestone and Worlds Wonder move to Band 2 from Band 1 following the review of Peak Week Peak Capacity (PWPC) values in 2023. The number of WTWS in Band 1 remains at 19 until 2029-30.

Changes from PR19 forecast - forecasts for PR19 were based on actual DI rather than PWPC values, therefore the forecast for number of works in band 1 was slightly different.

CW4.28: WTWs in size band 1 - % of total DI

For 2022-23 we are reporting 2.7% of total DI as per APR. The percentage of water treated in band 1 WTW reduces from 2023-24 in line with line CW4.27.

Changes from PR19 forecast - forecasts for PR19 were based on actual DI rather than PWPC values, therefore the forecast for volume percentages treated by works in band 1 was slightly different.

CW4.29: WTWs in size band 2 - Number of works

For 2022-23 we are reporting 20 works as per APR. For 2023-24 we are forecasting an overall reduction of 3 works in band 2. This is because Holmestone and Worlds Wonder have moved to band 2 from band 1 and Causeway, Friars Wash, Runleywood Chalk, Connaught and St Margarets move to band 3 following the review of Peak Week Peak Capacity (PWPC) values in 2023. For 2024-25 to 2027-28, this increases to 18 WTWs as Friars Wash PWPC will reduce in line with the decrease in abstraction and return into band 2 from band 3 in 2024-25, as agreed with the Environmental Agency. For 2028-29 and 2029-30, this decreases to 17 as abstraction from Friars Wash ceases.

Changes from PR19 forecast - forecasts for PR19 were based on actual DI rather than PWPC values, therefore the forecast for number of works in band 2 was slightly different.

CW4.30: WTWs in size band 2 - % of total DI

For 2022-23 we are reporting 5.3% of total DI as per APR.

The percentage of water treated in Band 2 WTW varies from 2023-24 onwards, in line with line CW4.29.

Changes from PR19 forecast - forecasts for PR19 were based on actual DI rather than PWPC values, therefore the forecast for volume percentages treated by works in band 2 was slightly different.

CW4.31: WTWs in size band 3 - Number of works

For 2022-23 we are reporting 24 works as per APR. For 2023-24 we forecast an overall increase of 1 in band 3. This is because Causeway, Friars Wash, Runleywood Chalk, Connaught and St Margarets move to band 3 from band 2 and Kensworth Lynch, Drellingore, Dover Priory, Rakeshole South move from band 3 to band 4 following the review of Peak Week Peak Capacity (PWPC) values in 2023. In addition, Chesham is removed from service and no longer included in PWPC. Finally, as we return Chalfont St Giles back in service in 2023-24 (following the completion of the HS2 work), this is a band 3 works. For 2024-25, this decreases to 24 WTWs as Friars Wash moves back to band 2. For 2025-26, the overall number of WTWs in band 3 remains the same due to a decrease of 2 (Periwinkle Lane and Runleywood Chalk are removed from service due to sustainability reductions) and an increase of 2 (Oughtonhead is returned into supply once the nitrate removal plant is commissioned, and Runleywood Greensand is returned into supply). The number remains at 24 until 2029-30.

Changes from PR19 forecast - forecasts for PR19 were based on actual DI rather than PWPC values, therefore the forecast for number of works in band 3 was slightly different.

CW4.32: WTWs in size band 3 - % of total DI

For 2022-23 we are reporting 10.4% of total DI as per APR.

The percentage of water treated in band 3 WTW varies slightly from 2023-24 onwards, in line with line CW4.31.

Changes from PR19 forecast - forecasts for PR19 were based on actual DI rather than PWPC values, therefore the forecast for volume percentages treated by works in band 3 was slightly different.

CW4.33: WTWs in size band 4 - Number of works

For 2022-23 we are reporting 11 works as per APR. For 2023-24 we forecast an increase of 4 in band 4. This is because Kensworth Lynch, Drellingore, Dover Priory, Rakeshole South move from band 3 to band 4 following the review of Peak Week Peak Capacity (PWPC) values in 2023. This number remains constant until 2029-30.

Changes from PR19 forecast - forecasts for PR19 were based on actual DI rather than PWPC values, therefore the forecast for number of works in band 4 was slightly different.

CW4.34: WTWs in size band 4 - % of total DI

For 2022-23 we are reporting 9.8% of total DI as per APR.

The percentage of water treated in band 4 WTW varies slightly from 2023-24 onwards, in line with line CW4.33.

Changes from PR19 forecast - forecasts for PR19 were based on actual DI rather than PWPC values, therefore the forecast for volume percentages treated by works in band 4 was slightly different.

CW4.35: WTWs in size band 5 - Number of works

For 2022-23 we are reporting 10 works as per APR.

For 2023-24 to 2026-27, we forecast a decrease of 1 in band 5. This is because Blackford PWPC was removed as part of the review of Peak Week Peak Capacity (PWPC) values in 2023 (as not in supply). As Blackford returns into service in 2027-28, the number increases to 10 and then remains constant until 2029-30.

Changes from PR19 forecast - forecasts for PR19 were based on actual DI rather than PWPC values, therefore the forecast for number of works in band 5 was slightly different.

CW4.36: WTWs in size band 5 - % of total DI

For 2022-23 we are reporting 17.8% of total DI as per APR.

The percentage of water treated in band 5 WTW varies slightly from 2023-24 onwards, in line with line CW4.35.

Changes from PR19 forecast - forecasts for PR19 were based on actual DI rather than PWPC values, therefore the forecast for volume percentages treated by works in band 5 was slightly different.

CW4.37: WTWs in size band 6 - Number of works

For 2022-23 we are reporting 3 works as per APR. This number remains constant until 2027-28. In 2028-29, this decreases to 2 as Chertsey is moved from band 6 to band 7, as a result of capital work being completed to increase the capacity of Chertsey works to increase our resilience and ensure we have sufficient water available in line with our WRMP and our Supply 2050 Business Case.

Changes from PR19 forecast - forecasts for PR19 were based on actual DI rather than PWPC values, therefore the forecast for number of works in band 6 was slightly different.

CW4.38: WTWs in size band 6 - % of total DI

For 2022-23 we are reporting 10.1% of total DI as per APR.

The percentage of water treated in band 6 remains fairly consistent from 2023-24 to 2027-28 and decreases by around 4% from 2028-29 onwards when Chertsey changes to band 7.

Changes from PR19 forecast - forecasts for PR19 were based on actual DI rather than PWPC values, therefore the forecast for volume percentages treated by works in band 6 was slightly different.

CW4.39: WTWs in size band 7 - Number of works

For 2022-23 we are reporting 0 works as per APR. This number remains constant until 2027-28. In 2028-29, this increases to 1 as Chertsey is moved from band 6 to Band 7, as a result of capital work being completed to increase the capacity of Chertsey works to increase our resilience and ensure we have sufficient water available in line with our WRMP and our Supply 2050 Business Case.

Changes from PR19 forecast - forecasts for PR19 were based on actual DI rather than PWPC values, therefore the forecast for number of works in band 7 was slightly different.

CW4.40: WTWs in size band 7 - % of total DI

For 2022-23 we are reporting 0.0% of total DI as per APR.

The percentage of water treated in band 7 remains at zero from 2023-24 to 2027-28 and increases to around 4% from 2028-29 onwards when Chertsey changes to band 7.

Changes from PR19 forecast - forecasts for PR19 were based on actual DI rather than PWPC values, therefore the forecast for volume percentages treated by works in band 7 was slightly different.

CW4.41: WTWs in size band 8 - Number of works

For 2022-23 we are reporting 3 works as per APR and do not forecast any changes.

Changes from PR19 forecast - forecasts for PR19 were based on actual DI rather than PWPC values, therefore the forecast for number of works in band 8 was slightly different.

CW4.42: WTWs in size band 8 - % of total DI

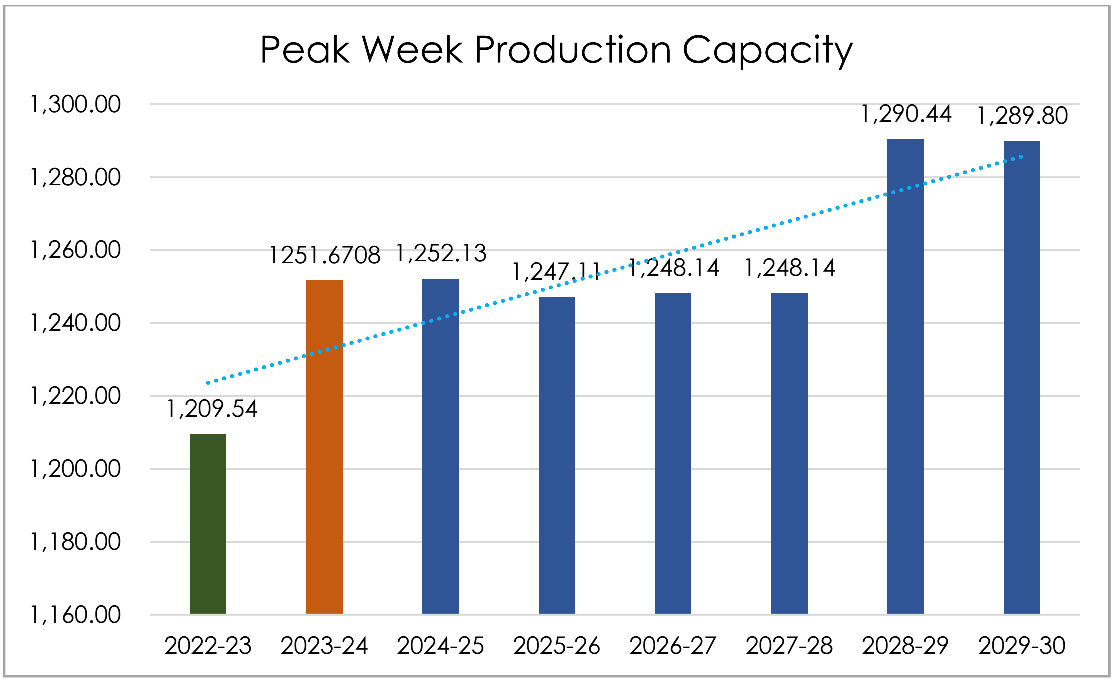
For 2022-23 we are reporting 43.9% of total DI as per APR.

The percentage of water treated in band 8 remains similar throughout.

Changes from PR19 forecast - forecasts for PR19 were based on actual DI rather than PWPC values, therefore the forecast for volume percentages treated by works in band 8 was slightly different.

CW4.43: Peak Week Production Capacity

We conducted an evaluation of PWPC, utilising the 2023-24 PWPC value of 1,251.67 Ml/d as our reference point. This assessment involved a thorough analysis of actual site performance data spanning a 5-year period, encompassing any modifications to assets or processes.



The increase from the previous year's 2022-23 figure of 1,209.54 ML/D can be attributed to amplified demand during the high summer period across preceding years, coupled with enhanced precision in data capture.

Our projection procedure involved leveraging accessible information for targeted adjustments due to expenditure for improvements at the site level. These adjustments accounted for variations in treatment methodologies, sustainability reductions, and alterations in site operational protocols for the relevant fiscal year. Subsequently, these adjustments were incrementally incorporated onto the baseline figure year by year, yielding our comprehensive forecast evaluation.

Changes from PR19 forecast – For the 2023-24 PWPC we used actual volumetric data for our review, for 2023 – 2025, we anticipate that several improvement projects will positively affect our production output.

CW4.44 & 45: Peak week production capacity having enhancement expenditure for grey (line 44) and green (line 45) solution improvements to address raw water quality deterioration

We have used spend profiles for the ongoing capital projects to determine the number of treatment works that are having enhancement expenditure improvements for raw water deterioration for 2023 – 2025 and we have used spend profiles in the business cases to determine the WTWs having enhancement expenditure for 2025 – 2030. This information was combined with the Peak Week

Production Capacity figures for each water treatment works, as per line CW4.43, to generate the figures for these two lines.

The split between lines CW4.44 and CW4.45 was determined based on the type of investments proposed. All the enhancement expenditure for 2020 – 2025 and 2025 – 2030 is for additional treatment assets or infrastructure assets (to enable blending), which are considered 'grey' solutions. None of the enhancement expenditure is for 'green' solutions which are defined as 'nature-based solutions/non-conventional.'

Changes from PR19 forecast - These two lines were not required at PR19 so there are forecasts to which they can be compared.

CW4.46: Total water treated at more than one type of works

For 2022-23 we are reporting 0.00 Ml/d as per APR. For 2020 – 2025 and 2025 – 2030 we are forecasting that this will remain as 0.00 Ml/d as we do not have any plans to treat water at more than one type of works

Changes from PR19 forecast - forecasts for 2023 – 2025 remain consistent with PR19 forecasts.

CW4.47: Number of treatment works requiring remedial action because of raw water deterioration

At the end of 2022-23 we had six treatment works included in Section 19 Undertakings for metaldehyde and one treatment works subject to a Regulation 28(4) Notice relating to an upgrade to the disinfection process. We submitted closure reports to DWI for the metaldehyde Undertakings as this pesticide no longer poses a risk and consequently DWI revoked the Undertakings in June 2023. We also completed the disinfection upgrade at the treatment works and are currently in the validation phase of the project. We expect the Notice relating to this treatment works to be closed in 2023-24. This Notice was put in place subsequent to PR19 and accounts for the difference in the number of treatment works we reported then and now, seven rather than six treatment works,

There are also two separate Notices relating to Cryptosporidium at Iver and Egham WTWs. The treatment upgrade work and the validation work at both treatment works is due to be completed in 2028-29.

As part of our accelerated investment projects submission in October 2022 we included four water quality schemes at treatment works that were a consequence of raw water deterioration. These were for nitrate at Broome, Kingsdown and Stansted WTWs and PFAS at Holywell WTW. In our PR24 submission to DWI in March 2023, we submitted three further PFAS schemes at water treatment works, Bowring, Blackford and Wheathampstead. We received Notices for Holywell and Stansted in June 2023 and Broome, Kingsdown in July 2023. We expect to receive Notices from DWI for all the remaining schemes with varying completion dates throughout AMP8.

CW4.48: Zonal population receiving water treated with orthophosphate

We supply orthophosphate dosed water to around 78% of our customers.

Our extensive lead sampling programme has confirmed that we are orthophosphate dosing the supplies to our 11 high-risk water supply zones with respect to lead and so we have no plans to add extra or remove existing orthophosphate dosing plants. Therefore, the water supply zones receiving orthophosphate dosed water will remain the same over 2023 – 2025 and 2025 – 2030 and the only change in population will be as a result of population growth.

Changes from **PR19 forecast** - The population supplied with orthophosphate dosed water is around 1.7% less than we predicted at PR19 because of lower than expected population growth.

CW4.51: Total number of water treatment imports

We do not currently have imports that sit within this category and no changes are proposed which affect the number of water treatment imports over the remainder of AMP7 and all of AMP8, so figures remain consistent with 2022-23 actual figures.

Changes from PR19 forecast - forecasts for 2023 – 2025 remain consistent with PR19 forecasts.

CW4.52: Water imported from 3rd parties to water treatment works

For 2022-23 we are reporting 0.00 Ml/d as per APR. For 2023 – 2025 and 2025 – 2030 we are forecasting that this will remain as 0.00 Ml/d as we do not have any plans to import water from 3rd parties to our water treatment works

Changes from PR19 forecast - forecasts for the remainder of AMP7 remain consistent with PR19 forecasts.

CW4.53: Total number of water treatment exports

We do not currently have any exports that sit within this category and no changes are proposed which affect the number of water treatment exports over 2023 – 2025 and 2025 – 2030, so figures remain consistent with 2022-23 actual figures.

Changes from PR19 forecast - forecasts for 2023 – 2025 remain consistent with PR19 forecasts.

CW4.54: Water exported to 3rd parties from water treatment works

For 2022-23 we are reporting 0.00 Ml/d as per APR. For 2023 – 2025 and 2025 – 2030 we are forecasting that this will remain as 0.00 Ml/d as we do not have any plans to export water to 3rd parties from our water treatment works

Changes from PR19 forecast - forecasts for 2023 – 2025 remain consistent with PR19 forecasts.

CW4.55: Total number of water treatment works effluent discharges requiring new MCERTS flow monitoring

2023 – 2025 Forecast

Data for the remaining two years of AMP7 has been forecast based on the current requirements of each Environmental Permit registered to AWL. We undertook a substantial review in 2020 and all MCERTS requirements were fully compliant regarding MCERTS flow monitoring. We now undertake a regular structured review and have an external assessment body to validate this.

NQA Certificates - Expiry 30.04.24.pdf

2025 – 2030 Forecast

We forecast full compliance with MCERTS conditions and requirements as they are currently articulated within the existing permits. We will review our internal asset standards and current flow monitoring assurance procedures as we anticipate a significant shift to total Operator Self-Monitoring and away from EA inspections. We also anticipate review of permit conditions that will likely lead to it becoming a standard requirement in all permits as it is in Abstraction Licences, and we will review requirements and any likely investment required through 2024-25.

CW4a: Transition and accelerated programme - Raw water transport, raw water storage and water treatment data

This table is deliberately blank as transitional and accelerated funding will be used to ensure capital projects are delivered on time; however, this will not result in any asset changes prior to the initial dates.

CW5: Treated water distribution – assets and operations

CW5.1: Total installed power capacity of potable water pumping stations

The volumetric capacity changes are in line with the changes documented in lines CW5.17-CW5.20. In addition, the following capacity changes (which did not impact on numbers) are as follows:

- Replacement booster station at Fathing Common (2023-24)
- Additional boosters at Oxhey Woods(2023-24)
- Upgraded boosters at Elmstead Market and Ardleigh (2024-25)
- Amersham and Northmoor High Lifts removed with kW allocation from source added (2025-26)
- Periwinkle Lane and Runleywood (Chalk) each have one set of booster removed (2025-26)

- Additional boosters at Bulls Green, Heronsgate 2, Ickenham, Kings Walden, Park Lane and Periwinkle Lane (2029-30)

Changes from PR19 forecast – PR19 forecasts were higher than 2022-23 figures. A number of booster stations and dual function source pumps are not operational since PR19, as listed below:

- Potable Water Pumping Stations not operational since PR19:

  Bower Heath, Buckland Mill, Debden Road, Edgeware, George Gur, Holland Avenue, Mark Hall, Penton Hall and Rowley Lane (dual function source pumps)

- Source Pumping Stations (dual function abstraction and distribution) not operational since PR19:

  Chartridge, Clandon and Chesham

Some additional capacity changes are due to APH updates and amendments made on a yearly basis.

CW5.2: Total volumetric capacity of service reservoirs

The volumetric capacity changes are in line with the changes documented in line CW5.21.

Changes from PR19 forecast - these are in line with the changes documented in line CW5.21.

Wn2 / CW5 Line	2022-23	2023-24	2024-25
Total volumetric capacity of service reservoirs PR19	1544.83	1564.83	1564.83
Total volumetric capacity of service reservoirs PR24	1525.9	1564.7	1566.1

- Hadham Mill and Lower Standen only included from 2020-21 onwards (see CW5.21 for full details)
- Chaul End reservoir is now due in 2024-25

Additionally, the volumetric capacity has also reduced slightly from PR19 forecasts due to aligning our storage asset database with our storage data held in MAXIMO where some small variances between our two storage sources were identified and resolved.

CW5.3 Total volumetric capacity of water towers

No changes are proposed which affect the volumetric capacity of water towers over 2023 – 2025 and the period 2025 – 2030, so figures remain consistent with 2022-23 actual figures.

Changes from PR19 forecast - The volumetric capacity reduced by 0.1Ml in APR22. When aligning our storage asset database with our storage data held in MAXIMO some small variances between our two storage sources were identified and resolved.

CW5.4: Water delivered (non-potable)

For 2022-23 we are reporting 1.06 Ml/d as per APR. We are forecasting that for 2023 – 2025 and the period 2025 – 2030 this will stay at 1.06 Ml/d as we are not expecting the number of non-potable customers we supply to change in this period.

Changes from PR19 forecast – This is much lower than the 4.14 Ml/d forecast for PR19 as we now have fewer non-potable customers, and one is now using significantly less water.

CW5.5: Water delivered (potable)

For 2022-23 we are reporting 854.16 Ml/d as per APR. Our forecast for 2023 – 2025 and the period 2025 – 2030 is based on a normal year forecast with a low population growth, therefore our water delivered (potable) is reducing significantly in 2023-24 (80.37 Ml/d reduction) and continues to reduce to 724.24 Ml/d by the end of 2025 – 2030 in line with our targets for both per capita consumption and business demand reductions.

Changes from PR19 forecast – Water delivered (potable) is significantly higher than we had forecast at PR19, which is a result of our overall distribution input being much higher now than we had forecasted at the time.

CW5.6: Water delivered (billed measured residential properties)

For 2022-23 we are reporting 349.32 Ml/d as per APR. Our forecast for 2023 – 2025 and 2025 – 2030 is based on a normal year forecast with a low population growth in line with our target for per capita consumption. We are forecasting that the water delivered (billed measured residential properties) will increase slowly until the end 2029-30 (356.77 Ml/d) as we continue to meter our unmeasured household customers.

Changes from PR19 forecast - forecasts for 2023 – 2025 are lower than the PR19 forecasts as we have not switched as many household customers to measured supplies as forecast in PR19.

CW5.7: Water delivered (billed measured businesses)

For 2022-23 we are reporting 158.24 Ml/d as per APR. Our forecast for 2023 – 2025 and 2025 – 2030 is based on a normal year forecast with a low population growth in line with our target for business demand, which means our water delivered (billed measured business) is forecasted to reduce considerably in 2023-24 (145.87 Ml/d) and then increase slightly and remain around the same volume until the end of 2025 – 2030 (147.59 Ml/d).

Changes from PR19 forecast - forecasts for 2023 – 2025 are slightly lower than the PR19 forecasts.

CW5.8: Proportion of distribution input derived from impounding reservoirs

For 2022-23 we are reporting a proportion of 0.002 as per APR. We are not forecasting any changes so although the overall DI is reducing, there is no material changes to the proportion of water derived from impounding reservoirs.

Changes from PR19 Forecast – We did not forecast any water from impounding reservoirs at PR19 as these are only used under poor river water quality conditions.

CW5.9: Proportion of distribution input derived from pumped storage reservoirs

For 2022-23 we are reporting a proportion of 0.086 as per APR. This decreases to 0.061 in 2023-24 and 2024-25 as we are forecasting DI for a normal year and low population growth and therefore our Grafham import is reduced from 52Ml/d in 2022-23 to 30Ml/d. As a result of our sustainability reductions, we then forecast an increase in our Grafham import to 63Ml/d which results in an increase from 0.06 to 0.10 in 2025-26 and subsequent years.

Changes from PR19 Forecast – We forecasted lower volumes from pumped storage reservoirs at PR19 as the overall DI forecast was lower than actual and our Chertsey WTW was included in river abstractions. Following a review of the RAG guidance in 2020, it was then reclassified as pumped storage.

CW5.10: Proportion of distribution input derived from river abstractions

For 2022-23 we are reporting a proportion of 0.303 as per APR. This increases slightly to between 0.335 and 0.337 from 2023-24 onwards as we have assumed that our Iver WTW will produce 200 Ml/d from 2023-24 onwards (which is an increase from 185 Ml/d in 2022-23).

Changes from PR19 Forecast – We forecasted higher volumes from river abstractions at PR19 as these included our export to South East Water and water from our Chertsey WTW as described in line CW5.9.

CW5.11: Proportion of distribution input derived from groundwater works, excluding managed aquifer recharge (MAR) water supply schemes

For 2022-23 we are reporting a proportion of 0.609 as per APR. This is similar in 2023-24 and 2024-25 and reduces from 2025-26 onwards as the proportion from pumped storage reservoirs increases.

Changes from PR19 Forecast – Our PR19 forecast was broadly in line with actuals.

CW5.12: Proportion of distribution input derived from artificial recharge (AR) water supply schemes

For 2022-23 we are reporting a proportion of 0.000 as per APR. For 2023 – 2025 and 2025 – 2030 we are forecasting that this proportion will remain as 0.000 as we do not have any plans to introduce any artificial recharge (AR) water supply schemes

Changes from PR19 Forecast – there have been no changes since our PR19 forecast.

CW5.13: Proportion of distribution input derived from aquifer storage and recovery (ASR) water supply schemes

For 2022-23 we are reporting a proportion of 0.000 as per APR. For 2023 – 2025 and 2025 – 2030 we are forecasting that this proportion will remain as 0.000 as we do not have any plans to introduce any aquifer storage and recovery (ASR) water supply schemes

Changes from PR19 Forecast – there have been no changes since our PR19 forecast.

CW5.14: Proportion of distribution input derived from saline abstractions

For 2022-23 we are reporting a proportion of 0.000 as per APR. For 2023 – 2025 and 2025 – 2030 we are forecasting that this proportion will remain as 0.000 as we do not have any plans to introduce any saline abstractions

Changes from PR19 Forecast – there have been no changes since our PR19 forecast.

CW5.15: Proportion of distribution input derived from water reuse schemes

For 2022-23 we are reporting a proportion of 0.000 as per APR. For 2023 – 2025 and 2025 – 2030 we are forecasting that this proportion will remain as 0.000 as we do not have any plans to introduce any water reuse schemes

Changes from PR19 Forecast – there have been no changes since our PR19 forecast.

CW5.16: Total number of potable water pumping stations that pump into and within the treated water distribution system

The total number of potable water pumping station changes are in line with the changes documented in the individual lines below (CW5.17-CW5.20)

Changes from PR19 forecast – 2022-23 figures are lower than PR19 forecast figures due to a number of non-operational pumping stations since PR19 (see list in CW5.1).

CW5.17: Number of potable water pumping stations delivering treated groundwater into the treated water distribution system

The number of potable water pumping stations delivering treated groundwater into the treated water distribution system increases by one in 2023-24 as Chalfont St Giles high lift pumps will be back in supply when this site returns to its original site configuration after the completion of HS2 works. A further increase of one is expected in 2025-26 with Oughtonhead source which pumps into the distribution system included. The last increase is expected in 2027-28 when Blackford high lift pumps become operational again after a treatment upgrade to the site.

It is worth noting that the following changes occur in 2025-26 but do not increase the number in this line (as removal and replacement of pumps do not change the potable pumping classification line)

- Amersham high lifts are removed, and sources included instead (still included in CW5.17 as dual function)

- Northmoor high lifts are removed, and sources included instead (still included in CW5.17 as dual function)
- Runleywood(Chalk) boosters removed and Runleywood (Greensands) source included instead (still included in CW5.17 as dual function)

Changes from PR19 forecast - this potable water line was only introduced in 2020-21 so no previous forecast figures exist from PR19.

CW5.18: Number of potable water pumping stations delivering surface water into the treated water distribution system

No changes are proposed which affect the number of potable water pumping stations delivering surface water into the treated water distribution system over 2023 – 2025 and the period 2025 – 2030, so figures remain consistent with 2022-23 actual figures.

Changes from PR19 forecast - this potable water line was only introduced in 2020-21 so no previous forecast figures exist from PR19.

CW5.19: Number of potable water pumping stations that re-pump water already within the treated water distribution system

The number of potable pumping stations that re-pump water already within the treated water distribution system increases by one in 2023-24 as Harefield new booster station will be operational. A further increase of one is expected in 2025-26 with another new booster station (Stanwell Moor). Blackford boosters will be operational in 2027-28 which accounts for another increase of one in this line. There is a final increase in 2029-30 of four where new booster stations come into operation (Egham to Iver, Grove Park Link, Markyate and Preston)

Changes from PR19 forecast - this potable water line was only introduced in 2020-21 so no previous forecast figures exist from PR19.

CW5.20: Number of potable water pumping stations that pump water imported from a 3rd party supply into the treated water distribution system

The number of potable pumping stations that pump imported water into the treated water distribution system increases by one in 2023-24 with the addition of Cockfosters treated water import from Thames Water which was commissioned in June 2023. No further changes are proposed which affect this line over 2023 – 2025 and the period 2025 – 2030 so figures remain consistent with 2023-24 forecast figures.

Changes from PR19 forecast - this potable water line was only introduced in 2020-21 so no previous forecast figures exist from PR19.

CW5.21: Total number of service reservoirs

The number of service reservoirs is due to increase by one in 2023-24. As Sundon reservoir ownership has now transferred from Anglian Water to us, we will be reporting an additional reservoir for one year until the conditioning treatment on site is commissioned and Sundon will then become a treatment tank (see commentary for CW4.19). It is worth noting that Farthing Common (single cell 0.2Ml) reservoir has now been decommissioned and the new reservoir (two cells 0.45Ml total) is operational which does not impact on the number of reservoirs but does affect the capacity.

A further increase of one in 2024-25 is expected with the addition of Chaul End and Preston reservoirs and the removal of Sundon (when the conditioning treatment becomes operational, we will not be including this as a service reservoir due to SW3 treatment classification agreed in consultation with OFWAT). An increase of two is expected in 2029-30 with the addition of Hadham Mills and Hills reservoirs.

Changes from PR19 forecast - 2022-23 actual figures were three lower than PR19 forecasts due to changes made in APR21, APR22 and APR23 to Arkley, Hadham Mills, Lower Standen, Pin Green, Saltwood and Sherrardswood.

Wn2 / CW5 Line	2022-23	2023-24	2024-25
Total number of service reservoirs PR19	110	112	112
Total number of service reservoirs PR24	107	108	109

- Hadham Mill and Lower Standen included from 2020-21 – Hadham Mill structure was originally a contact tank but is now used as a treated water reservoir and Lower Standen is a treated water balancing tank (fed by 4 different supplies) and treated as a service reservoir with both cells inspected.
- Arkley and Pin Green amended from 2021-22 due to historic naming convention inconsistencies that enabled an additional cell to a reservoir to be named and counted as a separate reservoir - Arkley Reservoir 3 & 4 and Pin Green Reservoir 1 & 2 were identified as one reservoir with two cells not two separate reservoirs in each instance.
- Saltwood and Sherrardswood amended from 2022-23 - Saltwood Reservoir 1 & 2 was identified as one reservoir with two cells and Sherrardswood Reservoir 3 & 4 were identified as one reservoir with three cells.
- Chaul End reservoir is now due in 2024-25

Through the use of our Risk and Value Process, a better solution was developed to increase the size of our Preston reservoir and therefore not build a second cell at Bulls Green reservoir. So, there was not a 20Ml increase in 2023-24 for Preston and Bulls Green but an increase of 20Ml in 2024-25 for Preston instead.

Sundon reservoir and Farthing Common reservoir were not accounted for in PR19 forecasts.

CW5.22: Number of water towers

No changes are proposed which affect the number of water towers over 2023 – 2025 and the period 2025 – 2030, so figures remain consistent with 2022-23 actual figures.

Changes from PR19 forecast – forecasts for the remainder of AMP7 remain consistent with PR19 forecasts.

CW5.23: Energy Consumption – Treated Water Distribution

Refer to line CW4.7.

CW5.24: Average Pumping Head

We are expecting an increase to average pumping head – distribution based on our capital and operational plans for moving water around our network. The flow and pressure figures have been derived from the current design specification. The changes are listed below. These have been summed to give a total m.Ml figure which has been apportioned to the relevant year in the data table. These changes give a total of 11.69m increase to our baseline APH-Distribution figure.

Average pumping head – treated water distribution	Ml/d	mHd	Volumetric flow lifting [m.Ml]
Stanwell Moor (Midway North)	25	102	2550
Ickenham (to Harrow)	21	57	1197
Heronsgate 2	30	62	1860
Markyate	4	10	40
Egham to Iver	25	82	2050
Grove Park Link	20	50	1000
Park Ln	2.7	23	62.1
Periwinkle	3.6	36	129.6
Whitwell Pumps at Kings Walden site	2	45	90
Offley Pumps at Kings Walden site	2.5	60	150
Preston toward North BPS at Preston site	20	35	700
Bulls Green to Preston at Bulls Green site	20	53	1060

Changes from PR19 forecast – forecasts at PR19 were at an average of 73.8m for 2023 – 2025, we have revised these up to 84.5m. This is due to changes in how we move water around our business. With PR24 distribution input forecasts higher than PR19, we have needed to transport water further across our network using our booster transfer stations – this has increased the pumping head for distribution.

CW5.25: Total number of treated water distribution imports

For 2023-24, this increases by one with the commissioning of Cockfosters import in June 2023. There are no further changes proposed which affect the number of treated water distribution imports over 2023 – 2025 and the period 2025 – 2030, so figures remain consistent from 2023-24 onwards. There are two imports (Barham and Long Lane, Linton) that are included in this line that are not included in Table PD6 as although these are on the bulk register, they have not recently been used.

Changes from PR19 forecast – Lowerfield import from Cambridge was removed in APR23 submission as water had not been taken for a considerable number of years (when the agreement expired it was not renewed so the pipework has been disconnected). Additionally, Cockfosters import from Thames Water will be included from APR24 onwards.

CW5.26: Water imported from 3rd parties to treated water distribution systems

For 2022-23 we are reporting 61.90 Ml/d as per APR. For 2023 – 2025 the forecasts for table PD6 have been used. These have been forecasted based on the outputs of a model analysing historic weather and utilisation data, normalising for specific events such as the 2012 Olympic games and Covid-19 impacts as well as outage events. This sees a decrease in import utilisation to 33.81 Ml/d which is forecasted the same for 2024-25 and in line with our overall reduction in total DI.

For 2025 – 2030 we see an increase in volume of water imported from 3rd parties to treated water distribution systems. Once the Sundon scheme is implemented then we will be able to use up to 41 Ml/d of additional import from Grafham. However, this is only required under dry year conditions, so the normal year requirement will be limited to the groundwater Deployable Output lost due to the sustainability reductions that are enabled by the Sundon scheme delivery. These equal 33 Ml/d, which has been used as the average bulk supply import increase for 2025 – 2030. All other import volumes have been forecasted for a normal year.

Changes from PR19 forecast – The increase in water imported from the PR19 forecast is due to the increase in actual DI against the original forecast.

CW5.27: Total number of treated water distribution exports

We are forecasting an increase due to additional NAVS (New Appointments & Variations) that will be connected in our supply region. The increase rate has been based on the increase rate (%) of properties connected to NAVs as detailed in line DS4.10.

Changes from PR19 forecast - Additional NAVs that have been connected in our supply region were not accounted for in PR19 due to larger increases occurring in the last couple of years.

CW5.28: Water exported to 3rd parties from treated water distribution systems

For 2022-23 we are reporting 17.81 Ml/d as per APR. The forecasted volume then increases year on year in line with forecasted increase in the number of new properties served by NAVs as forecasted in table DS4.10. It has been assumed that each new property will use 375 l/prop/day, so this has been converted into an Ml/d forecast and included in the forecast for water exported to 3rd parties from treated water distribution systems. This results in an increase to 21.43 Ml/d by 2029-30.

Changes from PR19 forecast – Our export to South East Water was initially forecasted at 36 Ml/d at PR19. Actual exported volumes were much lower resulting in an overall decrease for our exports to 17.81 Ml/d. Additional NAVs (New Appointments & Variations) that have been connected in our supply region were not accounted for in PR19 due to larger increases occurring in the last couple of years.

CW5.29: Peak 7 day rolling average distribution input

For 2022-23 we are reporting 1,170.88 Ml/d for our Peak 7 day rolling average, which occurred week beginning 19 July 2022. We have carried out a review of historical peak factors and the conditions of the years to be able to determine a future normal year peak factor. This factor has then be applied to our DI forecast. As our DI forecast (see line CW5.38 and CW5.39) is based on a normal year with a low population growth, it is reducing significantly from 2023-24 onwards, and therefore our Peak 7 day rolling average DI is also proportionally reducing. As this is a forecast, we have not included a specific week.

Changes from PR19 forecast – This line was not required at PR19.

CW5.30: Peak 7 day rolling average distribution input / annual average distribution input

This line is calculated and remains constant throughout the forecast period as we have used 1.13 as the peak factor, as calculated in line CW5.29.

Changes from PR19 forecast – This line was not required at PR19.

CW5.31-5.32: Household consumption – Company Level

Our household consumption forecast has been developed as part of our rdWRMP24 submission which follows a 4-step process:

1. Develop the base year assessment and adjust for normal year and dry year annual average figures.
2. Determine the end of 2023 – 2025 position and the ongoing impacts of the Covid-19 pandemic.
3. Develop the baseline household consumption which represents the consumption we forecast without additional demand management activity.
4. Develop the final plan household consumption. This takes the baseline consumption and subtracts the demand management activity we plan to undertake in the future.

Base year assessment

We have used 2021-22 as the base year for our rdWRMP24 demand forecast modelling. This is in line with the Water Resources Planning Guidelines[1]https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-GB&rs=en-US&wopisrc=https://affinitywaterltd.sharepoint.com/teams/PR24ProgrammeTeam/_vti_bin/wopi.ashx/files/dd646aeca30e43809e3b1eb5839d354c&wdenableroaming=1&wdfr=1&mscc=1&hid=8E3BDCA0-203D-7000-60E0-68C352E4A510&wdorigin=ItemsView&wdhostclicktime=1695195859857&jsapi=1&jsapiver=v1&newsession=1&corrid=eeb4c6ea-7d33-4869-994c-366ff2e61e5b&usid=eeb4c6ea-7d33-4869-994c-366ff2e61e5b&sftc=1&cac=1&mtf=1&sfp=1&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush&rct=Normal&ctp=LeastProtected and ensured consistency with the other companies we were working with to produce the WRSE and WRE regional plans.

[1] Water Resource Planning Guidelines

The base year assessment identifies the demand for measured and unmeasured consumption under the 2021-22 weather conditions. This is then analysed to identify what demand would be like under set planning conditions as per the Water Resources Planning Guidelines. The conditions used for planning purposes are:

- Normal Year Annual Average (NYAA) - the demand in a typical (normal) weather year
- Dry Year Annual Average (DYAA) - the level of demand, which is just equal to the maximum annual average, which can be met at any time without introducing demand restrictions. This should be based on continuation of current demand management policies.

Further details of this work are included in the rdWRMP24, Appendix 4.1, Household Consumption Forecast.

2020 – 2025 position and the impact of Covid-19

The second step is to forecast our position at the end of AMP7. For household consumption, our initial end of 2020 – 2025 forecast is based on our PR19 forecasts. However, it is recognised that the PR19 forecasts were produced prior to the Covid-19 pandemic. Throughout the pandemic and following the removal of restrictions, we have carried out extensive modelling using a bespoke deep machine learning model to assess the impact the Covid-19 pandemic has had on household consumption and the ongoing impact that the changes to lifestyle brought about by the pandemic continues to have on water consumption. Our modelling estimates that lifestyle changes, such as the increase in remote working will continue to have, on average, an impact of increasing household consumption by 2.5 l/h/d on top of what people would have been using had the pandemic not occurred by 2024-25.

Baseline Household Consumption forecast

To forecast the baseline household consumption, the rdWRMP24 used a multiple linear regression (MLR) Household Consumption Model to develop a suite of different baseline forecasts that correspond to the range of growth scenarios being tested as part of our adaptive planning approach.

Household consumption is affected by a complex mix of interacting drivers including: the make-up of the occupants (numbers, age, socio-demographics, their habits, practices, and behaviours), the property type, whether they pay on a metered or rateable value bill, and geography. Multiple linear regression (MLR) uses historic measured data on consumption from a sample of properties to model household consumption using these factors.

The result of the modelling is our baseline household consumption forecast, providing household consumption values per year, per zone, for both measured and unmeasured populations.

Final plan household consumption forecast.

The final step to develop the household consumption for lines CW5.31 and CW5.32 is to apply the planned demand management activity to the baseline household consumption forecast.

For PR24, the demand management activity applied aligns with the household consumption reduction demand management activity included in the rdWRMP24.

In 2025 – 2030, this includes the:

- Behaviour change savings and self-fix wastage repairs forecast from smart metering.
- Household consumption savings from Home Water Efficiency Visits (HWECs)
- Wastage savings following repair from our targeted wastage programme.
- Government savings achieved through water labelling.

Subtraction of the demand management activity from the baseline household consumption provides the final plan household consumption forecast used in lines CW5.31 and CW5.32.

For PR24, we have used the baseline forecast of measured and unmeasured household consumption based on the low growth scenario named ONS18 rebased P. Please note that the term rebased refers to the fact this has been adjusted to ONS21 midyear estimates in the base year. The PR24 submission has used the low growth scenario to provide a conservative position on the potential population growth that may occur in the shorter term in 2025 – 2030.

For comparison, the rdWRMP24 reported pathway used the medium growth scenario called Housing Plan P consistent with Water Resources Planning Guidelines[2].

A description of these two scenarios is included in the commentary for SUP1a.

CW5.31

For the period 2022-23 our measured household consumption was 325.83 Ml/d. In line with Ofwat guidance, the PR24 tables include outturn data in 2022-23 rather than the rdWRMP24 forecasted value under normal year conditions. The equivalent volume within our normal year forecast is 318.3 Ml/d.

The forecast is then based on our normal year low growth forecast. Measured household consumption is forecasted to increase to 333.47 Ml/d by 2024-25 in line with our universal metering programme which is forecasted to see our metering penetration increase from 66.2% to 72.2% by the end of the 2020 – 2025 period. Measured household consumption is the forecasted to increase by a further 1.5% by the end of 2025 – 2030 with our metering penetration forecasted to reach 78.2%.

Due to the high number of unmeasured customers moving to measured tariffs in 2025 – 2030, the reductions in demand made by measured customers through demand management activity are outweighed by the number of customers

[2] Water Resource Planning Guidelines

becoming measured. The impact of the demand management activity can be seen in the overall household consumption reduction.

CW5.32

For the period 2022-23 our unmeasured household consumption was 285.77 Ml/d. As with line CW5.31 the PR24 tables include outturn data in 2022-23. The equivalent volume within our normal year forecast was 253.2 Ml/d.

This is forecasted to decrease year on year. Throughout 2025 – 2030 we forecast unmeasured consumption to decrease by 12%. The decrease in unmeasured consumption reflects both the impact of demand management activity and the movement of customers from unmeasured to measured following the installation of a meter in 2025 – 2030.

CW5.33-5.34 – Non-Household consumption – Company Level

The measured and unmeasured non-household consumption forecast included in PR24 from 2023-24 onwards has been taken directly from the rdWRMP24.

baseline Non-Household Consumption forecast

We have used a Multi Linear Regression (MLR) model, segmenting demand based on industry types. The UK Standard Industrial Classification (SIC) codes were used for this segmenting to separate out those industries likely to have different underlying drivers for future NHH demand. The groupings chosen and a description of each are provided in the table below.

Sector	Description
Agriculture and other industries influenced by weather	based on SIC code A: includes agriculture, forestry and fishing industries. These types of NHH customers' consumption have a stronger relationship with weather than other sectors and so have been treated separately in the modelling, particularly in the context of climate change scenarios
Non-service industries (economy driven)	Includes industries with SIC codes B, C, D, E and F. These are industries such as manufacturing and construction. These industries have been grouped as they are likely to show trends related to the economy, but these trends are likely to differ to those in the service industry category
Service industries (economy driven)	Includes SIC codes G, H, I, J, K, L, M and N. These are industries such as retail, real estate, and financial sectors. They have been separated as they are more likely to show trends related to the size of the economy or employment, but the responses will be different to that of non-service industries above
Service industries (population driven)	Includes SIC codes O, P, Q, R, S and T. These are industries such as education and health and are more likely to be driven by population size than measures of economic output. Therefore, it is important to include them as a separate grouping
Unclassified	This final group accounts for non-households which may not readily be assigned to any of the other categories. When modelling this group, care was needed to avoid strong trends in this sector simply reflecting changes in data quality over time

Segmentation groups used for non-household demand groups

As with the household demand forecast, the first year 2021-22, has seen an unprecedented change in NHH demand due to the policies introduced to combat the Covid-19 pandemic. This has been reflected in the data, but we recognised that it has also created added uncertainty going forward because it is still not known what the enduring impacts will be from changes in working practices, such as increased working from home. In the rdWRMP24, this uncertainty has been captured within the Target Headroom assessment.

Having segmented the properties, additional data was provided to Artesia for the modelling, including:

- Weather data – including average daily rainfall and average and maximum temperatures by year
- Econometric data - this was provided by Oxford Economics and was formatted into employment and gross value added (GVA) by SIC group and region. Historic data was provided from 1991, and forecast data was provided to 2040
- Population forecasts – Artesia were provided with the forecasts produced for Affinity Water by Edge Analytics which included both residential population forecasts and a communal population forecast
- Historic consumption – provided by SIC code

Using this data, the NHH forecast modelling process was carried out. This was divided into the following steps:

- Build the MLR model based on past aggregated consumption data, considering Oxford Economic variables and potentially other factors
- Calibrate the model for the base year, in this case 2021/22, first by industry sector using the property consumption data, then by WRZ using the AR consumption
- Apply the MLR model and the calibration to future explanatory variables to estimate future NHH consumption.

Further details of this work are included in the rdWRMP24, Appendix 4.2, Non-Household Consumption Forecast.

This has resulted in a slowly increasing baseline non household demand forecast of 1.25% between 2024-25 and 2029-30 (7% increase over the 25 years between 2025 and 2050). This is a change from our WRMP19 forecast, which saw a declining trend.

Final Plan Non-Household Consumption forecast

The final plan non-household consumption included in lines CW5.33 and CW5.34 is derived by applying the demand management activity to the baseline non-household consumption.

For PR24, the demand management activity applied aligns with the non-household consumption reduction demand management activity included in the rdWRMP24.

In AMP8, this includes the:

- Non-household consumption savings made by businesses following the replacement of their meter with a smart meter supported by advice.
- Business consumption savings from Business Water Efficiency Visits (HWEC's)

Lines CW5.33 and CW5.34 show that with demand management activity, non-household consumption remains almost static in 2025 – 2030 rather than increasing by 1.25% that would occur without any demand management activity.

CW5.33

For the period 2022-23 our measured non-household consumption was 156.86 Ml/d.

The forecast is based on our normal year low growth forecast. Measured non household consumption is forecasted to decrease to 144.54 Ml/d in 2023-24 as per our rdWRMP24 demand forecast. The forecast then remains almost static in 2025 – 2030 rather than increasing by 1.25% that would occur without any demand management activity.

CW5.34

For the period 2022-23 our measured non-household consumption was 9.74 Ml/d.

Our forecast shows a small decrease in 2023-24 of 0.47 Ml/d. This is a product of the assumptions used within the modelling for our WRMP demand forecast. The volume then remains almost static throughout the rest of the period.

CW5.35 – Total annual leakage

For the period 2022-23 our total annual leakage was 150.66 Ml/d as reported in our APR submission.

We are forecasting that this will reduce over the next two years to 149.60 Ml/d in 2023-24 and 148.47 Ml/d in 2024-25 in line with our delivery plan. This will meet our target of reducing leakage by 20% in 2020 – 2025.

For 2025 – 2030 we are forecasting a further 22.4 Ml/d reduction from our end position in 2020 – 2025 with our total annual leakage figure reducing to 126.06 Ml/d in 2029-30.

Changes from PR19 forecast: Submitted forecasts at PR19 are not consistent with the final methodology used to set performance commitment targets for 2020 – 2025. Therefore, comparison is not possible.

CW5.36 – Distribution System Operational

For the period 2022-23 we reported 0.81 Ml/d for distribution system operational use.

Our forecast shows a small decrease in 2023-24 of 0.17 Ml/d. This is a product of the assumptions used within the modelling for our WRMP demand forecast. The volume then remains constant throughout the rest of the period.

This line was not present at the PR19 submission, so no comparison to a previous forecast is available.

CW5.37 – Water Taken Unbilled

For the period 2022-23 we reported 19.14 Ml/d of water taken unbilled.

Our forecast shows a decrease in 2023-24 of 4.85 Ml/d. This is a product of the assumptions used within the modelling for our WRMP demand forecast which is in part due to the fact water taken unbilled is a highly uncertain aspect of our water balance and sees a large amount of post MLE adjustment. The volume then remains constant throughout the rest of the period.

Changes from PR19 forecast: the current forecast is higher than the 9.71 Ml/d included in the PR19 forecast which excluded void consumption. This since been included in our restated annual return submissions.

CW5.38: Distribution Input

This distribution input in line CW5.38 is the sum of household consumption (lines CW5.31 and CW5.32), non-household consumption (lines CW5.33 and CW5.34), leakage (line CW5.35) and the minor components, DSOU and Unbilled water (lines CW5.36 and CW5.37).

Our reported Distribution Input for the period 2022-23 was 948.81 Ml/d.

As per the commentary in CW5.31 and CW5.32 for this PR24 submission, our demand forecast has been based on normal year weather conditions and the low growth scenario named ONS18 rebased P. Please note that the term rebased refers to the fact this has been adjusted to ONS21 midyear estimates in the base year. The low growth scenario provides a conservative position on the potential population growth that may occur in the shorter term in 2025 – 2030. The equivalent normal year DI for 2022-23 was modelled at 890.30 Ml/d. This was 58.51 Ml/d lower than our outturn DI and is a result of the hot summer and the major freeze thaw event we experienced in the winter which led to an increase in both water delivered, and leakage compared to what would be expected under normal year conditions.

In line with our rdWRMP24 normal year low growth scenario Distribution Input is forecasted to decrease to 868.25 Ml/d in 2023-24. A significant part of this is the use of the normal year scenario which results in the 58.51 Ml/d decrease and in addition to this we forecast that our demand reduction interventions will result in a further 22.1 Ml/d reduction in demand in line with our delivery plans for reduction in both consumption and leakage.

Distribution Input is forecasted to decrease by a further 41 Ml/d between 2024-25 and 2029-30. The reduction in DI is due to the demand management activity we plan for 2025 – 2030.

The volume of overall DI reduction and the volume of demand management activity will not be identical due to the increasing baseline profiles for both household and non-household consumption.

The DI presented in the PR24 tables will differ from the DI presented in the WRMP Tables (from the rdWRMP24) due to the different growth forecasts used in these plans.

Changes from PR19 forecast: the current forecast for 2023 – 2025 is 40.11Ml/d higher than the 804.92 Ml/d included in the PR19 forecast. DI is the sum of household consumption (lines CW5.31 and CW5.32), non-household consumption (lines CW5.33 and CW5.34), leakage (line CW5.35) and the minor components, DSOU and Unbilled water (lines CW5.36 and CW5.37) and this difference is a result of the differences at the component level with household consumption being the most significant difference.

CW5.39: Distribution input (pre-MLE)

For the period 2022-23 we reported 960.20 Ml/d for Distribution Input (pre-MLE).

Forecasting this line is not possible, as we are not able estimate the level of MLE adjustment in future years. We have therefore reported this value the same as line CW5.38.

Changes from PR19 forecast: This line was not present at the PR19 submission, so no comparison to a previous forecast is available.

CW5.40-57: Water Balance – Regional Level

Not applicable to Affinity Water.

CW5.58: Leakage upstream of DMA

We currently utilise the Bursts and Background leakage Estimation (BABE) methodology to calculate leakage upstream of DMAs. For the period 2022-23 we estimate that leakage upstream of DMAs was 27.20 Ml/d.

During AMP8 we will increase our DMA coverage through our pressure management expansion coverage as part of our leakage reduction plan. This is likely to reduce the leakage upstream of DMAs (it will increase distribution losses as the mains move category). As the schemes are not designed to pipe level, we are not currently able to accurately account for this in the forecasts and have therefore forecasted the volume constant (see also commentary on line CW5.59), this does not impact our forecasts for Total Annual Leakage which our performance targets are based on.

BABE remains a valid method of calculating leakage upstream of DMAs in the reporting guidance for leakage in AMP8, at this stage we have no plans to introduce flow balancing for reporting.

Changes from PR19 forecast: This line was not present at the PR19 submission, so no comparison to a previous forecast is available.

CW5.59: Distribution main losses

For the period 2022-23 66.65 Ml/d of our total leakage value was attributed to Distribution main losses. We are forecasting that this will increase slightly in 2023-24 to

67.62 Ml/d, this is a product of the assumptions used within the modelling for our WRMP demand forecast and not a deterioration in performance.

The forecast across 2025 – 2030 decreases in line with our total leakage reduction as per our WRMP document.

Counter to the leakage upstream of DMAs, as we increase our DMA coverage in AMP8, we recognise that there will be an increase in the proportion of total leakage which forms distribution losses however until we have fully designed the DMAs, we are unable to model this to give an accurate forecast in the movement between leakage upstream of DMAs and the distribution mains losses.

Changes from PR19 forecast: This line was not present at the PR19 submission, so no comparison to a previous forecast is available.

CW5.60: Customer supply pipe losses – measured households excluding void properties

For the period 2022-23 23.50 Ml/d of our total leakage was attributed to this line.

We have aligned the forecasts with our WRMP modelling which shows a year-on-year decrease until the end of 2025 – 2030.

Changes from PR19 forecast: This line was not present at the PR19 submission, so no comparison to a previous forecast is available.

CW5.61: Customer supply pipe losses – unmeasured households excluding void properties

For the period 2022-23 27.73 Ml/d of our total leakage was attributed to this line.

Our forecast shows a small increase in 2023-24 of 0.62 Ml/d. This is a product of the assumptions used within the modelling for our WRMP demand forecast.

The losses then decrease every year until the end of 2025 – 2030 as we continue to switch our household customers from unmeasured to measured charges through meter optants and our universal metering programme.

Changes from PR19 forecast: This line was not present at the PR19 submission, so no comparison to a previous forecast is available.

CW5.62: Customer supply pipe losses – measured non-households excluding void properties

For the period 2022-23 1.37 Ml/d of our total leakage was attributed to this line.

We have aligned the forecasts with our WRMP modelling which shows a year-on-year decrease until the end of 2020 – 2025 and then remain constant throughout 2025 – 2030.

Changes from PR19 forecast: This line was not present at the PR19 submission, so no comparison to a previous forecast is available.

CW5.63: Customer supply pipe losses – unmeasured non-households excluding void properties

For the period 2022-23 0.47 Ml/d of our total leakage was attributed to this line.

We have aligned the forecasts with our WRMP modelling which shows a year-on-year decrease until the end of 2020 – 2025 and then remain constant throughout 2025 – 2030.

Changes from PR19 forecast: This line was not present at the PR19 submission, so no comparison to a previous forecast is available.

CW5.64: Customer supply pipe losses – void measured households

For the period 2022-23 2.18 Ml/d of our total leakage was attributed to this line.

We have aligned the forecasts with our WRMP modelling which shows a small increase in 2023-24 of 0.08 Ml/d. The losses then decrease to 2.19 Ml/d in 2024-25 and the remain constant throughout 2025 – 2030.

This is a product of the assumptions used within the modelling for our WRMP demand forecast.

Changes from PR19 forecast: This line was not present at the PR19 submission, so no comparison to a previous forecast is available.

CW5.65: Customer supply pipe losses – void unmeasured households

For the period 2022-23 0.96 Ml/d of our total leakage was attributed to this line.

We have aligned the forecasts with our WRMP modelling which forecasts these losses to remain constant throughout 2020 – 2025 and 2025 – 2030.

Changes from PR19 forecast: This line was not present at the PR19 submission, so no comparison to a previous forecast is available.

CW5.66: Customer supply pipe losses – void measured non-households

For the period 2022-23 0.52 Ml/d of our total leakage was attributed to this line.

We have aligned the forecasts with our WRMP modelling which shows a small increase in 2023-24 of 0.02 Ml/d. The losses then decrease to 0.53 Ml/d in 2024-25 and 0.52 Ml/d in 2025-26 and then remain constant at that level throughout the rest of AMP8. This is a product of the assumptions used within the modelling for our WRMP demand forecast.

Changes from PR19 forecast: This line was not present at the PR19 submission, so no comparison to a previous forecast is available.

CW5.67: Customer supply pipe losses – void unmeasured non-households

For the period 2022-23 0.08 Ml/d of our total leakage was attributed to this line.

We have aligned the forecasts with our WRMP modelling which forecasts these losses to remain constant throughout 2020 – 2025 and 2025 – 2030.

Changes from PR19 forecast: This line was not present at the PR19 submission, so no comparison to a previous forecast is available.

CW5.68-87: Components of total leakage – Regional Level

Not applicable to Affinity Water.

CW6: Water network+ - Mains, communication pipes and other data

CW6.1: Total length of potable mains as at 31 March

For 2023-24 we are reporting a 57.2km increase length of mains from 16,969.2km. We are forecasting an average annual increase in mains length of 49.7km to 17,316.8km in 2029-30. This compares with an average increase of 60.1km over the last 5 years. The forecast length of mains is lower than the previous 5-year average due to significantly reduced DS meterage expectations given the present economic outlook that is affecting home builders and buyers.

Changes from PR19 forecast: For PR19 we forecasted 16,979km and 17,028km, compared with 17,022km and 17,071km for PR24. There has been very little change.

CW6.2: Total length of potable mains relined

We have not relined any mains since 2009 and we do not intend to do for the period 2023-24 to 2029-30.

Changes from PR19 forecast: For PR19 we forecasted 0km and 0km, compared with 0km and 0km for PR24. No change in forecast.

CW6.3: Total length of potable mains renewed

For 2022-23 we are reporting 11.2km of new mains installed for renewed purposes as per APR. In the last two years of 2020 – 2025 we are forecasting 12.2km and 7.7km annually.

From 2025-26 to 2029-30 BGA delivery forecast is linked with planned investment in mains renewals programme: distribution mains renewals stands at £33,100k or 100.6km and trunk main renewals investment stands at £18,600k or 20.6km. Total of £51,700k in 2025 – 2030 equates to 120.8km. Overall in the period 2025 – 2030, we are expecting to renew 129.3km (including 8.5km of developer services work) of main at an average of 25.9km per year, twice the present rate in 2020 – 2025, due to increased mains investment.

Changes from PR19 forecast: For PR19 we forecasted 46km and 46km, compared with 12km and 8km for PR24. Current lower forecasts due to much reduced planned renewals activity.

CW6.4: Total length of new potable mains

For 2022-23 we are now reporting 57.2km of new mains installed for new purposes. This is slightly lower than reported at APR23. Going forward, we are forecasting a reduced length of mains installed averaging of 52.7km annually. The decrease in forecast mains activity is primarily due to much reduced DS mains laying caused by the current economic uncertainty, although partially off-set by increased investment in large diameter mains to facilitate Sustainability Reductions, Strategic Infrastructure and Single Point of Failure improvements.

Changes from PR19 forecast: For PR19 we forecasted 89km and 76km, compared with 56km and 52km for PR24. Current lower forecasts due to lower planned mains activities, particularly Developer Services.

CW6.5: Total length of new potable mains (<=320mm)

For 2022-23 we are reporting 15,663.0km as per APR. Going forward to 2029-30, we are forecasting increasing the length of main sized <= 320mm by 287.7km to 15,950.7km. Note this line also includes 5.8km of existing main that is expected to be converted from raw to potable water due to treatment changes. See lines CW4.5 and CW6.12 for further information.

Changes from PR19 forecast: For PR19 we forecasted 15,633km and 15,668km, compared with 15,706km and 15,747km for PR24. There has been very little change.

CW6.6: Total length of new potable mains (>320mm and <=450mm)

For 2022-23 we are reporting 625.0km as per APR. Going forward to 2029-30, we are forecasting increasing the length of main sized > 320mm & <=450mm by 15.9km to 640.9km. Please note this line also includes 7.0km of existing main that is expected to be converted from raw to potable water due to treatment changes. See lines CW4.5 and CW6.12 for further information.

Changes from PR19 forecast: For PR19 we forecasted 635km and 640km, compared with 629km and 637km for PR24. There has been very little change.

CW6.7: Total length of new potable mains (>450mm and <=610mm)

For 2022-23 we are reporting 498.8km as per APR. Going forward to 2029-30, we are forecasting increasing the length of main sized > 450mm & <=610mm by 9.4km to 508.2km.

Changes from PR19 forecast: For PR19 we forecasted 523km and 527km, compared with 505km and 505km for PR24. There has been very little change.

CW6.8: Total length of new potable mains (>610mm)

For 2022-23 we are reporting 182.3km as per APR. Going forward to 2029-30, we are forecasting increasing the length of main sized >610mm by 34.6km to 216.9km.

This relatively large increase in length of main sized >610mm is driven by our BGA Sustainability Reductions and Supply 2050 programmes in AMP8.

Changes from PR19 forecast: For PR19 we forecasted 189km and 194km, compared with 182km and 182km for PR24. There has been very little change.

CW6.9: Total length of new potable mains laid or structurally refurbished pre-1880

For 2022-23 we are reporting 76.5km as per APR. Going forward to 2029-30, we are forecasting this line will decrease by an average of 0.2km per year to 75.3km. This compares with an average decline of 0.2km per year over the last 5 years.

Changes from PR19 forecast: For PR19 we forecasted 76km and 75km, compared with 76km and 76km for PR24. There has been very little change.

CW6.10: Total length of new potable mains laid or structurally refurbished between 1881 and 1900

For 2022-23 we are reporting 203.7km as per APR. Going forward to 2029-30, we are forecasting this line will decrease by an average of 0.4km per year to 200.8km. This compares with an average decline of 0.4km per year over the last 5 years.

Changes from PR19 forecast: For PR19 we forecasted 202km and 202km, compared with 204km and 203km for PR24. The slightly higher mains lengths are due to the lower rate of renewals achieved since the original forecast.

CW6.11: Total length of new potable mains laid or structurally refurbished between 1901 and 1920

For 2022-23 we are reporting 610.2km as per APR. Going forward to 2029-30, we are forecasting this line will decrease by an average of 1.2km per year to 601.0km. This compares with an average decline of 1.2km per year over the last 5 years.

Changes from PR19 forecast: For PR19 we forecasted 605km and 603km, compared with 610km and 609km for PR24. The slightly higher mains lengths are due to the lower rate of renewals achieved since the original forecast.

CW6.12: Total length of new potable mains laid or structurally refurbished between 1921 and 1940

For 2022-23 we are reporting 2,520.5km as per APR. Going forward to 2029-30, we are forecasting this line will decrease by an average of 0.5km per year to 2,516.7km. This compares with an average decline of 0.3km per year over the last 5 years. A slightly increased rate of decline has been forecast due to the higher rates of renewal planned for AMP8 and we expect to continue to remove from service early spun iron installed in the 1930s which show high burst rates.

Changes from PR19 forecast: For PR19 we forecasted 2,453km and 2,438km, compared with 2,520km and 2,520km for PR24. The slightly higher mains lengths are due to the lower rate of renewals achieved since the original forecast.

CW6.13: Total length of new potable mains laid or structurally refurbished between 1941 and 1960

For 2022-23 we are reporting 3,858.4km as per APR. Going forward to 2029-30, we are forecasting this line will decrease by an average of 9.1km per year to 3,785.4km. This compares with an average decline of 8.6km per year over the last 5 years. An increased rate of decline has been forecast due to the higher rates of renewal planned for AMP8 and we expect to continue to remove from service spun iron installed in the post war era which show high burst rates.

Changes from PR19 forecast: For PR19 we forecasted 3,757km and 3,725km, compared with 3,853km and 3,849km for PR24. The slightly higher mains lengths are due to the lower rate of renewals achieved since the original forecast.

CW6.14: Total length of new potable mains laid or structurally refurbished between 1961 and 1980

For 2022-23 we are reporting 3,719.6km as per APR. Going forward to 2029-30, we are forecasting this line will decrease by an average of 8.1km per year to 3,655.0km. This compares with an average decline of 7.6km per year over the last 5 years. An increased rate of decline has been forecast due to the higher rates of renewal planned for AMP8 and we expect to continue to remove from service spun iron installed in the post war era and some early plastic pipes which show high burst rates.

Changes from PR19 forecast: For PR19 we forecasted 3,658km and 3,637km, compared with 3,712km and 3,709km for PR24. The slightly higher mains lengths are due to the lower rate of renewals achieved since the original forecast.

CW6.15: Total length of new potable mains laid or structurally refurbished between 1981 and 2000

For 2022-23 we are reporting 2,751.9km as per APR. Going forward to 2029-30, we are forecasting this line will decrease by an average of 1.5km per year to 2,739.5km. This compares with an average decline of 1.5km per year over the last 5 years.

Changes from PR19 forecast: For PR19 we forecasted 2,754km and 2,753km, compared with 2,749km and 2,747km for PR24. There has been very little change.

CW6.16: Total length of new potable mains laid or structurally refurbished between 2001 and 2020

For 2022-23 we are reporting 3,094.8km as per APR. Going forward to 2029-30, we are forecasting this line will decrease by an average of 0.4km per year to 3,091.3km. This compares with an average decline of around 0.4km per year over the last 5 years.

Changes from PR19 forecast: This line has been split in two since PR19 (CW6.16 & CW6.17). Comparing the sum of these lines against the PR19 forecast shows very similar forecasts for 2023-24 and 2024-25: 3,474km and 3,596km (PR19) versus 3,2961km and 3,355km (PR24).

CW6.17: Total length of new potable mains laid or structurally refurbished post 2021

For 2022-23 we are reporting 133.5km as per APR. Going forward to 2029-30, we are forecasting this line will increase by the sum of CW6.3 and CW6.4 to 651.8km. An average increase of 74.0km a year. This compares with an average increase of 74.8km over the last 3 years.

Changes from PR19 forecast: This line did not exist in PR19, so no comparison is available.

CW6.18: Number of lead communication pipes

For 2022-23 we are reporting 312,153 lead communication pipes as per APR23. For the remainder of AMP7 we are forecasting declining our current estate of lead communication pipes annually by 1,032 per year and for AMP8 by 1,132 per year. This reflects the sum of two activities:

- 350-450 lead communication pipes replaced each year for Water Quality reasons (see CW6.21); and
- 682 lead communication pipes replaced each year for operational non-Water Quality reasons (see CW6.22)

Changes from PR19 forecast: We are forecasting in PR24 about 4.5% to 5.0% more lead pipes existent due to a lower replacement rate achieved versus planned.

CW6.19: Number of galvanised iron communication pipes

For 2022-23 we are reporting 246,165 galvanized iron communication pipes as per APR23. For 2023 – 2025 and 2025 – 2030 we are forecasting declining our current estate of galvanised iron communication pipes annually by 224 per year. This activity is hard to predict as there is no set programme to remove galvanised iron pipes - pipe will only be replaced to repair leaks and improve flow / pressure to customers. Therefore, we have taken the average of the last 5 years (224) given that forecast network activity rates are expected to remain at a similar level; this forecast is within the minimum (192) and maximum (296) annual replacement activity observed over the last 5 years.

Changes from PR19 forecast: We are forecasting in PR24 about 0.2% more galvanised iron pipes existent due to a very slightly lower replacement rate achieved versus planned.

CW6.20: Number of other communication pipes

For 2022-23 we are reporting 524,680 other material communication pipes. This is a change to the 522,631 reported at APR due to re-forecasted new connection numbers by our Developer Services Team post APR.

For 2023 – 2025 and 2025 – 2030 we are forecasting increasing our current estate of other material communication pipes annually by the sum of two components:

1) all lead and galvanized iron pipe replaced reported in lines CW6.18 & 19; and

2) the sum of new connections installed by Developer Services reported in lines DS4.3 & 4.

By 2029-30, we are estimating 580,806 communication pipes.

Changes from PR19 forecast: We are forecasting in PR24 around 11.1% to 12.8% less other material pipes existent due to both a lower rate of lead and galvanised iron pipe replacement achieved, and a lower rate of new pipe install by Developer Services versus planned.

CW6.21: Number of lead communication pipes replaced or relined for water quality

Our lead communication pipe replacement programme for the rest of AMP7 will consist of replacing pipes where customers have replaced their lead supply and request we replace the communication pipe, which we anticipate will be around 300 a year, and where we obtain a result from a sample taken from a customer's property with a lead concentration above 10 ug/l, which we anticipate will be around 50 a year based on historic trends. The small-scale lead service pipe replacement project we carried out in the Company's East area between 2021 and 2022 has finished so we will not be carrying out any further proactive lead communication pipe replacement in 2020 – 2025. The cessation of this project means that we will not be replacing the 1600 communication pipes a year during 2020 – 2025 we predicted at PR19.

Our lead strategy for 2025 – 2030 includes the activities mentioned above plus replacing lead communication pipes where we obtain a result from a sample taken from a customer's property with a lead concentration between 5 and 10 ug/l, which we anticipate will be around 100 a year, again based on historic trends. We expect DWI to include this requirement in a Regulation 28 Notice for 2025 – 2030 so we have included this number in the line.

CW6.22: Number of lead communication pipes replaced for other reasons

The number of lead communication pipes replaced for Other Reasons (not WQ) is driven principally by operational activity: replacing communication pipes to fix leaks, to maintain pressure to customers etc. The number of pipes replaced is not part of any programme and varies considerably year-to-year.

Over the previous 5 years we have recorded 3,412 lead replacements: 903, 1,129, 386, 406 and 588 - at an average of 682 annually. Going forward, our assumption is that lead replacement activity for "other reasons" will be similar to recent years given continued subdued investment in pipes, therefore we are using the previous five-year average of 682 replacements as our forward forecast rate.

Changes from PR19 forecast: This line was not present at PR19, so no comparison to a previous forecast is available.

CW6.23: Total length of lead communication pipes replaced or relined

We have used an average length of communication pipe of 4.55m which is based on the median length from the lead pipe replacement project we carried out in 2015 – 2020.

CW6.24: Number of external lead supply pipes replaced or relined

We carried out a small-scale lead supply pipe replacement trial in our Brett community in 2022-23. We do not have any similar projects planned for the rest of 2020 – 2025. The 2022-23 number is based on payment certificate applications from supply chain, subject to physical inspection and our quality assurance assessments. Therefore, we believe the data to be high quality based on evidenced actual delivery.

Our strategy for 2025 – 2030 will be to replace external lead supply pipes where we obtain a result from a sample taken from a customer's property with a lead concentration above 5 ug/l. We predict there will be 100 samples a year with results between 5 and 10 ug/l a year and 50 samples a year with results above 10 ug/l.

Changes from PR19 forecast: This line was not present at PR19, so no comparison to a previous forecast is available.

CW6.25: Total length of external lead supply pipes replaced or relined

We carried out a small-scale lead supply pipe replacement trial in our Brett community in 2022-23. We do not have any similar projects planned for the rest of AMP7. The 2022-23 length is based on payment certificate applications from supply chain, subject to physical inspection and our quality assurance assessments. Therefore, we believe the data to be high quality based on evidenced actual delivery.

The trial in our Brett community gave an average supply pipe length as 14.66m and so we have used that number in our forecasts for AMP8.

Changes from PR19 forecast: This line was not present at PR19, so no comparison to a previous forecast is available.

CW6.26: Number of internal lead supply pipes replaced or relined

We have not undertaken or plan to undertake replacement activity within customer properties that meets this line definition in 2020 – 2025 or in 2025 – 2030.

Changes from PR19 forecast: This line was not present at PR19, so no comparison to a previous forecast is available.

CW6.27: Total length of internal lead supply pipes replaced or relined

We have not undertaken or plan to undertake replacement activity within customer properties that meets this line definition in 2020 – 2025 or in 2025 – 2030.

Changes from PR19 forecast: This line was not present at PR19, so no comparison to a previous forecast is available.

CW6.28: Company Area

We are reporting 4,515km2 as per APR and forecasting the same area up to 2029-30.

The Company area has not changed significantly (by more than 2km2) in the last 20 years and we have reported the same number for at least the last four years.

The Legal Team, whilst they are anticipating changes in the future, are not aware of any impending changes at present. Therefore, our current view is that the Company Area will remain unchanged until 2029-30.

No area deductions for NAVs have been made, as per Ofwat line guidance in RAG 4.11.

The 4,515km2 we are reporting is in line with our PR19 projections for 2023-24 and 2024-25.

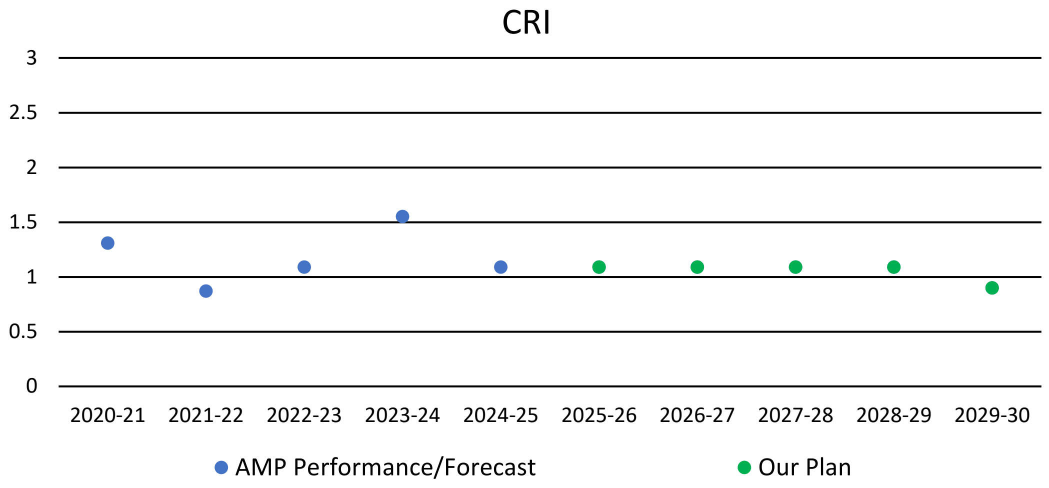
CW6.29: Compliance Risk Index

Our Compliance Risk Index (CRI) performance for the first three years of 2020 – 2025 (2020: 1.31, 2021: 0.87 and 2022: 1.09) has been significantly better than our forecast at PR19 where we predicted performance of 2.8 for the whole of 2020 – 2025. The improvement in our performance has been driven by a reduction in the number of exceedances, particularly from treatment works and service reservoirs, and more thorough investigations into the exceedances which has resulted in fewer recommendations and suggestions.

We have used our CRI performance from 2020 – 2022 as the basis for our forecasting for the rest of 2020 – 2025 and 2025 – 2030, taking the average of these three years at 1.09. A single coliform detection at one of our largest treatment works in the first quarter of 2023, has led to us forecasting performance slightly above this figure for 2023 but we still expect to be within the deadband. We expect to bring performance back in line with the 2020 – 2022 average for 2024-25.

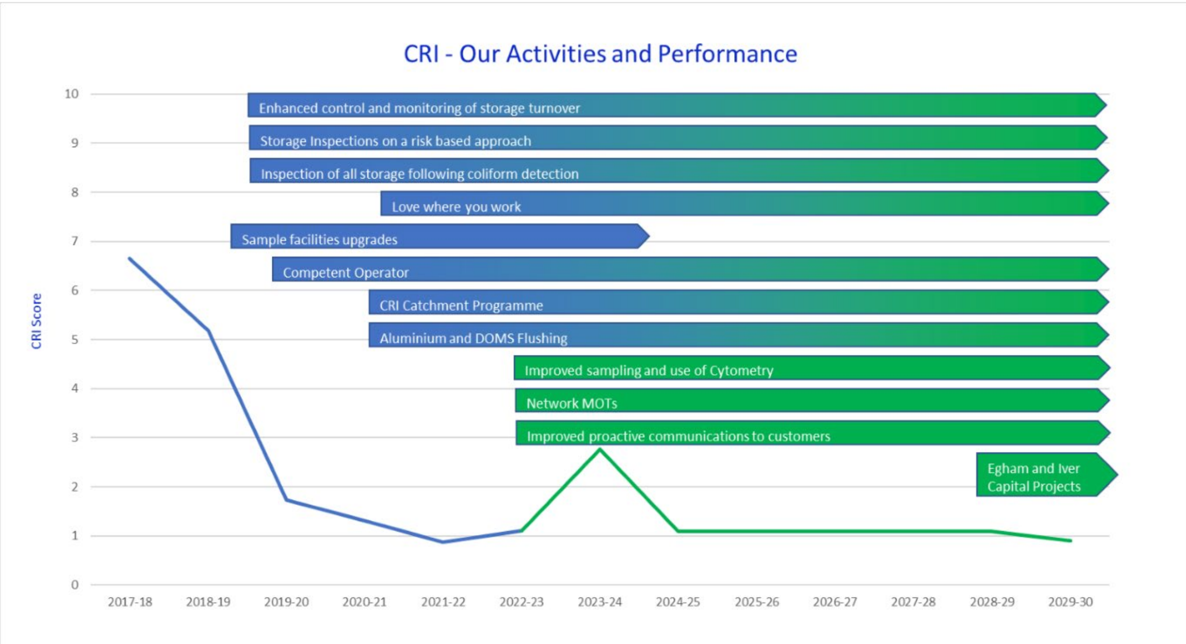
We have noted the impact one off exceedances can have on CRI performance as part of our forecasting for 2025 – 2030, however we have taken the view that our underlying performance sits at 1.09 and that this represents the most appropriate target for ourselves, delivering an ambitious plan for our customers. Given our strong performance in CRI, maintaining this level will continue to stretch ourselves.

The forecasts we have set ourselves for the rest of 2020 – 2025 and 2025 – 2030 look to continue our position in the upper quartile of water companies for this measure.



We recognise that there is significant upward pressure on CRI performance and to maintain stable performance requires intervention including maintenance, operations and capital investment.

We have determined a number of activities to maintain stable performance from 2020 – 2022. Due to the volatility associated with CRI, it is very challenging to define specific and accurate benefits to each activity. Instead, we will use all measures to deliver a collective benefit, using the improvements we have made using this approach since 2017 as evidence that a holistic approach can deliver the performance levels forecast. These summary activities are shown in the graph below, with named activities, which have been identified through the improvement plan exercise, included in following table.



Improvement Initiative Description	Business Case	base / Enhancement
Competent Operator, Licence to Control, RAMS, Valve Ops, Flushing, RTS, hydraulics and transients, WQ Awareness, EUSR, DWSP Awareness, Introduction to Water Treatment,	Opex	base
Aluminium and DOMS Flushing	Flushing	base
Storage Programme including Sample Lines and CFD modelling Enhanced monitoring, Inspection using risk based approach	Non- Infra	base
Satellite imagery, production perimeter checks, landowner engagement	Catchment	base
Cytometry, equipment, processes, sample points	Opex	base
Site standards, estates GM, site signage, Love Where You Work	Opex	base
Network MOTs, NRVs, surge vessels	Network Calming	Enhancement
Supply chain, 3rd party and developers. Including fire hydrant use	Opex	base
Investment in treatment facilities at Egham and Iver	Egham Iver	Enhancement

The drinking water quality schemes we have proposed for 2025 – 2030 will also play a part in maintaining our CRI performance at our current level by preventing exceedances of drinking water standards in the future. We believe we will achieve a small improvement in our CRI score in the final year of 2025 – 2030 as a result of the cumulative effect of all initiatives and schemes.

Longer term to 2035, a CRI score of 0.9 will continue to be our forecast. Given challenges described this will continue to be a stretching target but also recognises that the significant step changes we have made across 2020 – 2025 and forecast to make by 2030. The underlying upward pressure on CRI will continue, so a static target represents a challenging target.

CW6.30: Event Risk Index

Our Event Risk Index (ERI) performance for 2022 has been calculated by summing the ERI scores for the ten events we reported to DWI during the year, giving a total of 25. A screenshot of the event details is below.

Notified date	DWI Ref	Closed date (by DWI)	Reportable Incident	WSZs Affected	WTW	Brief description	Classification	DWI ERI Score	Population Affected	Duration of Event (hours)	Seriousness Score	DWI Assessment Score	AFW Estimated ERI Score
18/02/2022	8445	25/05/2022	Coagulant Dosing Failure at Egham WTW	Z063, Z064,	Egham	Coagulant dosing failure	SIGNIFICANT	0.617	292174	2	2	2	0.616760
22/02/2022	8451	01/03/2022	Lead exceedence at a single domestic property	Z048	Clay Lane 36	Lead exceedence after flushing	MINOR	0.000	2	73	4	1	0.000154
16/06/2022	8553	03/08/2022	High Road, Eastcote, HA5 2EY	Z087	Iver	18" burst main	NOT SIGNIFICANT	3.379	48500	88	1	3	3.378551
19/07/2022	8608	22/09/2022	Lead exceedence at a single domestic property	Z012	Newport	Lead exceedence after flushing	MINOR	0.001	5	72	4	3	0.001140
01/08/2022	8642	05/08/2022	Boil Water Notice Silwood Road, Sunninghill	Z064	Egham	Detection of coliforms following mains	MINOR	0.000	7	72	3	1	0.000399
17/08/2022	8670	24/08/2022	Water Supply Issue at Harrow Crown Court	Z056	Iver	Black tinged water at Harrow Crown C	MINOR	0.002	50	48	3	1	0.001900
20/08/2022	8676	25/08/2022	Solvent Odour Mimran Road Hertford	Z021	Wadesmill, M	Solvent Oodur in supply to five comme	MINOR	0.001	12	72	3	1	0.000684
08/09/2022	8720	15/09/2022	Lead exceedence at a single domestic property	Z087	Iver	Lead exceedence after flushing	MINOR	0.000	2	72	3	1	0.000114
19/10/2022	8786	21/10/2022	The White Lion Public House, St Albans Road,	Z046	Grove	Detection of coliforms following mains	NOT SIGNIFICANT	0.000	2	72	2	1	0.000076
20/12//2022	8880	12/04/2023	Loss of Supplies in Bishop Stortford	Z018	Causeway, I	Loss of supply following freeze/thaw	SIGNIFICANT	21.362	41838	215	3	3	21.361746
								25.362					25.361524

Our ERI scores for the first three years of AMP7 have been 24 in 2020, 150 in 2021 and 25 in 2022. At PR19 we forecast our ERI performance to be 100 across 2020 – 2025 and our performance over the first three years has been broadly in line with this forecast.

Our average ERI performance for the first three years of 2020 – 2025 has been 66. For forecasting performance for the rest of 2020 – 2025 and 2025 – 2030 we have used this average figure as a starting point and factored in a small improvement because of the controls, procedures and processes we have in place to give a score of 50.

CW6a: Transition and accelerated programme - Water network+ - Mains, communication pipes and other data

This table is deliberately blank as transitional and accelerated funding will be used to ensure capital projects are delivered on time; however, this will not result in any asset changes prior to the initial dates.

CW7: Demand management - Metering and leakage activities

The number of smart meters installed in AMP7 through the accelerated funding scheme and its associated costs, are only included in CW17 and CW7a and not in CW7.

All the 2025 – 2030 costs are based on the 2022-23 costs provided by our installation contractor and current meter supplier.

CW7.1: New optant meter installation for existing customers

For 2020 – 2025 we forecasted to install 17,549 with a total cost of £4,635,280. This is in line with our Metering Programme Definition Document cost forecasts.

From year 1 to year 3 we have installed 11,190 meters at a cost of £3,719,233. We have been on target on costs throughout year 1 to year 3.

The 2025 – 2030 numbers are based on a forecast from the metering team. We are expecting to see fewer optants in 2025 – 2030 compared to 2020 – 2025 as the total meter penetration increases.

Costs for optant meter installations within the smart network (AMI) are split between enhancement for the technology uplift and base for meter and installation.

Technology uplift includes the comms module and any non-meter costs. For non-meter costs, we have included the cost of property surveys, OSV installations, field investigations, internal fixed costs, IT and comms but exclude smart metering infrastructure costs. These are added up and then divided by the total number of meters.

Costs for optant meter installations outside the smart network (AMR) are all base. That includes the cost of the meter and its installation.

We have forecasted that 50% of optants will be simple screw-in installations and the remaining 50% will require a dig and a new or replacement boundary box. A very small number will be internal installations with their cost ranging between the two aforementioned options. We are also expecting the number of installations to reduce during 2025 – 2030.

CW7.2: New selective meter installation for existing customers

For 2020 – 2025 we forecasted to install 200,000 with a total cost of £49,550,000. This is in line with our Metering Programme Definition Document cost forecasts.

From year 1 to year 3 we have installed 122,087 meters at a cost of £30,0289,778. We have been on target on installs and on costs throughout year 1 to year 3.

For 2025 – 2030, these are all enhancement costs based on the number of new selective meters as selected by the WRMP team to achieve 80%-meter penetration by the end of 2025 – 2030.

Costs include the cost of meter with comms module, the cost of installation and any non-meter costs (as described in CW7.1).

For installation costs, we have assumed 50% digs and 50% screw ins. For the digs, we have assumed 50% cost uplift to accommodate for the increasingly difficult installations we will have to do as the meter penetration increases. We have forecasted a flat delivery profile.

CW7.3: New business meter installation for existing customers

For 2025 – 2030, a small number of new business meter installations is forecasted based on 2020 – 2025 performance. We have allocated £8.68m to install 20k smart meters, so this is just a small proportion of that. We have also forecasted a flat annual delivery profile.

CW7.4: Residential meters renewed

For 2025 – 2030 we forecasted to replace 57,000 with a total cost of £11,078,000. This is in line with our Metering Programme Definition Document cost forecasts.

From year 1 to year 3 we have renewed 35,332 meters at a cost of £6,359760. We have been on target on installs and on costs throughout year 1 to year 3.

For 2025 – 2030, this includes AMR to AMI retrofits, proactive basic to AMI replacements of out of life meters and reactive basic to AMI, basic to AMR, AMR to AMI and AMR to AMR replacements.

AMR to AMI retrofits and proactive replacements are all enhancement costs while reactive replacements are split between enhancement and base similarly to optant meters, as described on CW7.1.

Retrofits/upgrades include the cost of the comms module, the cost of the installation of that module and any non-meter costs in enhancement.

Proactive replacements include the cost of the meter with the comms module, the installation costs and any non-meter costs in enhancement.

Reactive replacements include the cost of the comms module and any non-meter costs for AMI meters in enhancement.

Reactive replacements include the cost of the meter and its installation for both AMR and AMI meters in base.

We have forecasted that 35% of replacements jobs will require a dig and a new or replacement boundary box and 65% will be simple screw-in installations.

CW7.5: Business meters renewed

For 2020 – 2025, CW7.5 cost is combined with CW7.4.

For 2025 – 2030, this includes proactive basic and AMR to AMI replacements, reactive basic to AMI, basic to AMR and AMR to AMR replacements.

Proactive replacements are all enhancement costs while reactive replacements are split between enhancement and base similarly to optant meters, as described for CW7.1.

Enhancement costs are all based on our strategy to spend £8.68m to install 20k AMI meters.

Base costs are based on the forecast of volumes and costs provided by the metering team based on our current figures for year 1 to year 3 of 2020 – 2025 which have been extrapolated to the whole of 2020 – 2025. We have then assumed that the same numbers can be applied to 2025 – 2030.

For any proactive replacements we have assumed that we'll start with a small number and ramp up later in 2025 – 2030.

CW7.6: New optant meters installed for existing customers

For 2022-23 we are reporting 4,341 AMR meters installed for existing customers. For the remainder of 2020 – 2025 we are forecasting to install 2,049 in year 4 and 2,000 in year 5, all of which will be AMR meters. Reporting methods are similar to previous years where we used our WMS, Maximo job management systems.

2025 – 2030 Forecast: The total number and annual profile of optant meters was forecasted by the Metering team based on 2015 – 2020 and 2020 – 2025 figures and the fact that there will be fewer customer requests in 2025 – 2030 as the total meter penetration increases.

More specifically, we installed 37,072 optant meters in 2015 – 2020 and we are forecasting 17,549 installs in 2020 – 2025, which represents a 53% reduction. The Universal Metering Programme will resume in 2025 – 2030, and our meter penetration will rise from 73% at the end of 2020 – 2025 to 80% at the end of 2025 – 2030. As a result, we are expecting an even more drastic reduction of optant installations, reaching 83%. based on the above, we are forecasting 3,000 optant installations in 2025 – 2030 with the numbers slowing down during 2025 – 2030.

Our smart metering programme will run over 3 AMPs and approximately one third of our network will become smart every 5 years. Based on that, we are estimating that one third of those optant installations will be within our network in 2025 – 2030, thus 1,000 AMI meters, and the remaining two thirds outside of it, thus 2,000 AMR meters.

A small number has been subtracted from the AMI meters within our network as this will be done through the Accelerated Funding Scheme Smart Metering Pathfinder trial. More specifically, we are planning to do 72,602 new AMI installations in 2025 – 2030, of which, 1,000 will be AMI optant installations, a percentage of 1.38%. Similarly, we have a commitment to install 4,000 new AMI meters in 2020 – 2025 through the Accelerated Funding Scheme and we are estimating that 55 or 1.38% of that will be AMI optant installs. So, for CW7.6 we have subtracted 55 AMI optant installations from the total 1,000 we are forecasting for the whole of 2025 – 2030.

The total number for this line should be:

2,000 AMR meters + 1,000 AMI meters – 55 AMI meters = 2,945 meters

CW7.7: New selective meters installed for existing customers

For 2022-23 we are reporting 46,065 AMR meters installed for existing customers. For the remainder of 2020 – 2025 we are forecasting 40,000 new meters to be installed for existing customers each year all of which will be AMR meters. We have engaged our supply chain to increase meter installations by a further 10,000 per year in 2023-24 and 2024-25 to recover the shortfall to our original plan. While there is a risk, we will fall slightly short of our original 2020 – 2025 plan to install 239,152 meters by 2025, we remain committed to exploring all options to deliver the target.

Reporting methods are like previous years where we used our WMS, Maximo and contractor's WMS to input in our data tables.

The number of new selective meters was selected by the WRMP team in order to achieve 80% meter penetration by the end of 2025 – 2030. It is a flat annual delivery profile.

A small number has been subtracted from the number of new selective meters as this will be done through the Accelerated Funding Scheme Smart Metering Pathfinder trial. More specifically, we are planning to do 71,602 new selective installations in 2025 – 2030, and we have a commitment to install 4,000 new AMI meters in 2020 – 2025 through the Accelerated Funding Scheme. As mentioned above in CW7.6, we are estimating that 55 of those 4,000 new installs will be AMI optant installs, so resulting in 3,945 new selective installs in 2020 – 2025. For CW7.7

reporting we have subtracted 3,945 new selective meters from the total 71,602 we are forecasting for the whole of 2025 – 2030.

The total number for this line should be: 71,602 – 3,945 = 67,657

CW7.8: New business meters installed for existing customers

For 2022-23 we are reporting one basic and 66 AMR business meters installed for existing customers. For the remainder of 2020 – 2025 we are forecasting 50 new meters to be installed for existing customers each year all of which will be AMR meters.

For 2025 – 2030: as we have seen in the first three years of 2020 – 2025, we would expect there to be a small number of business customers each year requesting to be put on a meter. We are forecasting that 250 AMI meters will be installed over the five-year period. This figure is split evenly across the 5 years at 50 meters a year.

Changes from PR19 forecast – this line was only introduced in 2020-21 so no previous forecast figures exist from PR19.

CW7.9: Residential meters renewed

For 2022-23 we are reporting 12,254 meters renewed. For the rest of 2020 – 2025 we are forecasting 11,000 meters to be renewed for both 2023-24 and 2024-25. This is a reduction in PR19 as the request for meters to be renewed is lower than forecasted.

2025 – 2030 *Forecast*

Based on the total number of properties in our region and the maximum meter penetration we can achieve (90%), we calculated that we need to install 1.426m AMI meters. With support from external consultancies (Stantec and PA Consulting), we undertook a cost benefit analysis and reviewed several different delivery profiles. The conclusion drawn was that a 3 AMP roll out was the best option in terms of programme deliverability and benefits realisation. We considered the fact that this would be a completely new metering programme for us and that smart technologies will improve over time, so we decided to start the period 2025 – 2030 a bit slower and ramp up meter installations in 2030-35 and 2035-40. More specifically, it was decided to install 377,165 AMI meters in 2025 – 2030 as this would allow us to achieve our leakage and demand reduction targets. Of those 377,165, and as mentioned in CW7.6 and CW7.7, 71,602 will be new selective meters and 1,000 will be optant meters. The remaining 304,563 will be meters renewed.

This includes the following sub-categories:

- 75,000 AMR meters that will be retrofitted with an AMI comms module that will allow them to connect to the smart network. This will allow us to reduce the costs of the programme and increase the smart meter penetration in specific DMAs. This number was selected by us based on the available AMR meters that fit certain criteria. There is no mathematical model behind this selection, but we believe the number strikes the right balance between replacing old underperforming meters and upgrading existing AMR meters.

- 14,500 reactive replacements of meters that have seized to operate, perform poorly or at a customer's request. These, similar to the optants, are forecasted by the Metering team based on 2020 – 2025 figures. In the period 2020 – 2025, we are forecasting approximately 11k reactive replacements per year based on current performance in Years 1-3. For 2025 – 2030, we are forecasting 20% fewer replacements due to large proactive replacement programme. As a result, we are forecasting 44k reactive replacements in 2025 – 2030.

  Our smart metering programme will run over 3 AMPs and approximately one third of our network will become smart every 5 years. Based on that, we are estimating that one third of those reactive replacements will be within our network in AMP8, thus 14,500 AMI meters, and the remaining two thirds outside of it, thus 29,500 AMR meters. The 29,500 AMR meters are not included in the total number of AMI meters (377.165) we will install in 2025 – 2030 but are included in this line as AMR meters. Based on 2020 – 2025 figures, it is estimated that 75% of all the reactive replacements will be of basic meters and the remaining 25% will be of AMR meters. So, the breakdown of reactive replacements is as follows:

  - 25%*14,500 = 3,625 AMR to AMI meters within our network
  - 75%*14,500 = 10,875 basic to AMI meters within our network
  - 25%*29,500 = 7,375 AMR to AMR meters outside our network
  - 75%*29,500 = 22,125 basic to AMR meters outside our network
- 215,063 proactive replacements of old, past the end-of-life basic meters with new AMI meters. This is what is left if you subtract the 75k retrofits and 14.5k reactive replacements from the total number of 304,563 meters to be renewed.

As above, a number of AMI meters renewed has been subtracted as this will be done through the Accelerated Funding Scheme Smart Metering Pathfinder trial.

More specifically, we are planning to do 304,563 meter replacements (retrofit, reactive and proactive to AMI) in 2025 – 2030 and we have a commitment to do 16,000 replacements in 2020 – 2025 through the Accelerated Funding Scheme so the total number of AMI meters in this line is 304,563 – 16,000 = 288,563.

More specifically, of the total 304,563 AMI meters, 75,000 (25%) will be retrofits/upgrades so in 2020 – 2025, 25%*16,000 = 3,940 will be retrofits and 75,000 – 3,940 = 71,060 will be the number of retrofits in AMP8.

Similarly, of the total 304,563 AMI meters, 229,563 (75%) will be replacements so in AMP7, 75%*16,000 = 12,060 will be retrofits and 229,563 – 12,060 = 217,503 will be the number of replacements in 2025 – 2030.

The number of AMR meters will not be impacted by the Accelerated Funding Scheme Smart Metering Pathfinder trial, so 29,500 AMR meters will be installed in 2025 – 2030.

The total figure for this line should be the sum of those 3 numbers:

229,563 + 71,060 + 29,500 = 318,063

CW7.10: Business meters renewed

For 2022-23 we are reporting 17 basic and 1,089 business meters renewed. For the rest of 2020 – 2025 we are forecasting 1,550 meters to be renewed for both 2023-24 and 2024-25 which is an increase from the PR19 forecast as we have started providing an enhanced meter service for our largest retailer which is showing a 40% increase in meters being renewed.

For 2025 – 2030 we are planning to rollout 19,750 AMI meters to business customers over the 5-year period as part of the smart metering programme which will all be proactive replacements of existing meters, starting with 2.650 meters in 2025-26 and increasing each year to 4.900 by 2029-30.

We are also forecasting that we will have 220 reactive meter replacements each year all of which will be AMR meters. This has been calculated by using data from Maximo to look at all the work orders which have been raised for reactive non-household meter replacements for the first three years of the AMP, split by meter size.

CW7.11: Replacement of basic meters with smart meters for residential customers

For 2022-23 we are reporting 9,720 basic meters being replaced with AMR meters. For the remainder of 2020 – 2025, we are forecasting to do 8,500 for year 4 and 9,000 for year 5. This is calculated from the previous 3 years' average, year 1 6,939, year 2, 8,073 and year 3, 9,720. They average at 8,244. The incremental increase is due to the age of meters getting older and more will need to be replaced.

Reporting methods are like previous years where we used our WMS, Maximo.

Changes from PR19 forecast – this line was only introduced in 2020-21 so no previous forecast figures exist from PR19.

2025 – 2030 Forecast:

Please see detailed description of types of installations in CW7.9.

This line should include:

22,125 basic to AMR reactive replacements outside our network.

10,875 basic to AMI reactive replacements within our network.

215,063 basic to AMI proactive replacements within our network.

The total number of AMI meters is: 10,875 + 215,063 – 12,060 = 213,878

The total number of AMR and AMI meters is: 213,878 + 22,125 = 236,003

As described in CW7.9, 12,060 is the number of replacements that will be done through the Accelerated Funding Scheme Smart Metering Pathfinder trial.

CW7.12: Replacement of AMR meter with AMI meters for residential customers

For 2022-23 we have not used any AMI meters and only use AMR.

2025 – 2030 Forecast

Please see detailed description of types of installations in CW7.9.

This line includes:

75,000 AMR to AMI retrofits/upgrades

3,625 AMR to AMI reactive replacements within our network.

The total number of AMI meters is: 75,000 + 3,625 – 3,940 = 74,685

As described in CW7.9, 3,940 is the number of retrofits/upgrades that will be done through the Accelerated Funding Scheme Smart Metering Pathfinder trial.

CW7.13: Replacement of basic meters with smart meters for business customers

For 2022-23 we are reporting 944 basic meters being replaced with AMR meters. For 2023 – 2025 we are forecasting that 1,350 basic meters will be replaced with AMR meters and zero basic meters to be replaced with AMI meters.

For 2025 – 2030 we are forecasting to replace 17,180 basic meters with AMI meters which will happen as part of the rollout of 19,750 meters as stated in line CW7.10.

Of the 220 reactive meter's renewals in line CW7.10 for each year we are forecasting 190 to be basic meters being replaced with AMR meters each year

Changes from PR19 forecast – this line was only introduced in 2022-23 so no previous forecast figures exist from PR19.

CW7.14: Replacement of AMR meter with AMI meters for business customers

For 2022-23 we are reporting zero AMR meters being replaced with AMI meters.

For 2023 – 2025 we are forecasting that zero AMR meters will be replaced with AMI meters

For 2025 – 2030 we are forecasting to replace 2,570 AMR meters with AMI meters over the five years, which is part of the rollout of the 19,750 AMI meters as stated in line CW7.10.

Changes from PR19 forecast – this line was only introduced in 2022-23 so no previous forecast figures exist from PR19.

CW7.15: New residential meters installed for existing customers – supply-demand balance benefits

For 2022-23 we are reporting 1.497 Ml/d savings. based on the install numbers for 2023 – 2025 we are forecasting 1.55 Ml/d in 2023-24 and 1.54 Ml/d in 2024-25.

For 2025 – 2030 the benefits have been calculated using the PR24 data table line CW7.6 and CW7.7 and the savings from the WRMP, WRMP & PR24_Master_2023, PR24 Links, Line 71, New residential meters installed for existing customers – supply-demand balance benefit – Metering activities – Explanatory variables, Ml/d by year. The total number of meters has been used to calculate the percentage of each meter type. The total saving has then been divided by the meter categories to calculate the benefits per meter type.

CW7.16: New business meters installed for existing customers – supply-demand balance benefits

For 2022-23 we are reporting -0.007 Ml/d savings. Based on the install numbers for 2023 – 2025 and extrapolating 2022-23 figures we are forecasting -0.01 Ml/d in both 2023-24 and 2024-25.

For 2025 – 2030 we are forecasting 0 Ml/d benefit as there are no benefits forecast in the WRMP.

CW7.17: Replacement of basic meter with smart meters for residential customers – supply-demand balance benefit

For 2022-23 we are reporting -0.319 Ml/d savings. based on the replacement numbers for 2023 – 2025 we are forecasting –0.28 Ml/d in 2023-24 and –0.30 in 2024-25.

For 2025 – 2030 the benefits have been calculated using the PR24 data table line CW7.11 and the savings from the WRMP, WRMP & PR24_Master_2023, PR24 Links, Line 73, Replacement of basic meters with smart meters for household customers – supply-demand balance benefit – Metering activities – Explanatory variables, Ml/d by year. The number of AMR and AMI meters forecast to replace basic meters has been used to calculate the percentage of each meter type. The total saving has then been divided by the meter categories to calculate the benefits per meter type.

CW7.18: Replacement of AMR meter with AMI meter for residential customers -supply-demand balance benefit

For 2022-23 we are reporting 0 Ml/d savings due to not replacing with AMI meters. based on the replacement numbers for 2023 – 2025 we are forecasting 0 Ml/d in both 2023-24 and 2024-25.

For 2025 – 2030 we are forecasting 0 Ml/d benefit as there are no benefits forecast in the WRMP.

CW7.19: Replacement of basic meter with smart meters for business customers – supply-demand balance benefit

For 2022-23 we are reporting -0.742 Ml/d savings. based on the replacement numbers for 2023 – 2025 and extrapolating 2022-23 figures we are forecasting –1.35 Ml/d in both 2023-24 and 2024-25.

For 2025 – 2030 we are forecasting 0 Ml/d benefit as there are no benefits forecast in the WRMP.

CW7.20: Replacement of AMR meter with AMI meter for business customers - supply-demand balance benefit

For 2022-23 we are reporting 0 Ml/d savings due to not replacing with AMI meters. based on the replacement numbers for 2023 – 2025 we are forecasting 0 Ml/d in both 2023-24 and 2024-25.

For 2025 – 2030 we are forecasting 0 Ml/d benefit as there are no benefits forecast in the WRMP.

CW7.21: Residential properties - meter penetration

For 2022-23, we are reporting 67.67% meter penetration as per APR. Our forecast for 2020 – 2025 is based on the PR19 forecast for optant, new selective and new builds.

For 2025 – 2030, our forecast is based on the number of optants and new selective meters as presented in CW7.6 and CW7.7 respectively. With regards to new builds, this is based on the work done by Edge Analytics for the Developer Experience Low Growth profile in WRMP. Please refer to SUP1a commentary for details on growth profiles.

New selective meters are all AMI meters as described in CW7.7.

Optant meters are split between AMR and AMI as described in CW7.6.

For new builds, in WRMP we have assumed that all meters are AMR. However, a number of those meters will be AMI ready which will be read in AMR mode until a smart network becomes available.

The 4,000 new meter installations that will be done through the Accelerated Delivery Funding Project have been subtracted from the total of optants and new selective meters for 2025 – 2030.

CW7.22: Per capita consumption (measured)

For 2022-23 we are reporting 137.50 l/prop/d as per APR. Our forecast for 2020 – 2025 and 2025 – 2030 is based on a normal year with a low population growth, therefore our measured per capita consumption is reducing by 6.9 litres in 2023-24 and continues to reduce until the end of 2025 – 2030 which is in line with our target for overall per capita consumption.

CW7.23: Per capita consumption (unmeasured)

For 2022-23 we are reporting 187.19 l/prop/d as per APR. Our forecast for 2020 – 2025 and 2025 – 2030 is based on a normal year with a low population growth, therefore our unmeasured per capita consumption is reducing by 27.7 litres in 2023-24 and continues to reduce until the end of 2025 – 2030 which is in line with our target for overall per capita consumption.

CW7.24: New meter installation - residential property - cost per property

For 2025 – 2030, this is split between AMI and AMR meters.

For AMI meters, this is the total enhancement cost for optants plus the total enhancement cost of new selective meters divided by the total number of AMI optants plus the total number of AMI new selective meters.

For AMR meters, this is the base cost for optants divided by the total number of AMR optants.

There are no new selective AMR meters, so the only contribution is from the optants.

All the above costs and installation numbers are presented in detail in CW7.1, CW7.2, CW7.6 and CW7.7

CW7.25: New meter installation - business property - cost per property

For 2025 – 2030, this is the total enhancement cost of new business meters divided by the total number of new business meters installed.

All the above costs and installation numbers are presented in detail in CW7.3 and CW7.8.

CW7.26: Replacement of existing basic meter - residential property - cost per property - total cost

For 2025 – 2030 this is split between AMI and AMR meters.

For AMI meters, we have proactive basic to AMI replacements plus reactive basic to AMI which have costs in enhancement and base.

For AMR meters, we have reactive basic to AMR replacements with all costs in base.

All the above costs and installation numbers are presented in detail in CW7.4 and CW7.9.

CW7.27: Replacement of existing basic meter - residential property - enhancement element of total cost

AMI meters: Proactive replacements are all enhancement. Reactive replacements inside the smart network are enhancement for the communication module / smart element.

AMR meters: Reactive replacements outside the smart network are all base. Reactive replacements inside the smart network are base for meter and installation costs.

All the above costs and installation numbers are presented in detail in CW7.4 and CW7.9.

CW7.28: Replacement of existing basic meter - business property - cost per property - total cost

For 2025 – 2030, this is split between AMI and AMR meters.

For AMI meters, as described in detail in CW7.5, these are all basic to AMI replacements.

For AMR meters, as described again in detail in CW7.5, these are all basic to AMR reactive replacements.

CW7.29: Replacement of existing basic meter - business property - enhancement element of total cost

For 2025 – 2030, this is split between AMI and AMR meters.

For AMI, we will use the calculations we used above in CW7.28 but will remove the costs in base. This is the base cost for the reactive AMI replacements within our network multiplied by the percentage of basic to AMI replacements over the total number of AMI replacements).

For AMR, all the costs are in base so the enhancement element will be zero.

CW7.30: Replacement of existing AMR meter - residential property - cost per property - total cost

For 2025 – 2030, this is split between AMI and AMR meters.

For AMI meters, as described in detail in CW7.4, these are all reactive AMR to AMI replacements and the costs are split between enhancement and base.

For AMR meters, as described in detail in CW7.4, these are all reactive AMR to AMR replacements and the costs are all in base.

CW7.31: Replacement of existing AMR meter - residential property - enhancement element of total cost

For 2025 – 2030, this is split between AMI and AMR meters.

For AMI, we will use the calculations we used above in CW7.30 but will remove the costs in base.

For AMR, all the costs are in base so the enhancement element will be zero.

CW7.32: Replacement of existing AMR meter - business property - cost per property - total cost

For 2025 – 2030, this is split between AMI and AMR meters.

For AMI meters, as described in detail in CW7.5, these are all AMR to AMI replacements.

For AMR meters, as described in detail in CW7.5, these are all AMR to AMR reactive replacements.

CW7.3: Replacement of existing AMR meter - business property - enhancement element of total cost

For 2025 – 2030, this is split between AMI and AMR meters.

For AMI, we will use the calculations we used above in CW7.32 but will remove the costs in base. This is the base cost for the reactive AMI replacements within our network multiplied by the percentage of AMR to AMI replacements over the total number of AMI replacements.

For AMR, all the costs are in base so the enhancement element will be zero.

CW7.34: Upgrade of existing basic meter - residential property - cost per property - total cost

For 2025 – 2030 we are reporting zero as no basic residential meters will be upgraded.

CW7.35: Upgrade of existing basic meter - residential property - enhancement element of total cost

For 2025 – 2030 we are reporting zero as no basic residential meters will be upgraded.

CW7.36: Upgrade of existing basic meter - business property - cost per property - total cost

For 2025 – 2030 we are reporting zero as no basic business meters will be upgraded.

CW7.37: Upgrade of existing basic meter - business property - enhancement element of total cost

For 2025 – 2030 we are reporting zero as no basic business meters will be upgraded.

CW7.38: Upgrade of existing AMR meter - residential property - cost per property - total cost

A number of AMR meters will be retrofitted with a comms module / smart element that will allow us to connect those meters to our smart network. As described in detail in CW7.4, only the cost of the comms module and cost to install it is included here.

CW7.39: Upgrade of existing AMR meter - residential property - enhancement element of total cost

This is a technology uplift and the whole cost will be enhancement.

CW7.40: Upgrade of existing AMR meter - business property - cost per property - total cost

For 2025 – 2030 we are reporting zero as no AMR business meters will be upgraded.

CW7.41: Upgrade of existing AMR meter - business property - enhancement element of total cost

For 2025 – 2030 we are reporting zero as no AMR business meters will be upgraded.

CW7.42: New meter installation – residential property – benefits per meter installation

Litres per day benefits from new meter installations in residential properties. Our estimates of water saved through meter replacements are consistent with our WRMP. There are blank cells on this line as these activities are not planned to be undertaken by the company.

CW7.43: New meter installation – business property – benefits per meter installation

Litres per day benefits from new meter installations in business properties. Our estimates of water saved through meter replacements are consistent with our WRMP. There are blank cells on this line as these activities are not planned to be undertaken by the company, the benefits for new business meter installation are 0 litres as no new business meters are forecast in the WRMP.

CW7.44: Replacement of existing basic meter – residential property – benefit per meter installation

Litres per day benefit from replacing basic meters in a residential property. Our estimates of water saved through meter replacements are consistent with our WRMP. There are blank cells on this line as these activities are not planned to be undertaken by the company.

CW7.45: Replacement of existing basic meter – business property – benefit per meter installation

Litres per day benefit from replacing AMR meters in a residential property. Our estimates of water saved through meter replacements are consistent with our WRMP. There are blank cells on this line as these activities are not planned to be undertaken by the company.

CW7.46: Replacement of existing AMR meter – residential property – benefit per meter installation

Litres per day benefit from replacing AMR meters in a residential property. Our estimates of water saved through meter replacements are consistent with our WRMP. There are blank cells on this line as these activities are not planned to be undertaken by the company.

CW7.47: Replacement of existing AMR meter – business property – benefit per meter installation

Litres per day benefit from replacing AMR meters in a business property. Our estimates of water saved through meter replacements are consistent with our WRMP. There are blank cells on this line as these activities are not planned to be undertaken by the company.

CW7.48: Upgrade of existing basic meter – residential property – benefit per meter installation

There are blank cells on this line as these activities are not planned to be undertaken by the company, this is consistent with our WRMP.

CW7.49: Upgrade of existing basic meter – business property – benefit per meter installation

There are blank cells on this line as these activities are not planned to be undertaken by the company, this is consistent with our WRMP.

CW7.50: Upgrade of existing AMR meter – residential property – benefit per meter installation

There are blank cells on this line as these activities are not planned to be undertaken by the company, this is consistent with our WRMP.

CW7.51: Upgrade of existing AMR meter – business property – benefit per meter installation

There are blank cells on this line as these activities are not planned to be undertaken by the company, this is consistent with our WRMP.

CW7a: Transition and accelerated programme – Metering activities

We are only installing AMI meters as part of our accelerated programme so have only populated columns G and I for the relevant lines described below. All other columns are intentionally left blank.

CW7a.1: New optant meter installation for existing customers

Figures have been copied from CW17.

CW7a.2: New selective meter installation for existing customers

Figures have been copied from CW17.

CW7a.3: New business meter installation for existing customers

This line is intentionally left blank as no business meters will be installed through this accelerated programme.

CW7a.4: Residential meters renewed

Figures have been copied from CW17.

CW7a.5 Business meters renewed

This line is intentionally left blank as no business meters will be renewed through this accelerated programme.

CW7a.6: New optant meters installed for existing customers

For our 2025 – 2030 smart metering programme, we will install 72,602 new AMI meters, 1,000 (1.38%) of which will be optants and 71,602 (98.62%) will be new selective meters. For the accelerated programme, we have committed to install 4,000 new meters and we used the same 1.38/98.62% split to calculate how many optants and new selective meters we will install. The result is 55 optants and 3,945 new selective AMI meters.

CW7a.7 New selective meters installed for existing customers

For our 2025 – 2030 smart metering programme, we will install 72,602 new AMI meters, 1,000 (1.38%) of which will be optants and 71,602 (98.62%) will be new selective meters. For the accelerated programme, we have committed to install 4,000 new meters and we used the same 1.38/98.62% split to calculate how many optants and new selective meters we will install. The result is 55 optants and 3,945 new selective AMI meters.

CW7a.8: New business meters installed for existing customers

This line is intentionally blank as no business meters will be installed through this accelerated programme.

CW7a.9 Residential meters renewed

We have committed to renew 16,000 meters.

CW7a.10 - Business meters renewed

This line is intentionally blank as no business meters will be renewed through this accelerated programme.

CW7a.11: Replacement of basic meters with smart meters for residential customers

For our 2025 – 2030 smart metering programme, we will renew 304,563 meters, 229,563 (75%) of which will be from basic to AMI and 75,000 (25%) will be from AMR to AMI. For the accelerated programme, we have committed to renew 16,000 meters and we used the same 75/25% split to calculate how many basic and how many AMR meters we will replace. The result is 12,060 replacements from basic to AMI and 3,940 replacements/upgrades from AMR to AMI.

CW7a.12: Replacement of AMR meter with AMI meters for residential customers

For our 2025 – 2030 smart metering programme, we will renew 304,563 meters, 229,563 (75%) of which will be from basic to AMI and 75,000 (25%) will be from AMR to AMI. For the accelerated programme, we have committed to renew 16,000 meters and we used the same 75/25% split to calculate how many basic and how many AMR meters we will replace. The result is 12,060 replacements from basic to AMI and 3,940 replacements/upgrades from AMR to AMI.

CW7a.13: Replacement of basic meters with smart meters for business customers

This line is intentionally blank as no business meters will be replaced through this accelerated programme.

CW7a.14: Replacement of AMR meter with AMI meters for business customers

This line is intentionally blank as no business meters will be replaced through this accelerated programme.

CW7a.15: New residential meters installed for existing customers – supply-demand balance benefits

The Ml/d benefits from installing new residential meters for existing customers was calculated by taking the 0.3 ML/d saving included in the smart metering accelerated funding bid and dividing that by the percentage of new meters (based on the figures in CW7a lines 7.6, 7.7, 7.11 and 7.12).

CW7a.16: New business meters installed for existing customers – supply-demand balance benefits

This line is deliberately left blank as we do not plan to undertake this activity.

CW7a.17: Replacement of basic meter with smart meters for residential customers – supply-demand balance benefit

The Ml/d benefits from installing replacement basic residential meters for existing customers was calculated by taking the 0.3 ML/d saving included in the smart metering accelerated funding bid and dividing that by the percentage of basic replacement meters (based on the figures in CW7a lines 7.6, 7.7, 7.11 and 7.12).

CW7a.18: Replacement of AMR meter with AMI meter for residential customers -supply-demand balance benefit

The Ml/d benefits from installing replacement AMR residential meters for existing customers was calculated by taking the 0.3 ML/d saving included in the smart metering accelerated funding bid and dividing that by the percentage of AMR replacement meters (based on the figures in CW7a lines 7.6, 7.7, 7.11 and 7.12).

CW7a.19: Replacement of basic meter with smart meters for business customers – supply-demand balance benefit

This line is deliberately left blank as we do not plan to undertake this activity.

CW7a.20: Replacement of AMR meter with AMI meter for business customers -supply-demand balance benefit

This line is deliberately left blank as we do not plan to undertake this activity.

CW7a.21: Residential properties - meter penetration

This line is deliberately left blank.

CW7a.22: Per capita consumption (measured)

This line is deliberately left blank.

CW7a.23: Per capita consumption (unmeasured)

This line is deliberately left blank.

CW8: WRMP schemes (excluding leakage and metering activities)

CW8.1: Supply-demand balance improvements delivering benefits starting from 2031 (AFW_AZ3_HI-IMP_AZ3_ALL_guc3 50 phase 1 lb: GUC Option 3)

This is the bulk transfer of raw water from Severn Trent through the utilisation of the existing infrastructure of the Grand Union Canal. It is scheduled to become operational in 2030-31 and will deliver a WAFU benefit of approximately 100 Ml/d.

- Capex prior to 2025-26 has been determined using Cexall Reports from the Affinity Water Procurement system. The associated cost is the aggregate value of all current and previous POs from the report. The forecasted capex for AMP8 is taken from the Affinity Water CBA.
- Opex is 0 for in AMP values as the option is not delivered until 2030/31, post AMP8. For post AMP8, opex is determined using the "Internal Interconnectors" table. The average of the opex, post implementation, for the planning period is used for "post 2029-30" opex.

Benefit - The design maximum flow for the transfer is 100 Ml/d.

This scheme is not an internal interconnector, so the final set of columns have not been completed.

CW8.2: Supply-demand balance improvements delivering benefits starting from 2031 (AFW_STR_HI-RSR_RE1_CNO_abingdon150(lon): SESRO 150mm3)

This option is a large Surface Water Storage Reservoir located in Abingdon, the construction of which will benefit Thames Water, Southern Water and Affinity Water. In current, the cost of the option is split between the three countries proportional to usage. Affinity Water is currently slated to pay 15% and therefore has a licence to 15% of the WAFU.

- Capex prior to 2025-26 has been determined using Cexall Reports from the Affinity Water Procurement system. The associated cost is the aggregate value of all current and previous purchase orders(POs) from the report. The forecasted capex for 2025 – 2030 is taken from the Affinity Water CBA.
- Opex is 0 for in 2025 – 2030 values as the option is not delivered until 2039-40, post 2025 – 2030. For post 2025 – 2030, opex is determined using the "Internal Interconnectors" table. The average of the opex, post implementation, for the planning period is used for "post 2029-30" opex.

- Benefit – There is no assigned Ml/d benefit as SESRO does not provide an additional WAFU benefit to an Affinity Water zone.
- This scheme is not an internal interconnector, so the final set of columns have not been completed.

CW8.3: Supply-demand balance improvements delivering benefits starting from 2031 (AFW_RA4_HI-TFR_UTC_CNO_ltr_2a_conv100_p1: Thames to Affinity Transfer Stage 1)

This is a Raw Water Transfer Option designed to allow Affinity Water to transfer their proportion of WAFU from Abingdon to their water resource zones. The Option is modular and the decision on whether 50 Ml/d or 100 Ml/d is to be selected, is still ongoing.

- Capex prior to 2025-26 has been determined using Cexall Reports from the Affinity Water Procurement system. The associated cost is the aggregate value of all current and previous POs from the report. The forecasted capex for 2025 – 2030 is taken from the Affinity Water CBA.
- Opex is 0 for in 2025 – 2030 values as the option is not delivered until 2044-45, post 2025 – 2030. For post 2025 – 2030, opex is determined using the "Internal Interconnectors" table. The average of the opex, post implementation, for the planning period is used for "post 2029-30" opex.
- Benefit – There is an assigned WAFU benefit of 50 Ml/d, which is the maximum benefit of the option.
- This scheme is not an internal interconnector, so the final set of columns have not been completed.

CW8.4: Demand-side improvements delivering benefits in 2025-2030 (excl leakage and metering) (Customer side demand management)

This option is an amalgamation of smaller demand side management options into a single option as has been done previously in PR19 and the following three APRs (APR21 – APR23). The options included are HWECs, BWECs, Wastage Reductions and Tariffs.

- There is no Capex associated with this option.
- The opex is derived from the Master Demand Submission Spreadsheet and is the summation of the opex of the above demand management options.
- Benefit – Demand Saving Benefit is cumulative and not reported for pre- or post-2025 – 2030.
- This scheme is not an internal interconnector and therefore the remaining cells have been left blank.

CW8.5: Supply-side improvements delivering benefits in 2025-2030 (AFW_AZ7_HI-GRW_ALL_ALL_tappingtonsouth: Tappington South)

AFW_AZ7_HI-GRW_ALL_ALL_tappingtonsouth: Tappington South: Is a small new groundwater scheme in AFWDR7. The scheme is expected to be delivered in 2029-30 and on completion will deliver a Ml/d benefit of 0.6 Ml/d.

- There is no capex expenditure prior to 2025 – 2030. Capex for 2025 – 2030 has been determined using Table 5a. 'Cost Profiles' of the rdWRMP24 Tables. As the option is expected to be delivered in 2030-31, there is no capex recorded for 2025 – 2030.
- Opex is 0 for in 2025 – 2029 values as the option is not delivered until 2029-30, where the opex first begins. For post 2025 – 2030, opex is determined using Table 5a from the WRMP. Cost Profile and utilisation is determined by the option utilisation in the BVP.
- Benefit - The design maximum utilisation for the new groundwater source is 0.6 Ml/d.

This scheme is not an internal interconnector, so the final set of columns have not been completed.

CW8.6: Supply-side improvements delivering benefits in 2025-2030 (AFW_tra-cockfoscon: Cockfosters)

The connection is an import which was commissioned in June 2023 in order to provide resilience against any supply issues produced by High Speed 2 (HS2) while the project is under construction. The transfer is scheduled to start to be utilised in 2029-30, however, there are outstanding discussion with Thames therefore associated capex and opex may change.

- There is no capex expenditure prior to 2025 – 2030. Capex for AMP8 has been determined using Table 5a. 'Cost Profiles' of the rdWRMP24 Tables. As the option is expected to be delivered in 2029-30, there is no capex recorded for post 2025 – 2030.
- Opex: the option is expected to be delivered in 2029-30 and ceases usage upon delivery of the GUC in 2030-31. Therefore there is only 1 year of opex costs for Cockfosters derived from Table 8 Export, which is derived from the WRSE IVM.
- Benefit - The option benefit is provided in WAFU, with each year of operation representing the total capacity of the transfer, 5 Ml/d.

CW8.7: Supply-side improvements delivering benefits in 2025-2030 (AFW_tra-pericon: Perivale)

The connection is an existing import which was commissioned in order to provide resilience against any supply issues produced by High Speed 2 (HS2) while the project is under construction. The transfer is scheduled to start to be utilised in 2025-26, however, there are outstanding discussion with Thames therefore associated capex and opex may change.

- There is no capex expenditure prior to 2025 – 2030. Capex for 2025 – 2030 has been determined using Table 5a. 'Cost Profiles' of the rdWRMP24 Tables. As the option is expected to be delivered in 2025-26, there is no capex recorded for post 2025 – 2030.
- For 2025 – 2030, opex is determined using Tab 8 Export from rdWRMP24 Tables. This Tab is derived from the IVM and proportions opex based on utilisation in

the reported pathway. Opex ceases after 2029-30 due to the delivery of the GUC and the transfer no longer being required.
- Benefit – The option benefit is provided in WAFU, with each year of operation representing the total capacity of the transfer, 10 Ml/d.

CW8.8: Internal interconnectors delivering benefits in 2025-2030 (AFW_AZ2_HI-ROC_NET_ALL_grovevalve: The Grove valve -Licence Re-Location BPS transfer)

Grove Value Licence is a 25 Ml/d transfer designed to transfer water between HDZ in the Central Region. It will be delivered in 2029-30 with a maximum flow of 25 Ml/d

- There is no capex expenditure prior to 2025 – 2030. Capex for 2025 – 2030 has been determined using Table 5a. 'Cost Profiles' of the rdWRMP24 Tables. As the option is expected to be delivered in 2029-30, there is no capex recorded for post AMP8.
- There is only one year of opex in 2025 – 2030 as the scheme is delivered in 2029-30. 2025 – 2030 Opex is determined using Tab 5. Cost Profiles from the rdWRMP24 Tables.
- Benefit - The design maximum flow for the internal interconnector is 25 Ml/d. This is taken from Table 4 of the rdWRMP24 tables, shown below.
- This scheme is an internal interconnector and the relevant metrics come from a table provided by the Project Technical Lead, which is included in the evidence folder and shown below.

CW8.9: Internal interconnectors delivering benefits in 2025-2030 (AFW_midwaynorthbps: Midway North BPS upgrade)

The Midway North BPS upgrade is a scheme developed for the Connect 2050 project which increases our already established WRZ6 to WRZ4 transfer by 8 Ml/d.

- There is no capex expenditure prior to 2025 – 2030. Capex for 2025 – 2030 has been determined using Table 5a. 'Cost Profiles' of the rdWRMP24 Tables. As the option is expected to be delivered in 2029-30, there is no capex recorded for post 2025 – 2030.
- There is only one year of opex in 2025 – 2030 as the scheme is delivered in 2029-30. 2025 – 2030 Opex is determined using Table 8 export which derives utilisation and therefore opex from the WRSE IVM.
- Benefit - The design maximum flow for the internal interconnector is 8 Ml/d. This is taken from Table 4 in the rdWRMP24 tables, shown below.
- This scheme is an internal interconnector and the relevant metrics come from a table provided by the Project Technical Lead, which is included in the evidence folder and shown below.

CW8.10: Internal interconnectors delivering benefits in 2025-2030 (AFW_AZ4_HI-TFR_AZ6_ALL_egham2iver22: Egham to Iver 22 ML/D)

The Egham to Iver 22 Ml/d option is an inter-zonal transfer between AFWWY6 and AFWPN4. The option is first implemented in 2029-30:

- There is no capex expenditure prior to 2025 – 2030. Capex for 2025 – 2030 has been determined using Table 5a. 'Cost Profiles' of the rdWRMP24 Tables. As the option is expected to be delivered in 2029-30, there is no capex recorded for post 2025 – 2030.
- There is only one year of opex in 2025 – 2030 as the scheme is delivered in 2029-30. AMP8 Opex is determined using Table 8 export which derives utilisation and therefore opex from the WRSE IVM.
- Benefit - The design maximum flow for the internal interconnector is 20 Ml/d. This is taken from Table 4 in the rdWRMP24 tables, shown below.
- This scheme is an internal interconnector and the relevant metrics come from a table provided by the Project Technical Lead, which is shown below.

Table 4: WC Level - Options Appraisal Summary			
WRMP24 Reference	Option ID	Option Name	Capacity Ml/d
51cP	AFW_AZ4_HI-TFR_AZ6_ALL_egham2iver22	Egham to Iver 22MLD	20
51cP	AFW_midwaynorthbps	Midway North BPS upgrade	8
51cP	AFW_AZ2_HI-ROC_NET_ALL_grovevalve	The Grove valve -Licence Re-Location BPS transfer	25

Figure 1: Table 4 showing capacity of Internal Interconnectors

		Complete for internal interconnectors only					
WRMP Scheme	Business Case	Length (km)	Diameter (mm)	Pipe material (text-freeform)	Pumping capacity installed (kW)	Storage capacity installed (m³)	Comments
Egham to Iver	Connect 2050 - WRMP	10.6	700	HPPE/DI	310		WRZ interconnector - WRMP
The Grove valve -Licence Re-Location BPS transfer	Connect 2050 - WRMP				151		WRZ interconnector - WRMP
Stanwell Moor Upgrade(aka Midway North)	Connect 2050 - WRMP				385		WRZ interconnector - WRMP
DO Wey	Connect 2050 - WRMP						2 GAC absorbers at Chertsey and 1 GAC absorber at Walton. Total Capacity 40Ml/day - WAFU WRMP
Hadham Mill	50% C2050 - Resilience/50% WINEP - SR					20000	Resilience - SPOF LTDS
Hills	C2050 - Resilience					10000	Resilience - SPOF LTDS
Ickenham (to Harrow)	WINEP - SR	10.7	650	HPPE/DI	181		Needed for all Sustainability Reductions
Heronsgate 2	WINEP - SR	12.8	650	HPPE/DI	281		Needed for all Sustainability Reductions
Markyate	WINEP - SR	1.1	250	HPPE/DI	6		Redbourne Resilience
Park Ln	WINEP - SR	4.5	250	HPPE/DI	9		Codicote resilience
Periwinkle	WINEP - SR	3.2	350	HPPE/DI	20		Kensworth Lynch Resilience
Whitwell Pumps at Kings Walden site	WINEP - SR	0.5	250	HPPE/DI	14		Kings Walden Resilience
Offley Pumps at Kings Walden site	WINEP - SR				23		Kings Walden Resilience
Preston toward North BPS at Preston site	WINEP - SR				106		Kings Walden Resilience
Bulls Green to Preston at Bulls Green site	WINEP - SR				160		Kings Walden Resilience

Figure 2: Internal Interconnectors metrics provided by Technical Lead.

CW8 to CW3 alignment

The expenditure for WRMP schemes reported in CW8 have included the consideration of real price effects and frontier shift efficiency. To maintain consistency with other tables, the expenditure without any real price effects or frontier shifts are reported in table 1 below, aligning to CW3.

In addition to the variances seen in the expenditure, the classification column used to capture the expenditure cost categories for the WRMP schemes have been reported against different lines in CW3. They can be mapped against CW3 lines in the table 2

Scheme name	Capital expenditure (£m) - *Without RPE & FS* pre-2025-26	2025-26	2026-27	2027-28	2028-29	2029-30	After 2029-30	Opex costs (£m) - *Without RPE & FS* 2025-26	2026-27	2027-28	2028-29	2029-30	After 2029-30
GUC option 3 100 Ml/d LB	3.329	3.235	3.227	3.227	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	23.963
SESRO 150mm3	0.911	5.737	5.737	11.453	6.281	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.787
Thames to Affinity Transfer Stage 1	2.083	0.000	0.000	1.336	2.671	2.671	0.000	0.000	0.000	0.000	0.000	0.000	2.318
Customer side demand management		0.000	0.000	0.000	0.000	0.000	0.000	2.060	2.060	2.060	2.060	2.060	6.163
Tappington South	0.000	0.136	0.171	0.205	0.171	0.000	0.000	0.000	0.000	0.000	0.000	0.029	0.034
Cockfosters	0.000	0.000	0.000	0.000	1.194	0.000	0.000	0.000	0.000	0.000	0.000	0.396	0.000
Perivale	0.000	2.215	0.000	0.000	0.000	0.000	0.000	0.594	0.594	0.594	0.594	0.594	0.000
The Grove valve - Licence Re-Location BPS transfer	0.000	0.000	0.000	0.000	2.882	0.000	0.000	0.000	0.000	0.000	0.000	0.235	0.235
Midway North BPS upgrade	0.000	0.000	0.000	0.000	1.124	0.000	0.000	0.000	0.000	0.000	0.000	0.235	0.235
Egham to Iver 22MLD	0.000	10.340	17.233	24.216	17.233	0.000	0.000	0.000	0.000	0.000	0.000	0.217	0.217

Table 1 WRMP expenditure reported without the consideration of real price effects and frontier shifts.

Table 2 Expenditure Classification mapping to CW3

Scheme name	CW8 Classification	CW3 Classification
GUC option 3 100 Ml/d LB	Supply-demand balance improvements delivering benefits starting from 2031	Supply-demand balance improvements delivering benefits starting from 2031
SESRO 150mm3	Supply-demand balance improvements delivering benefits starting from 2031	Supply-demand balance improvements delivering benefits starting from 2031
Thames to Affinity Transfer Stage 1	Supply-demand balance improvements delivering benefits starting from 2031	Supply-demand balance improvements delivering benefits starting from 2031
Customer side demand management	Demand-side improvements delivering benefits in 2025 – 2030 (excl leakage and metering)	Allocated across metering lines
Tappington South	Supply-side improvements delivering benefits in 2025 – 2030	Supply-side improvements delivering benefits in 2025 – 2030
Cockfosters	Supply-side improvements delivering benefits in 2025 – 2030	Supply-side improvements delivering benefits in 2025 – 2030
Perivale	Supply-side improvements delivering benefits in 2025 – 2030	Supply-side improvements delivering benefits in 2025 – 2030
The Grove valve - Licence Re-Location BPS transfer	Internal interconnectors delivering benefits in 2025 – 2030	Supply-side improvements delivering benefits in 2025 – 2030
Midway North BPS upgrade	Internal interconnectors delivering benefits in 2025 – 2030	Supply-side improvements delivering benefits in 2025 – 2030
Egham to Iver 22MLD	Internal interconnectors delivering benefits in 2025 – 2030	Supply-side improvements delivering benefits in 2025 – 2030

CW9: Enhancement expenditure analysis (cumulative) – water resources and water network plus

This table was built upon the corresponding data from CW3.

Each investment forecast line (Cost driver) was assessed against the original investment details to determine the beginning of the benefits delivery period and any expenditure which is beyond the onset of benefits delivery.

Since these investments were assessed at investment cost forecast line (broken down to driver and price control level), this gives the relevant level of detail to correctly populate this table.

Typically, beneficial use of the scheme where the output is a new physical asset is linked to financial completion. Snagging items do not usually prevent us from being able to use the asset, even if some expenditure falls into subsequent years (e.g. release of retention or defects liability).

In-year benefit is appropriate for programmes of work such as metering and catchment management, where expenditure is profiled across the period 2025 – 2030, but benefits are realised on completion of specific items (e.g. the installation of a single meter or the completion of a catchment cover crop scheme).

We confirm we are compliant with the guidance for this table.

CW10: Wholesale water local authority rates

Summary

Our forecast for Business Rates is based on the determination agreed with the Valuation Office Agency (VoA) in Spring 2023, for the coming 5 year period. We have invested resource and effort in working with the VoA and have secured a reduction in rates for the coming period, which we continue to share with our customers. We have held our forecast RV flat for the remaining years of the 2025 – 2030 period and forecast a small year on year increase based on the escalation of the small business multiplier.

CW10.1: Rateable value

Our forecast rateable value is based on the actual valuation received in 2023 for the next rates period. We have held the rateable value flat for the next period, representing our view of the outcome of the next rates review.

CW10.2-9: Water wholesale local authority rates

Our current ratings settlement is not subject to transitional relief and, given our flat RV forecast for the next review, we do not forecast any transitional relief.

CW10.10-17: Analysis of change in charge before transitional relief

We have no change in rates liability driven by revaluation. We forecast that the current regime, whereby our liability increases annually driven by a change in the small business multiplier will continue throughout the period to 2030.

Affinity Water

CW11: Third party costs by business unit for the wholesale water service

CW11.1-11: Third party costs ~ price control (operating expenditure)

Line CW11.4 contains our forecast costs associated with recharges to third parties who damage our network and matches the revenue reported in table RR9. We base our forecast on past performance, and flat phase the amounts as they are difficult to predict by their nature.

CW11.12-15: Third party costs ~ non price control (operating expenditure)

Line CW11.12 contains our forecast costs of providing a bulk supply to South East Water and is based on their previous take. We forecast costs to remain flat in real terms, this is in line with our approach to efficiency in 2025 – 2030.

CW11.16-22: Third party costs ~ price control (capital expenditure)

Nil value. We are not forecasting any third-party rechargeable capex costs.

CW11.23: Diversions - s185 – capex

The expenditure in this line represents the forecasted diversionary work requested through developer driven growth. It has been assumed that the costs will remain consistent across future years. Diversionary works fluctuates due to changes in government policy and influenced by local council targets, for instances brownfield over greenfield development. Given the unpredictable nature of these factors, we've used historical data to estimate future expenditure.

CW11.24: Diversions - NRSWA - capex

The expenditure in this line represents the forecasted diversionary work requested under New Roads and Street works Act. It has been assumed that the costs will remain consistent across future years and has been determined using historic trends.

CW11.25: Diversions - other non-section 185 diversions - capex

Nil value. We are not forecasting any expenditure on non-section 185 or NRSWA diversions.

CW11.26: Third party costs ~ price control (capital expenditure)

This line is calculated and reflects the forecasts outlined in CW11.22 - CW11.25.

CW11.27-30: Third party costs ~ non price control (capital expenditure)

Nil value - We have reviewed the guidance and arrangements with South East Water and consider it no longer appropriate to recognise any third-party capital expenditure relating to this agreement, as the charge we make to SEW includes a charge for the financing of these assets.

CW12: Transitional spending in the wholesale water service

Why it is efficient to bring the investment forward

The transition funding has 2 core components, the 2025 – 2030 readiness (the people plan) and the Delivery plan for 9 projects. We have worked through all enhancement schemes to understand where delivery risks may be most prevalent and if bringing investment forward will lead to efficiency. A total of £8.105m is suggested within CW12, £3.49m of that is related to 2025 – 2030 readiness.

The below table details each of the 9 projects and why bringing them forward enables efficiency.

Scheme	Detail
WRMP Connect 2050 - Heronsgate to Bovingdon	A 13km 650mm pipeline will take 2-3 years to install depending on resources and labour availability. The new PS will require planning and new power supplies. Planning is becoming more onerous with a number of delays and also conditions applied by local councils which require further work to discharge before construction can begin. We have also experienced increasing power modifications/lack of capacity in the network so early engagement with UKPN across these schemes will require some initial design to secure the power in the correct location which may also require the PS to be moved from our land and therefore land may need to be purchased. Starting the scheme earlier and optioneer/route selection will de-risk the potential programme constraints these process may add. Also working within AONB will add additional issues including Environmental Impact Assessments of any proposed routes.
WRMP Connect 2050 - Egham to Harefield	An 11km pipeline with up to 5 significant infrastructure crossings including M25/M4, West Coast Mainline, Oil Pipelines and other sensitive national communication infrastructure but also a number of potential river crossings including the River Thames This funding is to prepare the route selection and some initial design to commence discussions with these key stakeholders to understand any constraints and commence any consenting process that maybe in place with any of the parties involved in these crossings. This is likely to take 3 years to install with up to a year for design work depending on the number of crossings f national infrastructure.
WINEP SR - Harefield (Ickenham) to Harrow	An 11km 650mm pipeline within a congested urban setting. Route selection will be key to delivery within the urban area such a large main and there are 2 no. National Rail crossings that will impinge on any route taken. The Greater London Authority are promoting joint working with utilities and running 2no. London boroughs consenting may become an issue without early engagement with firm route options to negotiate and potentially working with other utilities within the area which could lead to phasing issues as experienced on other joint utility screens. These 3 trunk mains schemes will have extensive third part stakeholders that could potentially hold up some and if not all of the works. It is

Scheme	Detail
	recommended to start the optioneering of the routes so that we can commence early engagement of third-party stakeholders.
Iver (DWI Obligation)	A 28-month design, construct, install and commission will be extremely difficult deliver with the added constraint of planning permission and site power upgrades. To de-risk delivery it is recommended to commence detailed design on completion of outline design to commence planning permission and discharge any early conditions applied prior to construction commencement in April 2025.
Egham (DWI Obligation)	A 28-month design, construct, install and commission will be extremely difficult deliver with the added constraint of planning permission. To de-risk delivery it is recommended to commence detailed design on completion of outline design to commence planning permission and discharge any early conditions applied prior to construction commencement in April 2025.
WRMP DO @Chertsey, Walton, Egham	To commence outline design of the required upgrades at each of the sites to be able to execute a design and build contract in Apr 2025 to ensure the benefit of making more water available prior to the completion of the Egham to Harefield Scheme above. This will release the water earlier to be utilised in commissioning the above scheme.
WRMP BPS Upgrade to Wey Booster	The first stage of this booster is being delivered in year 5 of AMP7 therefor whilst onsite we can deliver the increased volume from 17ML/D to 25ML/D. This will provide value to customers as we will not need to remobilise to site. The extra water being made available from WRMP DO @Chertsey, Walton, Egham scheme can be moved on day 1 of the water being made available.
WINEP SR - Hadmill Cell	The reservoir will require planning permission and early design will de-risk the delivery by submitting planning permission sooner. These are taking significantly longer for even simple structures and can take over 15 months to achieve especially within the green belt.

Why it was not part of its outcomes and long-term planning in PR19

The initiatives were agreed in 2020 – 2025.

Evidence that the proposed transition expenditure meets the criteria set out in Appendix 9

Early delivery reducing overall delivery costs in 2025 – 2030.

All 8 schemes are associated with WRMP, WINEP/NEP and the DWI submissions and obligations. The Iver, Egham and Connect 2050 schemes were requested for accelerated funding and not approved, the DWI Iver and Egham schemes were created by the DWI, however they did not support them during the AIP process, Ofwat then recommended we progress them to transitional funding.

As set out in the efficiencies there are multiple reasons why spreading the cost of them into this AMP from 2025 – 2030 is favourable in terms of design, complexity and planning permission.

Based on the above our transition expenditure meets Appendix 9 criterium.

The 2025 – 2030 Readiness Plan

1. It meets the criteria by putting in the supply chain to meet the enhanced capital spend. Therefore spread across all of our enhancement projects means we will have a supply chain in place to ensure we reduce the cost of delivery by having a more collaborative partnerships to deliver the schemes through incentivisation and efficient delivery. Current model transactional so would require further internal resources to deliver our 2020 – 2025 approach into 2025 – 2030 to be able to develop and implement this larger scale programme of works. This meets Ofwat criteria No. 4 as noted in the matrix below.
2. The plan will deliver the capability to enable us to fully implement all of our commitments with the increased enhanced programme of works. A new supply chain is required due to the current life of the existing but also deliver a programmatic approach to delivery that we successfully implemented on the HS2 programme and wish to deploy to across our new programmes.

Scheme	Ofwat Transition Criteria				
	1. The company provides sufficient and convincing evidence to justify the early start; and	2. The investment has early statutory deadlines in the next price control period	3. The expenditure relates to early design and planning of large, non-routine investments	4. The expenditure relates to schemes included in a final WRMP24 or statutory requirements set out in final PR24 WINEP/NEP submission, where early delivery helps reduce overall delivery costs in 2025 – 2030 and helps earlier delivery of customer and environmental benefits	5. Investment relates to a scheme we have approved for transition funding prior to the price control determination process, for example through Defra's accelerated process
WRMP Connect 2050 - Heronsgate to Bovingdon	Met		Met		
WRMP Connect 2050 - Egham to Harefield	Met		Met		
WINEP SR - Harefield (Ickenham) to Harrow	Met		Met		
Iver (DWI Obligation)	Met	Met			
Egham (DWI Obligation)	Met	Met			
WRMP DO @Chertsey, Walton, Egham	Met		Met		
WRMP Connect 2050 - BPS Upgrade to Wey Booster (Midway North)	Met		Met		
WINEP SR - Heronsgate to Bovingdon TM and BPS route appraisal	Met		Met		
WINEP SR - Hadmill Cell	Met		Met		
AMP8 Delivery (supply chain Mobilisation)	Met		Met	Met	

We have not included corporate overheads in CW12 as we have already attributed overheads in 2020 – 2025 and feel that to allocate overheads to these projects/programmes would be inconsistent with how the AIP was developed and inappropriate for early 2025 – 2030 spend.

2020 – 2025 Supply Chain

The 2020 – 2025 supply chain comprises multiple vendors across a range of frameworks and contracts. Whilst this solution has worked well for Affinity to date, the future programme presents some significant challenges for the current supply chain;

- 2025 – 2030 programme is growing in size and complexity
  - Current supply chain approach to the programme is unattractive to tier 1s.
  - Future programme is too large for current "tier 2" suppliers (contributes to more than 20% of turnover).
  - Client capacity and capability, in some areas such as procurement, costing and contract management will be stretched by 2025 – 2030 requirements.
- The current supply chain is not optimised to maximise efficiency and value
  - An absence of cost and market intelligence is undermining the ability to source effectively and control costs.
  - The supply chain mix/diversity prevents competition.
  - An absence of supply chain performance management processes / KPIs are undermining supply chain performance.
  - Current policy of incremental project by project procurements are undermining the scale, delivery efficiencies and outcome focus.

Potential 2025 – 2030 Supply Chain

In Q3 2022-23 Mott Macdonald were commissioned to undertake a review of the current 2020 – 2025 supply chain and recommend an approach and outline programme to design, engage and procure a new supply chain capability for 2025 – 2030 and beyond. Part of this analysis considered both the potential future supply chain models ranging from traditional to more collaborative alliancing models. The analysis also benchmarked and acknowledged the current Affinity Water maturity and capability. The recommendation was that a hybrid delivery model would be attractive to the supply chain, engage the suppliers in end-to-end efficiency and innovation and maximise scale economies whilst presenting a lower implementation challenge.

Supply Chain Model Fit					
Model	**Scale Economics**	**Internal Management Cost**	**Implementation Challenge**	**Supply Chain Performance**	**Overall Affinity Business Fit**
Current / Traditional Model	◔	◔	○	◔	◔
Hybrid Delivery Model	◕	◑	◑	◕	◕
Alliance Delivery Model	●	●	●	●	◑

In addition to the need to procure a different supply chain, Mott Macdonald identified 5 business change workstreams that would be important to both enable and make the new 2025 – 2030 supply chain effective. These were;

- Creation of a cradle to grave programme management capability, cross cutting asset planning and all capital delivery routes.
- Creation of a single programme management office reporting on programme and project performance.
- Creation of a new governance model that sets appropriate thresholds for cost, risk, change and benefit realisation based on project or programme complexity and scale.
- Development and adoption of more mature procurement business processes
- Creation (or development) of an estimating function and implementation of best practice approaches.

Affinity Water have delivered this approach on the HS2 Programme that has proven the model proposed has been effective in delivery.

Companies should make clear that they are on track with their PR19 Enhancement programme

Please see the business plan doc, chapter 06 'Costs, section 6.1.2 'Wholesale Enhancement total Expenditure'.

In each case an appropriate level of table commentary is expected to explain the company's allocation approaches

The table below details each of the 8 schemes, the level of funding required by the business for year 4 and year 5 of 2020 – 2025 and the total cost of the Scheme in 2025 – 2030 giving a transitioned percentage. This demonstrates the risk level on behalf of the company and the relative perspective of the transition funding required. These costs are in the 2022-23 price base.

Scheme	Total Transition Cost (£m)	Total AMP8 Cost (£m)	% Transitioned
WRMP Connect 2050 - Heronsgate to Bovingdon	0.30	29.73	1.0%
WRMP Connect 2050 - Egham to Harefield	0.38	46.33	0.8%
WINEP SR - Harefield (Ickenham) to Harrow	0.33	23.97	1.4%
Iver (DWI Obligation)	1.50	45.48	3.3%
Egham (DWI Obligation)	0.30	14.22	2.1%
WRMP DO @Chertsey, Walton, Egham	0.40	4.50	8.9%
WRMP Connect 2050 - BPS Upgrade to Wey Booster (Midway North)	0.90	0.90	100.0%
WINEP SR - Heronsgate to Bovingdon TM and BPS route appraisal	0.30	29.73	1.0%
WINEP SR - Hadmill Cell	0.10	6.90	1.4%
Total	4.51	201.75	2.9%

The below provides a summary of the data as seen in the PR24 data tables, CW12 in the 2022-23 price base. Please note, the AMP8 readiness plan is included in the costs.

Price base	TWD		WT	
Ofwat Ref	**Sum of 2024**	**Sum of 2025**	**Sum of 2024**	**Sum of 2025**
CW12.115	0.077	0.178	0.018	0.042
CW12.16	0.179	0.539	0.141	0.423
CW12.53	0.819	1.889	0.192	0.443
CW12.94			1.300	1.865
Grand Total	1.076	2.605	1.652	2.773

Note: Minor variances to total numbers against the data tables are due to rounding.

The AMP8 readiness plans are outlined below, they are in the 2022-23 price base.

		AMP 7		
	Investment	year 4	year 5	Total Cost
AMP8 Readiness – People Plan – £3.496m	External Staff	1.073	0.198	1.271
	Affinity Water Staff	1.105	1.120	2.225
	Total	2.178	1.318	3.496

CW13: Best value analysis; enhancement expenditure - water resources and water network+ CW14: Best value analysis; enhancement expenditure of least cost options - water resources and water network+

Third-party Contributions

As part of developing our WINEP programme, we have engaged with third-party partners including catchment partnerships, wildlife trusts and environmental NGOs to identify key risks and issues in our catchments, our proposed approach and how we can collaborate better through partnership working. As a result, we have gauged the potential support and the likelihood that the contributions will be realised. We have also reviewed our previous schemes to understand what levels of support are likely to materialise and the nature of the contribution. financial contributions such as grant funding, catchment-trading of ecosystem services and collaborative funding and co-delivery of projects will be integrated into our schemes to deliver best value to our customers and the environment.

We have used this information to develop a realistic estimate of potential contributions across the whole of our WINEP programme and have then allocated the third-party costs to each relevant scheme. More details on the nature and costing of the third-party costs are provided in the relevant WINEP business cases.

Best Value Analysis – Approach and Modelling Assumptions

We have rigorously followed a robust methodology for the economic analysis using the UK HM Treasury Green Book (2020) approach as the basis for the calculations. We have developed a spreadsheet to undertake the analysis for the different options and to calculate the NPVs and benefit / cost ratios.

The adopted approach fully aligns with and complies with Ofwat's and the EA's WINEP stated methodology and rigorously utilises the benefit valuations provided.

The use of the spreadsheet enables a very flexible approach to be taken for the analysis, as we can develop several options for analysis, undertake sensitivity studies, and combine projects for analysis as necessary.

We also use our Copperleaf system to replicate and consolidate different projects and programmes of work across the whole asset base for our PR24 submission. Copperleaf acts as the master record for all of our investments and looks at the environmental and community, and performance metrics across the whole investment portfolio. Copperleaf also acts as a check of some of the economic calculations.

The key features of our economic analysis approach include:

- Whole life costs, benefit and dis-benefit calculations
- Net present values calculated over a 30-year period
- Options presented in 2022-23 cost base
- Benefit valuations and metrics have followed Ofwat's methodology for performance commitments, WINEP methodology for environmental and community benefits, and supported by industry standard sources for other areas
- In a few areas, we have used our own willingness to pay valuations based upon our own research and other published research. This is either where there is no other information, e.g. lead health, or to support sensitivity studies
- All benefit metrics and valuations are held in our Service Measure Framework
- Use of the Consumer Price Index with Housing Costs for indexation for costs and benefits
- Use of the RCV and the Spackman approach for capitalisation
- We have depreciated the financial costs using a Weighted Average Cost of Capital (WACC) of 2.92%, which is consistent with the value used for the development of our Long-Term Delivery Strategy

Each individual best value analysis and the associated business case also has some assumptions made on the analysis. These are generally associated with the timing and profile of the costs and the benefits, and the risks and values associated with the benefit metrics. These assumptions are detailed in the relevant business case.

Cost Estimation

Different investments have used slightly different approaches to estimating the costs depending upon the nature of the work. For example, river restoration is very different to installing smart meters, which is different again to upgrading a treatment works. For repetitive work, we use unit costs. For bespoke projects we tend to use a combination of bottom-up estimates and unit costs. The specific approach that has been adopted are detailed in the individual business cases, which also describe the confidence grade that we have in the cost estimates that we have used. Please refer to Appendix 6 for more information on our approach to cost estimating.

For each cost item, we have considered the timing of the expenditure. For example, is there is any lag before the project will start? And what is the phasing of the project? As such, we have developed a profile for each investment over time.

Supporting Evidence for Cost Estimation

Our investment costs have been estimated using our PR24 cost models, which are based on historic cost information. In most cases, we have robust historic costs as we deliver the work on a daily basis, which means that we have mature and accurate cost information.

In addition, our Asset Delivery colleagues have helped to capture additional cost information, particularly those costs that relate to difficult and/or unique engineering areas, to support our cost estimates.

The majority of our investments have also been reviewed through our Risk and Value assessments, which challenge the need; the choice of options; the cost estimates; and the risks and benefits. During this process, the costs have been challenged for uncertainties; delivery timing; delivery risks and for efficiencies. In addition, each business case has been subjected to several senior manager Red Team sessions. These have also reviewed and challenged the investment costs, timing and efficiencies.

In many areas, our costs have been reviewed and challenged by independent third parties. The details of this are included in the relevant business case.

Uncertainties and Sensitivity Analysis

Our objective has been to develop robust and realistic cost estimates that account for uncertainties and include potential to make efficiencies. However, when we have estimated the benefits we have focused on making conservative, realistic, estimates as the uncertainties are generally greater. By making conservative benefit assumptions and undertaking sensitivity analysis, we can be confident that the overall analysis is sufficiently robust to support the investment decisions.

We have routinely considered the key benefit metrics for sensitivity studies as this generally becomes the most material uncertainty in the analysis. Within our spreadsheet we have used the goal seek function to determine the value of a particular metric of concern that would be required to make the scheme cost beneficial. This provides a sensitivity check on the metric and has been included in the commentaries within the business cases.

The level of uncertainty varies for each best value analysis. More details of these are presented in the individual business cases. In all cases, we have made conservative benefit assumptions to compensate for the uncertainties and supported these with our sensitivity analysis.

Best Value Analysis – Assessment Period

We have consistently used the recommended 30-year appraisal period to calculate the net present benefit and cost values. Costs and benefits have been extended across the appraisal period where appropriate. Details of the specific assumptions made are provided in the individual business cases.

We have the ability to run long-term assessments and have used these in some case to understand the sensitivities of the NPV period on the overall economic analysis. However, all reported NPV values in this data table and the relevant benefit table are based on the 30-year appraisal period. We believe that this approach is valid for all of our assessments.

The WRMP SRO schemes: SESRO, GUC and T2AT are in the early planning stages and the benefits will only be realised if additional investments are made post AMP8. As such, we have not attempted to determine the benefits associated with the investments made in AMP8. The tables therefore show the costs and NPV costs for these investments, but there are no corresponding benefits or NPV benefits presented in the tables. However, we have undertaken a full best value assessment of the schemes has been undertaken as part of the Long-term Delivery Strategies. As these assessments cover are longer term investments, we have extended the appraisal period to 50-years for these.

CW15: Best value analysis; enhancement benefits - water resources and water network+

Best Value Analysis – Approach and Modelling Assumptions

We have rigorously followed a robust methodology for the economic analysis using the UK HM Treasury Green Book (2020) approach as the basis for the calculations. We have developed a spreadsheet to undertake the analysis for the different options and to calculate the NPVs and benefit / cost ratios. The spreadsheet and approach have been independently assured and audited.

The adopted approach fully aligns with and complies with Ofwat's and the EA's WINEP stated methodology and rigorously utilises the benefit valuations provided.

The use of the spreadsheet enables a very flexible approach to be taken for the analysis, as we can develop several options for analysis, undertake sensitivity studies, and combine projects for analysis as necessary.

We also use our Copperleaf system to replicate and consolidate different projects and programmes of work across the whole asset base for our PR24 submission. Copperleaf acts as the master for all of our investments and looks at the environmental and community, and performance metrics across the whole investment portfolio. Copperleaf also acts as a check of some of the economic calculations.

The key features of our economic analysis approach include:

- Whole life costs, benefit and dis-benefit calculations
- Net present values calculated over a 30-year period
- Options presented in 2022-23 cost base
- Benefit valuations and metrics have followed Ofwat's methodology for performance commitments, WINEP methodology for environmental and community benefits, and supported by industry standard sources for other areas
- In a few areas we have used our own willingness to pay valuations based upon our own research and other published research. This is either where there is no other information, e.g. lead health, or to support sensitivity studies
- All benefit metrics and valuations are held in our Service Measure Framework
- Use of the Consumer Price Index with Housing Costs for indexation for costs and benefits
- Use of the RCV and the Spackman approach for capitalisation
- We have depreciated the financial costs using a Weighted Average Cost of Capital (WACC) of 2.92%, which is consistent with the value used for the development of our Long-Term Delivery Strategy

Each individual best value analysis and the associated business case also has some assumptions made on the analysis. These are generally associated with the timing and profile of the costs and the benefits and the risks and values associated with the benefit metrics. These assumptions are detailed in the relevant business case.

Benefit Estimation

We have focused our benefit quantification on the use of our Service Measure Framework benefit metrics and have used the associated benefit valuations published in the Ofwat and WINEP methodologies and other sources.

We have also considered other benefits such as cost savings, additional revenue and other performance metrics where they are applicable. We have focused on identifying and estimating the most material benefits and used these to determine the financial valuations. In general, the less material benefits are quantified or discussed. Therefore, our economic justification is intrinsically conservative by nature, and simplistic and transparent in approach.

In some areas, we have had to estimate the major metrics. Where these are material and there is uncertainty in the estimation of the benefits, we have chosen conservative forecasts, and undertaken sensitivity analysis to understand the value required to make the investment cost beneficial. Where the benefits are less material, we have, where possible, qualitatively assessed the benefits rather than include them in the economic analysis.

For each benefit, we have considered the timing of the benefit realisation and duration of the benefits over time. For example, is there is any lag before the benefit will start to materialise? Is there is a phased benefit realisation? And will the benefits diminish over time? As such, we have developed a profile for each benefit over time.

In some of our investment areas it has not been appropriate to determine benefits for the associated investments. As such, the costs of these are included in tables CW13 and 14, and no corresponding benefits are presented in this tables. These are:

- WRMP SRO Schemes: SESRO, GUC and T2AT are in the early planning stages and the benefits will only be realised if additional investments are made post 2025 – 2030. These are also likely to be DPC schemes and therefore any benefits are not reported in this table
- Water Resources Investigations: The outcome of these investigations are presently unknown. The WINEP methodology recommends that benefits are not identified for these investments
- Biodiversity: Ofwat and the EA methodologies do not use valuations for biodiversity as there is a risk of double-counting. In addition, we are currently measuring our biodiversity baseline and are therefore not able to forecast the benefits related to our investments
- Thames Fish Passage Improvements: This project contributes to a Thames Water scheme. WINEP offers no mechanism or values to determine the benefits associated with this investment and we have found no evidence to justify any benefit quantification
- Walton Fish Screens: WINEP offers no mechanism or values to determine the benefits associated with this investment and we have found no evidence to justify any benefit quantification
- WINEP Natural Capital Schemes: We have estimated the sequested carbon benefits of these schemes in our economic analysis as per the EA's methodology. However, Ofwat has capped the allowable claimed carbon benefits to 1% of the gross operational emissions. In the table we have capped the benefits values. We have however NOT capped the associated NPV benefit values in the table. More details of our sequested carbon forecasts are presented in our relevant business cases

Supporting Evidence for Benefit Estimation

We have used a variety of approaches to estimate the benefit metrics. The exact approach and evidence used for each particular best value analysis are described in the relevant business case. The most notable approaches are summarised below:

- The forecasts for leakage, PCC, business demand and sustainable reductions, number of smart meters etc. have been developed as part of our WRMP and the systems that we have used to model the different impacts on supply and demand. The evidence to support the assumptions made in the WRMP modelling are detailed in the WRMP
- For the WINEP benefits we have rigorously followed the WINEP methodology for benefit values and metrics. We have supported these values and our assumptions with evidence from our recent river restoration and catchment management work and studies on the river Beane. These have provided

detailed information on the benefit metrics that can be realised and the timing of these benefits
- Most other investment areas have gone through a stringent Risk and Value assessment. These have used information on our historic and current performance; historic investments and the benefits realised; and detailed asset and local knowledge to systematically quantify the risks and benefits arising from different investment options. The outputs from these sessions have then been used in the best value analysis

Where we have had concerns on the accuracy of the evidence that we have to enable us to estimate the benefits, we have selected prudent values where they are material and undertaken sensitivity analysis. Where they are less material, we have not quantified the benefits and only discussed the potential benefits. This approach means that our best value analysis is inherently conservative by nature.

Uncertainties and Sensitivity Analysis

We have made a number of assumptions in our economic analysis. These are designed to be conservative by nature to account for the significant uncertainties that are inherent in the benefit monetisation. By making conservative assumptions and undertaking sensitivity analysis, we can be confident that the overall analysis is sufficiently robust to support the investment decisions.

The most significant uncertainties, in the economic analysis, are with the benefit metrics, valuations and the timing and duration of the benefits. We have used the Ofwat and WINEP valuations wherever possible and have focused our attention on the metrics and the benefit profiles.

We have routinely considered the key benefit metrics for sensitivity studies as this generally becomes the most material uncertainty in the analysis. Within our spreadsheet we have used the goal seek function to determine the value of a particular metric of concern that would be required to make the scheme cost beneficial. This provides a sensitivity check on the metric and has been included in the commentaries within the business cases.

The level of uncertainty varies for each best value analysis. More details of these are presented in the individual business cases. In all cases, we have made conservative assumptions to compensate for the uncertainties and supported these with our sensitivity analysis.

Best Value Analysis – Assessment Period

We have consistently used the recommended 30-year appraisal period to calculate the net present benefit and cost values. Costs and benefits have been extended across the appraisal period where appropriate. Details of the specific assumptions made are provided in the individual business cases.

We have the ability to run long-term assessments and have used these in some case to understand the sensitivities of the NPV period on the overall economic analysis. However, all reported NPV values in this data table and the relevant benefit table are based on the 30-year appraisal period. We believe that this approach is valid for all of our assessments.

The WRMP SRO schemes: SESRO, GUC and T2AT are in the early planning stages and the benefits will only be realised if additional investments are made post AMP8. As such, we have not attempted to determine the benefits associated with the investments made in AMP8. The tables therefore show the costs and NPV costs for these investments, but there are no corresponding benefits or NPV benefits presented in the tables. However, we have undertaken a full best value assessment of the schemes has been undertaken as part of the Long-term Delivery Strategies. As these assessments cover are longer term investments, we have extended the appraisal period to 50-years for these.

Table Completion

The benefit metric values are represented as annual values and as the change in benefit value from the previous year. This implies an annual changing baseline of performance, which aligns with the methodology used in OUT3, and which ensures alignment between the OUT3 performance commitment values and CW15 values. These are NOT the values used in our economic analysis as the benefit metric values used are those that show the annual change in benefit from our baseline set before the investment was made, i.e. 2024-25. The values in the table are calculated from those used in the economic analysis. As such the benefit metric values do NOT directly relate to the benefit NPVs.

The operational greenhouse gas emissions (water) benefit metric values have been capped to limit the number of tonnes of CO2 sequestered as per the Ofwat guidance. The corresponding benefit £ values and NPVs relate to the estimated sequestered carbon values that we have used in the economic analysis.

We have not changed the formatting or calculation cells in the table. We note that there are some minor formatting issues, but these are not material. We have ensured that the values in some cells perfectly align with corresponding cells in table OUT3 to make the test TRUE.

CW16: Best value analysis; enhancement benefits of least cost options - water resources and water network+

Best Value Analysis – Approach and Modelling Assumptions

We have rigorously followed a robust methodology for the economic analysis using the UK HM Treasury Green Book (2020) approach as the basis for the calculations. We have developed a spreadsheet to undertake the analysis for the different options and to calculate the NPVs and benefit / cost ratios. The spreadsheet and approach have been independently assured and audited.

The adopted approach fully aligns with and complies with Ofwat's and the EA's WINEP stated methodology and rigorously utilises the benefit valuations provided.

The use of the spreadsheet enables a very flexible approach to be taken for the analysis, as we can develop several options for analysis, undertake sensitivity studies, and combine projects for analysis as necessary.

We also use our Copperleaf system to replicate and consolidate different projects and programmes of work across the whole asset base for our PR24 submission. Copperleaf acts as the master for all of our investments and looks at the environmental and community, and performance metrics across the whole investment portfolio. Copperleaf also acts as a check of some of the economic calculations.

The key features of our economic analysis approach include:

- Whole life costs, benefit and dis-benefit calculations
- Net present values calculated over a 30-year period
- Options presented in 2022-23 cost base
- Benefit valuations and metrics have followed Ofwat's methodology for performance commitments, WINEP methodology for environmental and community benefits, and supported by industry standard sources for other areas
- In a few areas we have used our own willingness to pay valuations based upon our own research and other published research. This is either where there is no other information, e.g. lead health, or to support sensitivity studies
- All benefit metrics and valuations are held in our Service Measure Framework
- Use of the Consumer Price Index with Housing Costs for indexation for costs and benefits
- Use of the RCV and the Spackman approach for capitalisation
- We have depreciated the financial costs using a Weighted Average Cost of Capital (WACC) of 2.92%, which is consistent with the value used for the development of our Long-Term Delivery Strategy

Each individual best value analysis and the associated business case also has some assumptions made on the analysis. These are generally associated with the timing and profile of the costs and the benefits and the risks and values associated with the benefit metrics. These assumptions are detailed in the relevant business case.

Benefit Estimation

We have focused our benefit quantification on the use of our Service Measure Framework benefit metrics and have used the associated benefit valuations published in the Ofwat and WINEP methodologies and other sources.

We have also considered other benefits such as cost savings, additional revenue and other performance metrics where they are applicable. We have focused on identifying and estimating the most material benefits and used these to determine the financial valuations. In general, the less material benefits are quantified or discussed. Therefore, our economic justification is intrinsically conservative by nature, and simplistic and transparent in approach.

In some areas, we have had to estimate the major metrics. Where these are material and there is uncertainty in the estimation of the benefits we have chosen conservative forecasts, and undertaken sensitivity analysis to understand the value required to make the investment cost beneficial. Where the benefits are less material, we have, where possible, qualitatively assessed the benefits rather than include them in the economic analysis.

For each benefit, we have considered the timing of the benefit realisation and duration of the benefits over time. For example, is there is any lag before the benefit will start to materialise? Is there is a phased benefit realisation? And will the benefits diminish over time? As such, we have developed a profile for each benefit over time.

In some of our investment areas it has not been appropriate to determine benefits for the associated investments. As such, the costs of these are included in tables CW13 and 14, and no corresponding benefits are presented in this tables. These are:

- **WRMP SRO Schemes:** SESRO, GUC and T2AT are in the early planning stages and the benefits will only be realised if additional investments are made post AMP8. These are also likely to be DPC schemes and therefore any benefits are not reported in this table
- **Water Resources Investigations:** The outcome of these investigations are presently unknown. The WINEP methodology recommends that benefits are not identified for these investments
- **Biodiversity:** Ofwat and the EA methodologies do not use valuations for biodiversity as there is a risk of double-counting. In addition, we are currently measuring our biodiversity baseline and are therefore not able to forecast the benefits related to our investments
- **Thames Fish Passage Improvements:** This project contributes to a Thames Water scheme. WINEP offers no mechanism or values to determine the benefits associated with this investment and we have found no evidence to justify any benefit quantification
- **Walton Fish Screens:** WINEP offers no mechanism or values to determine the benefits associated with this investment and we have found no evidence to justify any benefit quantification
- **WINEP Natural Capital Schemes:** We have estimated the sequested carbon benefits of these schemes in our economic analysis as per the EA's methodology. However, Ofwat has capped the allowable claimed carbon benefits to 1% of the gross operational emissions. In the table we have capped the benefits values. We have however NOT capped the associated NPV benefit values in the table. More details of our sequested carbon forecasts are presented in our relevant business cases

Supporting Evidence for Benefit Estimation

We have used a variety of approaches to estimate the benefit metrics. The exact approach and evidence used for each particular best value analysis are described in the relevant business case. The most notable approaches are summarised below:

- The forecasts for leakage, PCC, business demand and sustainable reductions, number of smart meters etc. have been developed as part of our WRMP and the systems that we have used to model the different impacts on supply and demand. The evidence to support the assumptions made in the WRMP modelling are detailed in the WRMP
- For the WINEP benefits we have rigorously followed the WINEP methodology for benefit values and metrics. We have supported these values and our assumptions with evidence from our recent river restoration and catchment management work and studies on the River Beane. These have provided detailed information on the benefit metrics that can be realised and the timing of these benefits
- Most other investment areas have gone through a stringent Risk and Value assessment. These have used information on our historic and current performance; historic investments and the benefits realised; and detailed asset and local knowledge to systematically quantify the risks and benefits arising from different investment options. The outputs from these sessions have then been used in the best value analysis

Where we have had concerns on the accuracy of the evidence that we have to enable us to estimate the benefits, we have selected prudent values where they are material and undertaken sensitivity analysis. Where they are less material, we have not quantified the benefits and only discussed the potential benefits. This approach means that our best value analysis is inherently conservative by nature.

Uncertainties and Sensitivity Analysis

We have made a number of assumptions in our economic analysis. These are designed to be conservative by nature to account for the significant uncertainties that are inherent in the benefit monetisation. By making conservative assumptions and undertaking sensitivity analysis, we can be confident that the overall analysis is sufficiently robust to support the investment decisions.

The most significant uncertainties, in the economic analysis, are with the benefit metrics, valuations and the timing and duration of the benefits. We have used the Ofwat and WINEP valuations wherever possible and have focused our attention on the metrics and the benefit profiles.

We have routinely considered the key benefit metrics for sensitivity studies as this generally becomes the most material uncertainty in the analysis. Within our spreadsheet we have used the goal seek function to determine the value of a particular metric of concern that would be required to make the scheme cost beneficial. This provides a sensitivity check on the metric and has been included in the commentaries within the business cases.

The level of uncertainty varies for each best value analysis. More details of these are presented in the individual business cases. In all cases, we have made conservative assumptions to compensate for the uncertainties and supported these with our sensitivity analysis.

Best Value Analysis – Assessment Period

We have consistently used the recommended 30-year appraisal period to calculate the net present benefit and cost values. Costs and benefits have been extended across the appraisal period where appropriate. Details of the specific assumptions made are provided in the individual business cases.

We have the ability to run long-term assessments and have used these in some case to understand the sensitivities of the NPV period on the overall economic analysis. However, all reported NPV values in this data table and the relevant benefit table are based on the 30-year appraisal period. We believe that this approach is valid for all of our assessments.

The WRMP SRO schemes: SESRO, GUC and T2AT are in the early planning stages and the benefits will only be realised if additional investments are made post AMP8. As such, we have not attempted to determine the benefits associated with the investments made in AMP8. The tables therefore show the costs and NPV costs for these investments, but there are no corresponding benefits or NPV benefits presented in the tables. However, we have undertaken a full best value assessment of the schemes has been undertaken as part of the Long-term Delivery Strategies. As these assessments cover are longer term investments, we have extended the appraisal period to 50-years for these.

Table Completion

The benefit metric values are represented as annual values and as the change in benefit value from the previous year. This implies an annual changing baseline of performance, which aligns with the methodology used in OUT3, and which ensures alignment between the OUT3 performance commitment values and CW15 values. These are NOT the values used in our economic analysis as the benefit metric values used are those that show the annual change in benefit from our baseline set before the investment was made, i.e. 2024-25. The values in the table are calculated from those used in the economic analysis. As such the benefit metric values do NOT directly relate to the benefit NPVs.

The operational greenhouse gas emissions (water) benefit metric values have been capped to limit the number of tonnes of CO_2 sequestered as per the Ofwat guidance. The corresponding benefit £ values and NPVs relate to the estimated sequestered carbon values that we have used in the economic analysis.

We have not changed the formatting or calculation cells in the table. We not that there are some minor formatting issues, but these are not material. We believe that the calculations in cells AC525 to AH525 are incorrect. We have not changed these calculations in the table.

CW17: Accelerated programme expenditure – water resources and water network+

An explanation as to which approved scheme the expenditure relates to

The below table highlights the £11.988m spend in the water treatment price control for 2023-24 and 2024-25

Scheme number	Activity name	Accelerated expenditure (based on £m2022-23 price base)		Total
		2023-24	2024-25	
7	Smart Metering	7.000	2.000	9.000
8	Raw Water Deterioration - Broome Nitrate	0.250	0.150	0.400
9	Raw Water Deterioration - Kingsdown Nitrate	0.250	0.150	0.400
10	Raw Water Deterioration - Holywell PFOS	0.149	0.099	0.248
18	Raw Water Deterioration - Stortford water quality - Nitrate & Resilience	1.000	0.940	1.940

There are no opex costs, the above is all capex only.

An explanation of why it is efficient to bring the investment forward

The concentration of nitrate is increasing in the raw water abstracted at Kingsdown, Broome and Stansted WTWs, to the extent each of the sites has had to be turned off during periods of high nitrate levels, and modelling indicates it will not start to decrease for years to come. Additionally, the Stortford supply area supplied by Stansted WTW has a high resilience risk, due to limited storage and the configuration of the network. There is provision in the draft WINEP for some catchment management (CM) schemes in this area for 2025-30; the benefit from the CM schemes will be realised in the long-term and will not reduce the amount of nitrate already present in the soil layers from historic agricultural use.

The water is required to meet the supply-demand balance in the areas and to maintain resilience of the network. Therefore, we propose new ion-exchange treatment processes at Broome and Kingsdown WTW, for a total investment of £9m. For Stortford resilience we propose installing 1.95km trunk main [from Forest Hall Booster Pumping Station] and upgrading the boosters as a contingency, for a total investment of £1.94m.

It is critical that this investment at Kingsdown, Broome and Stansted WTWs is made at this time in order to safeguard the supply-demand balance in the Dour and Stortford regions, protect and improve service levels to customers and reduce risk of unplanned outage, low pressure and interruptions to supply.

The requirement for this investment is to meet the commitments set out in Ambition to "Deliver what our customers need, ensuring affordability for all," which encompasses "Exceed[ing] customers' expectations for drinking water," and to "Be prepared for change and resilient to shocks and stresses"

We will spend £3m for procurement which is split 70/30 between 2023-24 and 2024-25. The majority of all the procurement activities will take place in 2023-24 (we have already started) and we are planning to award the contract at the beginning of year 5. Following that, we will spend £4m for meters, installation, network/infrastructure and other smart metering activities such as surveys, field investigations, etc. This is allocated to 2024-25 as the 4,000 new installs and 16,000 replacements are planned for that period. Finally, we will spend £2m for IT and back office which is also allocated to 2024-25. With this trial, we are aiming to achieve 0.3 Ml/d water savings in 2020-25 and another 1.2Ml/d in 2025-30. It will also allow us to learn more about the benefits of smart metering, test our processes, update our IT systems reduce any delivery risks and will position us in the best possible place for the full smart metering roll out in 2025-30.

An explanation as to which Defra priority the expenditure aims to tackle

There was an Accelerated Infrastructure Programme Opportunity – In October 2022, Defra asked water companies to propose schemes for accelerated additional infrastructure delivery in 2023-24 and 2024-25 that would provide benefits for customers, communities, and the environment. Completion of planning permission, detailed design, and delivery contracts were proposed for both Kingsdown and Broome WTW nitrate schemes and submitted our draft business case to the DWI. In April 2023, Ofwat's draft decision supported the acceleration of both schemes proposed.

Biodiversity Net Gain (BNG) is derived from a metric created by Defra, which classifies types of habitats and their condition to give a unit score for a given site being worked on. UK Hab is the methodology that is used to classify the habitats and conditions within the metric, which is nationally used across the ecology industry.

BNG consideration has been calculated using the assessment tool provided by the Environmental Policy & Strategies team. This applies a representative percentage value to the capex costs of each relevant solution option based on internal analysis. The percentage factor in this calculation varies depending on the capex cost in question and the BNG classification of the site. This was then verified against previous similar project BNG costs where available, to ensure that the estimated costs were not an underestimate or greatly different from what would be expected. This assessment was completed for each scheme's preferred option and other viable options that required consideration of BNG, to form part of the selection process as per the following table.

Business Case	Scheme	AMP8 Capex (£)	Special Site / Habitat	Site %	Biodiversity Capex (£)	Notes
Raw Water Deterioration	Broome Nitrates - IONEX Plant	£ 4,429,294	N	1.0%	£ 44,293	Preferred Option
Raw Water Deterioration	Broome - Blending	£ 6,603,799	N	1.0%	£ 66,038	Option ruled out due to cost
Raw Water Deterioration	Broome - ACWA Plant	£ 4,089,790	N	1.0%	£ 40,898	Option ruled out due to higher Opex costs
Raw Water Deterioration	Kingsdown Nitrates - IONEX Plant	£ 4,429,294	N	1.0%	£ 44,293	Preferred Option
Raw Water Deterioration	Kingsdown Blending	£ 3,337,471	N	1.0%	£ 33,375	Option ruled out as no longer viable due to high Nitrate levels mean blend would still be above safe limit
Raw Water Deterioration	Kingsdown - ACWA Plant	£ 4,089,790	N	1.0%	£ 40,898	Option ruled out due to higher Opex costs
Raw Water Deterioration	Stortford Resilience Blending	£ 1,944,720	N	1.0%	£ 19,447	Preferred Option
Raw Water Deterioration	Stortford Resilience Nitrates - IONEX Plant	£ 3,612,990	N	1.0%	£ 36,130	Option ruled out due to higher cost
Raw Water Deterioration	Stortford Resilience Nitrates - ACWA Plant	£ 3,384,060	N	1.0%	£ 33,841	Option ruled out due to higher cost

Both Broome & Kingsdown are predominantly rural in nature with the agricultural land being highly arable and used mainly for winter wheat and rapeseed oil crops. Stansted Pumping Station (for Stortford Resilience) is situated in the residential area of the village Stansted Mountfitchett.

None of the sites are considered to be a site of special interest or habitat.

Where costs differ to those proposed through the acceleration process, for both 2023-25 and the entire scheme, an explanation as to why this is the case

Following updated Ofwat guidance in July, there is a movement of costs in the data tables. Costs move from year 1 in the period 2025-30 to year 4 and year 5 in the period 2020-25 This moves costs from year 1of the period 2025-30 in CW3 and to the period 2020-25 year 4 and 5 in CW17.

Smart Metering

We will spend £3m for procurement which is split 70/30 between 2023-24 and 2024-25. The majority of all the procurement activities will take place in 2023-24 (we have already started) and we are planning to award the contract at the beginning of 2024-25.

Following that, we will spend £4m for meters, installation, network/infrastructure and other smart metering activities such as surveys, field investigations, etc. This is allocated to 2024-25 as the 4,000 new installs and 16,000 replacements are planned for that period.

Finally, we will spend £2m for IT and back office which is also allocated to 2024-25. With this trial, we are aiming to achieve 0.3 Ml/d water savings in 2020-25 and another 1.2Ml/d in 2025-30. It will also allow us to learn more about the benefits of smart metering, test our processes, update our IT systems reduce any delivery risks and will position us in the best possible place for the full smart metering roll out in 2025-30.

AffinityWater

CW18: Cost adjustment claims - base expenditure: water resources and water network+

Summary

We propose a net cost adjustment claim for £42.2m in the wholesale water network plus price control for regional wages. This figure is stated after application of catch-up efficiency and deduction of implicit allowance. The detailed evidence supporting our claim is provided in Appendix AFW42.

CW18.1-2: Description and type of cost adjustment claim (water) CAC1

Our claim relates to regional wages, a regional operating circumstance.

CW18.3: Symmetrical or non-symmetrical (water) CAC1

We propose our regional wages as a symmetrical adjustment, since if allowed costs are increased for companies in high wage areas, then all else being equal, we would expect costs to be reduced for companies in lower wage cost areas. In our estimation work, we found that the relationship is not quite that simple as the extent of symmetrical adjustments in higher and lower cost wage areas depends also on the value of implicit allowance in those areas and differences in how far the models already allow (or do not fully allow) for regional wage differences for different companies.

Overall, our proposed adjustments are not materially different from zero when summed across the whole industry, so are consistent with the principle of symmetrical claims.

CW18.4: Reference to business plan supporting evidence (water) CAC1

We provide the evidence to support our cost adjustment claim in Appendix AFW42, including:

- evidence in support of the claim, against the relevant assessment criteria;
- details of the approach taken to calculate the implicit allowance and key assumptions made, such as the catch-up efficiency challenge applied.
- details of the approach taken to calculate the symmetrical adjustment and key assumptions made, such as the catch-up efficiency challenge applied to the adjustment.

CW18.5: Total gross value of the claim (water) CAC1

The total gross value of our claim is £50.8m. This value is stated after deduction of catch-up efficiency. As required by guidance, we have not adjusted for frontier shift efficiency or real price effects.

CW18.6: Implicit allowance (water) CAC1

We value implicit allowance £8.6m, which value is stated after deduction of catch-up efficiency. As required by guidance, we have not adjusted for frontier shift efficiency or real price effects.

CW18.7: Total net value of the claim (water) CAC1

The net value of our claim is £42.2m, which is the gross value of our claim £50.8m less our valuation of implicit allowance, £8.6m. This figure is also stated after application of catch-up efficiency, but before adjustments for frontier shift and real price effects.

CW18.8: Historic total expenditure (water) CAC1

We calculated the historic value of our claim by triangulating between three methods for claim estimation, set out in Appendix AFW42. We were not able to complete the column for 2010-11 as this pre-dates the accounting separation of water companies into the water network plus and water resource segments so it was not possible to identify costs in the water network plus segment. 2010-11 also predates the merger of the three companies that formed Affinity Water, which also complicates production of segmental cost information for 2010-11 and years before that.

CW19: Leakage expenditure and activity data

CW19.1-3, 10: Leakage expenditure – company level

As explained during the process of completing data for the additional leakage data request IN22/02, provision of this data is a challenge as our delivery models and accounting do not align as per the tables.

The costs include both direct and indirect costs associated with the leakage management activities and are totex values.

We have been able to determine the costs and activities that are related to maintaining and reducing the current level of leakage. The costs to maintain leakage and reduce leakage are based upon cost information from both financial accounting systems for the period 2022-23 and from internal budgets beyond.

The impact of weather has been factored into the cost to maintain the level of leakage. Costs that span both maintain and reduce have been proportionally allocated between the categories. Unless stated otherwise in this document we have proportionally allocated maintain/reduce costs based on consideration of volumes of leakage required to maintain the previous years reported level and volumes of reduction beyond this achieved in the reporting year. With volume required to maintain the previous year's level based upon steady state analysis of repairs and using appropriate flow rate and leak growth data along with leak run times to determine the volume required to maintain.

Prevent (rehab) – direct costs.

This represents the direct costs and expected direct costs of our mains renewal/rehabilitation programme. We do not conduct supply pipe renewals.

The delivery of a mains renewal/rehabilitation programme impacts several performance commitments not just leakage. There is no known methodology to apportion the costs of programmes that help deliver multiple benefits with differing measures of benefits. As such all the renewal/rehabilitation programme costs have been included in these costs.

Our forecasted renewal/rehabilitation programme for 2023-25 and for the entirety of 2025-30 is not at a length required to prevent deterioration in the overall performance of the network and so will not contribute to a reduction in leakage, therefore all the costs have been allocated to maintain.

Prevent (pressure management) – direct costs.
These represents the direct costs of maintaining and reducing leakage through our activities associated with pressure management. These costs include maintenance of existing schemes to preserve leakage savings such as the replacement and maintenance of assets that would result in an increase in leakage levels if not maintained, and our 2025-30 planned expansion of pressure management coverage as part of our leakage reduction plan.

Our people involved in this work also maintain and install our District Metering and network monitoring (aware activities). Theirs costs are therefore apportioned across all the activities based upon the size of the capital programmes in each area.

Prevent (calm networks) – direct costs.
At present we do not carry out any calm network activities as part of our leakage programme. Our costs in 2025-30 are a result of our network calming business case where they have a direct impact upon the leakage reduction plan. As the costs of network calming are contained entirely within the reduction plan, all the costs have been attributed to the reduce line.

Aware – direct costs.
These represent the costs of activities under the Aware category, including District Metered Areas (DMAs), data loggers, permanent noise/acoustic sensors, remote sensing, pressure analytics and our Data systems used for leakage reporting and analysis.

Our people involved in this work also maintain and install our pressure management. Theirs costs are therefore apportioned across all the activities based upon the size of the capital programmes in each area.

Locate – direct costs:
These costs include the costs of activities under the locate category in the report year. These relate to the deployment of field-based resources to locate leakage using active leakage control, temporary acoustic/noise sensing or in pipe investigations, including field-based time, training related to the activities being undertaken, performance management such as time/performance reviews, data analysis and preparation for targeting activities and planning time in relation to field-based work. These include the costs of vehicles, fuel, annual leave/sickness, and associated equipment. Costs also include team leadership roles and direct managers of leakage teams/functions.

Mend - direct cost

These costs include the costs of activities under the mend category in the report year. These relate to the repair of all leak types including both customer reported/reactive leak repairs and company detected/proactive leak repairs including mains bursts, supply pipes, communication pipes and fittings.

Supply pipes repair costs are costs borne by the company from undertaking repairs on behalf of customers through our free repair scheme. No contributions towards customer repaired repairs are given.

Costs relate to the gross operating costs of carrying out these activities including field-based time, associated training, performance management, scheduling, and planning.

Indirect costs

We do not capture indirect costs at a department level, rather these have been captured by business units.

Costs that have been captured at business unit level include, HR costs, Facilities management and property rent, Procurement, IT, Legal and insurance and other wholesale costs.

Leakage forms part of our Trunk treated water (TTW) distribution unit.

The TTW costs for the above items have been apportioned based on the proportion of total headcount of the TTW unit that leakage accounts for each year. e.g. if the leakage headcount was 25% of the total unit headcount, then 25% of the total unit costs have been allocated to leakage.

These costs only include the indirect costs associated with the activities associated with the leakage department. That is to say, indirect costs associated with programmes outside the leakage department have not been captured e.g. Mains renewals. This means that the indirect costs may be understated.

Comparison to PR19: These lines were not present at the PR19 submission, so no comparison to a previous forecast is available.

CW19.4-9, 11-12: Leakage expenditure – regional

Not applicable to Affinity Water

CW19.13-16: Prevent activities and attributes – company level

At the end of the 2022-23 period 59% of properties are under a pressure management regime. This varies between 37% of properties covered by fixed outlet control and 22% under modulated control.

Pressure management offers several benefits, from reducing the volume of leakage, extending asset life, reducing emergency bursts with the associated supply interruptions and social disruption, and reducing customer demand.

Part of our business plan is to utilise further pressure management to help improve our outcomes across several measures and help offset resilience challenges such as climate change, all under our network calming banner.

Over the 2025-30 period we will increase the number of properties under a pressure management regime to 73%. This will represent the extent of the ability of pressure management to offer benefits to the outcomes. We will also be extending the use of modulated pressure management across all the pressure managed areas again to reach the extent that current pressure management technology can offer.

Comparison to PR19: These lines were not present at the PR19 submission, so no comparison to a previous forecast is available.

CW19.17-24: Prevent activities and attributes – regional

Not applicable to Affinity Water

CW19.25-29: DMA characteristics – company level

Affinity Water has over 900 District Metered Areas (DMA)at the end of the 2022-23 period. This means around 92% of all properties are within continuous monitoring. This is currently below the 95% required for compliance with the reporting guidance for leakage. We are increasing the coverage across 2020-25 and will be compliant with the guidance by the end of the year 2023-24.

We will make additional small increases in coverage in 2025-30 as a result of our pressure management expansion through our network calming activity. Some of the new pressure managed areas will be areas where the remaining 5% not within DMAs are.

We have no plans to further break down existing DMAs into smaller ones so our percentiles of size will remain static in 2025-30. Breakdown will only be considered where there is positive Cost Benefit Analysis for doing so on a case-by-case basis.

We have invested significantly over the past two years to increase our DMA availability to meet the target of 90% and expect to outperform this measure during the remainder of 2020-25 period. This is to ensure we are on track to meet the increased target in 2025-30 of 95%.

Comparison to PR19: These lines were not present at the PR19 submission, so no comparison to a previous forecast is available.

CW19.30-39: DMA characteristics– regional

Not applicable to Affinity Water

CW19.40: Length of trunk mains and upstream network in trunk mains balances

We currently utilise the Bursts And Background leakage Estimation (BABE) methodology to calculate Trunk mains losses. We currently have no upstream flow balancing in place. BABE remains a valid method of calculation of trunk mains losses in the reporting guidance for leakage in 2025-30, therefore at this stage we have no plans to introduce flow balancing for reporting.

Comparison to PR19: This line was not present at the PR19 submission, so no comparison to a previous forecast is available.

CW19.41: Length of trunk mains

In the period 2022-23 the length of truck mains was 3,683.172km. This will reduce in 2023-24 as we predict that 493.530km will be removed due to inclusion in our expansion of DMAs to meet the guidance target of 95% of all properties covered by continuous flow monitoring.

The level is then expected to increase in line with our Connect 2050 plans.

Comparison to PR19: This line was not present at the PR19 submission, so no comparison to a previous forecast is available.

CW19.42: Proportion of trunk mains and upstream network in trunk mains balances

We currently utilise the Bursts And Background leakage Estimation (BABE) methodology to calculate Trunk mains losses. We currently have no upstream flow balancing in place. BABE remains a valid method of calculation of trunk mains losses in the reporting guidance for leakage in 2025-30, therefore at this stage we have no plans to introduce flow balancing for reporting.

Comparison to PR19: This line was not present at the PR19 submission, so no comparison to a previous forecast is available.

CW19.43-48: Trunk main balances – regional

Not applicable to Affinity Water

CW19.49: Smart networks – company level

Affinity water was a leader in deployment of permanent acoustic noise loggers during 2015-20 installing 20,000 units across the network. These have shown to have been useful during breakout events.

We have not expanded the coverage in 2020-25 but have utilised improved knowledge to relocate units to best achieve benefit. In addition, but not reported here, is that we also operate a large fleet of 'lift and shift' acoustic loggers. These operate the same as the permanent installed loggers, but they allow us to rotate them around the network to provide benefit where a permanent installation is not appropriate.

We have no plans to extend the coverage of permanent installations during 2025-30, we will though continue to optimise our existing fleet.

Comparison to PR19: These lines were not present at the PR19 submission, so no comparison to a previous forecast is available.

CW19.50-51: Smart networks– regional

Not applicable to Affinity Water

CW19.52: Active leakage control– company level

The time represents productive time related to active leakage control and includes field-based time spent locating hidden leakage and investigation of visible leaks. It includes temporary acoustic noise logging but excludes time spent maintaining permanent acoustic noise logging.

The time excludes non-productive time such as sickness absence, holidays, and non-leakage company meetings or updates. It also excludes time spent on maintenance of DMAs, PMAs and other network monitoring and activities that are related to the "aware" activity. The time also excludes time spent undertaking managing systems, reporting, and targeting of ALC resources.

We have no planned increases or reductions of ALC resources for 2023-25 as such we have forecasted the same level as 2022-23 across 2023-24 & 2024-25. Around 25 percent of the hours are related to visible leaks which are partly related to weather influence; however, we are unable to forecast the weather patterns to assess any resulting change on the hours needed in this area.

We have forecasted our 2025-30 values by adding our planned ALC interventions in AMP8 to the baseline from 2022-23.

Comparison to PR19: This line was not present at the PR19 submission, so no comparison to a previous forecast is available.

CW19.53-54: Active leakage control – regional

Not applicable to Affinity Water

CW19.55-58: Mains repairs– company level

The values in these lines represent the total number of mains repairs carried out or expected to be carried out in the case of years beyond 2022-23, excluding mains fittings such as hydrants, washouts, air valves and other network apparatus.

All leak repairs are logged in to our Works Management System (WMS), Maximo. This tracks the work order from creation to completion.

Whether a leak has been detected or reported is defined within a field in the WMS allowing the separation of the values.

The leak is defined as being included based upon the position at the end of the process ensuring that any work orders that changed category are included or excluded appropriately.

Completion is defined as the physical repair being undertaken including reinstatement.

The forecast years for the periods 2023-24 and 2024-25 are based on our normal work volume forecasts using 3X the last period, 2X the last but one period and 1X the last but two periods divided by 6. This allows for current trends of ALC resources to be captured and an allowance for weather-based impacts. Forecasts for 2025-30 use the baseline as described plus the anticipated impact of our ALC resource plan for 2025-30.

Comparison to PR19: These lines were not present at the PR19 submission, so no comparison to a previous forecast is available.

CW19.59-66: Mains repairs – regional

Not applicable to Affinity Water

CW19.67-70: Mains fittings repairs – company level

The values in these lines represent the total number of mains fittings carried out or expected to be carried out in the case of years beyond 2022-23, including mains fittings such as hydrants, washouts, air valves and other network apparatus.

All leak repairs are logged in to our Works Management System (WMS), Maximo. This tracks the work order from creation to completion.

Whether a leak has been detected or reported is defined within a field in the WMS allowing the separation of the values.

The leak is defined as being included based upon the position at the end of the process ensuring that any work orders that changed category are included or excluded appropriately.

Completion is defined as the physical repair being undertaken including reinstatement.

The forecast years for the periods 2023-24 & 2024-25 are based on our normal work volume forecasts using 3X the last period, 2X the last but one period and 1X the last but two periods divided by 6. This allows for current trends of ALC resources to be captured and an allowance for weather-based impacts. Forecasts for AMP8 use the baseline as described plus the anticipated impact of our ALC resource plan for 2025-30.

Comparison to PR19: These lines were not present at the PR19 submission, so no comparison to a previous forecast is available.

CW19.71-78: Mains fittings repairs – regional

Not applicable to Affinity Water

CW19.79-82: Communication pipe repairs – company level

The values in these lines represent the total number of communication pipe leak repairs carried out or expected to be carried out in the case of years beyond 2022-23, including stop taps and boundary boxes.

All leak repairs are logged in to our Works Management System (WMS), Maximo. This tracks the work order from creation to completion.

Whether a leak has been detected or reported is defined within a field in the WMS allowing the separation of the values.

The leak is defined as being included based upon the position at the end of the process ensuring that any work orders that changed category are included or excluded appropriately.

Completion is defined as the physical repair being undertaken including reinstatement.

The forecast years for the periods 2023-24 and 2024-25 are based on our normal work volume forecasts using 3X the last period, 2X the last but one period and 1X the last but two periods divided by 6. This allows for current trends of ALC resources to be captured and an allowance for weather-based impacts. Forecasts for 2025-30 use the baseline as described plus the anticipated impact of our ALC resource plan for 2025-30.

Comparison to PR19: These lines were not present at the PR19 submission, so no comparison to a previous forecast is available.

CW19.83-90: Communication pipe repairs – regional

Not applicable to Affinity Water

CW19.91-97: Supply pipe repairs – company level

The values in these lines represent the total number of supply pipe leak repairs carried out or expected to be carried out in the case of years beyond 2022-23 by the company.

We do not hold timed records of customer repaired supply pipes. This is because customers are not legally required to inform us that they have carried out the repair. We only generally establish if the customer has completed a repair post event if we move to enforcement or from a subsequent DMA leakage detection campaign.

All leak repairs are logged in to our Works Management System (WMS), Maximo. This tracks the work order from creation to completion.

Whether a leak has been detected or reported is defined within a field in the WMS allowing the separation of the values.

The leak is defined as being included based upon the position at the end of the process ensuring that any work orders that changed category are included or excluded appropriately.

Completion is defined as the physical repair being undertaken including reinstatement.

The forecast years for the periods 2023-24 and 2024-25 are based on our normal work volume forecasts using 3X the last period, 2X the last but one period and 1X the last but two periods divided by 6. This allows for current trends of ALC resources to be captured and an allowance for weather-based impacts. Forecasts for 2025-30 use the baseline as described plus the anticipated impact of our ALC resource plan for 2025-30.

Our current supply pipe policy is to either repair it free of charge based on eligibility or it will be left with the customer to repair. We currently offer no assisted repairs.

Any additional support would be done informally, we do not operate an approved plumber scheme and so any additional support would not be recorded.

Comparison to PR19: These lines were not present at the PR19 submission, so no comparison to a previous forecast is available.

CW19.98-111: Supply pipe repairs – regional

Not applicable to Affinity Water

CW19.112-113: Leakage levels – company level

Line 112 values represent the sum of the historical minimum achieved levels of leakage at different dates and times, using the current reporting guidance methodology for bottom-up leakage estimation (as defined in the leakage guidance for PR19 document (27th March 2018).

This is the minimum weekly level achieved over a 5-year period. Spurious values such as inoperable data or random events have been removed, to represent a true minimum achieved level obtained from weekly average leakage values. This is calculated at DMA level and follows our normal bottom-up leakage calculation process to extrapolate to company level.

Forecasting the change in this line is not possible, so the value from 2022-23 is used in the 2023-24, 2024-25 and 2025-30 values.

Line 113 values represent the volume of leakage in Ml/d to maintain leakage at the previous year levels e.g. average daily breakout. This value is our modelled weather-based breakout scenario (3X Average weather, 1X Harsh weather and 1X mild weather to take account of weather-based impacts across an AMP).

These scenarios are currently based on extrapolation from an approximate water company's steady state analysis. We do not yet have detailed steady state assessments to provide individual year assessments, we currently lack several data streams to complete the analysis, however we are in the process of attaining the required data streams to provide the analysis based solely on Affinity Water data.

Comparison to PR19: These lines were not present at the PR19 submission, so no comparison to a previous forecast is available.

CW19.114-117: Leakage levels – regional

Not applicable to Affinity Water

Affinity Water

CW20: Distribution mains condition

Note

Text highlighted in yellow identifies changes since the file was submitted with our plan on 2 October 2023. The edits have been made to account for changes to CW20 to take account of our response to Ofwat's queries OFW-OBQ-AFW-031 and OFW-OBQ-AFW-087. The changes to both the table and this commentary have been reviewed by our technical assurance partner. They have confirmed that …

"… the guidelines have been followed – specifically with regards to:

- *Table CW20 main cohort analysis is now compliant with regards the 20 year bandings that are now specified as a must within the guidance (i.e. 1901-1920 etc..)*
- *The CW20 table data is compliant for mains diameter and material bandings specified in the table guidance and example*
- *The changes that the recalculation has had have been checked within CW20 and all numbers are as expected and total mains length remains the same.*
- *Table CW20 is compliant for the overall average burst rates (within+/-10%) when the total bursts (2274) vs the total of nominal bursts(2525) is compared. When the average of tolerance averages is calculated, it is outside compliance at +12.42%. "*

Summary

The condition grading system used for this submission has been prepared in line with the provided guidance part 3 Cost Wholesale water.

The profile of mains length in each grade has been reconciled with the average number of bursts per annum repaired from April 2018 to March 2023.

Mains repairs (bursts) and water main attributes datasets have been integrated to provide the level of granularity to a pipe ID to proceed with this analysis.

The data has been verified against data records accuracy and identification of inconsistencies/anomalies to ensure a good quality of data.

A total of 11,639 bursts between 1st April 2018 and 31st March 2023 were recorded in our GIS system. However, the total bursts used in this analysis (for all mains currently in use as March 2023) is 11,370 bursts in the 5-year period due to the following reasons:

- 222 burst records were not used in this analysis, as they were in abandoned mains as March 2023. Abandoned mains were not part of the calculations of these lines.
- 47 bursts records were removed (0.41% of the total) as they were more than 0.3m away from an in-use potable main, not meeting our criteria to allocate the burst to an existing main.

The total number of reported bursts in the APR2018-2023 is 11886 (3S.6/3F) is 2% different than the total bursts recorded in our GIS system from April 2018 to March 2023 (11639). Investigations was conducted between our GIS and regulation team, revealing that one of the root causes was attributed to the upgrade in our work management system in 2018. We acknowledge and recognise the historic misalignment, and better control system is in place now to avoid this in the future.

A validation check was carried out to identify inconsistencies and anomalies in the data. Inconsistencies between material and age especially for plastic mains (HPPE, MDPE, PVC and PVC-U) were identified and resolved, representing only 0.029% of the total Km of potable mains. To validate the Installation date (pipe age) with specific material type we adopted the historical approach that Affinity Water used in Pioneer deterioration modelling, and it was verified against the Water Industry common use.

Anomalies identification: Records of HPPE mains laid between 1923 -1963 (between 60 to 100 years old) were identified, representing 0.0033% of the total Km of HPPE mains. Records of MDPE mains laid between 1954 -1963 (between 60 to 69 years old) were identified, representing 0.0049% of the total Km of MDPE mains. Records of PVC mains laid between 1892 -1947 (between 76 to 131 years old), representing 0.045% of the total Km of PVC mains. Records of PVC-U mains laid between 1905 -1947 (between 76 to 118 years old), this only represented 0.018% of the total Km of PVC-U mains. The material of all these records were changed to "Unknown" material category and grouped into the "Other" Material cohort. This information has been passed to our GIS team to be further investigated and resolved, and to compare with surrounding mains in order to verify material and age.

A total of 1072 cohorts were formed part of the cohort analysis.

It was aimed to align cohort groupings using standardised primary variables of material, age, and diameter. For this reason, in some cases, it was not possible to achieve the +50%/+50% tolerance range for all cohorts. 10% of the cohorts (107 cohorts) do not meet the defined tolerance.

From these 107 cohorts that do not meet the tolerance:

- 60 cohorts with no bursts, with a total length of 161.24km.
- 47 cohorts were not possible nor practical to arrange its size to fall within the tolerance range. In some cases, this was due to the standardised primary variables used for consistency reasons, and in other cases that the combination of the 14 variables used to group the cohorts were not sufficient and further analysis was not practicable due to the volume of bursts.

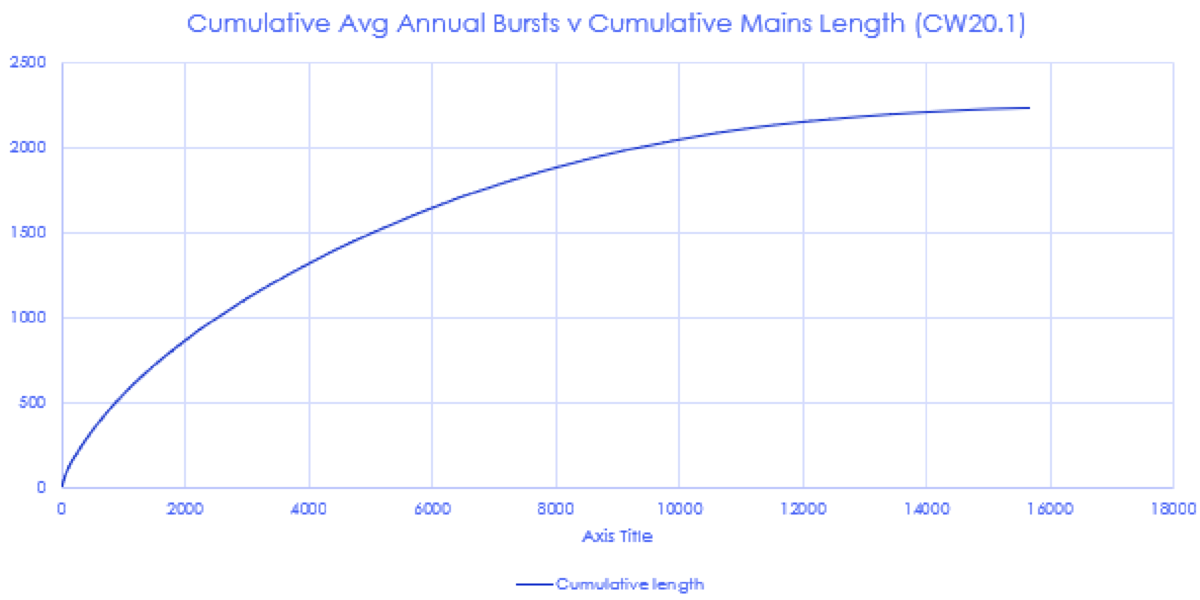
The average over all cohorts (total number of bursts against the total nominal bursts) has fallen within the -10%/+10% tolerance of the nominal size; however, the average of averages has fallen outside the -10%/+10% with +12.42% tolerance.

The methodology used for cohort grouping was an iterative process, executed using Python program, aimed to meet expected cohort nominal size. The process employed a cascade system, utilising sequence of variable combinations. The initial level involved grouping mains based on primary standardised variables (Material, Age and Pipe size), ensuring that all cohorts incorporate them as a minimum requirement. If a cohort didn't meet the nominal size initially, subsequent levels were applied successively. The next level grouped the mains by combining secondary variables of age and pipe size. Ungrouped mains were carried forward for further grouping, utilising a combination of Other variables to meet the cohort size. This iterative approach allowed compliant mains to form cohorts, while ungrouped mains moved to the next level for further grouping, enabling flexible arrangements to meet the required burst nominal size.

CW20.1 Potable mains length (up to 320mm diameter)

We are reporting a total length of 15,663.01km of potable mains up to 320mm diameter as reported in the APR. The condition grading system used for this submission has been prepared in line with the provided guidance part 3 Cost Wholesale water. The profile of mains length in each grade has been reconciled with the average number of bursts per annum repaired from April 2018 to March 2023 and is shown in graph below.

From the 969 cohorts formed part of the cohort analysis, 43 of them do not meet the tolerance criteria. 15 cohorts with no bursts, with a total length of 15.54km.



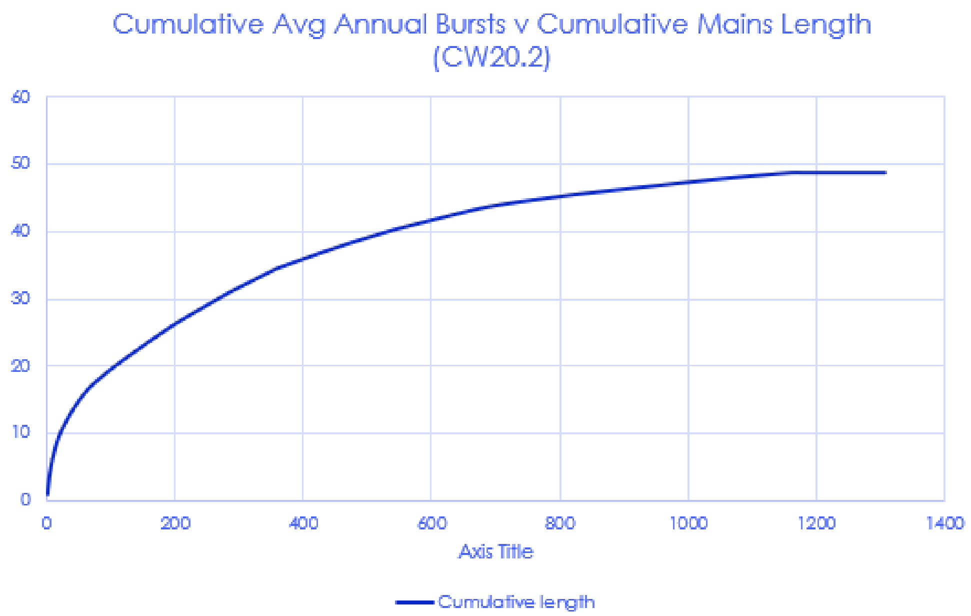
The marginal change on this line was due to a modification of the age and pipe size banding to ensure consistency with the Cohorting template guidance. The average change is -2.75%.

Changes from PR19 forecast – This line was not present at PR19, so no comparison is available.

CW20.2 Potable mains (greater than 320mm)

We are reporting a total length of 1,306.15 km of potable mains greater than 320mm diameter as per APR. The condition grading system used for this submission has been prepared in line with the provided guidance part 3 Cost Wholesale water. The profile of mains length in each grade has been reconciled with the average number of bursts per annum repaired from April 2018 to March 2023 as per graph below.

From the 103 cohorts formed part of the cohort analysis, 64 of them do not meet the tolerance criteria. 45 cohorts with no bursts, with a total length of 145.71km. The reason for this is the additional breakdown in 20 years banding and 3 categories pipe size, especially the category >610mm, with 28 cohorts with 0 bursts, representing only 0.29% of the total Km of mains.



The change on this line was due to a modification of the age and pipe size banding to ensure consistency with the Cohorting template guidance. The average change is 24.88%.

Changes from PR19 forecast – This line was not present at PR19, so no comparison is available.

CW20.3 Analysed cohort potable mains (up to 320mm)

The length in each condition grade has been calculated using data from Line CW20.1, excluding the length of replaced mains in the last 5 years for every cohort.

To identify mains replaced in the last 5 years, we identify mains classified as replaced or renewed main if its purpose is to replace an existing one. Once the replaced mains were identified, we selected those with a date laid on or after 1st April 2018, using the date laid information of each main record.

Once the mains replaced in the last 5 years were identified, the length of these mains was then discounted for each cohort.

The marginal change of this line was due to the change of cohort formation in Line CW20.1. The average change of the line is -2.75%

Changes from PR19 forecast – This line was not present at PR19, so no comparison is available.

CW20.4 Annual average bursts from cohort analysis (5 year average) potable mains (up to 320mm)

It has been calculated as the 5-year average bursts related in each condition grade using data from Line CW20.1. It has been excluded bursts on mains identified as "Mains replaced in the last 5 years" in every cohort.

The marginal change of this line was due to the change of Line CW20.3. The average change of the line is -3.89%

Changes from PR19 forecast – This line was not present at PR19, so no comparison is available.

CW20.5 Annual average bursts on analysed cohorts potable mains (up to 320mm)

The annual burst rate has been calculated by linking it to the 5-year average bursts in Line CW20.4, with the total length calculated in Line CW20.3.

This is a calculation line, so the change was caused by the changes in lines CW20.3 and CW20.4.

Changes from PR19 forecast – This line was not present at PR19, so no comparison is available.

CW20.6 Replaced or relined potable mains up to 320mm

For AMP7 the total length of replaced main is determined by aggregating the lengths of the "Mains replaced in the last 5 years".
To calculate the total relined potables mains, it has been identified by the length of every main up to 320mm that have been relined in the last 5 years and have a record of rehabilitation date, these mains were identified as "Mains relined in the last 5 years". 2 mains records have been found with a rehabilitation date in 2021; however, further investigation within the Asset Management team discovered that this was an error when registering the records in our GIS database. The error has been addressed and resolved. No relined mains have been found in the last 5 years.

This line has been changed from 400.15km (submitted version) to 107.66 km (updated version). The reason for the change was that it was discovered a potential misinterpretation regarding this line. The data we have provided in the submitted version included all newly installed mains of 5 years old or lower, as per our commentary:

"To exclude the replaced mains, the length of every new main has been identified up to 320mm installed from 2018 onwards, calculating the age of each main from year 2023 to the year of the installation. The mains that are 5 years old or less were identified as "Mains replaced in the last 5 years".

However, all new mains will comprise mains installed since 2018 and not only renewed/replaced mains and relined mains (e.g. new developments). For this reason, the line was recalculated to identify only replaced mains.

Changes from PR19 forecast – This line was not present at PR19, so no comparison is available.

CW20.7 Annual average bursts on replaced potable mains (5 year average) up to 320mm

It has been calculated as the average number of bursts on mains identified as "Mains replaced in the last 5 years".

This line has been changed from 7.2 to 2.2 annual burst average, due to the identification to only replaced mains (change of Line CW20.6).

Changes from PR19 forecast – This line was not present at PR19, so no comparison is available.

CW20.8 Annual average bursts (5 year average) on potable mains up to 320mm

It has been calculated as the average bursts using condition grading data from Line CW20.1, aggregating the total 5-year average burst calculated in Line CW20.4 with the 5-year average burst calculated in Line CW20.7.

Changes from PR19 forecast – This line was not present at PR19, so no comparison is available.

CW20.9 Current annual bursts on potable mains (up to 320mm)

The current annual burst has been calculated using burst data from last year 2022-2023, based on the cohort formation calculated in Line CW20.1.

The marginal change of this line was due to the change of cohort formation in Line CW20.1. The average change of the line is -6.04%.

Changes from PR19 forecast – This line was not present at PR19, so no comparison is available.

CW20.10 Current annual bursts on potable mains (up to 320mm)

The current annual burst rate for each condition grade has been calculated by linking it to the total bursts calculated in Line CW20.9, with the total length calculated in Line CW20.1.

This is a calculation line, so the change of this line was caused by the changes in lines CW20.1 and CW20.9. The average change of the line is -3.78%

Changes from PR19 forecast – This line was not present at PR19, so no comparison is available.

CW20.11 Annual bursts on mains (5 year average) greater than 320mm

It has been calculated as the 5-year average bursts related in each condition grade using the cohort formation in Line CW20.2.

Changes from PR19 forecast – This line was not present at PR19, so no comparison is available.

CW20.12 Annual bursts on mains (5 year average) on potable mains reported in APR 2019-2023

It has been calculated as the 5-year average bursts on all potable mains using condition grading data from Lines CW20.1 and CW20.2.
This was calculated aggregating the number of total 5-year average bursts in all mains up to 320mm calculated in line CW20.8, with the number of total 5-year average bursts in mains over 320mm calculated in line CW20.11.
As mentioned previously in the summary section of CW20, there is a misalignment in the bursts reported in the APR2018-2023 and the main repairs records stored in our GIS system. For the calculation of this line, we only used mains repair records located in in-use potable mains as March 2023. A total of 11,360 total burst records in 5-year period was used for this calculation, which is 2% difference comparing with the total main repairs reported in APR2018-2023, excluding bursts in currently abandoned mains as March 2023.

Changes from PR19 forecast – This line was not present at PR19, so no comparison is available.

CW21: Net zero enhancement schemes

CW21.1: AFW_EV – Net Zero: Electric Vehicles

(Note: the line numbering in the Ofwat table is incorrect, it is noted as CW19.1)

The electric vehicles programme at Affinity Water is the sole net zero enhancement scheme. The programme is split by base and enhancement. Where concerned, enhancement expenditure figures reported in CW21 account for the additional (offset) lease cost (OPEX) in replacing enough diesel vehicles to reduce operation carbon by 1920 TCO2e per year by the end of the AMP period. Capex costs reported in CW21 include the installation of additional charging infrastructure, including software costs. Any net carbon saving, for both operational (electricity costs) have been net off by existing diesel fuel costs, and embodied carbon disbenefit is removed from the operational benefits to report the total end of AMP GHG impact relating to the electric vehicles programme. Embodied carbon disbenefits were estimated for the installation of charging infrastructure. A profile of disbenefits was estimated based on planned infrastructure roll out.

A comparison against PR19 is not possible as electric vehicles and emissions reductions for Net Zero did not feature in our business plan at the time.

Component			AMP 7		AMP 8		TOTAL
	Specification	Cost	Quantity	Total	Quantity	Total	
Vehicles			84		370		
Additional lease cost	£150/mth			£87,300	370	£1,422,000	£1,509,300
Fuel saving	6p/mile			-£22,440	370	-£785,400	-£807,840
Driver Training		£170	84	£14,280	370	£62,900	£77,180
Charging locations			4		32		
Depot charger installs	44kw	£25,000	4	£100,000	32	£800,000	£900,000
	22kw	£15,000	4	£60,000	6	£90,000	£150,000
	7kw	£5,000	8	£40,000	44	£220,000	£260,000
Additional Staff chargers (Hub etc)	7kw		0		50	£250,000	£250,000
O&M	<22Kw	£500	12	£6,000	100	£50,000	£56,000
	>22kw	£1,000	4	£4,000	32	£32,000	£36,000
	Home		0		20	£20,000	£20,000
Site & Home infrastructure upgrades		£10,000		£30,000	32	£340,000	£370,000
Home charging units		£1,000	84	£84,000	120	£120,000	£204,000
Software							
Software license		£100	84	£8,400	370	£37,000	£45,400
Additional customisation costs				£20,000			£20,000
IT interfaces				£30,000			£30,000
Project Resources				£215,720		£1,000,000	£1,215,720
Feasibility Study				£16,000			£16,000
Capex (inc 20% risk for charger cost)				£668,520		£3,208,000	£3,876,520
Opex				£97,540		£818,500	£916,040
Total				**£766,060**		**£4,026,500**	**£4,792,560**

Source for this table can be found in the electric vehicles business case.