CONFIDENTIAL

24 March 2022

Household demand forecast 2021-22

West Country Water Resources Group

S054\505\GD003\02
Version: 4

Alan Cunningham
Subject Matter Expert

T: +44 7970 225450
E: alan.cunningham@ovarro.com

General enquiries or enquiries regarding permission for use of material contained in this document should be addressed to:

Ovarro DA Limited
Foundation House, 42-48 London Road
Reigate, Surrey, RH2 9QO
United Kingdom

E: sales@ovarro.com
T: +44 (0) 1306 742772

Registered Office: Rotherside Road, Eckington, Sheffield S21 4HL, United Kingdom | Registered in England and Wales, no 1774901

Revision History

Version	Date	Description
1	04 January 2022	First issue
2	28 February 2022	Additional micro-component scenarios; South West Water and Wessex Water normalisation approaches added; all results updated
3		Not used (spreadsheet version 3 was an update to correct errors found in a particular Water Resource Zone)
4	24 March 2022	Updates to scenarios, including variation of personal washing trends over time. Updates to South West Water normalisation approach. Updated results, incorporating forecasting spreadsheet improvements. Additional clarifications.

Author	Reviewer 1	Reviewer 2	Reviewer 3	Approver
Alan Cunningham				
	Julian Rickard			Alan Cunningham

Contents

1 Introduction

Ovarro DA Ltd ("Ovarro"), has been asked by the member companies of the West Country Water Resources Group (WCRWG) to produce a household demand forecast to support the WCWRG regional plan scheduled for publication in 2023 and the 2024 Water Resources Management Plan (WRMP24) for each member company.

The member companies are:

- Bristol Water (BW)
- South West Water (SWW)
- Wessex Water (WW)

This document is a draft report detailing the work undertaken to generate a forecast for the Bristol Water region. Associated spreadsheets implementing the forecast have been provided to the WCWRG member companies.

The intended audience for this document is Liz Cornwell (BW), Paul Merchant (SWW), Chris Hutton (WW) and colleagues at WCWRG member companies in the area of water resources.

2 Overview of demand forecast

2.1 Requirements

The WCWRG region comprises a total of 6 Water Resource Zones (WRZs) as follows:

- Bristol (BW)
- Bournemouth (SWW)
- Colliford (SWW)
- Roadford (SWW)
- Wimbleball (SWW)
- Wessex (WW)

In order to support the regional plan and WRMP24, forecasts of annual Distribution Input (DI) for each of the following planning scenarios are required for each WRZ:

- Normal Year Annual Average (NYAA)
- Dry Year Annual Average (DYAA)

In addition, the following WRZs require forecasts for Dry Year Critical Period (DYCP) scenarios:

- Wessex (peak week; peak month)
- Bournemouth (peak week)

In order to support the regional plan, WCWRG are considering a number of different scenarios under which DI is being derived as follows:

- Growth scenarios: See section 3.1

- Climate change: None, Medium, High
- PCC micro-component trend: Low, Medium, High

2.2 Outline approach

The household demand forecast comprises a number of constituent parts detailed in the following sections:

- A micro-component forecast to determine the likely changes in demand as a result of appliance efficiency and societal trends
- Derivation of base year household demand for each planning scenario
- Derivation of impacts of climate change scenarios on household demand
- Generation of outputs sufficient to populate WRMP forecasting tables

3 Forecasting properties and population

3.1 Growth scenarios

BW and SWW provided forecasts of total population and total property count under several growth scenarios. Results in this report are based upon the 'trend-based' growth scenario for the corresponding WRZs.

WW provided a single forecast of population and properties, including a split between measured and unmeasured properties. The total population and property count splits were used directly. The population in measured and unmeasured properties was inferred as for BW and SWW using the approach described below.

3.2 Allocating properties and population from growth scenarios

The total household population and property counts are taken from the selected growth scenario.

All new households are assumed to be measured.

A proportion of previously unmeasured households are assumed to switch annually based upon that observed in recent years. The following proportions are assumed:

Table 1: Assumed switching proportions

WRZ	Assumed switching proportion
Bristol (BW)	4.5%
Bournemouth (SWW)	4.2%
Colliford (SWW)	4.5%
Roadford (SWW)	4.3%
Wimbleball (SWW)	2.8%
Wessex (WW)	Based upon forecast provided

It is assumed that there will always be a small number of properties that cannot be metered. The threshold is set at meter penetration of 95% and, above this, no further properties are assumed to switch to metered billing.

It is assumed that the switching households will have the same occupancy as the average occupancy of the unmeasured customer base.

The total measured household population is calculated as the total population minus the remaining unmeasured household population once switching properties are accounted for.

4 Base year consumption by planning scenario

The approach to deriving base year consumption by planning scenario for each WRZ is detailed in Appendix A

5 Micro-component forecast

The standard Ownership, Frequency and Volume (OFV) micro-component forecasting approach as previously used by WCWRG member companies and described in UKWIR research[1] has been applied.

The micro-component modelling is focused on deriving baseline changes in water consumption associated with appliance efficiency and societal trends. Details of the assumptions made are provided in Appendix B.

The modelling is implemented in the spreadsheets provided. Frequency factors in the micro-component modelling have been adjusted across the model to align the Per Capita Consumption (PCC) for each WRZ with the base year.

The results of the micro-component modelling are subsequently adjusted to align with the forecast PCC under the scenario being considered, as discussed in section 8.1.

6 Scenario impacts

6.1 Climate change

Three scenarios regarding climate change have been developed based upon UKWIR research[2]:

- No impact: No adjustment to consumption is made as a result of climate change
- Medium impact: Based upon the 50th percentile results in the UKWIR analysis
- High impact: Based upon the 90th percentile results in the UKWIR analysis

The UKWIR report provides lookup tables by UKCP09 river basin region. For SWW and WW, the South West England region was used. For BW, a weighted average of the South West England and Severn regions was used; this is consistent with the approach taken by BW from WRMP19.

1 Customer Behaviour and Water Use, UKWIR Report ref: 12/CU/02/11

2 Impact of Climate Change on Water Demand, UKWIR report ref: 13/CL/04/12

The UKWIR report contains two models that forecast the climate change impact on household demand over a 28-year period for the different planning scenarios. Using the average of the two models gives the following climate change scenario impacts for a 28-year period:

Table 2: Climate change scenario impacts

	No climate change impact scenario	Medium climate change impact scenario	High climate change impact scenario
NYAA impact after 28 years (SWW and WW)	0.00%	0.84%	1.45%
NYAA impact after 28 years (Bristol)	0.00%	0.78%	1.42%
DYAA impact after 28 years (SWW and WW)	0.00%	0.84%	1.45%
DYAA impact after 28 years (Bristol)	0.00%	0.78%	1.42%
DYCP impact after 28 years (SWW and WW)	0.00%	2.33%	3.88%
DYCP impact after 28 years (Bristol, for information only)	0.00%	2.18%	3.84%

The percentage increase is applied linearly and extrapolated to the end of the forecast period.

6.2 Water efficiency and long-term COVID-19 impacts

As agreed with WCWRG, the forecasts have been developed on the basis of no specific water efficiency activity being applied. It is noted that this may need to be revised for the regulatory submissions to reflect committed activity through to 2024-25.

The consumption observed during 2020-21 and parts of 2021-22 shows substantial increases as a result of the COVID-19 pandemic and associated mitigation response including mandated homeworking. There is a need to distinguish between the one-off effects of mitigation actions and any long-term effects that will influence future demand, for example as a result of increased homeworking.

The long-term impacts of the COVID-19 pandemic on household consumption remain unclear. Additional household consumption related to increased homeworking may be offset by changes in personal washing and clothes washing habits. More generally, the future balance between office-based working and homeworking is uncertain. Except where stated as part of the base year adjustments, no specific assumptions have been made regarding these impacts.

7 Forecasting future household consumption

It is assumed that switching to measured status will lead to a 15% reduction in PCC, in line with previous research[3] [4], regardless of the PCC prior to switching. It is noted that higher estimates have been observed recently from universal metering programmes[5]. The switching population consumption based upon the current unmeasured PCC is subtracted from the unmeasured consumption from the previous year and, after applying the reduction, added to the measured consumption.

An assumption of 125 l/head/d has been made for new builds, based upon the value stated in Building Regulations[6]. If this assumption for a given year is higher than the PCC of the existing measured housing stock, then the PCC of existing measured housing stock is applied to new builds. Occupancy is assumed to be the same as the average for measured properties. The total consumption associated with these properties is added to the measured consumption total.

The results of the micro-component analysis are used to calculate proportional annual changes in consumption for unmeasured and measured households associated with appliance efficiency and societal trends that are not linked to any water efficiency activity. This adjustment is applied to the unmeasured and measured consumption from the previous year.

A percentage uplift for climate change is applied to the resulting consumption based upon the scenario being applied.

8 Outputs

8.1 Populating planning tables

The population, property and demand estimates are used to generate the information required to populate the relevant planning tables for the chosen growth and climate change scenarios for each WRZ and planning scenario.

The micro-component estimates for each year are scaled to align with the unmeasured and measured consumption for the NYAA planning scenario. Uplifts for other planning scenarios are assigned 80% to garden watering and 20% to personal washing. This aligns with the collaborative project[7] findings regarding increase in consumption and anecdotal evidence of additional personal washing during hot weather.

8.2 Results

Detailed results for each WRZ are provided in Appendix C.

3 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/290983/scho0508bobn-e-e.pdf

4 https://www.wessexwater.co.uk/-/media/files/wessexwater/corporate/strategy-and-reports/business-plan/0101ac--metering-tariff-trial.pdf

5 https://www.southampton.ac.uk/economics/research/discussion_papers/area/aplied_economics/1801-the-effects-of-the-universal-metering-programme-on-water-consumption.page

6 https://www.gov.uk/government/publications/sanitation-hot-water-safety-and-water-efficiency-approved-document-g

7 Water Demand Insights from 2018 (Artesia Consulting 2020)

9 Endpoint

It is expected that the outputs of the analysis will be incorporated within the WCWRG and WRMP24 submissions.

Appendices

A. Base year normalisation adjustments

The following normalisation adjustments are required:

- Estimates of Normal Year Annual Average (NYAA) household consumption in the base year, for each WRZ, that take into account:
  - Observed consumption during NYAA weather conditions and any trends therein
  - Any changes from historical consumption reporting that apply from 2020-21 onwards (e.g., as a result of the Ofwat reporting guidance for leakage[8] published in March 2018)
  - The impact of COVID restrictions on 2020-21 demand meaning that it does not represent a typical consumption year
  - Any evidence of long-term impacts of the COVID-19 pandemic on household consumption, in particular as a result of the increase in homeworking
- Estimates of the proportional increases in household consumption during Dry Year Annual Average (DYAA) conditions compared with NYAA conditions, for each WRZ
- Estimates of the proportional increases in household consumption during Dry Year Critical Period (DYCP) conditions compared with NYAA conditions, for each WRZ where this is applicable

A.1. Bristol (BW)

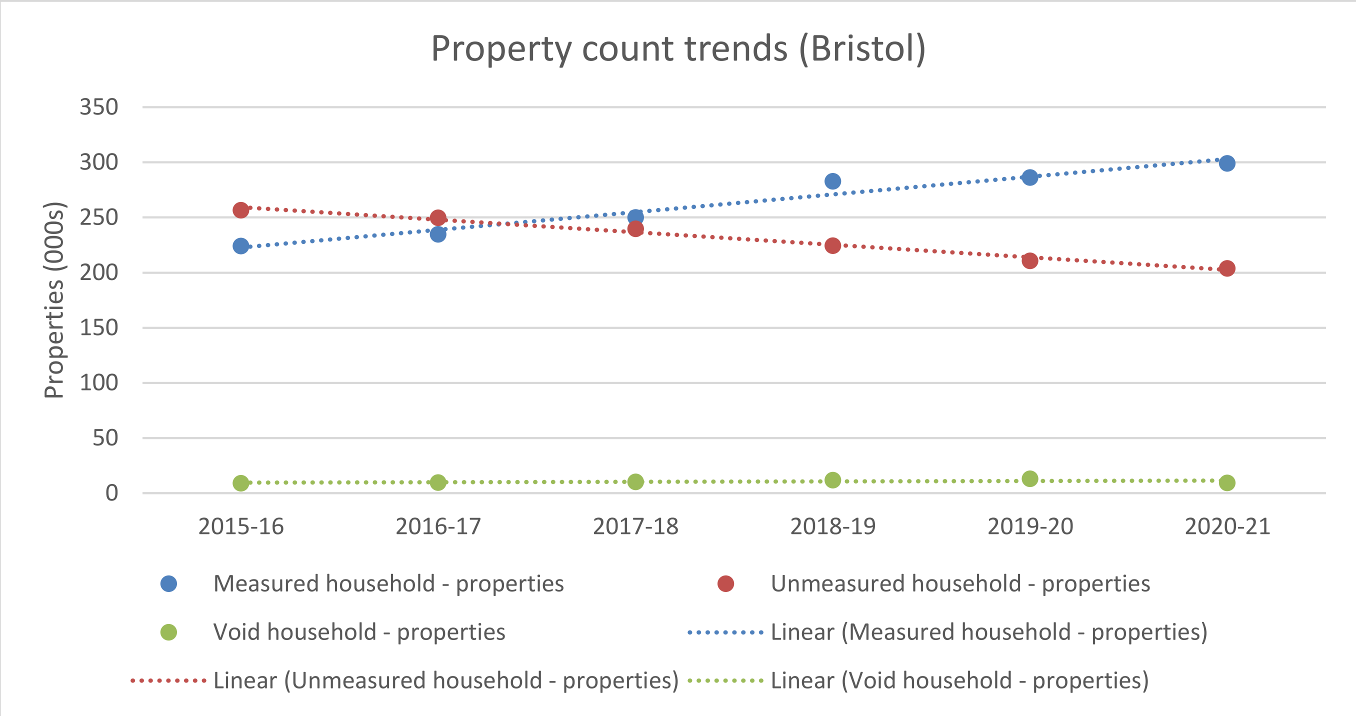
The base year for the forecast is currently assumed to nominally be 2020-21, given that this is the latest year for which property counts are available. Note that the consumption estimates will be significantly different from those observed during 2020-21 when significant COVID restrictions were in place leading to an increase in household consumption.

A.1.1. NYAA base year consumption (excluding homeworking adjustment)

Analysis of the historical reported data for Bristol shows that there is a discontinuity in the reported measured household count for 2018-19. This appears to explain the reported measured Per Household Consumption (PHC) for that year being lower than in 2017-18, despite the former being a warm, dry year.

8 https://www.ofwat.gov.uk/publication/reporting-guidance-leakage/

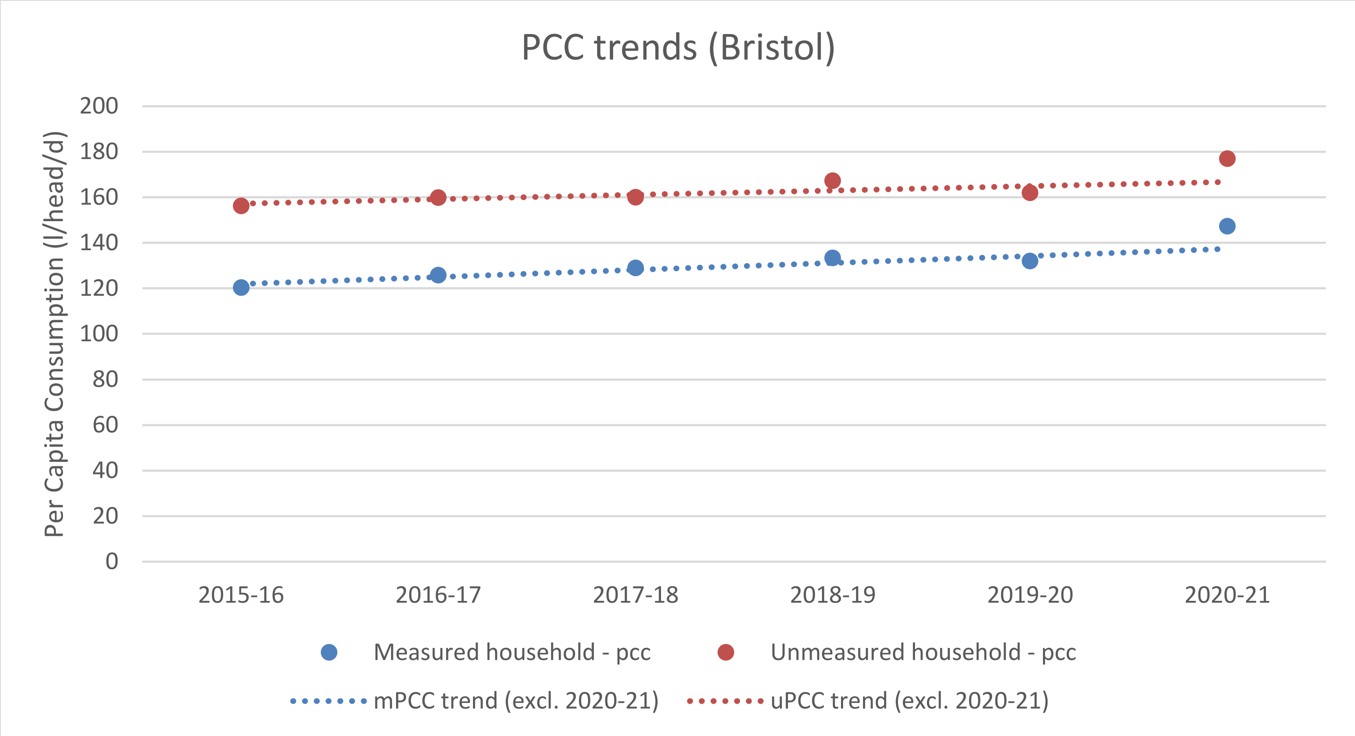
Figure 1: Property count trends for Bristol



Given the unusual relative PHC values observed, it is considered preferable to derive a base year NYAA consumption using a Per Capita Consumption (PCC) approach. The historical trend in PCC since 2015-16 (excluding the 2020-21 year impacted by COVID restrictions) has been extrapolated as shown in Figure 2.

This gives an unmeasured PCC estimate of 166.8 l/head/d and a measured PCC estimate of 137.3 l/head/d for the NYAA base year.

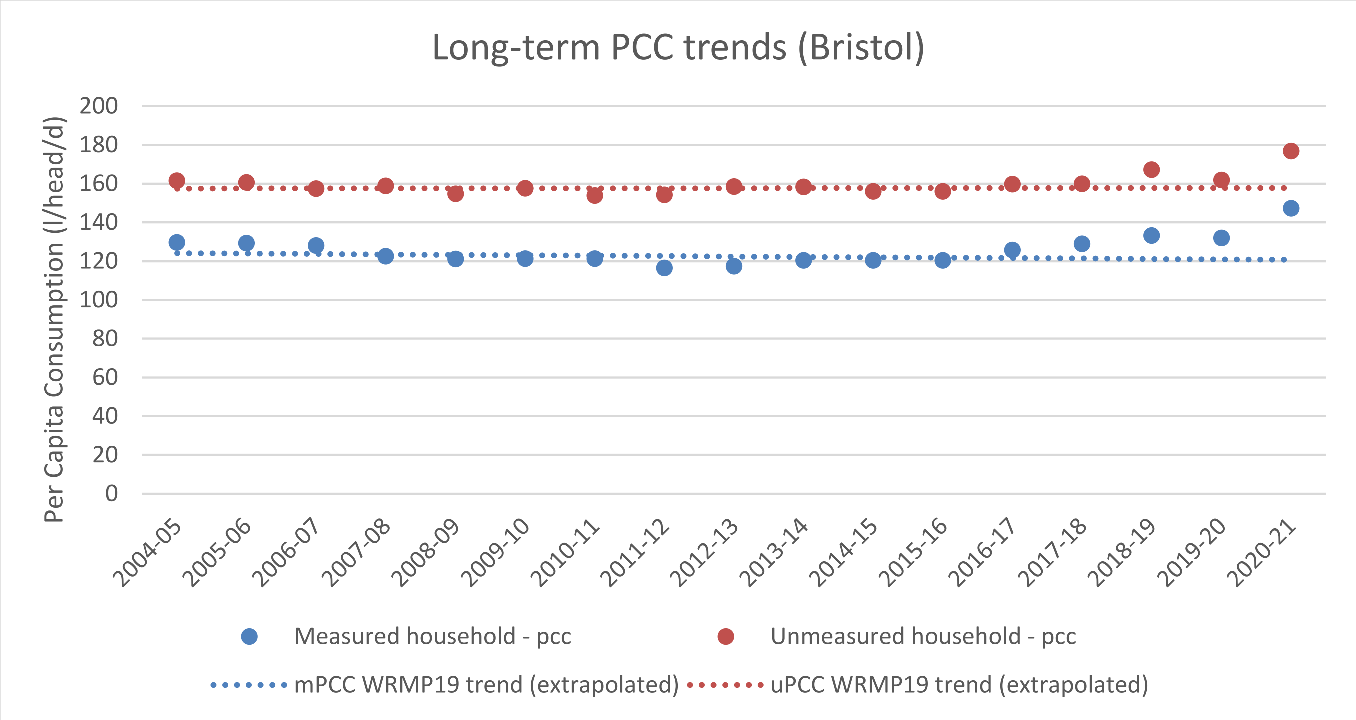
Figure 2: Bristol PCC trends since 2015-16



The equivalent WRMP19 consumption estimates were derived using a similar approach applied to the PCC data for 2005-2018. The resulting NYAA PCC estimates were 164.7 l/head/d and 126.7 l/head/d respectively for the 2017-18 WRMP19 base year, and forecast to reduce over the period to a nominal 2020-21.

The differences in NYAA estimates, in particular for measured PCC, can be explained by the recent upward trends that were not observed previously, as shown in Figure 3.

Figure 3: Comparison of recent Bristol PCC with previous long-term trends

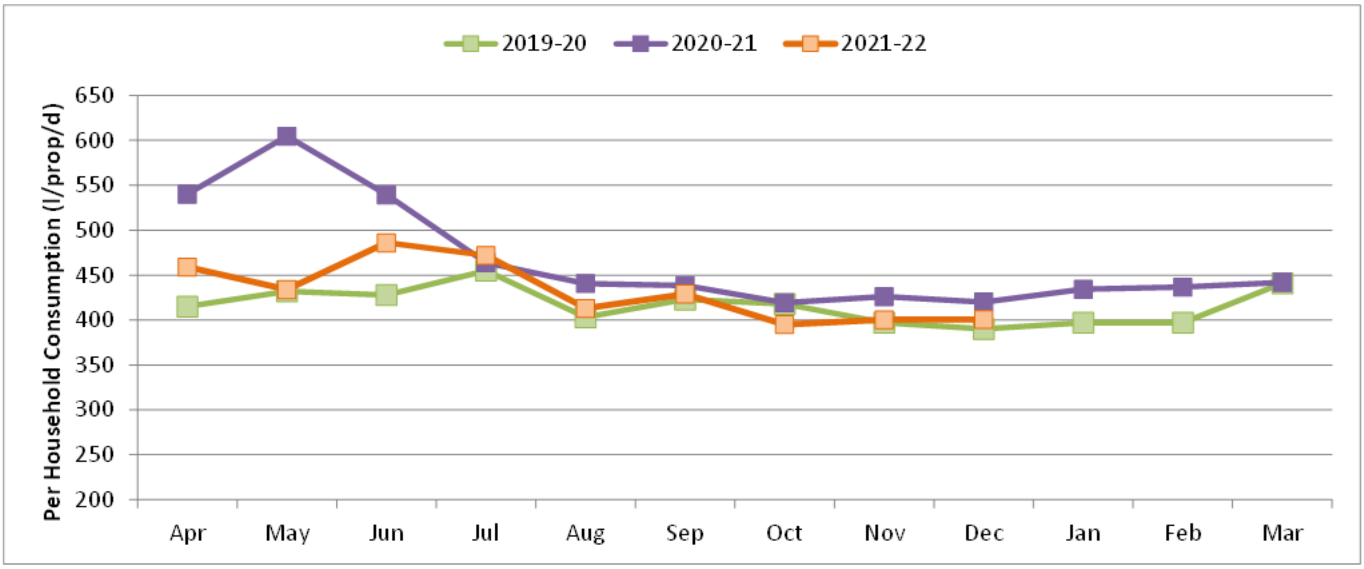


A.1.2. Evidence for homeworking adjustments

The consumption observed during 2020-21 and parts of 2021-22 shows substantial increases as a result of the COVID-19 pandemic and associated mitigation response including mandated homeworking. There is a need to distinguish between the one-off effects of mitigation actions and any long-term effects that will influence future demand, for example as a result of increased homeworking.

The evidence from the unmeasured consumption monitor does not currently justify an uplift to the long-term consumption trend resulting from homeworking impacts. As shown in Figure 4, the unmeasured household consumption for autumn 2021 when restrictions were relaxed is in line with the equivalent period from 2019-20, prior to the pandemic. If evidence of an uplift becomes available, BW may prefer to include this in future reporting.

Figure 4: BW Unmeasured Consumption Monitor Profile



BW does not have a measured consumption monitor and therefore no specific adjustment for measured household consumption could be derived. BW may prefer to add a homeworking impact adjustment for measured consumption when more evidence becomes available or using evidence from other WCWRG member companies.

A.1.3. DYAA consumption adjustment

2018-19 was a warm, dry year in the Bristol region. The DYAA factors have been obtained from the ratio of the observed 2018-19 consumption to the trend forecast for that year. This gives factors of 1.027 for unmeasured households and 1.017 for measured households. The resulting DYAA base year PCC estimates are 171.3 l/head/d for unmeasured households and 139.6 l/head/d for measured households.

The equivalent WRMP19 factors were 1.020 for unmeasured households and 1.044 for measured households using a similar approach applied to the PCC data for 2005-2018. The resulting DYAA PCC estimates were 164.7 l/head/d and 126.7 l/head/d respectively for the 2017-18 WRMP19 base year, and forecast to reduce over the period to a nominal 2020-21. These reflect the lower NYAA forecasts discussed above.

A.2. Colliford, Roadford and Wimbleball (SWW)

The base year for the forecast is currently assumed to nominally be 2020-21, given that this is the latest year for which property counts are available. Note that the consumption estimates will be significantly different from those observed during 2020-21 when significant COVID restrictions were in place leading to an increase in household consumption.

A.2.1. NYAA base year consumption (excluding homeworking adjustment)

The reported unmeasured Per Household Consumption for Colliford, Roadford and Wimbleball includes consumption from the following property types that are included as unmeasured households for regulatory reporting:

- Domestic agricultural properties (DAGs) – these can be thought of as the typical family farm, which is both a home (hence its inclusion in households) and a working farm. SWW estimate the consumption of these properties from similar measured properties and apply that to DAGs
- Tourist properties, such as B&Bs, small guest houses, etc., which are likely to have a larger consumption than average. SWW use data from an Exeter University study for this.

It has been agreed with SWW that the above properties should be excluded from the demand forecasts that are being prepared as part of this study. This affects the property counts, population and occupancy as well as the average normalised consumption.

The NYAA base year consumption has been based upon the consumption monitor data observed for calendar year 2019. The 2020-21 reporting year was relatively normal from a weather perspective, but the consumption in March 2020 was affected by the COVID-19 pandemic response. It is therefore appropriate to use the calendar year to avoid this impacting on the normalised demand.

The resulting consumption estimates are as follows:

Table 3: Colliford, Roadford and Wimbleball NYAA calculation

	Unmeasured	Measured
Average 2019 monitor consumption (l/prop/d)	479.4	272.2
Consumption monitor MUR	14.2%	10.0%
Adjusted 2019 consumption (l/prop/d)	558.8	302.4
Colliford, Roadford and Wimbleball average occupancy (head/prop)	2.36	2.20
NYAA PCC estimate, excluding homeworking (l/head/d)	236.5	137.3

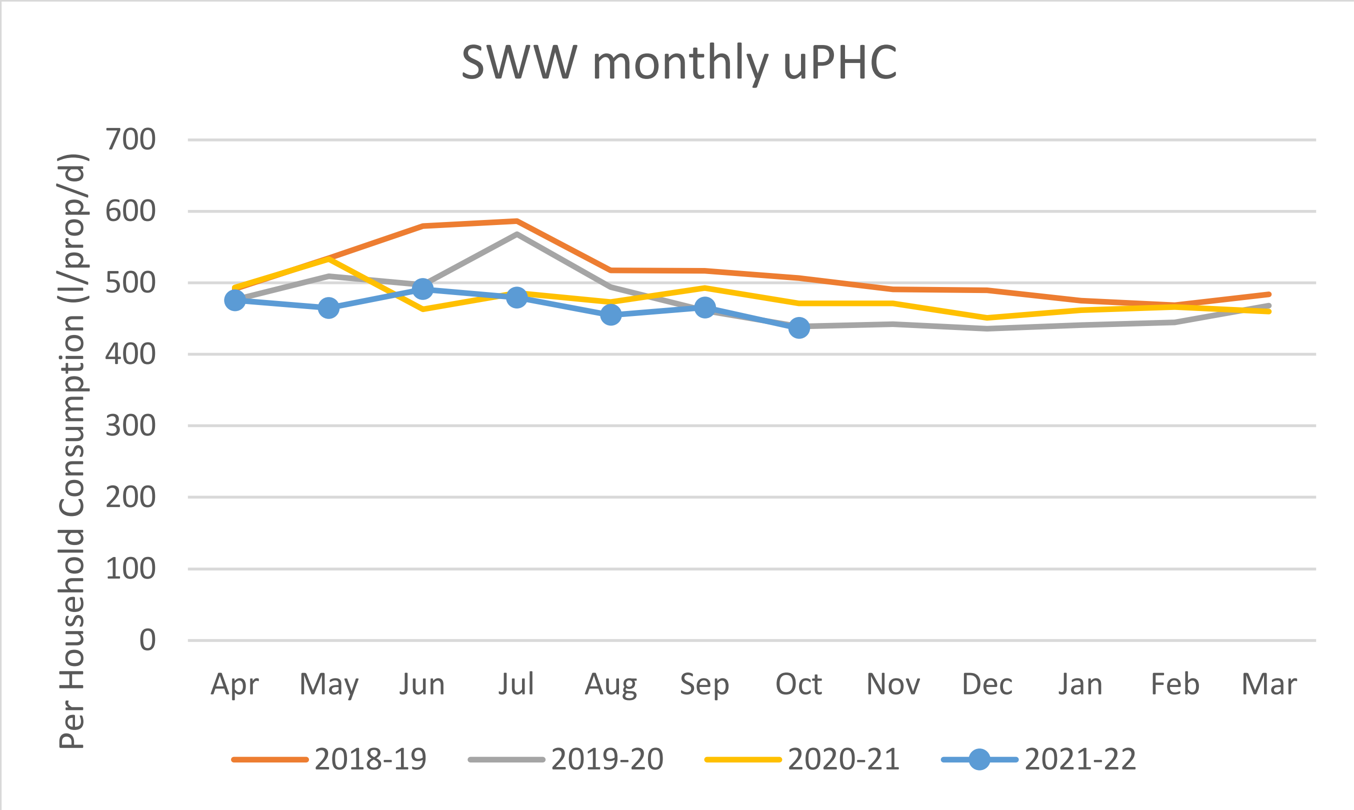
There is limited evidence to justify different PCC values for the individual WRZs.

These values are higher than the equivalents from WRMP19 analysis. The reflects higher PCC values reported in recent years.

A.2.2. Evidence for homeworking adjustments

The evidence from the unmeasured consumption monitor does not currently justify an uplift resulting from homeworking impacts. As shown in Figure 5, the unmeasured household consumption for recent months is in line with the equivalent period from 2019-20, prior to the pandemic. If evidence of an unmeasured uplift becomes available, SWW may prefer to include this in future reporting.

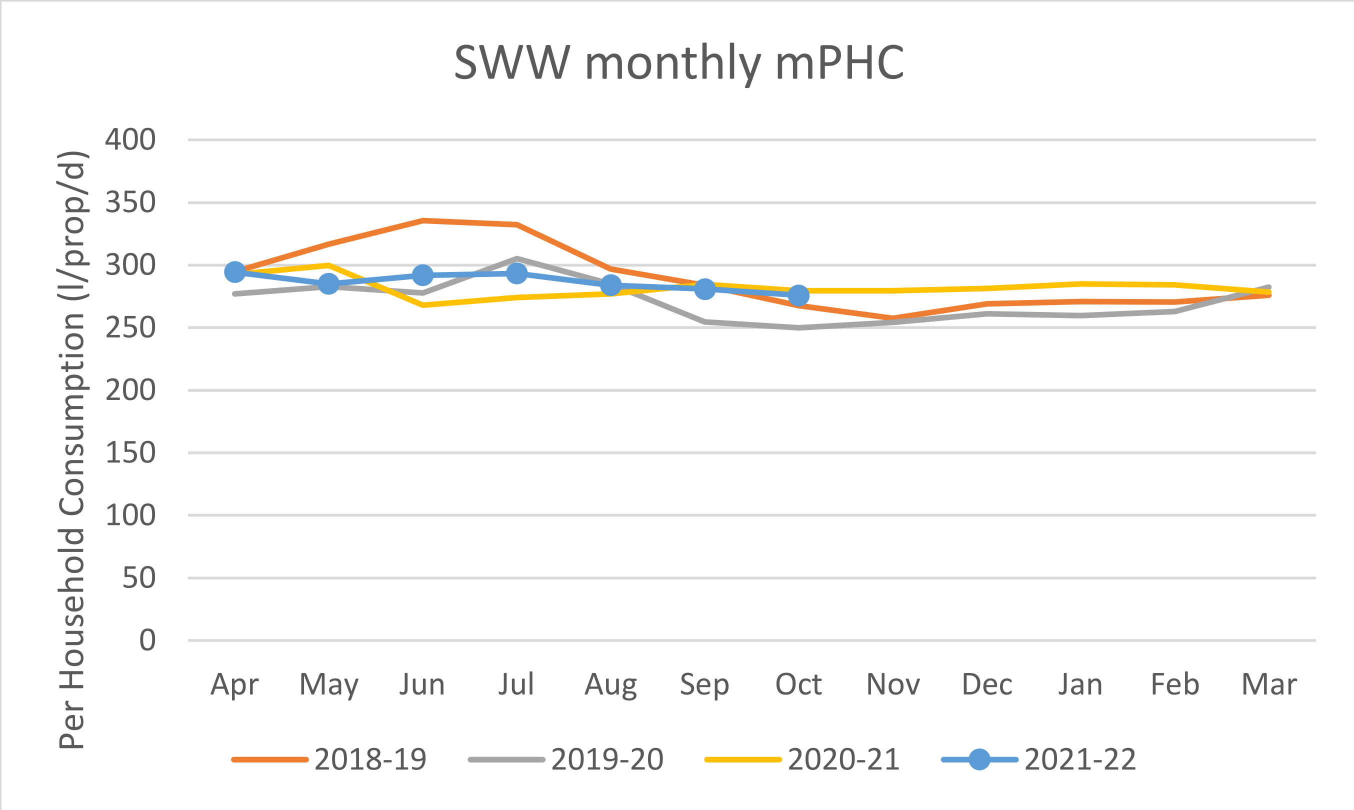
Figure 5: SWW Unmeasured Consumption Monitor Profile



There is evidence from the measured consumption monitor to justify an uplift resulting from homeworking impacts. As shown in Figure 6, the measured household consumption for recent months is notably greater than the equivalent period from 2019-20, prior to the pandemic. Whilst it is relatively aligned with the equivalent periods from 2018-19 and 2020-21, these were affected by the warm dry summer and pandemic restrictions respectively.

There is evidence that in the autumn of 2021 PHC was higher than in equivalent periods prior to the pandemic, though this will need to be reviewed with further data. It has been agreed with SWW to use the unadjusted measured NYAA consumption as above for the current forecasts. It is expected that SWW will apply an uplift once more data becomes available.

Figure 6: SWW Measured Consumption Monitor Profile



A.2.3. DYAA consumption adjustment

2018-19 was a warm, dry year in the SWW region. The DYAA factors have been obtained from the ratio of the observed 2018-19 consumption to the equivalent NYAA value. This gives factors of 1.068 for unmeasured households and 1.063 for measured households. The resulting DYAA base year PCC estimates are 252.5 l/head/d for unmeasured households and 146.0 l/head/d for measured households.

A single DYAA factor of 1.053 was derived for WRMP19; the revised factors are marginally higher than this. The resulting DYAA PCC estimates were lower in the WRMP19 analysis, reflecting the lower NYAA forecasts discussed above.

A.3. Bournemouth (SWW)

The base year for the forecast is currently assumed to nominally be 2020-21, given that this is the latest year for which property counts are available. Note that the consumption estimates will be significantly different from those observed during 2020-21 when significant COVID restrictions were in place leading to an increase in household consumption.

A.3.1. NYAA base year consumption

The reported 2020-21 unmeasured household consumption for Bournemouth was similar to the other SWW WRZs. There is no specific evidence to justify an alternative value, so a NYAA PCC of 236.5 l/head/d as discussed in section A.2 is also proposed for Bournemouth.

The reported 2020-21 measured household consumption for Bournemouth was notably higher than the other WRZs. An alternative estimate has been derived from an extract of measured household billing data provided. As discussed in section A.2, a 2019 calendar year is considered a reasonable approximation of NYAA conditions.

The resulting consumption estimates are as follows (MUR and homeworking adjustments are applied as discussed in section A.2):

Table 4: Bournemouth NYAA calculation

	Measured
Average 2019 consumption from meter readings (l/prop/d)	296.7
MUR estimate	10.0%
Adjusted 2019 consumption (l/prop/d)	329.7
Bournemouth occupancy (head/prop)	2.22
NYAA PCC estimate, excluding homeworking (l/head/d)	144.2

These PCC values are higher than the equivalents from WRMP19 analysis. This reflects higher PCC values reported in recent years.

A.3.2. DYAA consumption adjustment

The DYAA factors developed in section A.2.3 are considered applicable for Bournemouth region. This gives factors of 1.068 for unmeasured households and 1.063 for measured households. The resulting DYAA base year PCC estimates are 252.5 l/head/d for unmeasured households and 153.3 l/head/d for measured households.

A single DYAA factor of 1.053 was derived for WRMP19; the revised factors are marginally higher than this. The resulting DYAA PCC estimates were lower in the WRMP19 analysis, reflecting the lower NYAA forecasts discussed above.

A.3.3. DYCP consumption adjustment

The Bournemouth WRZ requires an estimate of DYCP consumption for a 7-day critical period.

The week beginning 31-Jul-2019 is the highest 7-day period of consumption observed in the consumption monitor. The DYCP factors have been obtained from the ratio of the observed consumption during this week to the equivalent NYAA value. This gives factors of 1.444 for unmeasured households and 1.405 for measured households. The resulting DYAA base year PCC estimates are 341.5 l/head/d for unmeasured households and 202.5 l/head/d for measured households.

A single DYCP factor of 1.490 was derived for WRMP19; the revised factors are slightly lower than this. The resulting DYCP PCC estimates were lower in the WRMP19 analysis, reflecting the lower NYAA forecasts discussed above.

A.4. Wessex (WW)

The base year for the forecast is 2019-20, as requested by WW. Note that the forecasts will be significantly different from observed consumption during 2020-21 and 2021-22 when significant COVID restrictions were in place.

A.4.1. NYAA base year consumption (excluding homeworking adjustment)

Analysis of the historical reported data for Wessex shows that there is a significant change in the reported consumption values as a result of the revised Ofwat guidance.

The NYAA base year consumption has been based upon the longer consistent time-series of data from the previous approach to reporting. An adjustment has then been applied to align with the higher values derived (prior to maximum Likelihood Estimation adjustments) under the revised methodology.

A previous model of unmeasured Per Household Consumption (PHC) and measured PHC in Wessex has been developed to support prior WRMPs. It can be seen from Figure 7 and Figure 8 that:

- The previous model significantly underestimates 2019-20 PHC for both unmeasured and measured households.
- The model significantly overestimated consumption in both measured and unmeasured properties in 2013-14 and 2014-15 (particularly given the hot spell in summer 2013)
- For measured households in particular, there appears to have been a steady increasing trend in PHC over recent years that represents a change from what had been observed previously.

The earlier data is therefore considered of limited use in modelling recent consumption patterns.

Figure 7: Previous model of unmeasured PHC in Wessex WRZ

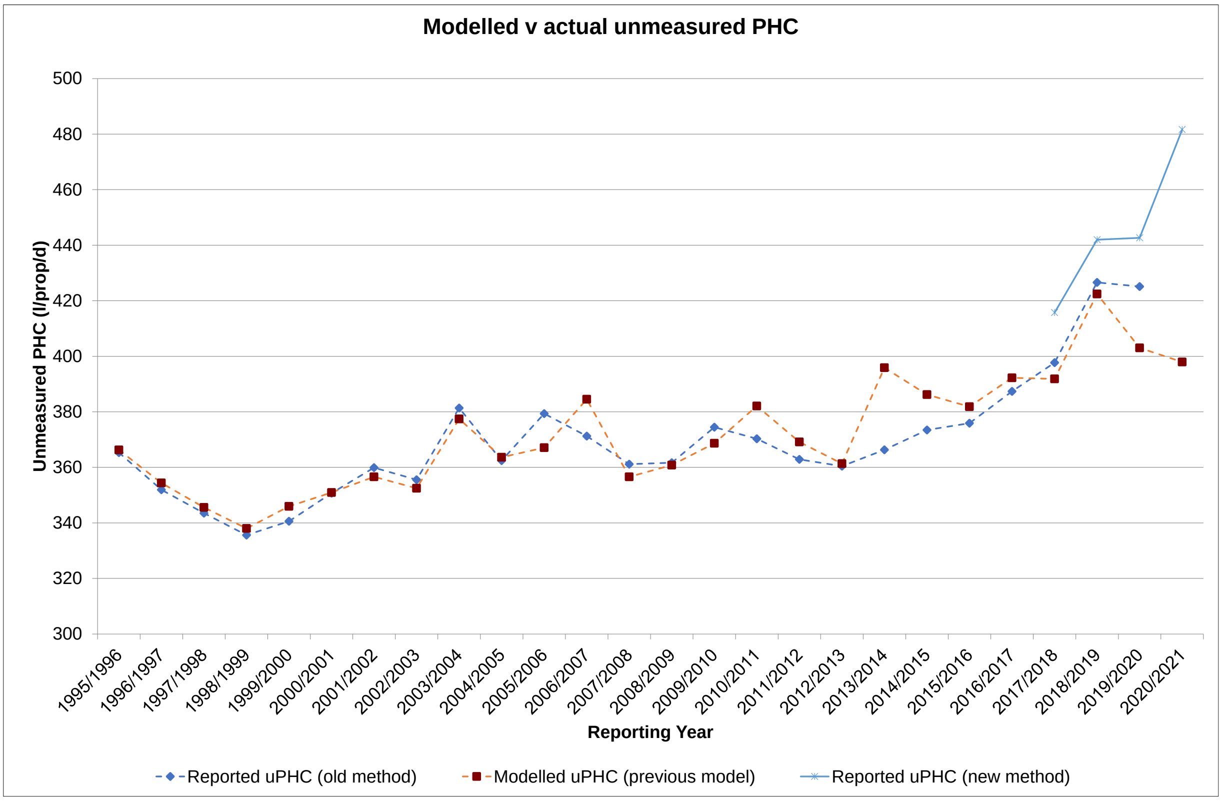
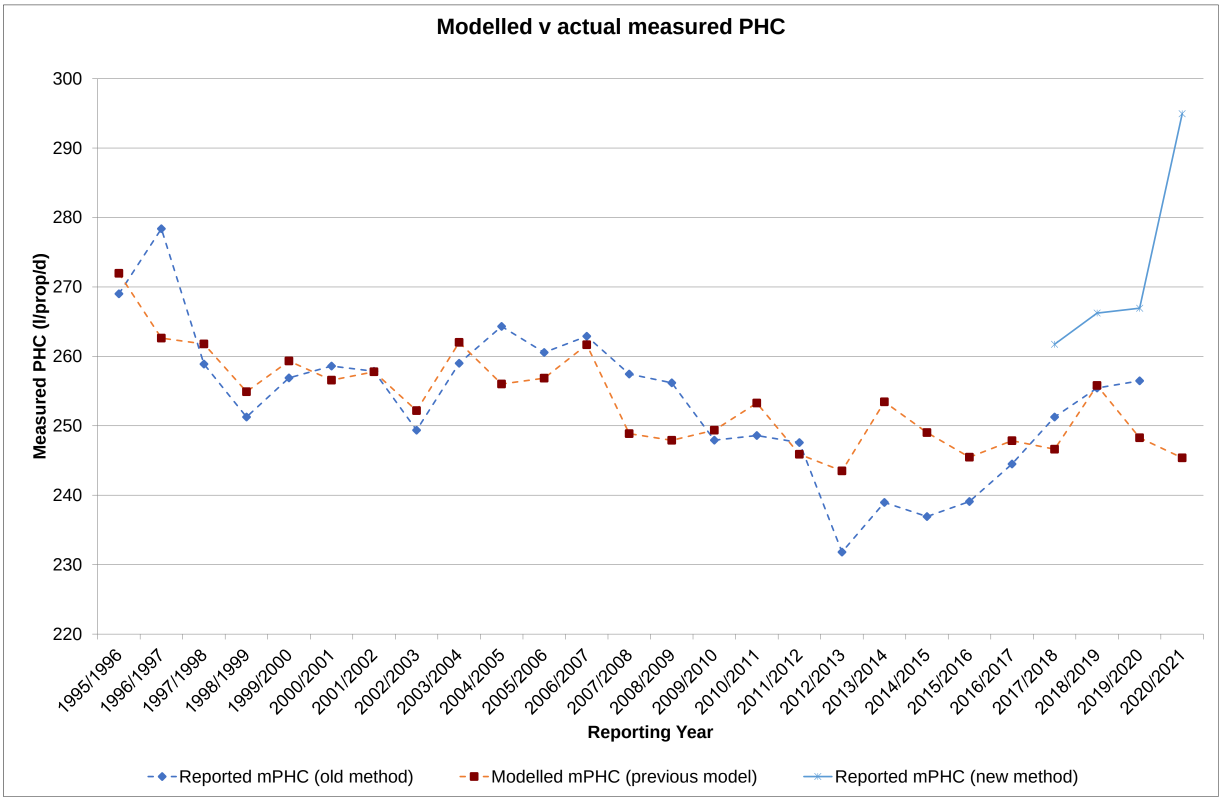


Figure 8: Previous model of measured PHC in Wessex WRZ



Models of the recent historical trends in PHC from 2013-14 to 2019-20 (excluding the 2020-21 year impacted by COVID restrictions) have been fitted using a standard least-squares linear regression approach. These capture the recent increasing trends for both measured and unmeasured properties and have been extrapolated as shown in Figure 9 and Figure 10.

The trend line formulas are:

- [Unmeasured NYAA PHC] = 360.5786 + 10.8751 * [Years since 2013-14]
- [Measured NYAA PHC] = 235.1979 + 3.6318 * [Years since 2013-14]

Figure 9: Unmeasured PHC trend for Wessex

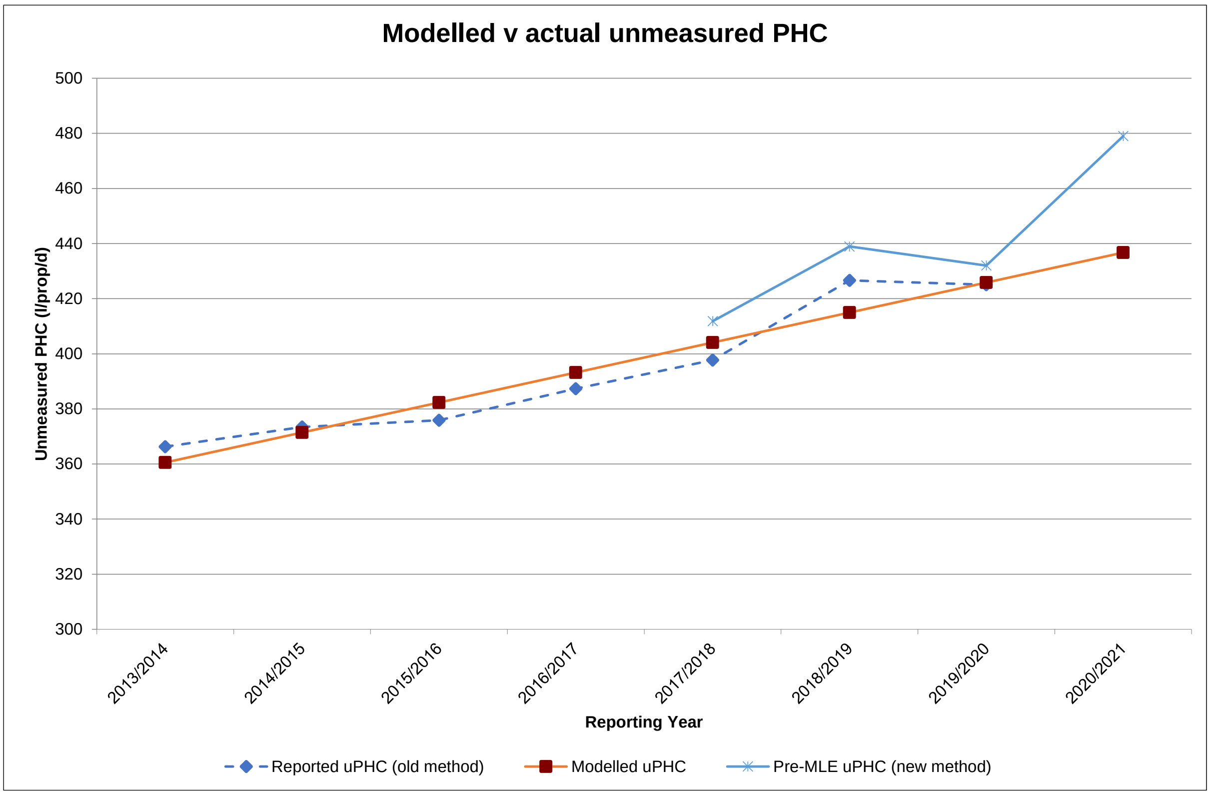
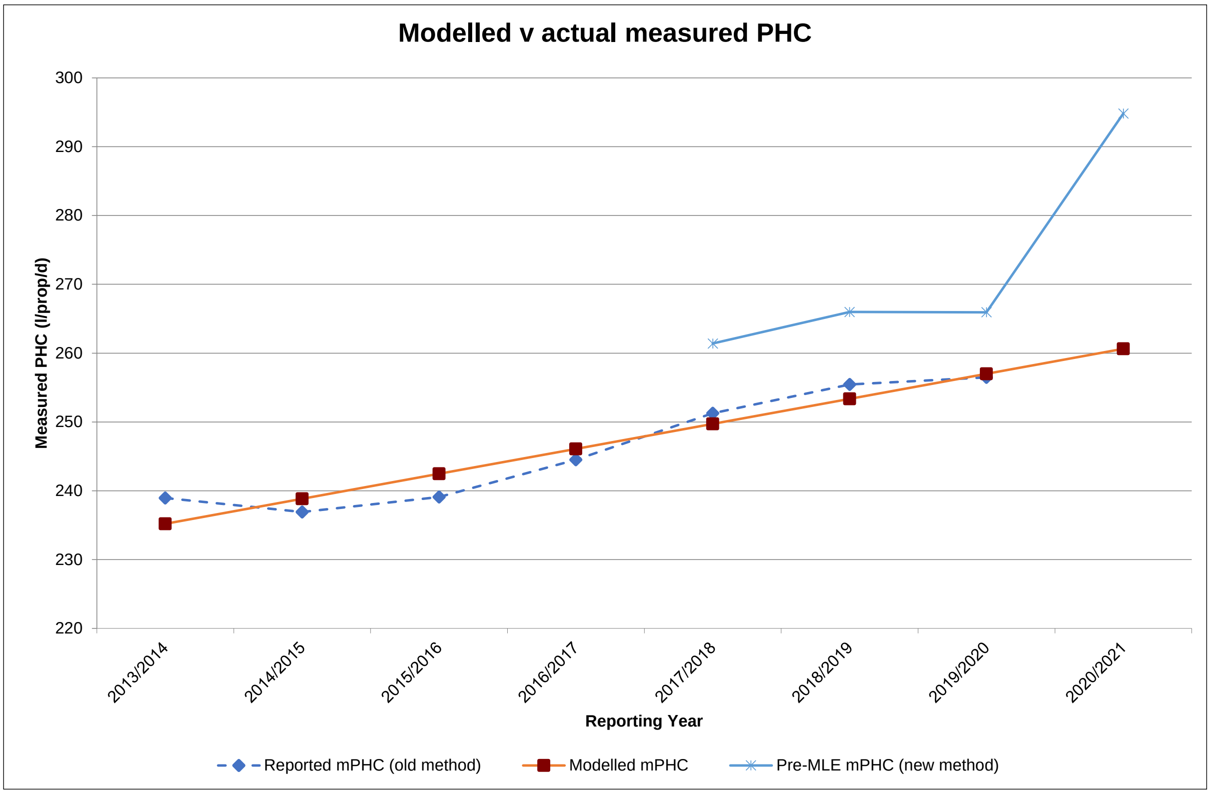


Figure 10: Measured PHC trend for Wessex



The resulting consumption estimates are as follows:

Table 5: Wessex NYAA calculation

	Unmeasured	Measured
Extrapolated 2019-20 NYAA consumption using old reporting (l/prop/d)	425.8	257.0
Average difference between old reporting and new pre-MLE (l/prop/d)	11.1	10.1
Adjusted 2019-20 NYAA consumption (l/prop/d)	437.0	267.0
Average 2019-20 occupancy (head/prop)	2.76	2.14
NYAA PCC estimate, excluding homeworking (l/head/d)	158.5	124.7

These values are higher than the equivalents from WRMP19 analysis. The reflects higher PHC values reported in recent years.

They are equivalent to normalisation factors of 1.011 (unmeasured) and 1.004 (measured) from the raw 2019-20 consumption to the NYAA consumption.

A.4.2. Evidence for homeworking adjustments

The consumption observed during 2020-21 and parts of 2021-22 shows substantial increases as a result of the COVID-19 pandemic and associated mitigation response including mandated homeworking. There is a need to distinguish between the one-off effects of mitigation actions and any long-term effects that will influence future demand, for example as a result of increased homeworking.

The evidence from the Small Area Monitor does not currently justify an uplift to the long-term consumption trend resulting from homeworking impacts. As shown in Figure 11 and Figure 12 respectively, the unmeasured and measured household consumptions for autumn 2021, when restrictions were relaxed, are in line with the equivalent period from 2019-20, prior to the pandemic. If evidence of a sustained increase in consumption becomes available, Wessex may prefer to include this in future reporting.

Figure 11: Wessex Unmeasured Small Area Monitor Profile

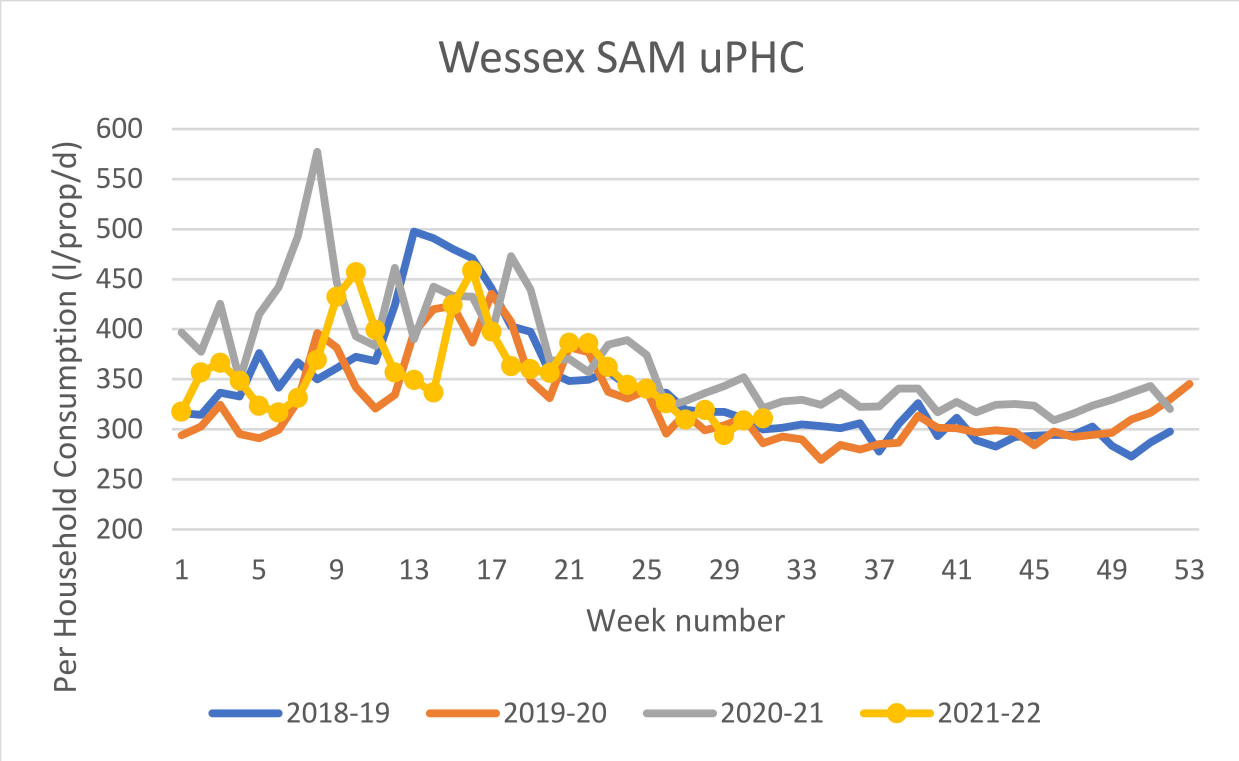
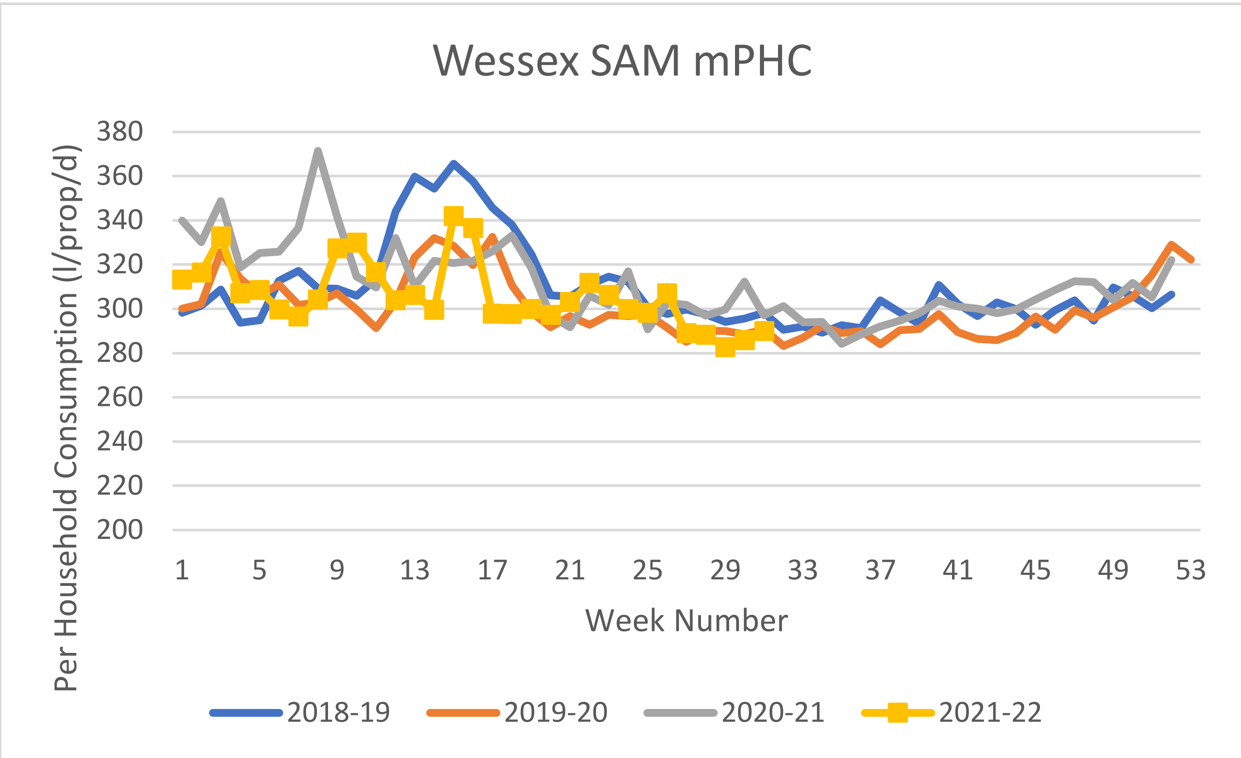


Figure 12: Wessex Measured Small Area Monitor Profile



A.4.3. DYAA consumption adjustment

2018-19 was a warm, dry year in the Wessex region. The DYAA factors have been obtained from the ratio of the observed 2018-19 consumption to the equivalent trend value, using the previous reporting methodology. This gives factors of 1.028 for unmeasured households and 1.008 for measured households.

WW has carried out a reconciliation analysis on the peak factors derived for individual demand components to ensure these align with peaking observed in Distribution Input. Revised DYAA/ NYAA factors of 1.035 and 1.015 have been provided on this basis.

The resulting DYAA base year PCC estimates are 164.0 l/head/d for unmeasured households and 126.6 l/head/d for measured households.

DYAA factors of 1.065 and 1.041 were derived for unmeasured and measured households respectively for WRMP14 and retained for WRMP19; the revised factors are lower than this. The resulting unmeasured DYAA PCC estimate was lower in the WRMP19 analysis, reflecting the lower NYAA estimate discussed above. The resulting measured DYAA PCC estimate is similar to the WRMP19 analysis, as the previous lower WRMP NYAA estimate was combined with a higher peaking factor.

A.4.4. DYCP (week) consumption adjustment

The Wessex WRZ requires estimates of DYCP consumption for a 7-day critical period.

DYCP (week)/ DYAA factors have been obtained from the ratio of the observed Small Area Monitor consumption during the 2018-19 peak week to the annual average for that year. This gives factors of 1.465 for unmeasured households and 1.184 for measured households. Combining with the DYAA/NYAA factors (prior to the reconciliation by WW), the equivalent DYCP (week)/ NYAA factors are 1.506 and 1.193 respectively.

Revised DYCP (week)/ NYAA factors of 1.486 and 1.193 have been provided by WW following the reconciliation analysis.

The resulting DYCP (week) base year PCC estimates are 235.5 l/head/d for unmeasured households and 148.7 l/head/d for measured households.

DYCP (week)/ NYAA factors of 1.481 and 1.196 were derived for unmeasured and measured households respectively for WRMP14 and retained for WRMP19; the revised factors are similar. The resulting DYCP PCC estimates were lower in the WRMP19 analysis, reflecting the lower NYAA forecasts discussed above.

A.4.5. DYCP (month) consumption adjustment

The Wessex WRZ also requires estimates of DYCP consumption for a peak month critical period.

DYCP (month)/ DYAA factors have been obtained from the ratio of the observed Small Area Monitor consumption during the 2018-19 peak rolling 4-week period to the annual average for that year. This gives factors of 1.427 for unmeasured households and 1.163 for measured households. Combining with the DYAA/NYAA factors (prior to the reconciliation by WW), the equivalent DYCP (month)/ NYAA factors are 1.468 and 1.173 respectively.

Revised DYCP (month)/ NYAA factors of 1.466 and 1.170 have been provided have been provided by WW following the reconciliation analysis.

The resulting DYCP (month) base year PCC estimates are 232.3 l/head/d for unmeasured households and 145.9 l/head/d for measured households.

No comparable values were derived for WRMP19.

B. Detailed micro-component analysis

Detailed assumptions for the micro-component modelling are discussed in the following sections. These are based upon the following sources of information:

- The WW Home Check (HC) data collected in 2016-2019 using in-home surveys
- The WW GetWaterFit (GWF) dataset collected in 2020-2021 on a self-reported basis
- Published industry research, notably the 2018 Energy Saving Trust (EST) report on water labelling options[9] that collated previous evidence
- PR19 micro-component analysis carried out on behalf of the WCWRG member companies

B.1. Toilet flushing

B.1.1. Ownership

All households are assumed to own at least one toilet. Multiple toilet ownership is not assumed to impact on frequency of use.

B.1.2. Frequency

The recent survey data provided by WCWRG does not contain any new information regarding toilet flushing frequency. The EST report assumes 4.71 flushes per person per day in household consumption modelling and suggests total correct toilet use of 1 large flush per day and 5.2 small flushes per day based upon medical research. The total number of flushes is assumed in the EST report to be an overestimate for households as it will include toilet use in non-households. It should be noted that the EST report was written prior to the increase in homeworking resulting from the COVID-19 pandemic.

Given the limitations of the current evidence, particularly in the context of any changes in home-working practices, a constant value of 5 flushes per day has been used. It is considered reasonable to assume that there is no difference in flushing frequency between measured and unmeasured properties. However, there are potential explanations for differences (e.g., proportion of retired people less likely to use the toilet in a workplace) that mean this assumption may be varied for reconciliation purposes.

There are some references in the literature to increased frequency of toilet use in the future due to an ageing population and trends towards working from home. Previous UKWIR research[10] suggested that the evidence is inconclusive and may also be counterbalanced by increased environmental awareness and consequent reduced flushing. The following assumptions have been made:

- Low scenario: No change in flushing frequency
- Central scenario: No change in flushing frequency
- High scenario: 0.5% p.a. increase in flushing frequency

[9] Independent review of the costs and benefits of water labelling options in the UK: EXTENSION PROJECT: Technical Report - FINAL

[10] Customer Behaviour and Water Use, UKWIR Report ref: 12/CU/02/11

B.1.3. Volume

Since 2001, a maximum flush volume of 6 litres has been mandated by legislation. Between 1993 and 2001, the maximum flush volume was 7.5 litres. Prior to that, flush volumes were higher and could be up to 13 litres in the 1960s. The EST report quotes an assumed toilet lifetime of 15 years.

The HC dataset suggested an average flush volume size of 6.32 litres for unmeasured properties and 6.29 litres for measured properties. This is consistent with the majority of pre-2001 toilets being replaced in the last 20 years.

A reduction in toilet volumes may be expected in respect of replacing the remaining stock of older toilets and minor incremental improvements in reducing flush volumes and/or promoting the effective use of dual flush toilets. The following assumptions have been made:

- Low scenario: 1% p.a. reduction in toilet volumes
- Central scenario: 0.5% p.a. reduction in toilet volumes
- High scenario: No reduction in toilet volumes

B.2. Personal washing

B.2.1. Ownership

The HC dataset suggests ownership of different types of showers as shown in Table 6. For the reasons discussed in section B.2.3 below, these have been grouped into standard showers and powerful showers.

Table 6: Shower Ownership by Type

	Unmeasured	Measured
Electric	48.5%	38.6%
Gravity	3.7%	5.0%
Standard showers	***52.2%***	***43.6%***
Mains pressure / combi	38.4%	47.1%
Multijet / Pumped / Power	9.3%	9.3%
Powerful showers	***47.8%***	***56.4%***

A 2018 report by Trend Monitor in partnership with the Bathroom Manufacturers Association [11] found that bar mixer showers and electric showers formed the majority of new shower purchases. The extent to which powerful showers will be prevalent in future is therefore dependent whether hot water is being fed from a cylinder or at mains pressure (e.g.) from a combi boiler. It is noted that a gas boiler ban for new homes from 2025 is currently expected as part of the Future Homes Standard[12], which may make mains pressure feeds to showers less likely in future. Future trends may also be influenced by environmental concerns regarding high flow rate showers.

[11] Bathroom Purchasing Trends Consumer Insight Report 2018 Edition

[12] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/956094/Government_response_to_Future_Homes_Standard_consultation.pdf

Overall, the future trends in shower design are unclear. This is considered further in section B.2.3.

It is assumed that the following proportions of properties have a bath that is routinely used based upon the HC dataset (baths that are never or rarely used are excluded):

Table 7: Bath Ownership

	Unmeasured	Measured
Bath ownership (in-use devices)	43.9%	37.0%

The anecdotal historical trend towards an increasing preference for showers over baths is noted, but the Trend Monitor report found that 66% of new bathrooms include a bath. Given that this is a higher proportion than that of baths currently in regular use, it is unclear as to whether this trend will continue. The following assumptions have been made:

- Low scenario: 0.5% p.a. reduction in bath ownership
- Central scenario: No change in bath ownership
- High scenario: No change in bath ownership

B.2.2. Frequency

The assumed frequency of baths and showers, based upon the HC dataset, is as follows:

Table 8: Personal washing frequency by Type

	Unmeasured	Measured
Showers (per person, per week)	7.0	6.5
Baths (per household, per week; if applicable)	4.2	3.5

This is relatively consistent with the values used in the EST report.

Frequencies of showers and baths may increase as a result of increased societal expectations for cleanliness. There is anecdotal evidence of increasing shower frequency in recent years as a partial explanation for recent rising PCC trends. They may also reduce as a result of increasing awareness of water consumption from either a financial or economic perspective. The following assumptions have been made:

- Low scenario: 0.50% p.a. reduction in washing frequency (baths and showers)
- Central scenario: 0.20% p.a. increase in shower frequency for first 5 years reflecting continuation of anecdotal recent trends. No change in subsequent shower frequency or bath frequency.
- High scenario: 0.25% p.a. increase in washing frequency (baths and showers)

B.2.3. Volume

A bath volume of 72.2 litres is used in the EST report. This is consistent with a typical capacity of approximately 180 litres and average filling of slightly less than half-full as suggested by the HC dataset. The HC dataset also indicates slightly less filling in measured households, so volumes of 75 l for unmeasured households and 70 l for measured households have been assumed.

Bath volumes may increase slightly, if there is a trend towards large baths seen as more luxurious, or reduce slightly for reasons of water consumption awareness driven by environmental or financial concerns. The following assumptions have been made:

- Low scenario: 0.50% p.a. reduction in bath volumes
- Central scenario: No change in bath volumes
- High scenario: 0.25% p.a. increase in bath volumes

The HC dataset suggests the following typical flow rates for different types of showers:

- Electric: 6.88 l/min (from 7,535 responses)
- Gravity: 7.82 l/min (from 816 responses)
- Mains pressure / combi: 9.46 l/min (from 8,511 responses)
- Multijet / Pumped / Power: 9.61 l/min (from 1,688 responses)

Whilst there is some evidence that electric showers have a lower flow rate than gravity showers, given the limited proportion of gravity showers in the dataset and relative similarity of flow rates, these have been combined in the analysis as standard showers with an assumed flow rate of 6.97 l/min.

Given the similarity of flow rates from mains pressure / combi showers and multijet / pumped / power showers, these have been combined in the analysis as powerful showers with an assumed flow rate of 9.48 l/min.

The direction of trend in shower flow rates, including the split between powerful and standard showers, is difficult to forecast and a material factor in future household consumption. Shower head technology is continuing to improve to develop more aeration and less water use for a similar experience. Conversely, higher perceived flow by the user is a characteristic of a good shower experience and seen as important in a modern shower. The following assumptions have been made:

- Low scenario: 0.50% p.a. reduction in average shower flow rate
- Central scenario: No change in average shower flow rate
- High scenario: 0.25% p.a. increase in average shower flow rate

A shower duration of 7.43 mins for unmeasured customers and 7.01 mins for measured customers has been assumed based upon the HC dataset; this is consistent with other published research[13]. The resulting shower volumes are relatively consistent with the EST report and UKWIR research using monitored shower data[14]. Similar to bath volumes, shower durations may increase for reasons of luxury, or reduce for reasons of water consumption awareness. There is anecdotal evidence of increasing durations in recent years as a partial explanation for recent rising PCC trends.

The following assumptions have been made:

- Low scenario: 0.50% p.a. reduction in average shower duration
- Central scenario: 0.20% p.a. increase in shower duration for first 5 years reflecting continuation of anecdotal recent trends. No change in average shower duration subsequently.
- High scenario: 0.25% p.a. increase in average shower duration

[13] https://www.mirashowers.co.uk/blog/trends/revealed-what-brits-are-really-getting-up-to-in-the-bathroom-1/

[14] Integration of Behavioural Change into Demand Forecasting and Water Efficiency Practices (UKWIR Report Ref: 16/WR/01/15)

B.3. Clothes washing

B.3.1. Ownership

Ownership of washing machines is very high and has been estimated at 99.4% based upon the GWF dataset. The HC dataset did not specifically ask about washing machine ownership.

Given the already high ownership figures, overall ownership of washing machines is assumed to remain unchanged over time in all scenarios.

B.3.2. Frequency

Washing machine frequencies of 4.3 times per household per week for unmeasured customers and 3.6 times per household per week for measured customers have been assumed based upon the HC dataset.

Washing machine frequencies may increase, as a result of increased cleanliness expectations, or reduce as a result of increased water consumption awareness. The following assumptions have been made:

- Low scenario: 0.50% p.a. reduction in washing machine frequency
- Central scenario: No change in average shower duration
- High scenario: 0.50% p.a. increase in washing machine frequency

B.3.3. Volume

Modern washing machines typically have a volume per use in the range 37-56 litres per use as indicated by the Ecodesign standards quoted in the EST report and manufacturer guidance[15].

Previous consumer research indicates an expected lifetime of typically 6-7 years[16]. Therefore, given that the Ecodesign standards were based upon best available technology in 2010, the vast majority of washing machines can be considered 'modern' in this context.

An average current volume per use of 56 litres has been used on the basis that more efficient current washing machines will be offset by less efficient older machines. It is unclear as to what extent efficiency improvements will continue. The following assumptions have been made:

- Low scenario: 0.50% p.a. reduction in average washing machine volume
- Central scenario: 0.25% p.a. reduction in average washing machine volume
- High scenario: No change in average washing machine volume

[15] https://www.samsung.com/uk/support/home-appliances/how-much-water-does-my-samsung-washing-machine-use-per-cycle/

[16] www.wrap.org.uk/sites/files/wrap/WRAP%20longer%20product%20lifetimes.pdf

B.4. Dishwashing

B.4.1. Ownership

Ownership of dishwashers is estimated at 60.2% for unmeasured properties and 65.7% for measured properties.

Households are assumed to do some dishwashing by hand, with the extent of this dependent on whether or not they own a dishwasher.

Dishwasher ownership has been significantly increasing in recent decades[17]. It is assumed that trends in increased dishwasher ownership will continue in the short-term, irrespective of specific water efficiency activity, but that it may not be feasible to install dishwashers in all properties. The following specific assumptions have been made (note that increased dishwasher ownership is likely to reduce water consumption by substituting hand dishwashing):

- Low scenario: 3% p.a. increase in dishwasher ownership, up to a maximum of 95% ownership
- Central scenario: 2% p.a. increase in dishwasher ownership, up to a maximum of 85% ownership
- High scenario: 1% p.a. increase in dishwasher ownership, up to a maximum of 75% ownership

B.4.2. Frequency

The following frequency of dish washing is assumed, based upon the HC and GWF datasets:

Table 9: Dishwashing frequency

	Unmeasured	Measured
Dishwasher use (per household, per week; if applicable)	4.8	4.4
Hand dishwashing (per household, per week; owning dishwasher)	8.1	8.4
Hand dishwashing (per household, per week; no dishwasher)	15.7	14.6

Frequencies may increase slightly, if more frequent use is seen to be convenient, or reduce slightly in response to increased awareness of water consumption. The following assumptions have been made:

- Low scenario: 0.5% p.a. reduction in dishwashing frequency
- Central scenario: No change in dishwashing frequency
- High scenario: 0.5% p.a. increase in dishwashing frequency

B.4.3. Volume

Modern dishwashers typically have a volume per use in the range 7-13 litres per use as indicated by the Ecodesign standards quoted in the EST report and manufacturer guidance[18]. Surveys of consumers and manufacturers indicate an expected lifespan of approximately 10 years[19].

17 https://www.statista.com/statistics/289151/household-dishwashing-in-the-uk/

18 https://www.bosch-home.in/experience-bosch/living-with-bosch/fresh-reads/9-things-you-may-not-know-about-your-dishwasher

19 https://www.consumerreports.org/dishwashers/how-to-make-your-dishwasher-last-longer/

An average current volume per use of 13 litres has been used on the basis that more efficient current washing machines will be offset by less efficient older machines. It is unclear as to what extent efficiency improvements will continue. The following assumptions have been made:

- Low scenario: 1% p.a. reduction in average dishwashing volume
- Central scenario: 0.5% p.a. reduction in average dishwashing volume
- High scenario: No change in average dishwashing volume

Previous research suggests that manual dishwashing by UK consumers of a full dishwasher load typically uses 49 litres[20]. It is considered reasonable to assume that measured customers would use less. Volume estimates of 45 l and 50 l for measured and unmeasured customers have therefore been used instead for customers without dishwashers.

For customers with dishwashers, it is likely that manual dishwashing is restricted to items that do not clean well in dishwashers, or are fragile, plus some pre-rinsing of items prior to placing them in the dishwasher. A volume estimate of 10 litres (approximately equal to one washing up bowl) has been assumed.

B.5. Miscellaneous internal use

For this analysis, miscellaneous internal use (other than plumbing losses) has been assumed at 5 uses per person per day, with an average volume of 3 litres for unmeasured properties and 2 litres for measured properties. This is relatively consistent with previous assumptions made by the member companies.

Miscellaneous internal use may increase (e.g., increased cleaning from increasing societal expectations of cleanliness) or reduce (e.g., from increased awareness of water consumption). The following assumptions have been made:

- Low scenario: 0.5% p.a. reduction in miscellaneous internal use
- Central scenario: No change in miscellaneous internal use
- High scenario: 0.5% p.a. increase in miscellaneous internal use

Plumbing losses are currently estimated as followed, based upon information provided by each of the member companies:

Table 10: Plumbing losses estimates

Company	Unmeasured estimate (l/prop/d)	Measured estimate (l/prop/d)	Source
BW	15.4	15.4	Value of 0.64 l/prop/hr provided for leakage analysis
SWW	51.1	10.7	Previous micro-component analysis
WW	16.1	7.2	Previous micro-component analysis

Miscellaneous internal use has assumed to remain constant in the absence of evidence to the contrary.

Plumbing losses may reduce in future from increased awareness of water consumption. They may, however, increase as a result of the apparently increasing numbers of toilets with leaking valves[21]. The following assumptions have been made:

- Low scenario: 0.5% p.a. reduction in plumbing losses

[20] Berkholz, Petra & Stamminger, Rainer & Wnuk, Gabi & Owens, Jeremy & Bernarde, Simone. (2010). Manual dishwashing habits: An empirical analysis of UK consumers. International Journal of Consumer Studies. 34. 235 - 242. 10.1111/j.1470-6431.2009.00840.x.

[21] https://www.bbc.co.uk/news/uk-54326178

- Central scenario: No change in plumbing losses
- High scenario: 0.5% p.a. increase in plumbing losses

B.6. Garden watering

B.6.1. Ownership

The following proportions of households using different methods of garden watering has been assumed, based upon the HC dataset:

Table 11: Garden watering device Ownership

	Unmeasured	Measured
Hosepipe (% properties)	15.2%	11.7%
Pressure washer / irrigation system (% properties)	0.4%	0.6%
Watering can (% properties)	10.5%	10.5%
Recycled water (% properties)	25.5%	35.6%

Properties using recycled water are assumed not to use significant volumes of clean water for garden watering and are not considered further.

Garden watering ownership may increase (e.g., as a result of garden design trends) or reduce (e.g., from increased awareness of water consumption). The following assumptions have been made (prior to any climate change adjustments):

- Low scenario: 0.5% p.a. reduction in garden watering device ownership
- Central scenario: No change in garden watering device ownership
- High scenario: 0.5% p.a. increase in garden watering device ownership

B.6.2. Frequency

The following frequencies of use during the summer have been estimated using the HC dataset:

Table 12: Garden watering device Frequency

	Unmeasured	Measured
Hosepipe (per property, per summer week; where applicable)	4.08	3.66
Pressure washer / irrigation system (per property, per summer week; where applicable)	4.80	3.73
Watering can (per property, per summer week; where applicable)	3.59	3.54

The summer period for regular garden watering is assumed to be 6 months (approximately mid-March to mid-September) and therefore the above values are halved in the analysis when calculating annual average demand.

Garden watering frequencies may increase (e.g., as a result of garden design trends) or reduce (e.g., from increased awareness of water consumption). The following assumptions have been made (prior to any climate change adjustments):

- Low scenario: 0.5% p.a. reduction in garden watering frequencies
- Central scenario: No change in garden watering frequencies
- High scenario: 0.5% p.a. increase in garden watering frequencies

B.6.3. Volume

The EST analysis quotes values of 11 litres per use and 7179 litres per year for hose attachments. It is assumed that this actually means a flow rate of 11 l/min with an implied 10.8-hour total duration of use throughout the year. A flow rate of 11 l/min has been used in the analysis.

The following durations have been assumed, based upon the HC dataset:

Table 13: Garden watering device durations

	Unmeasured	Measured
Hosepipe use duration (minutes)	16.6	15.2
Pressure washer / irrigation system use duration (minutes)	21.3	21.1

The volume of water used by watering cans has been assumed as 10 litres, which equates to one fill of a very large can or multiple fills of smaller cans.

Garden watering volumes may increase (e.g., as a result of garden design trends) or reduce (e.g., from increased awareness of water consumption). The following assumptions have been made (prior to any climate change adjustments):

- Low scenario: 0.5% p.a. reduction in gardening volumes
- Central scenario: No change in gardening volumes
- High scenario: 0.5% p.a. increase in gardening volumes

B.7. Miscellaneous external use

Miscellaneous outdoor use (in respect of car washing, cleaning garden furniture, etc) of 1 l/head/d has been assumed in addition to the devices calculated on the OFV basis. The GWF and HC datasets contained information on car washing, which indicated associated consumption of < 1 l/head/d. This is considered likely to form the largest component of outdoor use excluding garden watering.

Miscellaneous external use may increase (e.g., increased cleaning from increasing societal expectations of cleanliness) or reduce (e.g., from increased awareness of water consumption). The following assumptions have been made:

- Low scenario: 0.5% p.a. reduction in miscellaneous internal use
- Central scenario: No change in miscellaneous internal use
- High scenario: 0.5% p.a. increase in miscellaneous internal use

C. Detailed WRZ level results

C.1. Bristol (BW)

Note that the historical data shown for Bristol is taken directly from annual return submissions and may therefore be affected by methodology changes.

Figure 13: NYAA PCC for Bristol

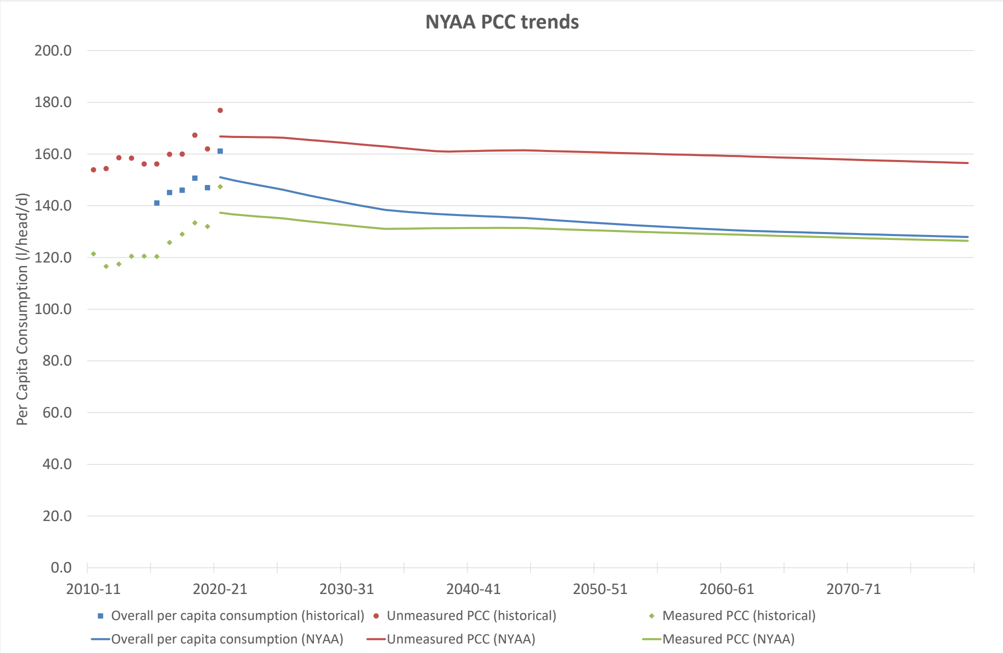


Figure 14: NYAA consumption for Bristol

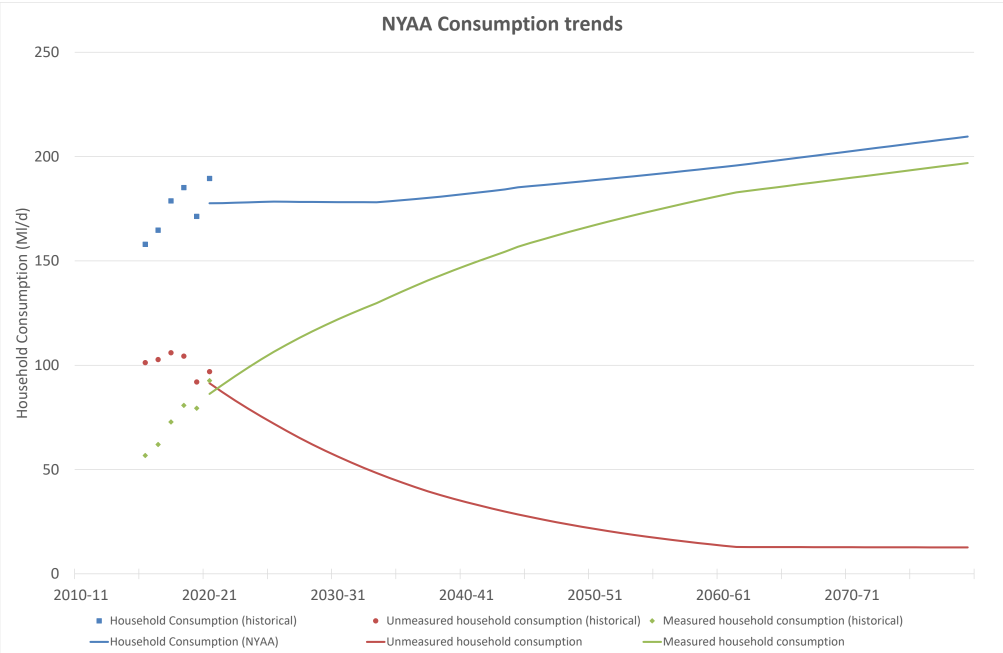


Figure 15: DYAA PCC for Bristol

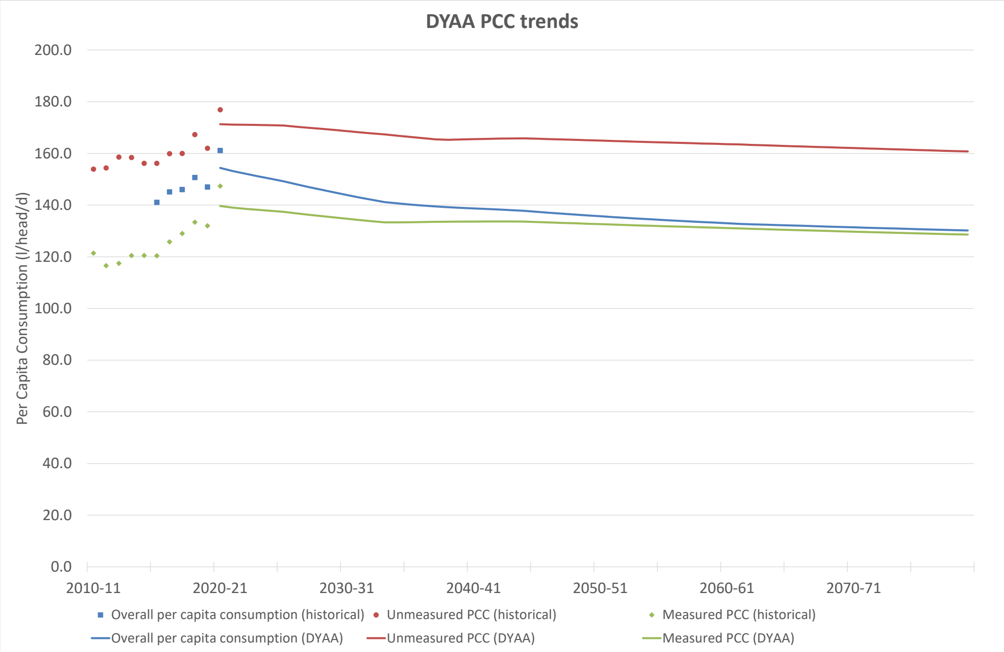


Figure 16: DYAA consumption for Bristol

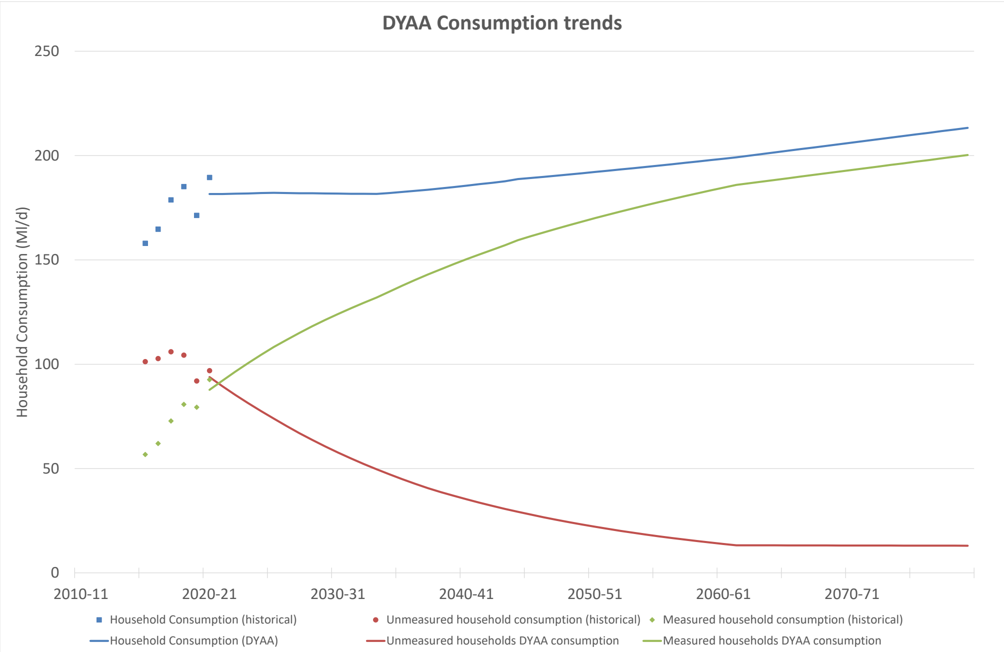
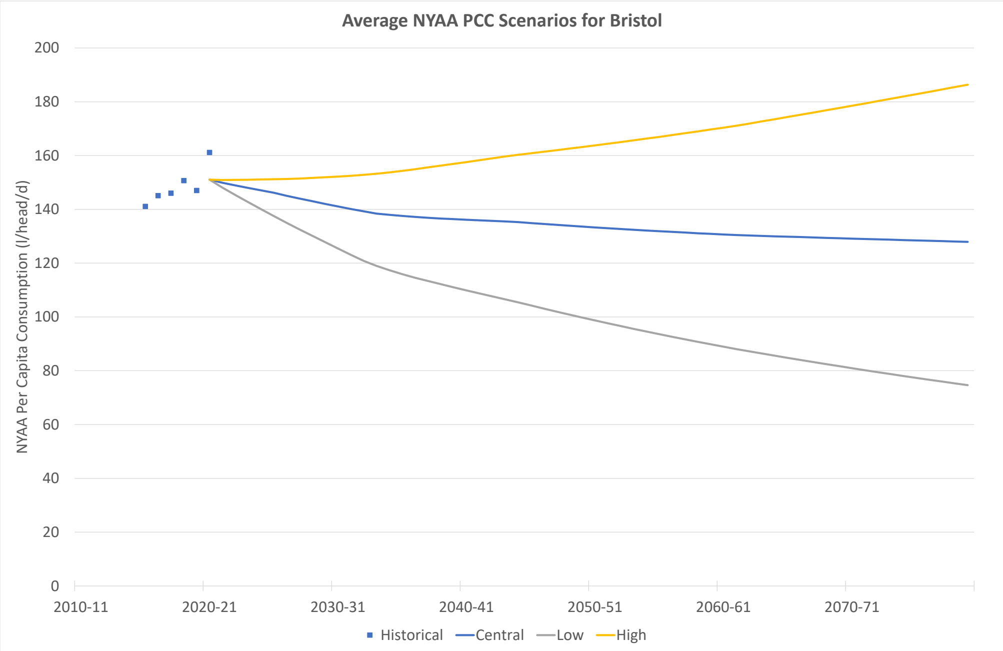


Figure 17: Alternative PCC scenarios for Bristol



C.2. Bournemouth (SWW)

Note that the historical data shown for Bournemouth is taken directly from annual return submissions and may therefore be affected by methodology changes.

Figure 18: NYAA PCC for Bournemouth

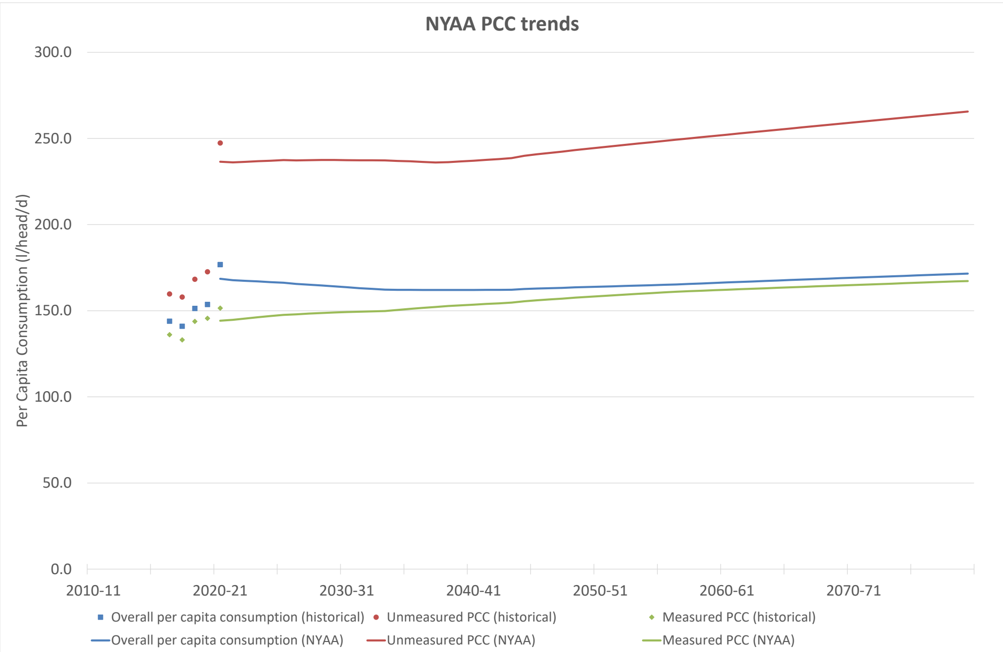


Figure 19: NYAA consumption for Bournemouth

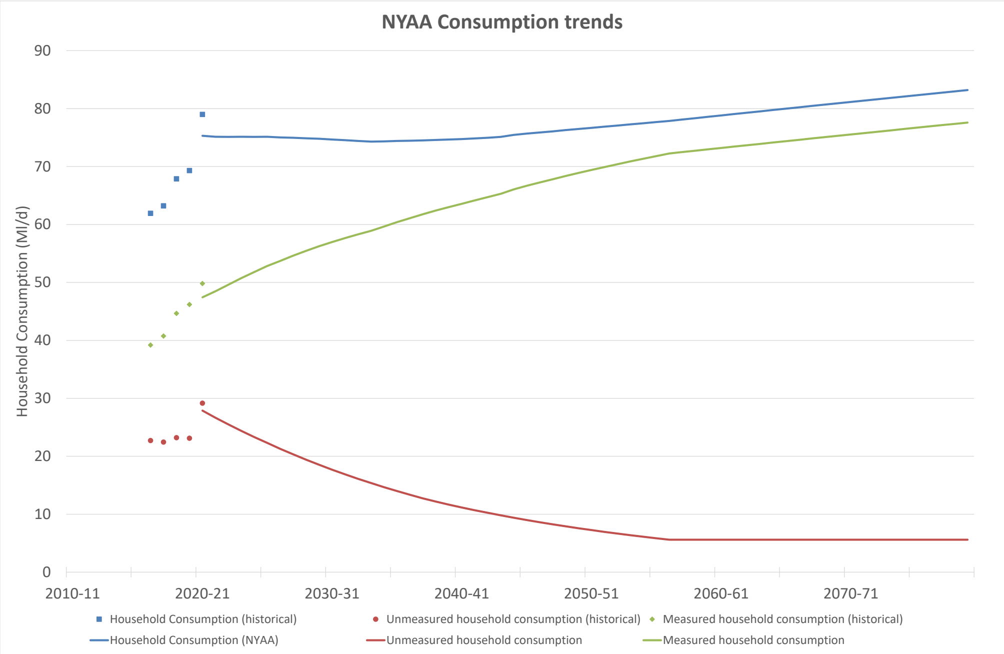


Figure 20: DYAA PCC for Bournemouth

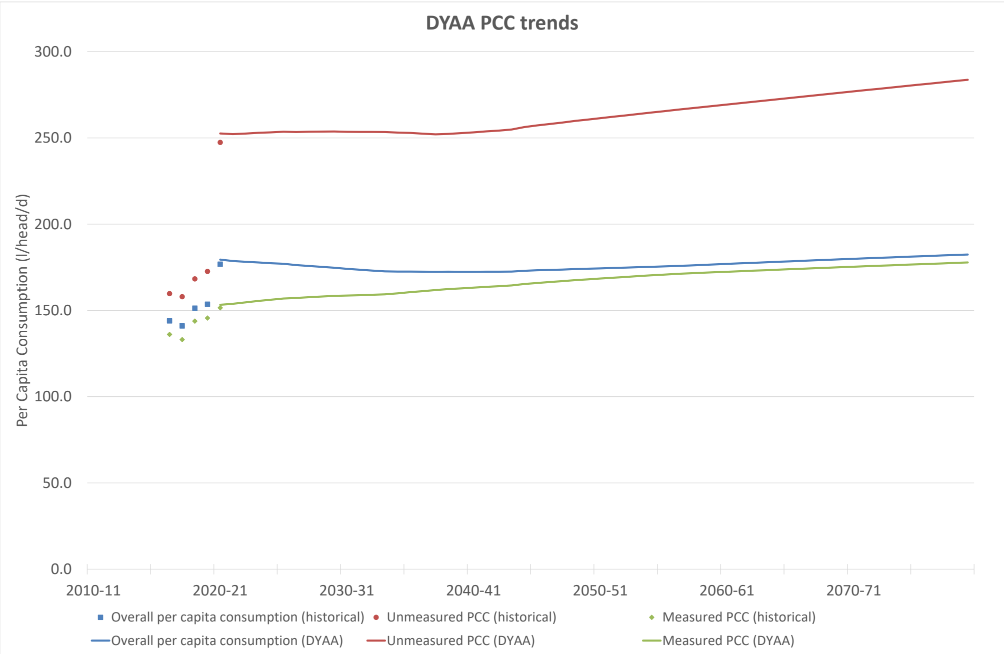


Figure 21: DYAA consumption for Bournemouth

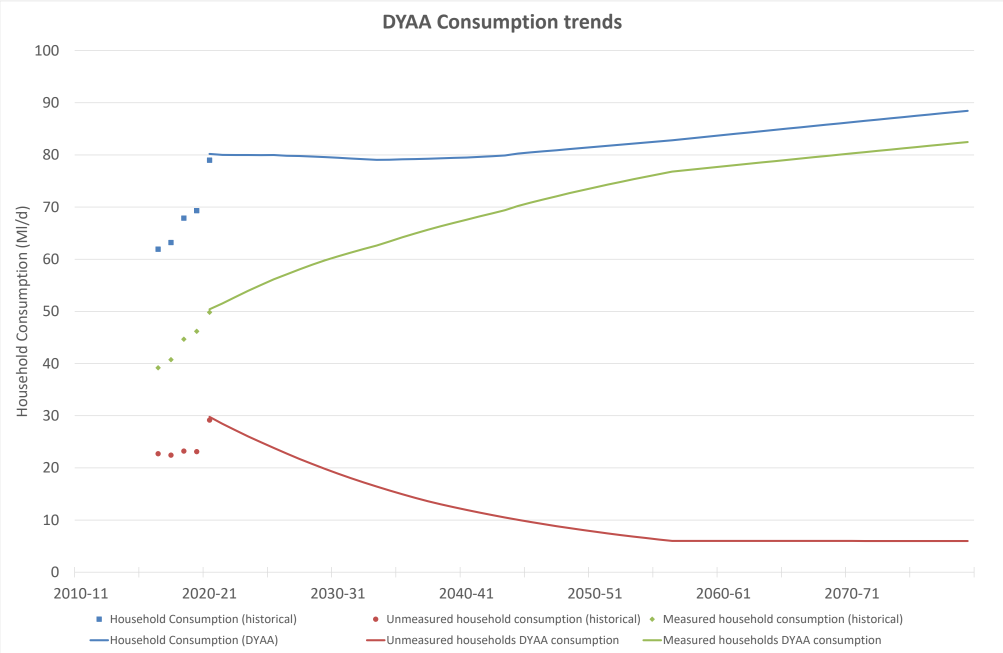


Figure 22: DYCP PCC for Bournemouth

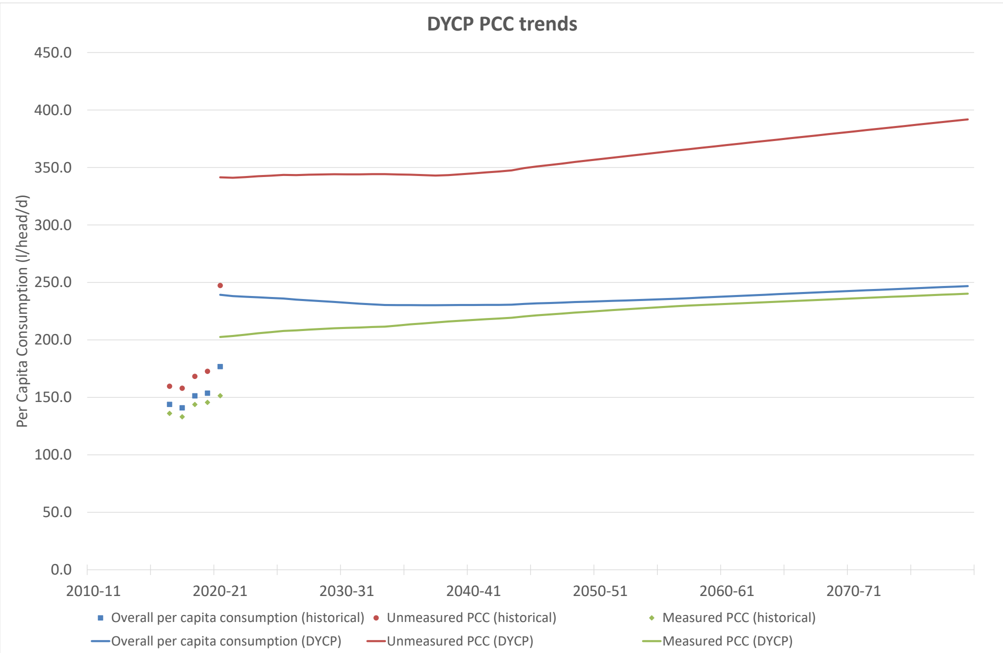


Figure 23: DYCP consumption for Bournemouth

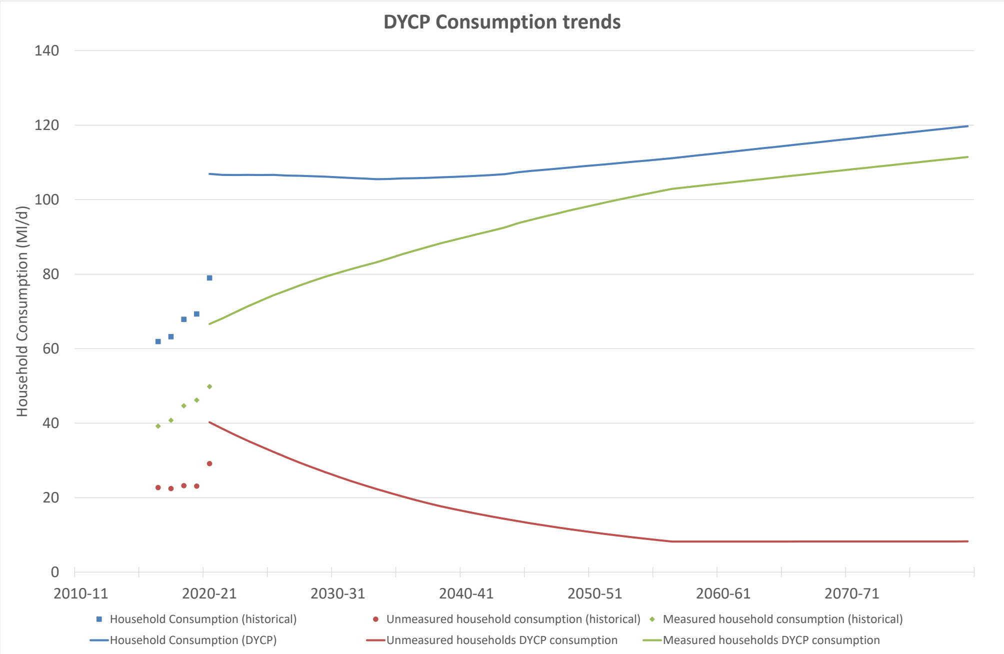
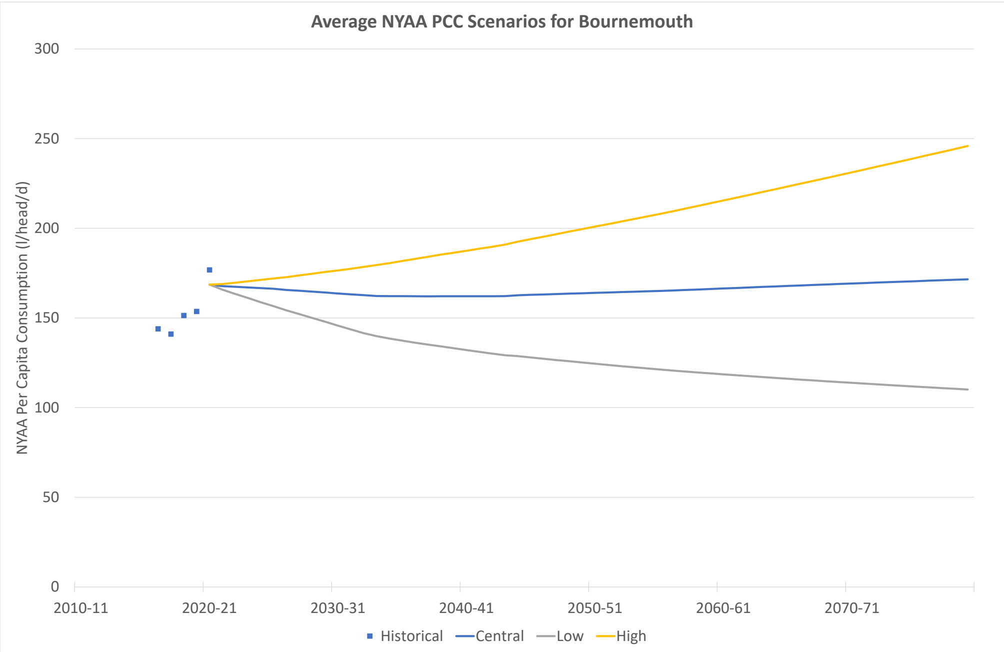


Figure 24: Alternative PCC scenarios for Bournemouth



C.3. Colliford (SWW)

Note that the historical data shown for Colliford is taken directly from annual return submissions and may therefore be affected by methodology changes. Also, the historical reported data for Colliford includes domestic agricultural properties and tourist properties, which are excluded from these forecasts.

Figure 25: NYAA PCC for Colliford

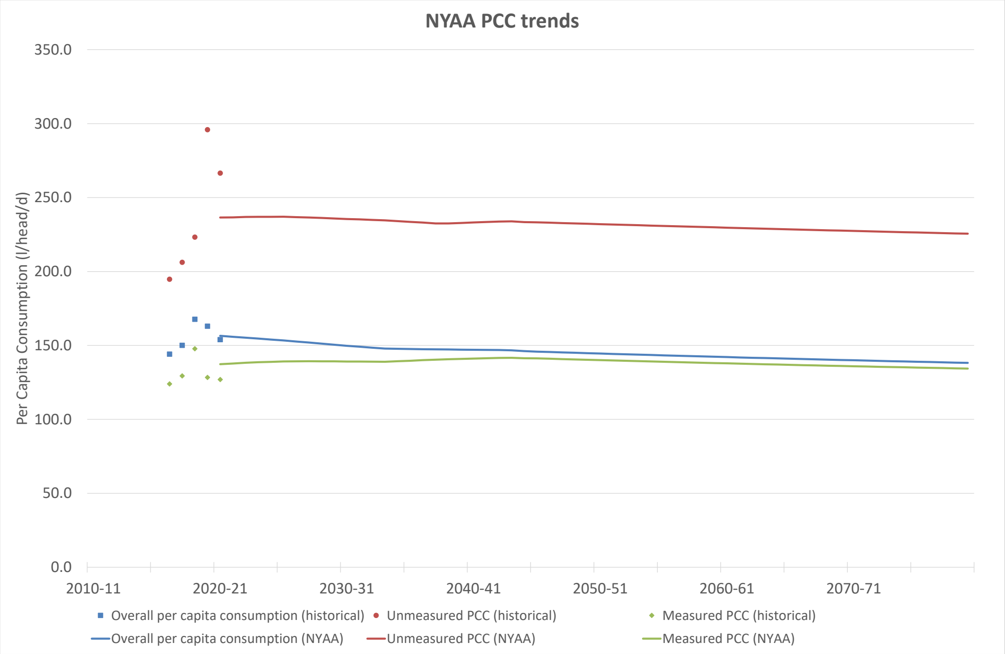


Figure 26: NYAA consumption for Colliford

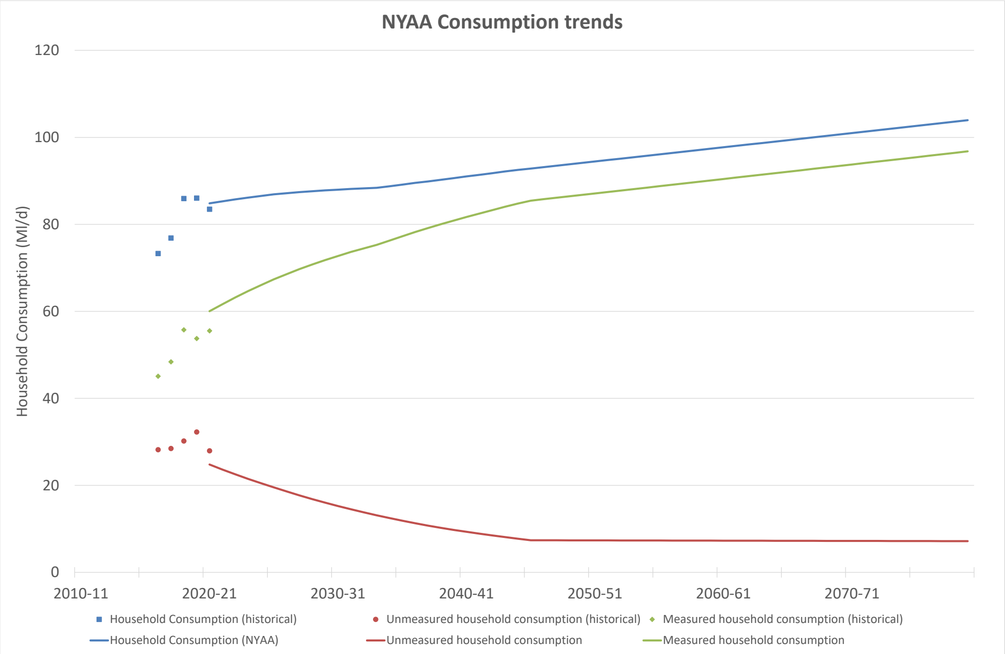


Figure 27: DYAA PCC for Colliford

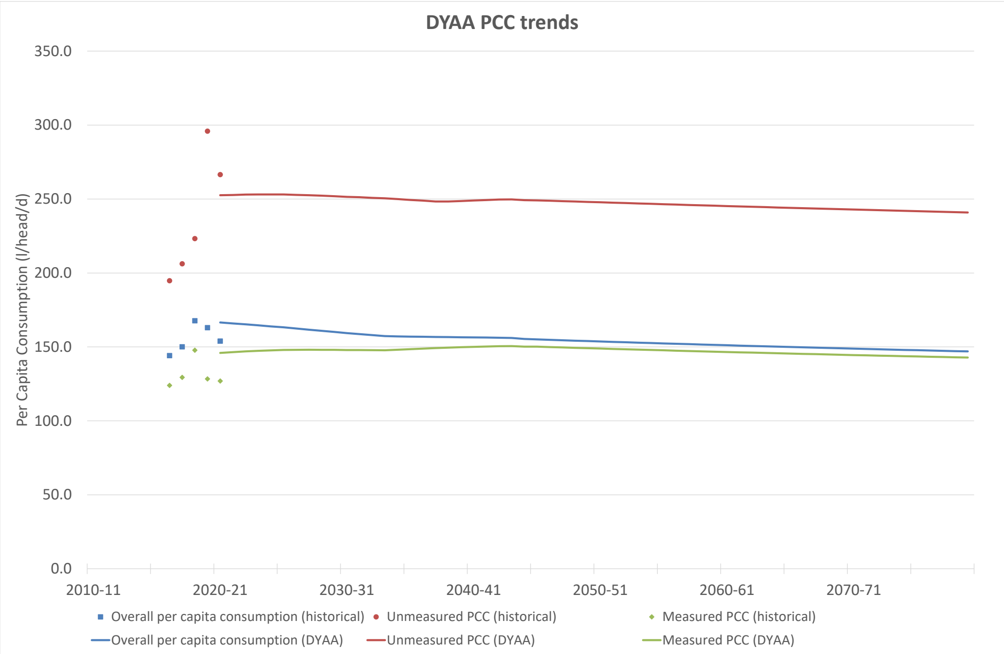


Figure 28: DYAA consumption for Colliford

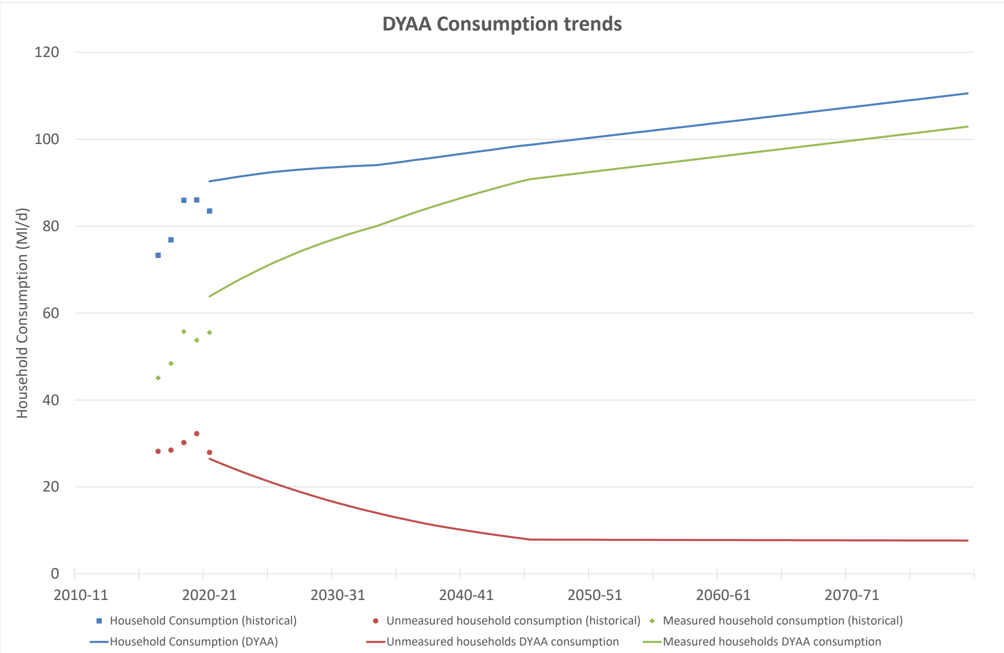
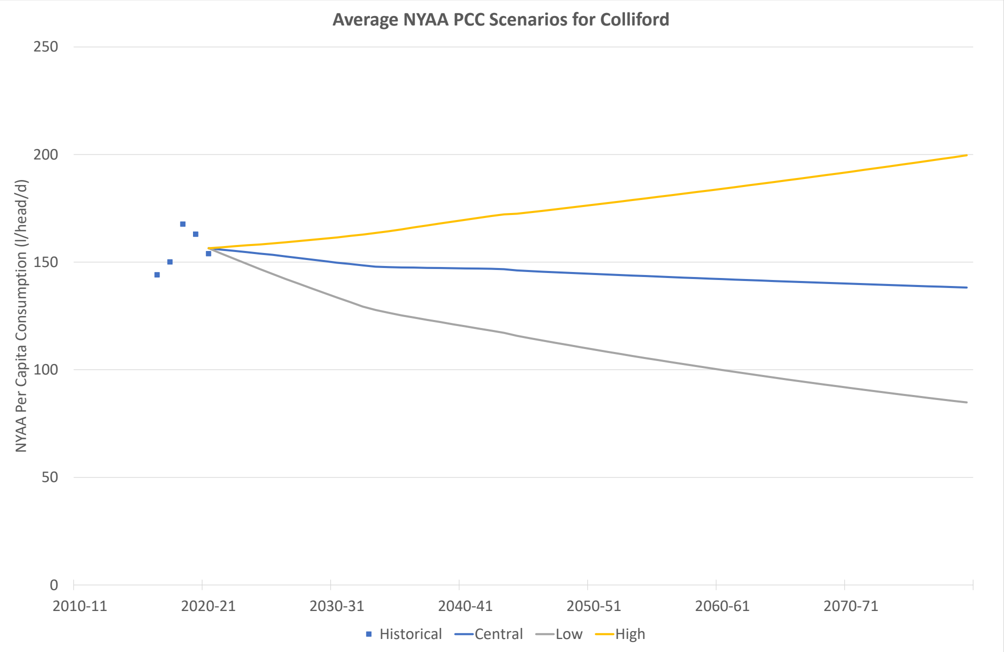


Figure 29: Alternative PCC scenarios for Colliford



C.4. Roadford (SWW)

Note that the historical data shown for Roadford is taken directly from annual return submissions and may therefore be affected by methodology changes. Also, the historical reported data for Roadford includes domestic agricultural properties and tourist properties, which are excluded from these forecasts.

Figure 30: NYAA PCC for Roadford

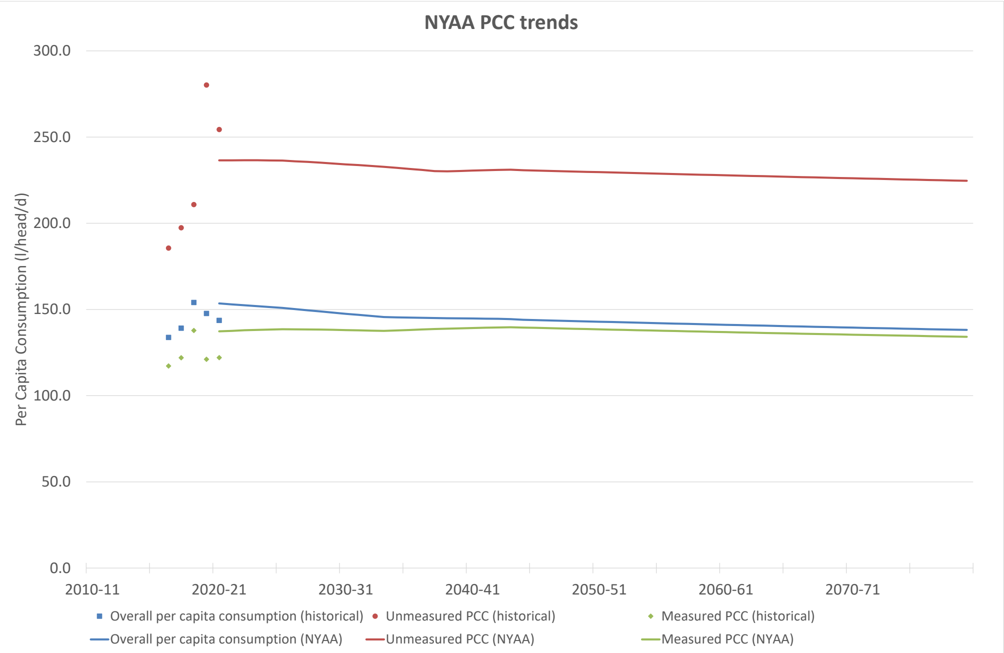


Figure 31: NYAA consumption for Roadford

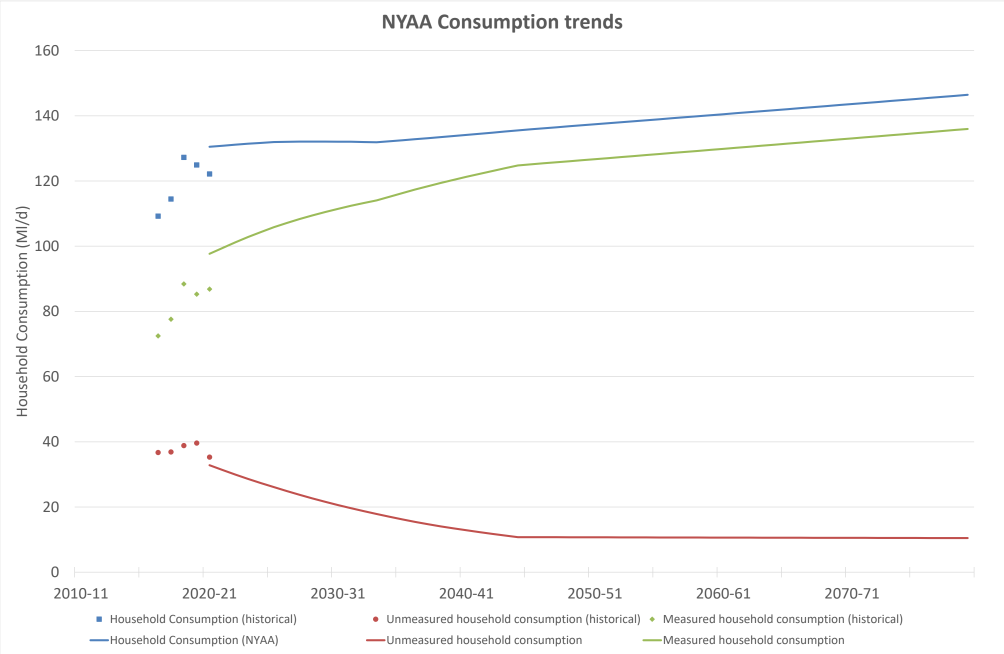


Figure 32: DYAA PCC for Roadford

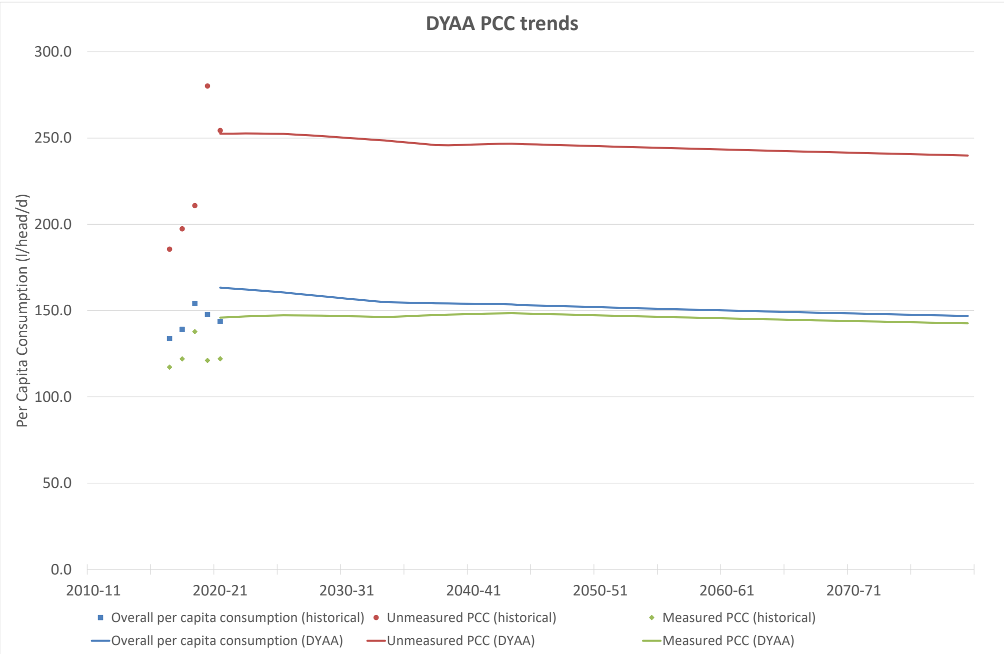


Figure 33: DYAA consumption for Roadford

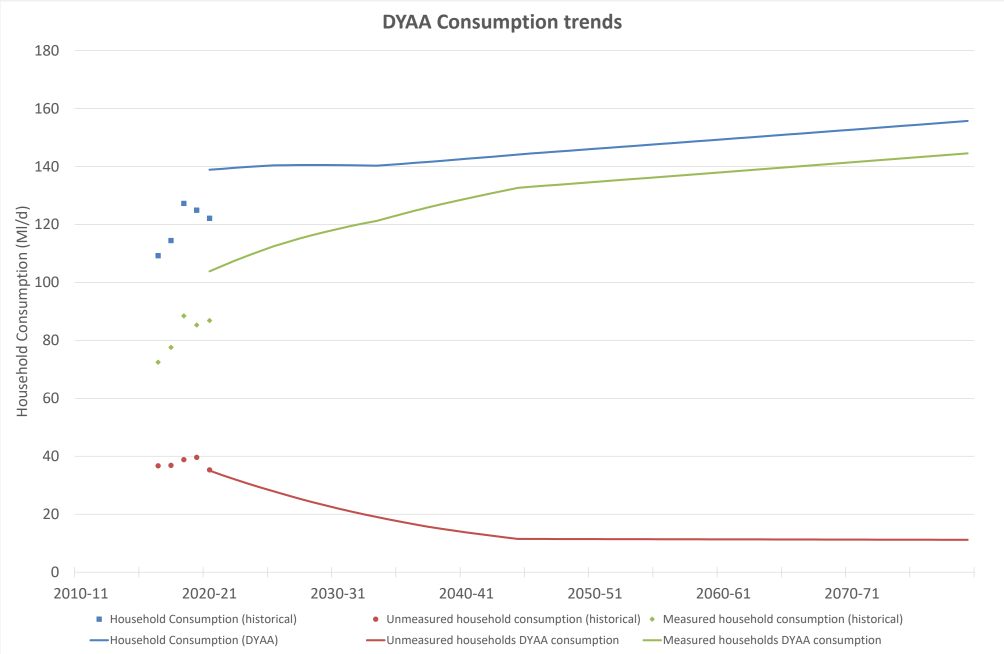
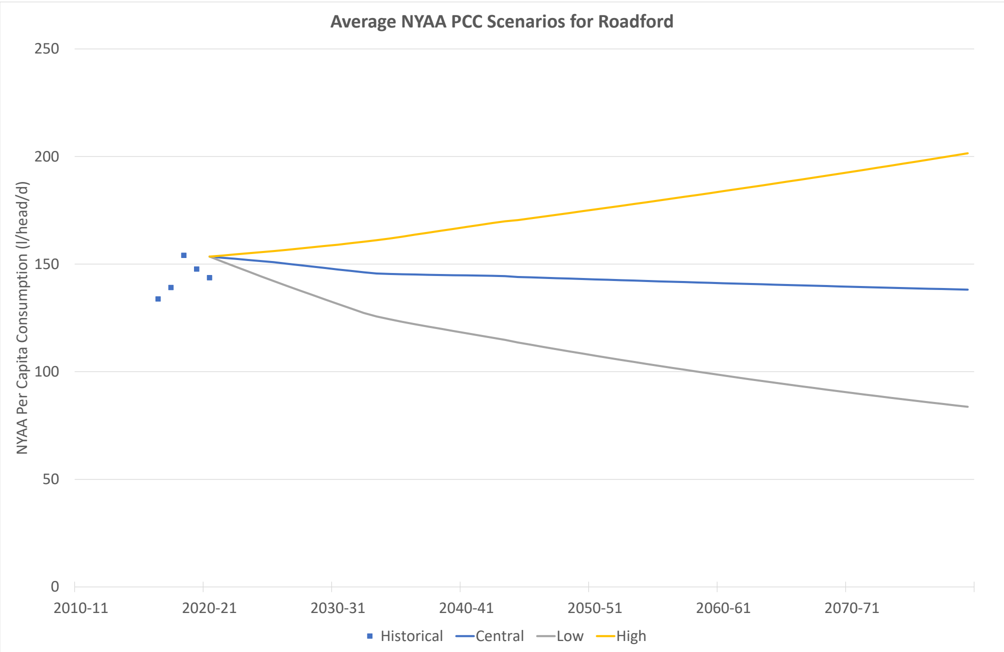


Figure 34: Alternative PCC scenarios for Roadford



C.5. Wimbleball (SWW)

Note that the historical data shown for Wimbleball is taken directly from annual return submissions and may therefore be affected by methodology changes. Also, the historical reported data for Wimbleball includes domestic agricultural properties and tourist properties, which are excluded from these forecasts.

Figure 35: NYAA PCC for Wimbleball

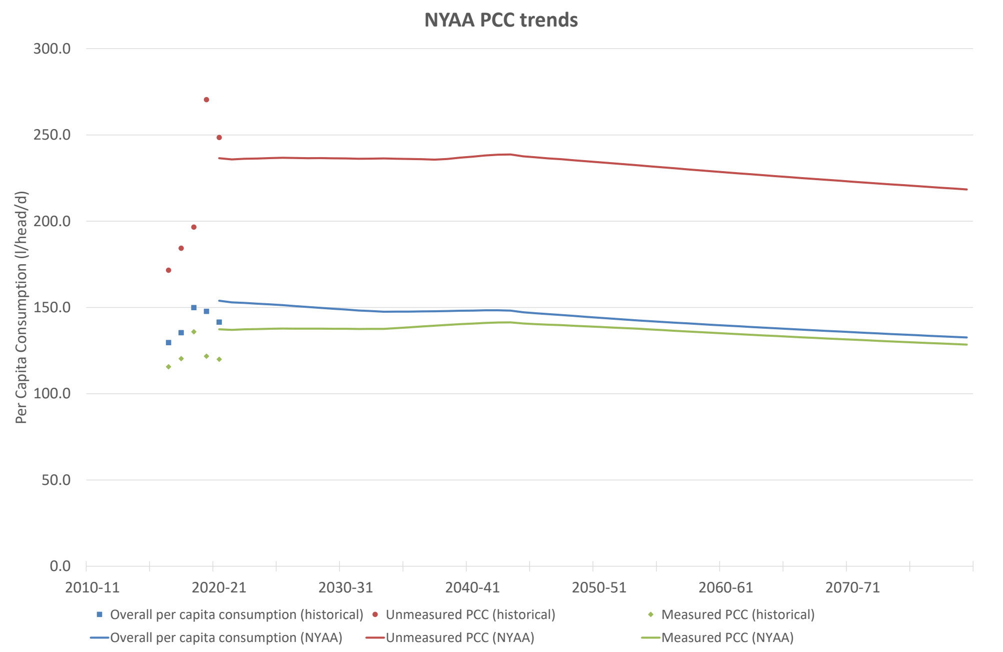


Figure 36: NYAA consumption for Wimbleball

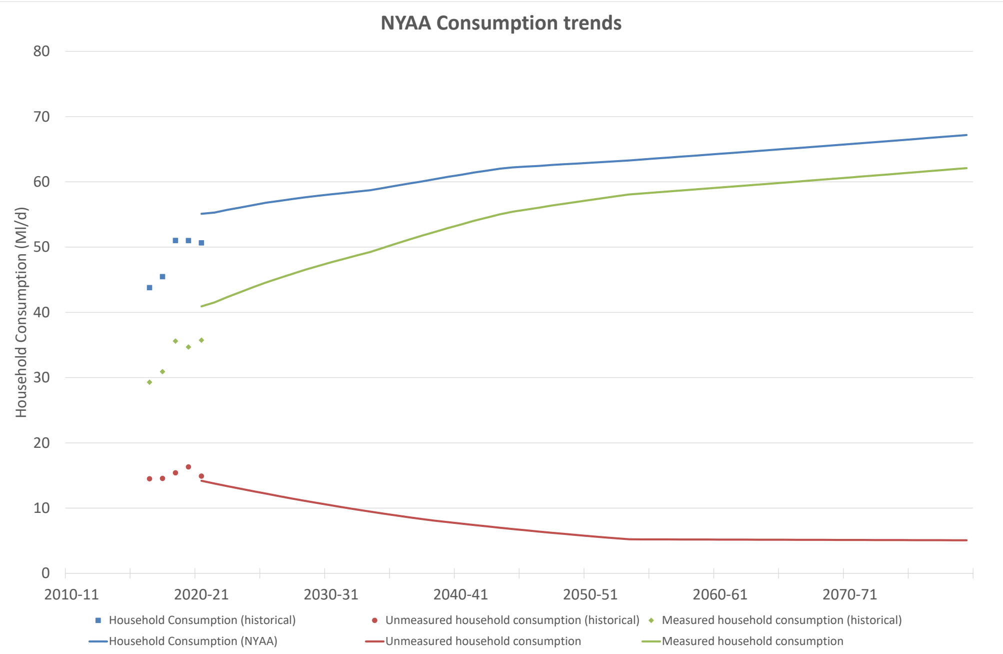


Figure 37: DYAA PCC for Wimbleball

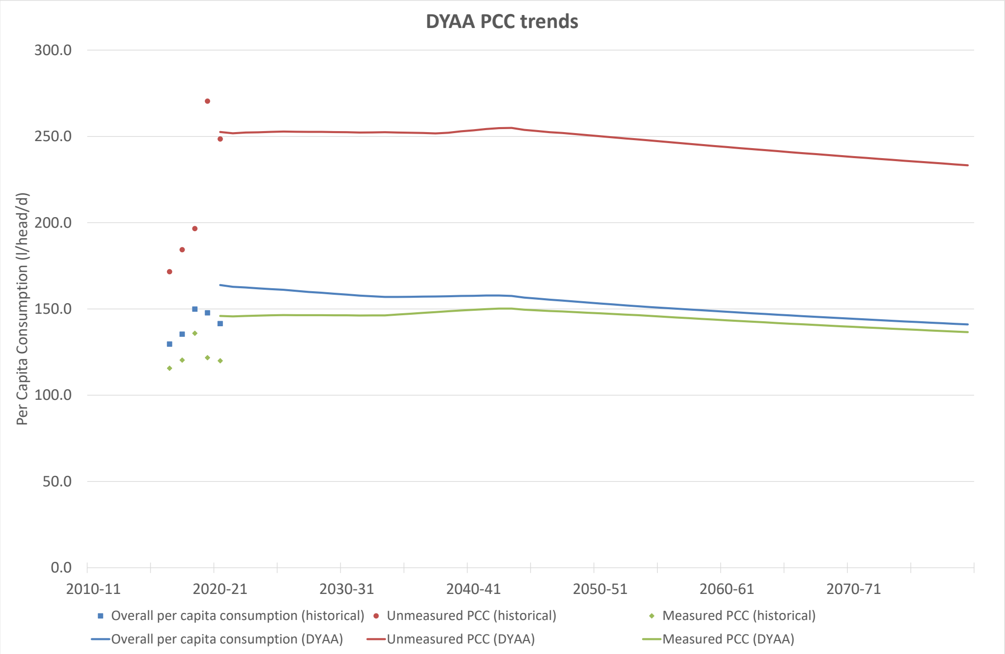


Figure 38: DYAA consumption for Wimbleball

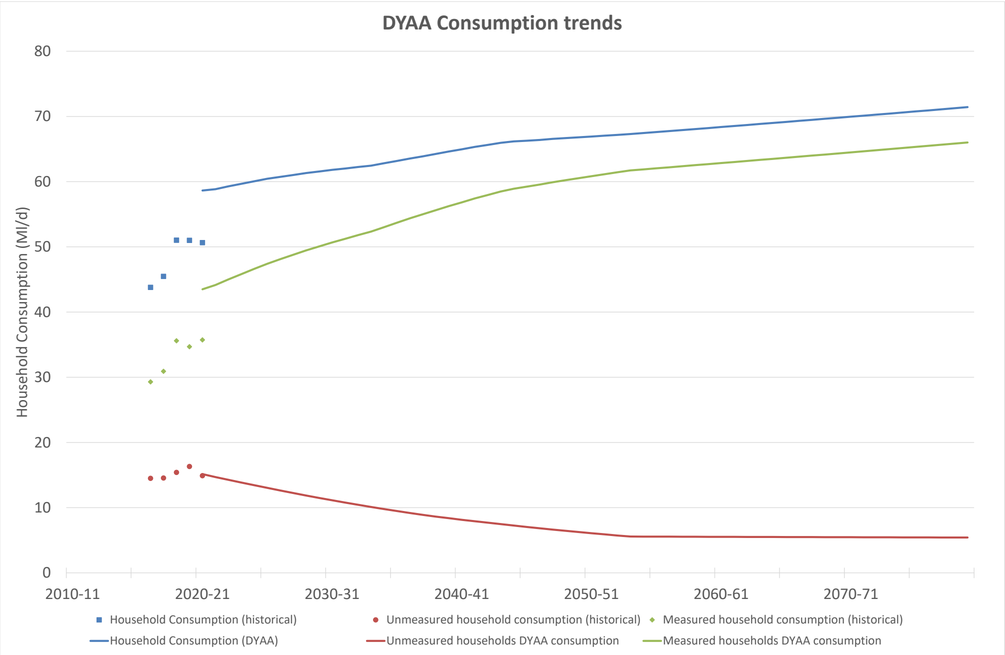
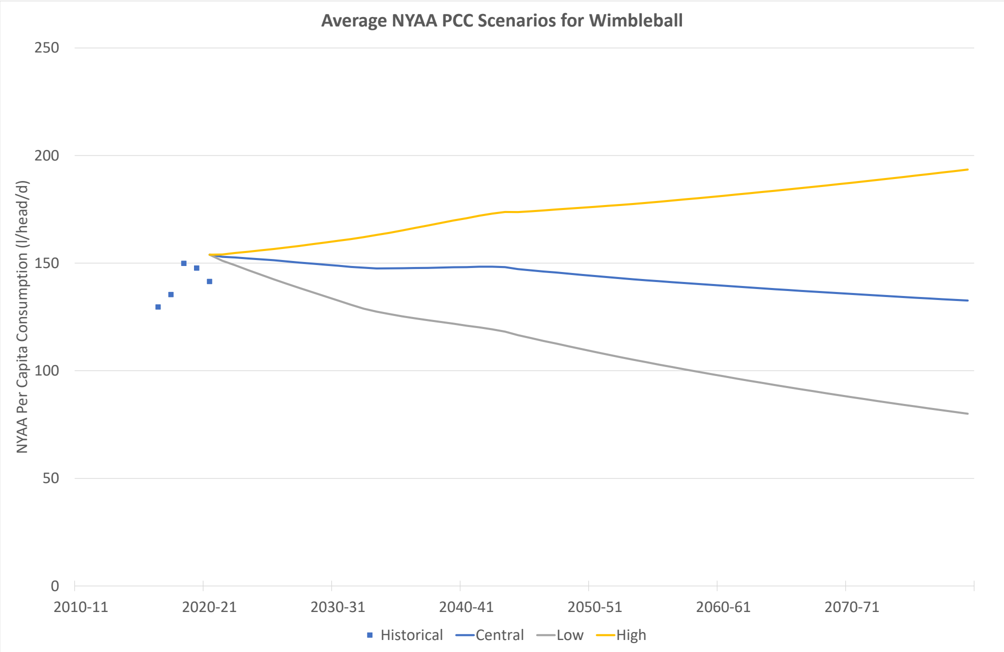


Figure 39: Alternative PCC scenarios for Wimbleball



C.6. Wessex (WW)

Note that the historical datasets plotted for Wessex are the provided values regarding the application of the AMP7 water balance methodology to prior years. These will therefore differ from historical reporting.

Figure 40: NYAA PCC for Wessex

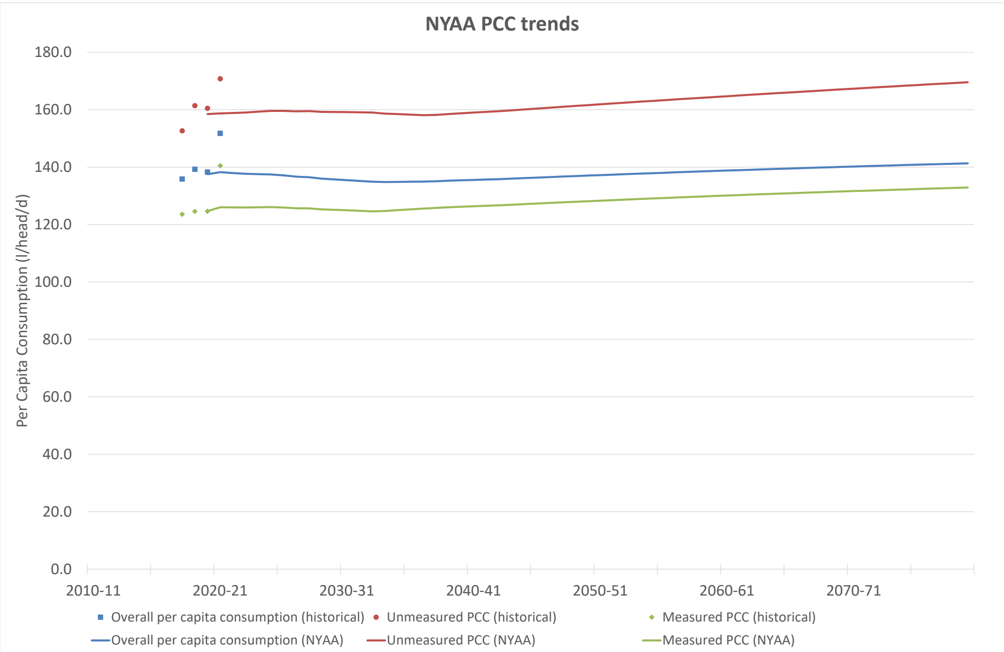


Figure 41: NYAA consumption for Wessex

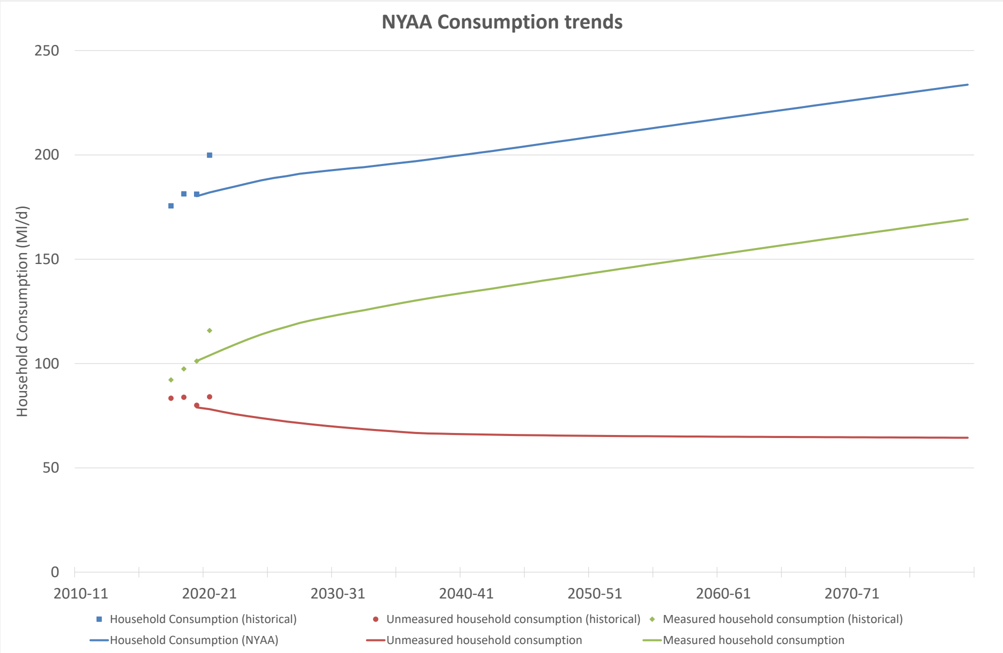


Figure 42: DYAA PCC for Wessex

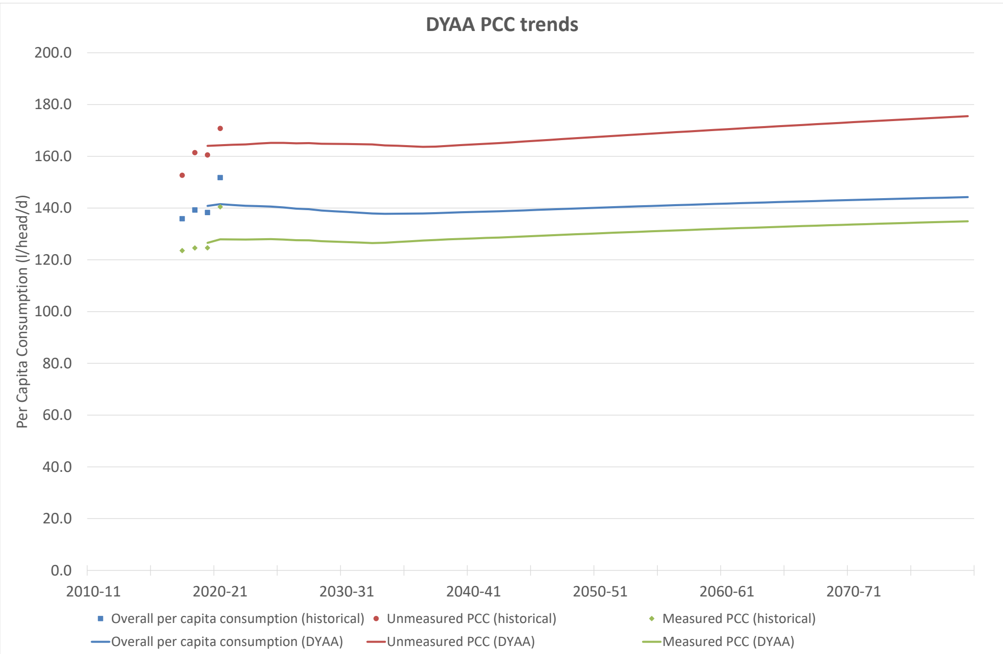


Figure 43: DYAA consumption for Wessex

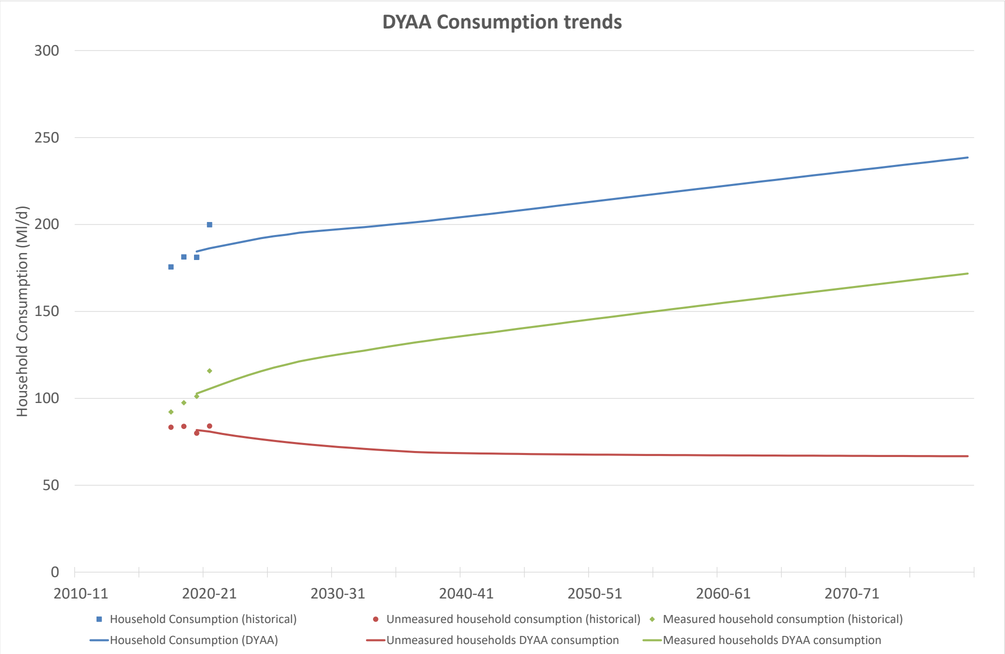


Figure 44: DYCP (week) PCC for Wessex

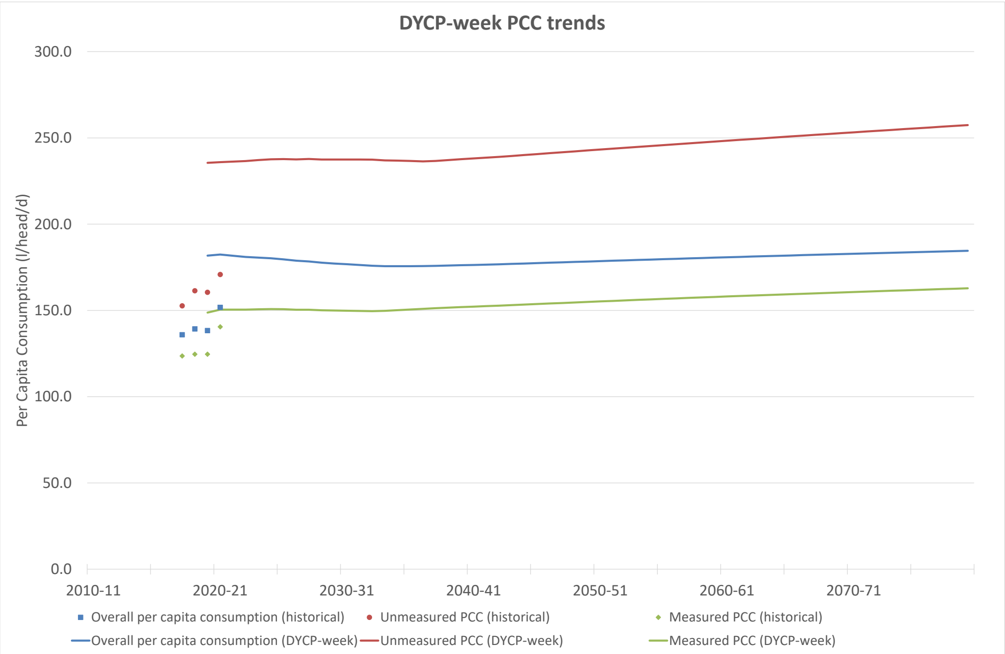


Figure 45: DYCP (week) consumption for Wessex

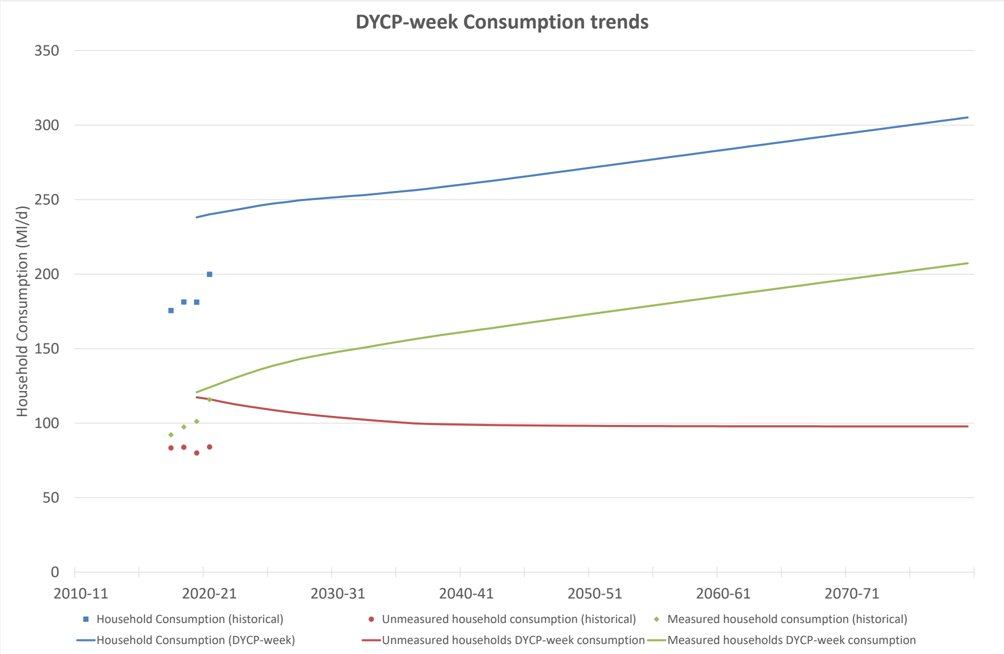


Figure 46: DYCP (month) PCC for Wessex

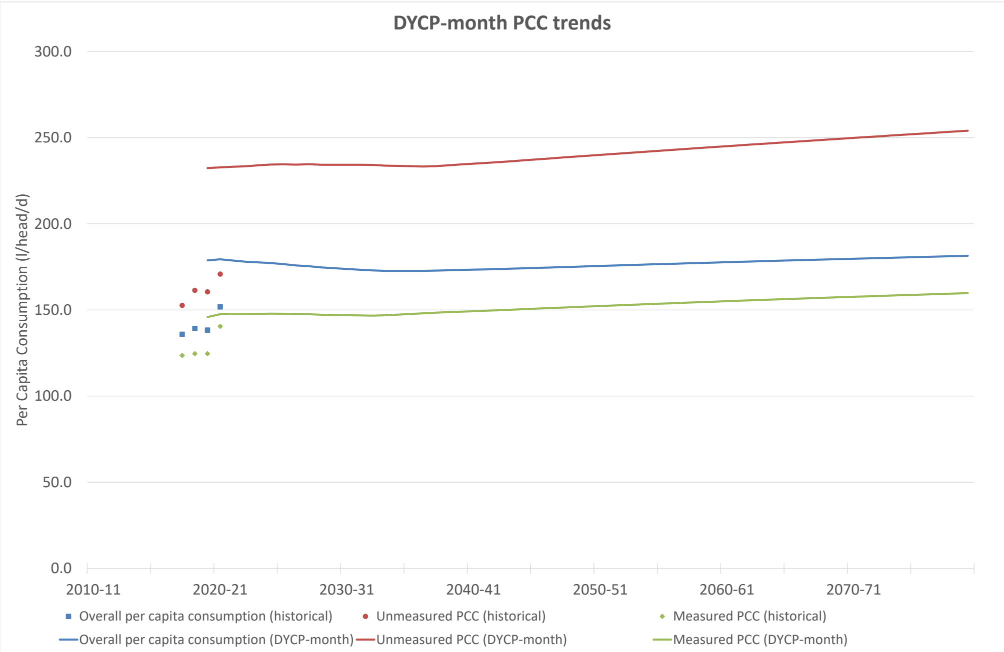


Figure 47: DYCP (month) consumption for Wessex

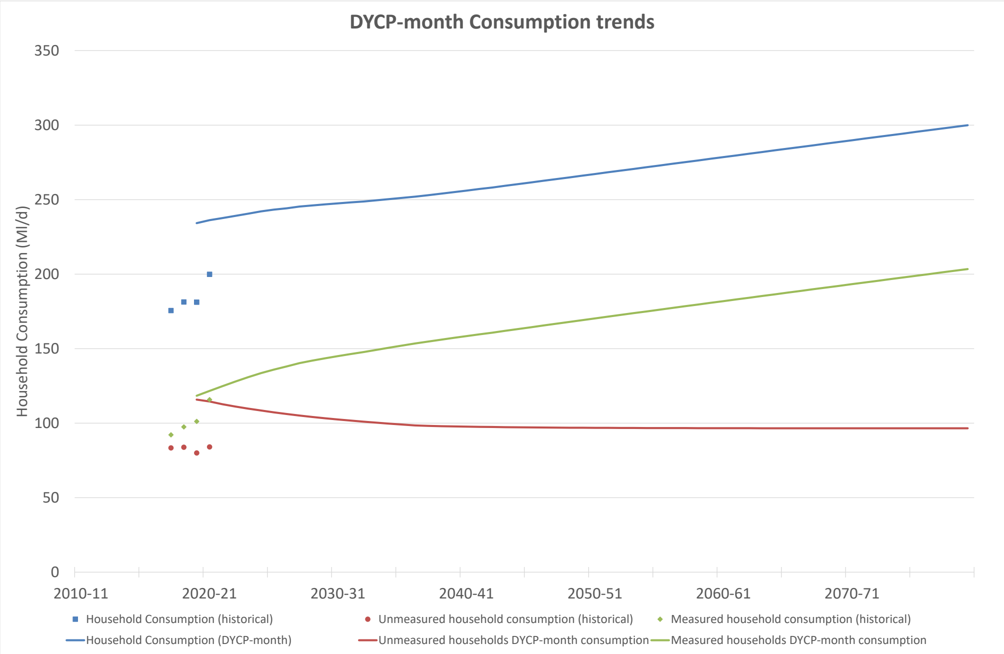
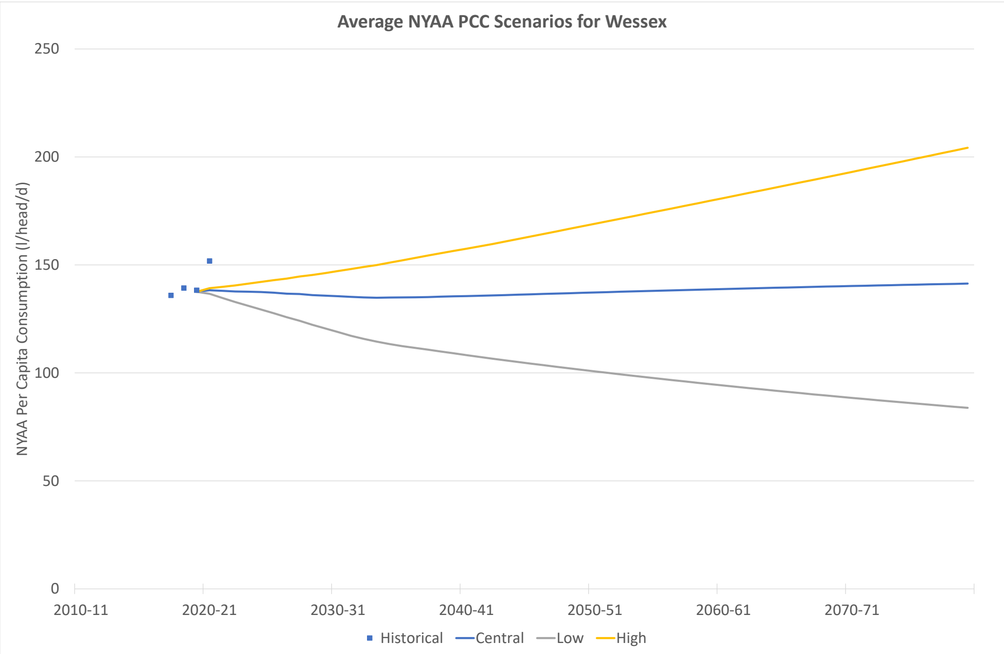


Figure 48: Alternative PCC scenarios for Wessex



OVARRO
CONNECTING
TECHNOLOGIES