APPENDIX J

Non-PWS water needs and opportunities

This appendix provides more detail of WRW's assessment of the water needs for the non-public water supply abstractors. It starts by summarising our approach, then presents the needs and opportunities. It also includes profiles characterising major abstracting sectors and their water needs.

Contents

J.1. Non-PWS approach

We are working with non-PWS abstractors to identify current and future water needs across the Water Resources West region. This allows us to make best use of the resources we have available, and to seek joint solutions with other sectors where there is a predicted future deficit.

WRW has an adopted methodology to achieve these goals. The process we followed is illustrated below in Figure 1.

Our work started with the aim of understanding the current non-PWS water needs and forecasting future water needs by area and by sector – Outputs 1 & 2 in Figure 1 below.

To achieve this we combined various datasets from the Environment Agency, Natural Resources Wales, the Drinking Water Inspectorate and the Canal and River Trust. This data has been used to define our baseline position for fully licensed and recent actual abstractions.

Following the methodology adopted for non-PWS we then set out to prioritise the operational catchments in the region in terms of water availability and the balance between PWS and non-PWS abstraction – Output 3 below. The intention of this step was to identify catchments where there was either an environmental water deficit that needed to be addressed, or where there was a supply/demand deficit in public water supply that could potentially be addressed through joint resource development. From this work we identified the Staffordshire Trent Valley and the

Weaver-Dane catchments as priorities for investigation and they were agreed with our stakeholders as priority areas for investigation – Output 4 below.

Figure 1. Process flow for our non-PWS methodology.

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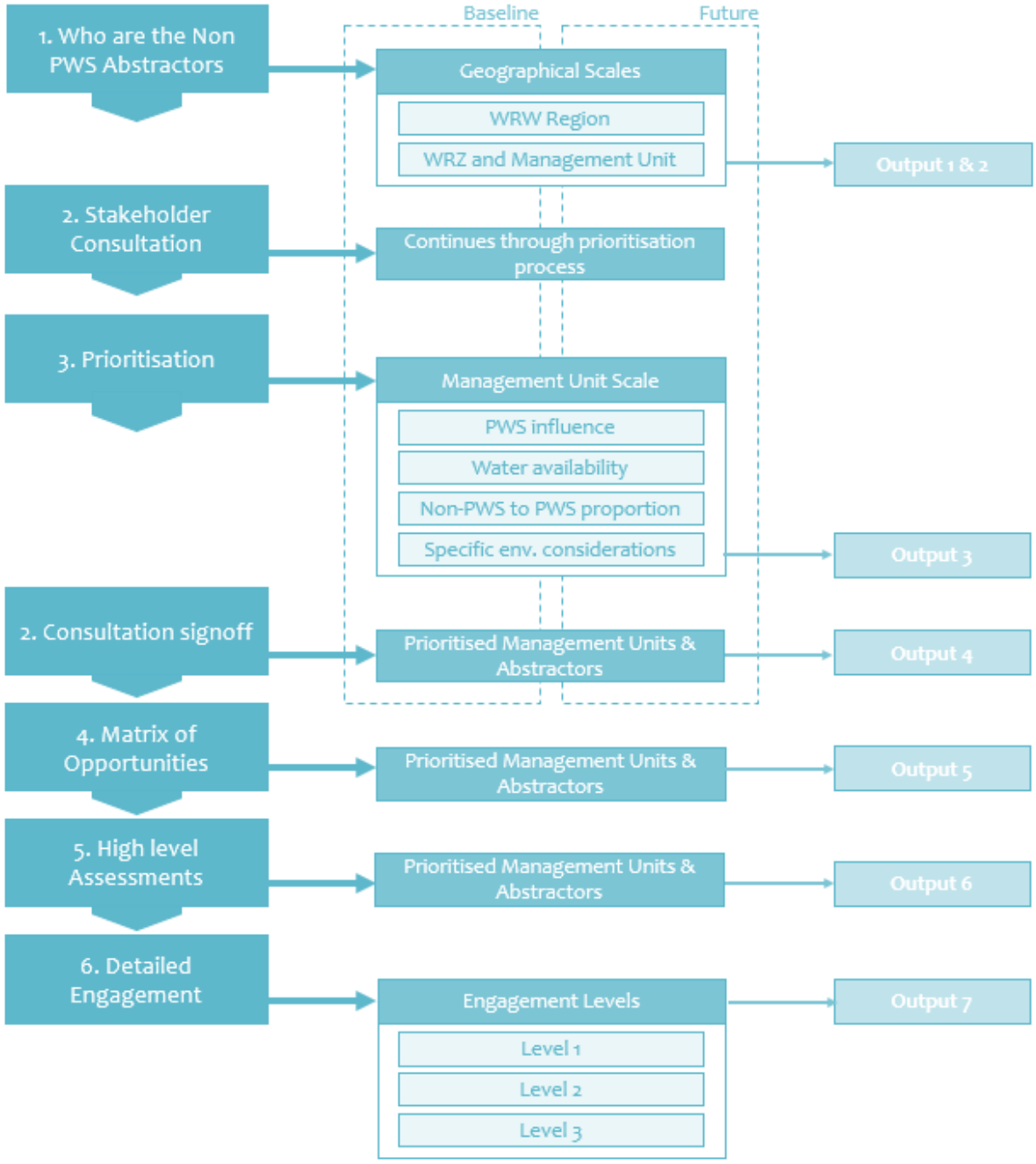

The intention following catchment prioritisation was to then investigate options that would provide opportunities to resolve environmental or PWS deficits; for example, is there opportunity for a non-PWS abstractor to switch to a public water supply in times of drought; are any non-PWS abstractors willing to trade licences etc. This was Output 5 from our methodology.

Output 6 and 7 of the methodology anticipated a characterisation of abstractions within the management unit and risks followed by detailed engagement with non-PWS stakeholders. This stage of the project has now effectively been combined with Environmental Destination as the scale of non-PWS abstraction reductions to meet environmental targets, or capping of non-PWS licences to prevent (WFD) deterioration appears to be significant, and overshadows any contribution non-PWS sectors might make to PWS deficits.

In March 2022 we presented a paper to the multi-sector WRW Senior Group to redefine the outputs of the exercise and take account of non-PWS licence reductions that are to be calculated and applied by the Environment Agency. To support and frame this change in approach we developed a set of principles by which the non-PWS workstream should proceed. These principles are:

1. WRW is not a regulator or licensing authority and cannot take decisions that should properly be reserved for them.
2. WRW is not an abstractor and cannot take decisions that should properly be reserved for them.
3. WRW's regional plan has no statutory basis. It cannot compel others to take action. Its function is to provide evidence which will be useful to others to inform decisions and actions.
4. The needs and circumstances of PWS and non-PWS are different. It is therefore right that different approaches are used and different types of evidence may be provided.
5. Where assumptions are used to compile evidence in the plan they should be clear, reasonable and agreed by all members of the group – including regulators. Such assumptions might include:
    - Beneficiary pays and/or polluter pays
    - Fair shares, e.g. costs or licence reductions allocated in proportion to licenced volumes.
6. Evidence in the plan should be prepared on the basis of currently known legislation, regulation and government policy. E.g. Abstraction licences are granted on first come first served basis, when need is proven.
7. WRW can highlight and potentially influence where legislation or policy should be changed to achieve better outcomes. Positions should only be taken where agreed by all members of the group (excluding regulators where it would be inappropriate for them to take views on such matters). E.g.
    - Abstraction reductions identified in principle need to be future proofed. This means that EA must make changes to its licensing strategy to anticipate climate change and changes to the EFI. They must not give away water secured.
    - Questions about reservation / allocation of water for future needs should be addressed

Following adoption of these principles we then agreed the outputs for non-PWS that would appear in the autumn 2022 draft plan to be:

- Identification of licensed volumes that are no longer needed by abstractors and which could be added to environmental headroom by voluntary sacrifice or revocation by the regulator.

- Illustration of a plausible worst-case abstraction reduction scenario in the chosen catchments (Staffordshire Trent Valley and Weaver-Gowy) using the best available data, and potential options to address any shortfall in need by non-PWS sectors.
- Opportunities for joint development of resource options between PWS and non-PWS abstractors.

These outputs are presented in the following section.

J.2. Water needs and opportunities

Identification of licensed volumes that are no longer needed by abstractors and which could be added to environmental headroom by voluntary sacrifice or revocation by the regulator.

From the dataset we hold we have identified the available unused volume in PWS and non-PWS licences that appear to have zero abstraction in the period 2010 to 2015 in England and 2015-2019 in Wales. These licences potentially meet the condition of being able to be revoked by regulators, or surrendered by the licence holders; though the Agency would not be expected to revoke licences that are held for valid contingency planning reasons (so-called 'sleeper' licences)[1].

These numbers, shown in Table 1 below, should be treated with caution because of the age of the dataset, and likely changes in use over the last several years. We have identified some PWS sources within this dataset that are in use in 2022.

Table 1. PWS and non-PWS fully licenced volumes with no recent abstraction.

Catchment	Volume of licence Ml/d (consumptive)
Alt and Crossens	17
Avon Bristol and North Somerset Streams	0
Avon Warwickshire	17
Clwyd	1
Dee	3
Derwent Derbyshire	10
Derwent North West	0
Don and Rother	7
Douglas	2
Dove	4
Idle and Torne	2
Irwell	8
Kent and Leven	0

1 www.legislation.gov.uk/ukpga/2003/37/notes/division/5/1 - see clause 83.

Catchment	Volume of licence Ml/d (consumptive)
Lower Mersey	22
Lower Trent and Erewash	17
Lune	1
Ribble	52
Severn Middle Shropshire	8
Severn Middle Worcestershire	48
Severn Uplands	3
Severn Vale	5
Soar	8
South East Valleys	12
Tame Anker and Mease	39
Teme	2
Trent Valley Staffordshire	32
Upper Mersey	33
Usk	68
Waver and Wampool	0
Weaver Gowy	9
Welland	0
Wye	12
Wyre	26
Grand Total	**466**

Illustration of a plausible worst-case abstraction reduction scenario in the chosen catchments using the best available data, and potential options to address any shortfall in need by non-PWS sectors.

There are two elements to a 'worst case' reduction in abstraction. Firstly there is the potential for licence capping to ensure no-deterioration for Water Framework Directive. This has been calculated for PWS licences and may be the subject of detailed investigations beginning in 2025. We do not hold the detailed data on non-PWS abstractions necessary to make this calculation, but we can illustrate the apparent headroom, i.e. fully licenced minus recent actual volumes, in each catchment as a broad proxy.

The second element for a 'worst case' reduction in abstraction is licence reductions for Environmental Destination, i.e. licence reductions that may be required to meet the Environmental Flow Indicator (EFI) in 2050. These reductions have been calculated using the

Water body Abstraction Tool supplied by the Environment Agency which holds data on abstractions between 2010 and 2015.

For the Staffordshire Trent Valley and Weaver-Gowy catchments the results are shown in Table 2 below.

Table 2. Unused headroom in licences and calculated licence reductions (non-PWS only).

Catchment	Non-PWS Headroom (Consumptive Ml/d)	Non-PWS licence reduction (Consumptive Ml/d)
Trent Valley Staffordshire	137	7
Weaver Gowy	55	24

Licence headroom is based on the 2010-2015 dataset held by WRW. Licence reductions are based on outputs from the Environment Agency Water body Abstraction Tool which we believe to also contain 2010-2015 data and is then calculated to produce a compliant environmental flow in 2050.

Note that these numbers are calculated independently of each other. In reality any assessment for no-deterioration and licence reduction in 2050 should be undertaken simultaneously. The difference is catchment names is because the EA Water body Abstraction Tool reports on CAMS areas rather than WFD management catchments.

Opportunities for joint development of resource options between PWS and non-PWS abstractors.

We are currently planning to hold catchment workshops in our priority catchments in autumn 2022. We plan to engage with local abstractors to:

- Verify our understanding of current and future water needs.
- Understand the willingness of abstractors to surrender unused licences.
- Communicate the potential scale of licence caps and licence reductions, and the implications of doing so.
- Explore our assumptions for future growth across various sectors.
- Look for opportunities to develop new resource options to replace water that will be lost from current licences.

We will be supported in these workshops by a representative from the Environment Agency.

An example of the kind of local solutions we are seeking is presented in the case study below.

Case study: On-farm reservoirs

Water use is a critical aspect of agriculture, it is used for irrigation, raising livestock and post-harvest processing. Motivated by climate change, water availability and soil husbandry techniques some farms are investing in innovative and collaborative small-scale sustainable water resources solutions.

Naish Farms and Thoresby Farming are neighbouring farms in Nottinghamshire which have worked together to develop and build two on site reservoirs. The first reservoir was built in 1996 as a response to a spell of dry weather experienced in 1995, and can be used to irrigate 900 acres at an application rate of 1 inch per acre and all of the land is within a 5km radius. The second reservoir is larger and was built in 1998 when it was apparent what water security the first reservoir had given to both businesses. Both structures discharge into the River Meden, which supports downstream re-abstraction. The reservoirs provide storage for unseasonably high flows, which may result in reduced flooding risk on downstream reaches. Water is taken in the winter and stored for use in the summer to support the growing of vegetables. Water is required to help the crop to grow in dry times but also to make sure that it hits the quality desired by the retailers, failing to do so is very costly.

Innovative water resources solutions like this are difficult to implement. The funding and licencing processes are not ideally suited to projects of this nature and the application system is complex to navigate, which further discourages wider uptake. Farms and agricultural water use are an integral part of WRW's future view for the region. Continued collaboration between farmers, regulators and other abstractors, including water companies is needed to ensure solutions are found and support is provided where needed.

J.3. Sector Profile – Navigation – Canal and River Trust

The Canal and River Trust is a navigation authority and charity, managing water supplies to meet demands for over 2000 miles of canals across England & Wales. It is the largest non-PWS abstractor in the Water Resources West area in terms of water demands and canals can (and already do) provide cross-catchment connections for water transfer within and beyond the WRW area, as well as directly supporting onward abstraction for third parties from the canal system.

We have 1,723 km of canal, 48 canal supply reservoirs, and 97 licensable abstraction points supplying the canal network within the Water Resource West area. Typical average daily regulated abstraction is nearly 650 Ml/d (based on historical data/estimates for period 2011-17), and in addition there are considerable volumes of unregulated abstraction.

Current water use

Some parts of the network are in deficit whilst others are able to meet the Trusts aspirational 1 in 20-year level of service. The reasons for this are varied and complex, some canals have always historically struggled for adequate water resources, or have suffered decline in water availability over time (e.g. canals that became derelict and have been restored with limited investment in water supplies or without addressing significant water demands, such as losses). Elsewhere, water resource availability has been improved through investment in canal relining, back-pumping schemes (to recirculate lock usage water) or new river abstractions. Environmental legislation, particularly the recent Water Act 2003 implementation, is starting to constrain historical allocations of water to supply the canal network, with abstraction licence conditions reducing water at times of low flows.

Future water use

Climate change is a significant concern to the Trust in terms of the potential scale of impact on water resource availability. Whilst there be some modest gains in reservoir yields (due to winter rainfall patterns) the overall trend is likely to result in reduced summer water availability.

The Trust has previously set out its plans for managing water resources across its network in a Water Resources Strategy (2015) and a new Strategy is due to be issued later in 2022. This will set out the continued aspiration to meet a 1 in 20-year level of service across the network, and to work collaboratively with the Water Resources National Framework and in the development of the 5no Regional Plans, with the aim of identifying opportunities to provide more resilient water supplies, both to the navigation sector, and other sectors.

The Regional Plan

Given the scale and number of its abstraction operations within the Water Resources West area, the Trust has played an active role in the creation of the Plan, particularly in providing insight and data to support the non-PWS section aspects of the Plan, and challenging the Plan to go further with developing tangible solutions that work across the PWS and non-PWS realm.

The Trust is grateful for the focus and effort on our water resources management and how it can be part of the wider solution to the challenges being faced within the Water Resources West area, in a way that will hopefully be mutually beneficial. The Trust fully recognises that the maturity of long-term water resources planning for the non-PWS sector is still some way behind that of the water industry, but strongly feels that if the pressures on water resources are to be addressed properly then the Plan needs to embrace the whole spectrum of water users, and we are pleased to see the Water Resources West team engaging fully in this activity.

Given the lack of maturity in water resources planning across the non-PWS sector, it is inevitable that the projection made in the first Plan will need further refinement and more focus to match the robustness of those made for public water supply, which has a long track-record of work in this area through the established Water Resources Management Plan process.

It would be beneficial if the Plan could seek to unlock more collaborative funding opportunities for research and modelling so that the non-PWS sector can attain a similar level of understanding of its water resources situation and future challenges as are already well quantified for the water industry, to ensure subsequent Plans are more cohesive.

J.4. Sector Profile – Power Sector

Power Plants are major users of river water in WRW, mainly on the Trent. Thermal Power Stations provide stable, dispatchable generation for security of electricity supply and services to the National Grid to complement and support intermittent renewable energy sources.

As the UK moves towards net zero greenhouse gas emission by 2050, the demand for electricity will increase (electrification of transport/heating etc.). Much of this will be provided by renewables, however in order to meet net zero with a secure, stable electricity supply there will be a significant need for firm low carbon power generation capacity, including nuclear power, thermal power with carbon capture utilisation and storage (CCUS) and alternative fuels such as hydrogen.

The Power Sector is different from the water sector, there are no investment cycles, it is highly competitive, there is international ownership and competition law prohibits certain types of collaboration between companies; as a result there is no sector plan - and consequently no power sector plan for water. Power plant operators and developers make decisions based on market conditions, there is no duty to develop power plant projects. Water abstraction restrictions could impose energy technology choices, cutting off some routes to net zero, threatening security of supply and/or impacting future costs for the customer.

The power sector is represented by Energy UK and the Joint Environmental Programme (JEP), however there is no company or body which can negotiate or 'trade-off' on behalf of the power sector, due to competition law.

Current water use

Power Stations currently hold abstraction licences to draw water from rivers which is used mainly for cooling. This use provides increased efficiency compared with air cooling, resulting in societal benefits of reduced emissions to air and affordability of power. In the past decade several power stations have closed in the region reducing the amount of water the sector abstracts. Some of these sites will be re-purposed and the water may become available, others may become future energy sites and the water demand will remain or even increase.

Future water use (to 2050)

Recent work by JEP has examined future power sector water needs based on possible routes to net zero (see the Annex to this Appendix). The analysis projects a continuing fall in annual freshwater consumption by the sector through the early 2020s followed by an increase in consumption and increasing uncertainty.

Energy UK published its third Climate Change Adaptation[2] for UK electricity generation in July 2021, detailing measures electricity generators have put in place to keep power plants - and other

[2] Climate Change Risks and Adaptation Responses for UK Electricity Generation, Energy UK, July 2021 https://www.energy-uk.org.uk/publication.html?task=file.download&id=7951

generating technologies operating in the face of increasingly volatile weather and to mitigate other risks resulting from a changing climate.

Research by Imperial College shows that geographic diversity of power sites (freshwater as well as coastal) helps minimise costs and manage the risks in the pathway to net zero. This, coupled with the difficulties of developing at the coast (protected areas, rising sea levels, coastal erosion etc.), drives the need for freshwater power stations. Much of the infrastructure for power stations – grid connections, water abstractions etc. – already exist at the freshwater sites, making them efficient sites for future development. However, if water rights are removed from a site it can be difficult or impossible to provide alternatives.

The Regional Plan

Energy UK are members of the WRW Senior Group, our role is to ensure the importance of water to the power sector and the societal benefits it can provide are understood and considered during creation of the plan. Energy transformation to net zero is likely to result in higher freshwater demands from the power sector than in recent history at some locations. We are working closely with WRW in order to ensure the current and future projected needs of the sector are based on the most up to date information.

There is no power generation sector plan, statutory or otherwise, as competition law precludes some forms of collaboration for power companies. Operational plant requires continuing access to water and water rights to generate electricity and provide system security. Proposed plant (e.g., production of hydrogen) will require water rights for the duration of the asset's life (>25 years) to secure investment and contribute to net zero and system security. Future development of power assets is likely to be required both inland and at the coast

If existing power sector licences are reduced, this would preclude development of new energy asset options dependent on freshwater, that would otherwise contribute to achievement of UK net zero 2050.

The power sector requires access to water and water rights now and in the future to ensure decarbonisation in a resilient, robust, efficient and affordable way.

J.5. Sector Profile – UK Paper-based Industries

The UK Paper-based industries are represented by the Confederation of Paper Industries (CPI), the leading organisation working on behalf of the sector. CPI's membership includes the overwhelming majority of the supply chain for paper, comprising paper and board manufacturers and converters, corrugated packaging producers, makers of soft tissue papers, and collectors and processors of paper for recycling. CPI represents an industry with an aggregate annual turnover of £12 billion, 62,000 employees and which supports a further 100,000 jobs in the wider economy. Members range in size from large multi-national organisations with multiple sites in the UK, to single site SMEs.

Paper remains a ubiquitous part of our lives – from traditional uses such as recording and spreading ideas, to its indispensable use in personal hygiene; from hi-tech flexible packaging to good old-fashioned cardboard boxes; and from new uses such as components critical to the development of renewable energy to the generation of green energy from paper once it eventually reaches the end of its renewable life.

Current water use

The lion's share of water use in the sector is through the paper mills (46), most of whom abstract from either groundwater or surface water. A continuous supply of freshwater is critical to the sector which uses the water primarily as a carrier and, in some instances as cooling water. As such water is recycled many times before eventually being treated and discharged. In general, paper mills have sufficient water currently although a number of mills are located in areas designated as water stressed.

Future water use

Whilst there has been a decline in graphic papers in recent times, there has been and continues to be growth in the sector, particularly in areas of Tissue and Packaging with new machines in the planning. Any production growth will require increased water use. Great strides have been made in water efficiency over recent times but growth will always equate to increased use. It is important to note though, around 90% of this water is returned to the environment.

In terms of adapting to climate change, the sector has an adaptation plan written in conjunction with the EA, which is in the process of being updated.

The Regional Plan

CPI, representing the UK Paper-based Industries, has participated in the creation of the Plan and is broadly content with the projections in the Plan. Going forward we would like to see the Final Plan contain more detail as to how catchment level solutions could work. As frequently cited, the sector uses the water it abstracts with most being returned to the environment. Depending upon catchment situations it may not make sense, for example, for a solution to be a blanket abstraction reduction when the water used by one and returned could meet the supply needs of another. Essentially, we would be looking for a framework for creativity in the catchment solutions.

J.6. Sector Profiles – Agriculture

Food and farming is part of the fabric of the Water Resources West Region, shaping the landscape from the Cumbrian Fells, across the Midlands and down the Severn Estuary, delivering for the environment and providing a wide range of food products. British farmers produce 61% of the country's food, making a vital contribution to the nation's food security, providing employment and supporting tourism.

Water is essential for growing a wide range of food products, including livestock, crops, fruit and veg. Water is also an essential use in food processing and manufacturing. Access to sustainable water supplies is essential for producing agricultural products and will become increasingly important for planning food production, achieving national food security and the objectives of the UK government Food Strategy, all in a changing climate.

The WRW area is extremely diverse in terms of agricultural production. The primary sectors are combinable crops, dairy, livestock, horticulture, potatoes and poultry. The region also has an ornamental sector – nurseries providing garden and commercial plants.

Current water use

Water for farming comes from a range of sources including rainfall, abstracted water (from surface waters and boreholes) to mains water. Many farmers, particularly in the horticultural sectors, have invested in on farm water storage. Farmers use less than 2% of the total water abstracted in the UK, however peak need tends to be over the summer months; although drier periods can extend from spring, through the summer into the autumn.

Water is required for livestock drinking, crop irrigation, vegetable washing, food preparation and production. Some crops, such as protected strawberries, require a continual supply and cannot tolerate even short periods (a matter of hours) without irrigation.

Farmers work on long-term cropping cycles, planning their use of water years in advance. Access to stored water helps give some resilience against dry weather events which appear to be becoming more frequent. Abstraction is highly regulated, and growers use a range of techniques such as measuring soil moisture and increasing the water holding capacity of soils to ensure maximum irrigation efficiency.

Future water use

Farming businesses take their environmental responsibilities seriously, these include provision of biodiversity features and the conservation of natural resources, including soil and water, on which their businesses depend. On top of that, our farmers and growers are world leaders in food safety, traceability, and animal welfare.

A large amount of the region's farmland is in active environmental management, either on a voluntary basis or through schemes, showing farming's commitment to species and habitat. Farm businesses though need to be productive and profitable to be able to continue to deliver these

environmental benefits. This farmland also conserves important carbon stocks, particularly in England's uplands.

In the face of climate change, with increasing extremes of flooding and drought, along with sea level rise that threatens farmland, farm businesses need to improve flood and drought resilience. Farmers have a key role in flood management and mitigation, whether that is providing public goods such as flood storage and natural flood management, or an increasing focus on land management that will improve soil health and water quality.

Those working the land are also working with our water companies and a variety of other firms and organisations to safeguard water supplies, improve habitat, protect pollinators, and boost farmland bird numbers. Water abstractor groups have been created in some areas across the country. The Nottinghamshire Water Abstractor Group and Herefordshire Group are examples of abstractors working collaboratively to find solutions for future water resilience. They provide an opportunity for engagement with abstractors in a catchment.

The Regional Plan

Farmers and growers as food producers are an essential user of water and need an integrated water management strategy that gives them a fair share of regional water resources and access to secure supplies of water for the irrigation of crops and livestock watering, on a long-term basis. This is critical to support their economic growth and investment, and recognition as food producers who are making significant contributions to food security and keeping the nation fed.

Farmers and growers need a responsive and less complex licensing system that promotes flexibility, innovation, is agile, and makes the best use of resources. More joined up thinking across the regulatory agencies to ensure a fair share of water for all water users is essential.

The WRW plan should help identify and facilitate the introduction of innovative water supply options for agriculture and horticulture. This could include such aspects as local transfers; pooling and sharing of licenses to improve water management; local water trading platforms; water efficiency advice and support; catchment-based options; water recycling on farm; and low input irrigation techniques, knowledge transfer and support.

WRW should help lever incentives for individual farm businesses across a range of sectors to help increase storage and drought resilience, for example infrastructure grants and a supportive planning regime for farm reservoirs. The win-win scenario is helping farm businesses with positive policies to improve water quality, help tackle pollution, and incentivising measures that can improve both productivity and the environment.

Annex. Potential Power Sector Freshwater Consumption

Produced by the JEP Water Working Group for WRW Draft Water Resources Plan, 13 May 2022

All water use requirements in this annex are annual freshwater requirements, reported in units of Ml/d. All data tables in this annex are for the whole WRW region.

FES21 are the four Future Energy Scenarios produced by National Grid ESO in 2021. Each of the four scenarios represents a credible pathway for the development of energy from today to 2050. No probabilities are attached to the scenarios.

The JEP has rerun the JEP power-water model with FES21 scenarios for WRW (using the updated WRW boundaries from autumn 2021). The JEP model[3] is run many times, using a Monte Carlo approach, with each replication representing a power sector that meets the energy production implied by the FES scenario being modelled. This modelling approach is necessary for the energy sector because it is a competitive market without central planning. The model then aggregates the individual Monte Carlo replications to provide a 2.5th %ile, median and 97.5th %ile of the power freshwater consumption for each FES21 scenario. Table 3 presents the JEP model results for the WRW freshwater consumption in 2050 by power (nuclear, combustion, hydrogen) for each of the four FES21 scenarios.

Table 3. Annual Freshwater consumption in 2050 in WRW Region for combustion + nuclear + hydrogen.

Freshwater in Ml/d	Steady Progression	System Transformation	Consumer Transformation	Leading the Way
2.5th %ile	0.07	12.3	0.94	2.69
Median	2.25	131.9	63.9	46.9
97.5th %ile	75.8	328.3	183.1	187.1

WRW also requires projected annual freshwater use from today to 2050 for the power sector in the WRW region. Table 4 over the page reports annual values (for each year and statistic, the greatest value obtained under the four considered FES21 scenarios is taken) for the 2.5th %ile, median and 97.5th %ile of the modelled freshwater power consumption. Therefore Table 4 does not represent a specific single scenario, instead it gives an envelope of potential freshwater consumption by the power sector.

Finally, just a reminder that future power and hydrogen production plants will require access to water and water rights to enable investment in the new plant and to ensure electricity system security and decarbonisation for the country as a whole, in a resilient, efficient and affordable way.

[3] See Appendix B of https://www.energy-uk.org.uk/publication.html?task=file.download&id=7941 for details of the model.

Table 4. Projected Annual Power (Nuclear, Combustion, Hydrogen) Freshwater Use Envelope

Year	2.5th %ile (Ml/d)	Median (Ml/d)	97.5th %ile (Ml/d)
2023	3.6	6.6	12.7
2024	3.3	6.0	11.5
2025	3.1	5.7	10.8
2026	3.4	6.3	12.1
2027	4.1	7.7	24.3
2028	2.1	4.0	38.4
2029	1.4	2.7	48.4
2030	1.1	2.4	69.4
2031	1.3	3.1	84.4
2032	1.5	4.1	93.8
2033	1.6	6.2	128.7
2034	1.7	12.0	130.9
2035	1.6	17.3	134.4
2036	1.4	26.8	161.2
2037	1.2	40.7	173.4
2038	1.2	47.9	195.4
2039	1.1	56.9	209.4
2040	0.9	63.2	220.5
2041	0.9	70.8	241.9
2042	1.1	79.0	254.0
2043	1.0	91.2	264.2
2044	3.2	98.5	283.9
2045	4.9	104.0	295.5
2046	6.9	112.0	303.4
2047	9.0	120.7	310.3
2048	10.9	125.1	323.0
2049	11.7	126.7	324.5
2050	12.3	131.9	328.3