



## SUBMISSION TO IRISH WATER

Public Consultation on the Regional Water Resources Plan for the Eastern and Midlands Region.

March 2022

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## Introduction

The Water Forum welcomes the wide scope of work undertaken by Irish Water (IW) to develop the draft Regional Water Resources Plan (RWRP) for the Eastern and Midlands Region (herein referred to as ‘the draft Plan’). The Forum welcomes the opportunity to respond to the public consultation.

The draft plan is significant for both environmental and socio-economic development in Ireland over the coming decades. The Eastern and Midlands region is of particular importance, supplying over 50% of the country’s national supply (*887 million litres/day to 2.48 million people and 76,000 businesses*), it is the region with the lowest areas of rainfall across Ireland, along with the greatest population density.

Furthermore, population growth, climate change, aging infrastructure and spatial-economic changes are increasingly stressing the water resources, and IW is challenged to reverse the results of previous approaches (e.g. fragility of water supply to the Greater Dublin Area) and support increasing needs with limited resources, while facing a number of data gaps.

## Scope of the submission

The primary scope of the Forum’s submission aims to balance the need for urgency around actions that increase the water supply and resilience in the Eastern and Midlands Region, with the need for IW to gradually improve the way of planning and delivering these actions.

In response to this consultation, the Executive of the Water Forum carried out a technical review of the draft Plan and had detailed discussions with Forum members about a range of aspects of the Plan. Meetings with the Forum members highlighted many different views from a broad range of stakeholders, illustrating the complexity of responding to this significant public consultation, along with the strengths and learnings from sharing different perspectives of Forum members’ organisations. Due to the complexity of the different views, it was agreed to develop the submission addressing a range of high-level issues relative to the Eastern and Midlands Region, where the submission presents an agreed position from the Forum. Details of the technical analysis carried out as part of the development of the submission, can be discussed with Irish Water at future engagements with the Forum.

In the National Water Resources Plan (NWRP), Irish Water proposed three key pillars, stating *“together these pillars will enable Irish Water to optimise our capital and operational solutions to achieve the best outcomes and react to emerging issues”*. These three key pillars of Lose Less (reducing leakage), Use Less (promoting and supporting water conservation) and Supply Smarter (developing the right combination of infrastructure that provides a sustainable, connected, resilient, long term water supply where it’s needed without negatively impacting the environment), have each a role to play in achieving sustainability and resilience in water supply across the Eastern and Midlands region.

The Forum is of the view that the current EM WRP requires more emphasis across all three pillars and have therefore presented recommendations in the context of these. The Forum is particularly concerned about the lack of inclusion of the Use Less Pillar in the draft Plan. Approaching these pillars in a more holistic way, could result in simultaneous improvements at many levels. While the structure of this submission is based on the three pillars of the

NWRP, specific questions presented for the public consultation, have been included in the relevant sections.

- **Lose Less** – reducing water lost through leakage and improving the efficiency of Irish Water's distribution networks;
- **Use Less** – reducing water use through efficiency measures and improved water conservation by customers; and
- **Supply Smarter** – improving the quality, resilience and security of supplies through infrastructure improvements, operational improvements and development of new sustainable sources of water.



**Figure 1:** The three pillars proposed by Irish Water in their National Water Resources Plan; “together these pillars will enable Irish Water to optimise our capital and operational solutions to achieve the best outcomes and react to emerging issues”.

## Summary of Key Recommendations

### Use Less Pillar: Demand Management and Water Conservation

The Forum recommends that **demand management** via water conservation solutions, should be emphasised in the draft Plan.

#### **Domestic Water Conservation** (see report Cotterill and Melville-Shreeve, 2021)

- Enhance water education to support a bottom-up understanding of water (from the processes that underpin treatment and supply, to the energy and resources required to produce drinking water).
- Initiate an awareness campaign to highlight water scarcity in Ireland and potential future threats on our water supply as a proactive measure for demand management, rather than crises management.
- IW should establish community engagement liaison officers who could lead community engagement, increasing communication between IW and the public and supporting water conservation measures.
- IW should initiate a pilot project for the use of smart meters in a community, to determine if they are an effective tool for domestic water conservation.

#### **Non-domestic water conservation**

Water Stewardship measures, standards and indicators should not only benefit and reflect the user's water use and cost efficiency, but also the environmental sustainability, i.e. the use of resources and pollution.

When assessing new connections enquiries, water conservation technologies such as greywater reuse and rainwater harvesting should be encouraged in the planning process.

### Lose Less Pillar: Leakage Management

The Forum recommends that IW adds urgency to their National Leakage Reduction Programme, particularly in areas with greatest supply demand deficits.

Furthermore, IW should increase the number of district meters across the Eastern and Midlands region as a leakage management tool, starting with areas with greatest supply deficits.

### Supply Smarter Pillar

#### Hydrological Balances for Informed Decision Making

The Forum recommends that IW include scheduled actions to address current data gaps to accurately assess hydrological balances and supply-demand estimates, with a clear outline of tangible goals and timelines. Details should be included of the relevant external cooperation requirements (e.g. formal collaboration between IW and the EPA, GSI, ongoing projects such as the GW3D project).

The consideration of the broader environmental capacity (catchment-based assessments), in conjunction with the infrastructure capacity, is key to lead to the necessary methodological updates regarding supply (water availability) and demand estimates. Furthermore, accumulative impacts of abstractions on a catchment should be considered.

### Future demand and forecasts

The Forum recommends increased transparency in IW's role on regulatory control of growth, development and expansion of activities (i.e. their capacity to refuse new domestic and non-domestic connections depending on the necessary infrastructure required to allow their optimum water allocation, ensure their sustainable operation and provision of high-quality water services) to ensure there is transparency and accountability for water sustainability in the planning process.

### Climate change projections

Despite being a 5 year plan for infrastructure, this IW plan must support water services for at least 100 years, and therefore it must carefully consider various climate change scenarios.

The Forum recommends that an urgent action is added to the Plan to **develop Drought Management Plans** (in line with EC recommendations), and subsequently review and assess the proposed water transfers and reservoir optimisations. These plans should be made publicly available and indicate how much capacity there is throughout the region during extended drought periods.

The same review and assessment should be carried out with respect to the **Flood Risk Management Plans**, to ensure the provision of resilient water services.

Furthermore, consideration of sea level rise should be included in planning processes for water transfers, reservoirs and upgrades of water treatment plants.

**Cooperation with Met Eireann and academics** will be essential to consider actual climate change scenarios in the Plan (e.g. IPCC's RCP results).

### Sustainable provision of high-quality Water Services

The Forum recommends that a **more holistic, integrated approach** is adopted, in the context of Integrated Catchment Management and FILLM<sup>1</sup>. This could reduce dependencies on end of pipe approaches for addressing potential or emerging risks to the supplies. Furthermore, accumulative impacts of abstractions on a catchment should be considered.

The Forum recommends that IW increase their staff capacity to include scientists with expertise in integrated catchment management to support this transition.

The Forum recommends that IW ensure sufficient staffing resources (i.e. sufficiently trained personnel to manage infrastructure and to provide the best possible services) are included as a key interim solution of the plan.

The Forum recommends that IW should present emergency action plans for the Eastern and Midlands Region to illustrate resilience against extreme drought or interruption to

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<sup>1</sup> Framework for Integrated Land and Landscape Management (FILLM) [TWF-FILLM-Report-Feb21-v9WEB.pdf](https://www.thewaterforum.ie/TWF-FILLM-Report-Feb21-v9WEB.pdf) ([thewaterforum.ie](https://www.thewaterforum.ie))

supply. Details of reservoir capacity (litres per day) should be included and presented in the final Plan.

#### Water transfers: Ensuring efficiency

The Forum is supportive of the need for interconnected supplies to increase resilience and for the need of water transfers to address the water deficits in the GDA in particular.

The Forum recommends that IW include measures in the final plan for ongoing cooperation with the EPA and the GSI, to build and incorporate accurate hydrological model estimates for the supply and demand across the region for the various proposed water transfers, as the data becomes available.

The Forum recommends there is flexibility for review and adaption of the preferred options following the assessment and incorporation of these hydrological balances, along with any new changes outlined in the upcoming Abstraction Bill.

#### Environmental Impact

The Forum is of the view that IW should have more emphasis on their 'green agenda', illustrating how they are aligning their plans with both national policies, such as the Climate Action Plan, and international polices, such as the EU Green Deal, Paris Agreement and the UN Sustainable Development Goals.

The Forum recommends that both the SEA and the AA should be based on hydrological balances to ensure any water abstractions do not have a negative environmental impact. IW must also outline how the proposed water transfers will comply with the Water Framework Directive.

#### Terminology

The Forum recommends that a table is added to the Plan to include the definitions of key terminologies used throughout the plan to avoid misinterpretations and subjective measures.

#### Transparency

The Forum recommends that IW should add actions to the Regional Plan to highlight how they will increase transparency in their data, monitoring and knowledge-based tools; making open-source information available for water supply services so that the public and stakeholders can make informed contributions to public consultation processes.

## The Regional WRP and the Three Pillars

### 1. Use Less Pillar - Demand Management and Water Conservation

It is the Forum's view that IW needs to place a stronger emphasis on water conservation in the Eastern and Midlands Regional Water Resources Plan (EM WRP), given the deficits in the supply demand balance (SDB), the future challenges (climate change, population growth, exploitation of nearest resources, inadequate infrastructure) and the current levels of energy used by IW<sup>2</sup>. Despite 'Use Less' being one of the three pillars proposed in the NRWP, there is little focus on water conservation measures within the draft Plan, with limited options considered (p. 190-193, 202) for having additional water from demand management and exploiting renewable resources (e.g. local reservoirs, rainwater harvesting), or options for optimum allocation (different sources to different users through a new-connection licensing plan). The Forum recommends that efforts to improve water conservation should occur simultaneously to the proposed increases in water supply to address the supply demand deficits of the region. The actions of the Box 5.1 (p.133) are a good starting point that could be applied to all areas, even as interim measures that can serve multiple purposes, more than leakage reduction.

In 2019 the Water Forum commissioned research on the Eastern and Midlands Water Supply project and the general approach regarding water transfers (Maublanc, 2019) to support the Forum's submission to the CRU. The scope of this research is applicable to the Preferred Option of the Regional Water Resources Plan, which includes the New Shannon Source (NSS). One of the key findings of this research was that there is a lack of a **demand management** strategy within IW:

*"Water demand is not an external parameter, such as rainfall, but instead a component of the system that a water utility can, and should, manage; to that end, it is necessary to adopt a holistic view of all the drivers, as well as levers, that can influence water demand in the future. While Irish Water indicates that it intends to implement a demand management strategy, the impact of such strategy is not evidenced in the proposed demand projections" (Maublanc, 2019).*

The Forum subsequently made a submission to the CRU, where one of the concerns raised was that, in concentrating on the supply from the River Shannon as the main response to addressing the water demand in the Greater Dublin Area, insufficient emphasis would be placed on demand reduction, leakage management and conservation measures. The Forum presented these findings to IW ahead of the development of the NWRP and are of the view they are still relevant to the Regional WRP. Therefore, the Forum recommends that **demand management via water conservation solutions, should be considered from the early planning stages** (e.g. Table 7.20 p.237), which should occur simultaneously to leakage reduction efforts and additional water supplies as proposed in the Plan.

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<sup>2</sup> IW are the largest single user of electricity in Ireland and therefore should be considering all ways to reduce this; water conservation, i.e. less demand from users, less treatment, less pumping, less leakage, less energy is an obvious example (Cotterill and Melville-Shreeve, 2021).



In 2021 the Water Forum commissioned research on *A Framework for Improving Domestic Water Conservation in Ireland*, (Cotterill and Melville-Shreeve, 2021)<sup>3</sup>; the research introduced issues around water scarcity in Ireland and the common misconceptions about water availability. Ten policy recommendations were proposed as part of this research where a number of recommendations are relevant to IW and to the Use-less Pillar and the Forum recommends they are incorporated into the Regional Plan:

- Strengthen water education to support a bottom-up understanding of water (from the processes that underpin treatment and supply, to the energy and resources required to produce drinking water and that 1/3 drinking water is used to flush the toilet in homes), to bring the necessary behavioural change around a more reasonable water resources management.
- Initiate an awareness campaign to highlight water scarcity in Ireland and potential future threats on our water supply. Educational campaigns can lead to a longer and deeper change in behaviour than traditional policy instruments, so they are considered necessary for the public to understand the challenges and the seriousness of the situation, as well as the benefits for changing certain perceptions and habits.
- The research recommended that a National Water Conservation Team is established, comprised of all agencies and partners responsible for water, to share best practice, skills and knowledge in Ireland. The Forum suggests IW will have a leading role in this team once established.
- Introduce smart metering as a non-pricing strategy to raise awareness of how and where water is used – this could be considered for a pilot project for a community in Ireland to determine if it has a positive impact on water use.
- Identify funding for retrofittable water-saving kits which should be provided free of charge to all domestic households – this could be considered for the Eastern and Midlands region, especially in areas with greatest SDB deficits.

Furthermore, there is still poor communication around water scarcity and droughts in Ireland. Research commissioned to the Forum (Antwi et al. 2021)<sup>4</sup>, analysed how drought and water scarcity were communicated by different bodies in Ireland, which found that “water scarcity” and “shortage” in describing drought impact on Ireland's water resources were rarely used. One of the key recommendations from this research is for IW to improve their coverage of drought events to increase public interest and conservation action. The Forum recommends that IW increase their communications and education strategies to increase awareness of water scarcity and drought in Ireland as a proactive measure rather than in crises management. The Forum is willing to support Irish Water in these efforts.

In order to increase efforts on community engagement and demand management, the Forum recommends that IW should increase investment in community engagement through the inclusion of community liaison officers across the country, which will support awareness campaigns and allow two-way communication between IW and the public. This would allow communities to be involved and co-create community projects for water conservation,

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<sup>3</sup> Cotterill and Melville-Shreeve, 2021; [A Framework for Improving Domestic Water Conservation in Ireland - Research Report - An Foram Uisce \(thewaterforum.ie\)](#)

<sup>4</sup> Antwi, H.S., Linnane, S., Getty, D., Rolston, A. (2021). Communicating water availability to improve awareness and the implementation of water conservation measures in the Republic of Ireland. [Communicating-water-availability FULL-REPORT-1.pdf \(thewaterforum.ie\)](#)

supporting an integrated approach to water management and source protection initiatives.

With respect to the **non-domestic water conservation**, the Forum supports the Water Stewardship Programme for non-domestic users and supports its continued efforts in the plan. The Forum recommends that Water Stewardship should be supported and implemented based on the principles of Integrated Catchment Management (ICM), where measures, standards and indicators will not only benefit and reflect the user's (e.g. companies) water use and cost efficiency, but also the environmental sustainability, i.e. the use of resources and pollution. This requires a catchment-scale assessment supported by the respective data, and transparency in the resources used. Specifically, the water stewardship's contribution should be measurable through the water demand reduction and the increment of water availability of water bodies. Moreover, the operational use of water by IW must be also known and considered in every Water Resource Zone (WRZ) (p.86).

When assessing new connection enquiries for both non-domestic and domestic users, Irish Water should encourage and support water saving technologies such as greywater reuse and rainwater harvesting. Where there are policy gaps in relation to water conservation measures, such as building regulations or planning, Irish Water should identify these gaps with the DHLGH and the Water Forum, particularly in areas with critical supply issues.

The Forum welcomes future engagement and collaboration with IW in relation to water conservation initiatives. Water conservation is a central pillar of the Forum's Strategic Plan, where one of the Strategic Goals is to 'advocate for the need for and benefits of meaningful public engagement and education on water resource management'. Therefore, the Forum would be happy to support IW in future initiatives and communications around water conservation.

## 2. Lose Less Pillar - Leakage Management

The Forum recommends that IW adds urgency to their National Leakage Reduction Programme, particularly in areas with greatest supply demand deficits.

In the water resource zone (WRZ) scale, efficient water use is connected to the minimisation of losses which in the draft plan is perceived as fixing leaks. However, the Forum recommends that IW puts emphasis on mapping and controlling the networks' general performance. Leakage is not only the distribution network leakage, as considered (p.82); there are also transmission losses and/or distribution losses from the mains, theft, leakage and overflows at reservoirs and storage tanks, and water use (customer) losses. All of these additional components could result in even higher leakage, which are also influenced by external conditions (soil, weather, excess pressure, vibration and traffic loading) (Kingdom et al., 2006). IW should increase the level of data and control of these losses' components (speed of detection and repair, infrastructure renewal, pressure management), and raise awareness for the ones that cannot be subject to its own responsibility (i.e. theft and water use losses). Although this is partially recognised by IW there are no actions to address this gap.

One of the main challenges that IW recognise in meeting leakage reduction targets (p.131) is

the "necessary data to improve visibility of active leakage control efficiency and key parameters such as background leakage". Other key challenges involve the "availability of skilled and trained resources to undertake find and fix activity".

The use of meters to detect leaks has been identified in the draft Plan;

- Improving District Meter Area data through public meter upgrades "*improved understanding of water flows across the district helping to direct Find and Fix crews to the highest priority areas*" and "*provides a long-term source of valuable data on water use within the district*"
- Meters for non-domestic customers (Page 137) "*allows us to identify leaks quickly through our water meters reading and through the graphs that we have*"

**The Forum recommends that IW increase the distribution of district meters throughout the Eastern and Midlands region as a key a tool for leakage management** (the lose less pillar), as they would increase the efficiency of leak detection and management across the region.

Moreover, the connection of leakage reduction to the actual effect on the water bodies must be studied in order to lead to increased targeted fixes, that will not only reduce current losses, but will also be aligned with and support the RBMP's objectives. For example, the current water deficits reduction from the study area water bodies can be read complementarily to the respective results of Table 5.1 (p.129) to compare the effect of leakage reduction targets to their quantitative status.

### 3. Supply Smarter Pillar

#### 3.1 Hydrological Balances for Informed Decision Making

*This section is related to Question 3 proposed for the public consultation; Section 3 of the draft RWRP-EM and each of the Technical Appendices 1-9 outline the Need (Deficits) in both Quantity and Quality across the region and in each of the Study Areas. Do you have any comment on the Need (Deficit)?*

The Water Framework Directive (WFD), its Guidance Technical Reports, the Common Implementation Strategy reports, and many European River Basin Management Plans, recognise that monitoring and modelling of water bodies at catchment scale, and of the water demand, are necessary for all water suppliers, and fundamental for the evidence they provide for planning. Increasing the level of control and overview over catchments and infrastructure assets, supported by more complete databases, improved methods and scientific assessments, would lead to more transparent management, robust and coherent planning, along with integrated decision-making.

IW recognise the weakness in hydrogeological data in the Regional Plan;

- "*we need to undertake further research and investigation to increase our understanding of the hydrology and hydrogeology relating to some of our water sources and support our operational management*" (p. 51).

- the need for monthly hydrological assessments to determine the impact of tourism of water demand forecasts (p. 26),
- *“further improvements can be gained by improving the data that is available to us for modelling. Irish Water have a firm commitment to update the SDB as datasets are updated and more data becomes available to them”* (p. 285)
- to make informed decisions and meet WFD requirements (p.254)
- estimating transfers for the Regional Options (Section 8.2).

**The Water Forum recommends that IW specify scheduled actions in the draft plan to incorporate hydrological data and water balance estimates for the relevant catchments throughout the Eastern and Midlands region.** Specifically, accurate, monthly hydrological estimations and infrastructure capacity planning are required to ensure continued supply during critical periods.

**The Forum recommends that IW include a section in the Regional Plan to provide actions for transparent, ongoing collaboration between IW and the EPA and GSI to determine the data requirements for accurate estimates of the water availability and balance for every catchment which has a drinking water source.** Furthermore, the cooperation with EPA and GSI, as well as the multi-annual government funded GW3D project (p.107), must also be set as priorities for robust assessments for water availability from the aquifers, essential to support the additional groundwater abstractions proposed in the Plan. This cooperation is essential in the context of sustainable Integrated Catchment Management (ICM). Furthermore, the Forum is aware that the actual abstraction limits and conditions which Irish Water will operate under has yet to be determined in the current abstraction licensing process. **The Forum therefore recommends that the final Plan and proposed water transfers will allow for flexibility in the Preferred Options once the data on cumulative water balances have been assessed.**

Addressing the current data limitations is crucial for having more transparent and informed decisions, in particular data gaps around catchments and water bodies, with the consideration of the broader environmental capacity (catchment-based assessments), rather than just the infrastructure capacity. A similar map to the Figure 3.7 (p.72) combining the supply sources with the water bodies that are ‘used’ and their quantitative and qualitative capacity, along with their WFD status, should be a crucial factor for planning (e.g. for water transfers). This would allow IW to examine where exactly the water available for use (WAFU) constraints are (e.g. Fig.3.10 in p.78), and which users they supply. Furthermore, the accumulative impacts of abstractions should be assessed in a catchment (i.e. an integrated catchment management approach) for greater resilience and environmental protection. A better estimate of the hydrological balances in WRZs, would allow the perspective of the water quantity management to change from *“Water Quantity that Irish Water can provide”* (p.5 of the assessment of need), to *“Water Quantity that each water body can provide”*.

## 3.2 Future demand and forecasts

*This section is related to Question 1 proposed for the public consultation;*

*The Eastern and Midlands Region baseline is discussed in section 2 of the draft RWRP- EM. Do you have any comments on the Eastern and Midlands Region or in respect of the population growth and economic development and how this is considered in our water resources planning approach?*

Population growth and expansion of businesses (industrial and agricultural) are expected to increase pressures for water supply in the coming years. Accurate projections are essential as a proactive managerial approach of the available water resources and the necessary targeted infrastructure updates (He et al., 2021). Future planning around water supply services will require data from reliable growth projections, along with data on IW's infrastructure and the environmental (water bodies) capacity.

The population growth of settlements and cities (p. 83) based on the draft National Planning Framework (NPF)<sup>5</sup> can be considered sustainable in terms of existing indicators of development (e.g. rate at which cities are expanding spatially versus the rate their population is growing), but not necessarily in terms of IW's supply capacity (hydrological yield, capacity of water treatment plants and reservoirs' capacity) to cover the increasing demand (Alamanos and Linnane, 2021a). A way to approach such phenomena, expands on Table 2.2 on p.23; the population growth projections should also include (here or in the respective Appendices) the city-specific projections, to ensure there is adequate control on the supply at different regions within a county, where the city-specific served population that is served by reservoirs must be known for a detailed planning. Similarly, in p.37 – Table 2.3; it is important to know which of these water bodies are located in areas with poor infrastructure and significant population growth. Examination of the condition of the water bodies (surface and groundwater) and the infrastructure serving each demand node in combination, with the expected future conditions is recommended. This information would support the selection of preferred options, as it can unfold more challenges that could lead to alternative water allocation requirements.

In relation to the process of new connection enquiries carried out by Irish Water as part of the planning process with Local Authorities, **the Forum recommends that IW provide further detail on its role on regulatory control of growth, development and expansion of activities** (i.e. their capacity to refuse new domestic and non-domestic connections depending on the necessary infrastructure required to allow their optimum water allocation, ensure their sustainable operation and provision of high-quality water services), **to ensure there is transparency and accountability for water sustainability in the planning process.** The need for solid planning and financial management was already raised in the Forum's SWMI's recommendations for IW, where focus should be given to measures which increase capacity, investments and flexibility of altering the planning process based on reasonable interaction with relevant bodies, if necessary.

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<sup>5</sup> <https://npf.ie/draft-of-ireland-2040/>

### 3.3 Climate change projections

Irish Water introduced national Water Conservation Orders in 2018 and 2020 as result of extended periods of dry weather, which resulted in disruption to service due to “*lack of capacity in our existing infrastructure*” (p.49 & in Box 2.5). This highlights the need for rigorous planning around future climate change. The European Commission stated that IW should develop Drought Management Plans as part of their NWRP<sup>6,7</sup>, which is still currently not addressed. **The Forum recommends that IW add an urgent action in the Regional WRP to develop these Drought Management Plans, and subsequently review and assess the proposed water transfers and reservoir optimisations.** These plans should be made publicly available and indicate how much capacity there is throughout the region during extended drought periods.

**The same review and assessment must be carried out with respect to the Flood Risk Management Plans<sup>8</sup>** since such extreme phenomena can majorly affect the provision of water supply services.

**The Forum recommends that the Regional Plan should consider actual climate change scenarios, in cooperation with Met Eireann and other climate experts,** in order to better estimate SDB and provide for better planning towards resilient systems. Collaboration with Met Eireann, and continuous cooperation with ICARUS (p.55), would allow such revisions to be incorporated in the plan.

A fundamental aspect in the current draft plan and the planned options refer to infrastructure upgrades, replacement or new ones. These infrastructure works are long-term investments, going beyond the 25-year horizon of the draft plan. A level of future-proofing is recommended to be considered into the plan, particularly in the face of climate change, either as part of the design studies of those works (e.g. design life usually considered for 50 or 100 years for such works), or as part of the options’ development and their evaluation (considering a respective time-horizon for their depreciation in cost calculations). This will have multiple benefits, economically and environmentally, and also related to the future resilience of the infrastructure assets. The consideration of sea level rise, for example, should be included in IW’s planning processes for water transfers, reservoirs and upgrades of water treatment plants in Study Areas 1, 3 and 9, to ensure that this Regional Plan supports resilient water services in the long term (i.e. >100 years).

The use of historic time-series data covering the Eastern and Midlands Region could be used to estimate the temperature and precipitation changes following the climate changes scenarios (Representative Concentration Pathways – RCPs) as proposed by the IPCC (Intergovernmental Panel on Climate Change) in its 5<sup>th</sup> Assessment Report (AR5) in 2014 (IPCC, 2014). These scenarios are consistent with a wide range of possible changes in future anthropogenic greenhouse gas (GHG) emissions and could be a great resource for addressing significantly larger uncertainty areas in the future planning and preferred options, as different situations are taken into account (mild, intermediate, and extreme changes). Detailed hydrological assessments for the WRZs, in combination with planning for a number of climate

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<sup>6</sup> [https://ec.europa.eu/environment/water/water-framework/pdf/5th\\_report/SWD\\_2021\\_250.PDF](https://ec.europa.eu/environment/water/water-framework/pdf/5th_report/SWD_2021_250.PDF)

<sup>7</sup> <https://www.eureau.org/resources/briefing-notes/5111-briefing-note-on-the-impact-of-drought-on-drinking-water/file>

<sup>8</sup> [https://www.floodinfo.ie/about\\_floodplans/](https://www.floodinfo.ie/about_floodplans/)

change scenarios would enhance the validity of the forecasts to determine how climate change will impact both water demand and water availability:

### 3.4 Sustainable provision of high-quality Water Services

*This section is related to Question 7 proposed in the public consultation;  
Have you any comments on this as a strategy of reducing risk to water supplies while developing our Preferred Approaches?*

The Forum recommends that a **more holistic, integrated approach is adopted in the context of Integrated Catchment Management and Framework for Integrated Land and Landscape Management (FILLM)<sup>9</sup>, which should include source protection measures.** This could reduce dependencies on infrastructural and treatment solutions to achieve adequate water quality (i.e. end of pipe approaches). The Forum recommends that IW outline the key engagement with leading agencies to address these source protection measures, with more consideration of ‘front of pipe solutions’. This transition will require skilled personnel, **the Forum therefore recommends the IW increase their staff capacity to include scientists with expertise in integrated catchment management.**

The Forum supports that IW will invest in their human asset base to improve their Level of Service; i.e. having sufficiently trained personnel to manage infrastructure and to provide the best possible services. Furthermore, the Forum supports that IW will invest in their structural asset base (pipes, reservoirs, networks, meters, SCADA, equipment) as interim and long-term solutions to strengthen IW’s level of service (p.234). To highlight the need for these investments, the infrastructure, human capacity and communication challenges could be included in the Barriers mentioned in p.102, as a means to reduce failure incidents, disruptions of water supply, and sustainable provision of water.

### 3.5 Water Transfers: Ensuring Efficiency

*This section is related to Question 6 of the proposed questions of the public consultation;  
Have you any comments on the Regional Preferred Approach?*

The Forum is supportive of the need for interconnected supplies to increase resilience and for the need for water transfers to address the water deficits in the region, particularly in the GDA.

While referring to the GDA, the Natura Impact Statement (NIS) states that (p.111): *“This supply demand balance issue will continue until a major new water source is developed for the region. It is estimated that the Preferred Approach may not be delivered before 2029. Therefore, it has been identified that interim options are required for this WRZ until the Preferred Approach solution is in place to alleviate the deficit. The interim options have been assessed within this NIS and comprises optimisation of Poulaphouca Reservoir, upgrade of*

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<sup>9</sup> The Water Forum (2021). Framework for Integrated Land and Landscape Management. <https://thewaterforum.ie/framework-for-integrated-land-and-landscape-management/> FILLM (Framework for Integrated Land and Landscape Management) supports a ‘whole-of-environment’ approach, agreed by AFU.

*Leixlip WTP and an increase in surface water abstraction from the River Liffey (options SA9-28 and SA9-46)”*.

Water transfer works are large projects by nature, can affect a large portion of the population, bring large-scale environmental impacts, and are not easily reversible decisions. Thus, it is important to ensure that such decisions are based on the best available data and analyses: robust and accurate hydrological models-estimates for the supply and demand, with planned measures for the upstream regions to cover the transferred water volume (measures in return for source areas). The Forum is concerned that this level of data and analysis is lacking in the draft plan.

In 2019 the Forum commissioned research on the Eastern and Midlands Water Supply Project and the general approach regarding water transfers (Maublanc, 2019); the research highlighted the need for hydrological data and modelling of water balances.

The Forum supports the need for additional water supply to the GDA and do not disagree with the proposed ‘Preferred Option’ to transfer water from the River Shannon and supply a number of WRZs across the Region, including the GDA. **The Forum however recommends that there is emphasis on the need to address the data gaps to support the accurate decision making and project planning of the proposed water transfer projects in the plan.** The Forum therefore recommends that IW include scheduled actions in the draft Plan to include cooperation with the EPA and GSI in order to assess hydrological balances of drinking water catchments across the Eastern and Midlands Region. Furthermore, the Forum recommends that IW should outline how it will allow for flexibility in the Preferred options of water transfers and additional groundwater abstraction, as more hydrological data becomes available. This flexibility in the final plan will be essential as the development of the Preferred Approach will also be directly impacted by the upcoming Abstractions Bill which may influence how much Irish Water can abstract from different sources.

**The Forum recommends that the optimisation of reservoirs should be included in the options for the GDA, where the capacity of the reservoirs is assessed under different extreme scenarios (i.e. water levels and storage for drought periods).** For the transfer works, there is no information if there is going to be a continuous or intermittent flow, and how thresholds will be determined (i.e. will thresholds be based on existing design, monitoring, modelling?). Having increased capacity of downstream reservoirs, by storage or transfers when upstream water levels are high and sufficient, will allow WRZs to be more resilient to drought or demand peak events. The Forum recommends that IW should present emergency action plans for the Eastern and Midlands Region to illustrate resilience against extreme drought or interruption to supply. Details of reservoir capacity (litres per day) should be included and presented in the final Plan.

In relation to the planning process of any water transfers proposed in the draft Plan, the Forum recommends that IW include details in the final plan of the required engagement and collaboration with the National Federation of Group Water Schemes (NFGWS), and individual group water scheme where water transfers propose to utilise or impact on existing group water schemes infrastructure, acknowledging that these are privately owned community assets.



### 3.6 Environmental Impact of the Regional Plan

*This section is related to two questions outlined in the public consultation;  
Question 4; Do you have any comments on how the Feasible Options for the Water Resource Zones (WRZs), Study Areas and the Region have been identified?*

The Forum is concerned that Regional Plan lacks detail on the environmental sustainability of the proposed plans. While it is understood there will be an environmental assessment carried out as part of the planning process, the Forum suggests IW should indicate the environmental implications of the proposed projects in the Regional Plan. The Forum is of the view that IW should have more emphasis on their 'green agenda', illustrating how they are aligning their plans with both national policies, such as the Climate Action Plan, and international policies, such as the EU Green Deal, Paris Agreement, the UN Sustainable Development Goals. While IW include an option for 'Lowest Carbon' in their decision-making criteria, the Forum suggests that more transparency is included in the final plan as to how IW will align with the Climate Action Plan, given that the Regional Preferred Approach, despite being the best option for lowest cost, most resilient and the environment, it was the worst option for lowest carbon. The Forum recommends that IW present the absolute difference in CO<sub>2</sub> between Combination 1 (worst option for carbon) and Combination 2 (best option for carbon). As IW are already the largest consumer of electricity in Ireland, IW should assess how they could reduce their national carbon footprint by this amount. IW should also present where they will have access to renewable energy for the pumping of treated water for any new water transfers.

*Question 8; Do you have any comments on the Strategic Environmental Assessment (SEA) Environmental Report and Natura Impact Statement (NIS) which accompany the draft RWRP-EM?*

The Forum acknowledges that a Strategic Environmental Assessment (SEA) and an Appropriate Assessment (AA) must be developed as part of IW's Regional Plan. SEA is a process that integrates environmental considerations into the preparation and adoption of plans and programmes, with a view to promoting sustainable development. Therefore, the Forum recommends that both the SEA and the AA should be based on hydrological balances, to ensure any water abstractions do not have a negative environmental impact. Finally, the Forum recommends that any of the proposed water transfers or new abstractions must comply with the Water Framework Directive.

## 4. Data Transparency

The Forum recommends that measures to increase the transparency in data available to or used by IW in the assessment of their proposed plans for the EM Region are included in the final Plan. Currently, there is no detail provided by IW on the actual water balances and their allocation (spatially) within the GDA, regarding their needs and deficits, and that there is no information on a design study (T=50, 100) for the works proposed. The use of surrogate data

and trends from neighbouring countries for the SDB estimates (p.139), and the headroom<sup>10</sup> (as explained in p.143) are sources of non-weighted uncertainty. The Forum recommends that the Regional Plan should indicate how much water can be saved from each option (e.g. hm<sup>3</sup>/month), for each month and supply source, in order to evaluate the options in a transparent and fair manner. For that purpose, a catchment-based approach, considering integrated planning with a focus on sustainability, and combinative solutions (demand management, water use efficiency, reservoirs optimisation and infrastructure updates, increasing the capacity of the reservoirs and/or their number) is internationally recommended (Diao, 2021).

An example of data transparency is provided in Appendix A showing the evolution of a simple and reliable Decision Support System for Athens, Greece (a public water utility with water transfers) which has recently become open-source<sup>11</sup>. The Forum recommends that IW should add actions to the Regional Plan to highlight how they will increase transparency in their data and monitoring; making open-source information available for water supply services so that the public and stakeholders can make informed contributions to public consultation processes.

## 5. Terminology

The Forum is concerned over the use of unclear terminologies in the draft plan, which could result in misleading interpretations. Table 1 below outlines a number of terms, their perceived meaning in the current draft, along with a comparison with terminologies in line with the international practice and literature. Clarity in terminology would ensure more accurate, tracking (objective measurement) of the performance of water services, and their improvement. Similar concerns over terminology have already been raised in the Forum's submission of the NWRP (AFU, 2021).

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<sup>10</sup> The rationale for the allowance of headroom (e.g. 20% for larger cities, 15% in towns, 10% in smaller villages) must be further justified and improved, considering the water bodies and IW's infrastructure capacity, as well as the actual demand drivers.

<sup>11</sup> Karavokiros, G., Nikolopoulos, D., Manouri, S., Efstratiadis, A., Makropoulos, C., Mamassis, N., Koutsoyiannis, D. (2020). Hydronomeas2020: Open-source decision support system for water resources management. European Geosciences Union General Assembly, Vienna, Austria. May, 2020.

**Table 1.** Terminology suggestions and comparison with existing approaches.

| <b>Term</b>                    | <b>Existing approach (Draft Plan)</b>  | <b>Proposed approach</b>   | <b>Justification</b>   |
|--------------------------------|--|--|--|
| Resilience                     | Whether the chosen Option addresses the supply-demand problem (i.e. avoiding a deficit water balance) – usually after a stress <sup>12</sup> | The ability of a system to resist, absorb, accommodate, and recover from the effects of a hazard in a timely and efficient manner (UN, 2012; Adger et al., 2005; Folke, 2006; Simonovic and Peck, 2013)  | Resilience refers to the response of a system to a threat, not a property of the examined solutions (especially the ability to provide positive water balances, which should be a condition for all examined options) <sup>13</sup>  |
| Sustainability                 | Whether the Option’s implementation avoids the known environmental impacts (from the impact assessments)                                     | Ensuring the reserves of adequate water volume of good quality available for the future (target year) water needs (Marques et al., 2015a; Rathnayaka et al., 2016)   | Sustainability can be a crucial evaluation criterion for the management (it reflects if it can secure future resources for use), rather than connecting it to its environmental impacts (which should be avoided/minimised –)  |
| Flexibility                    | Whether the Option achieves risk and uncertainty mitigation to avoid failure of the Option   | The ability to change options if the results are not satisfactory compared to pre-defined techno-economic and social criteria (Marques et al., 2015b; Jensen and Khalis, 2020)   | For long-term planning, flexibility (the ability to implement a first-stage solution while keeping a view of the long-term system development) is close to robustness (the ability of a solution to satisfy as many future scenarios as possible)  |
| Lose less                      | While other elements are mentioned, it seems to be mainly synonymous with leakage fix  | In a Supply-Demand-Balance, or more correctly, in a water balance, the demand component is not fixed, but variable under the proper management (Loucks and van Beek, 2017).  | Managing the demand (through also controlling the systems – beyond leakage fixes) will provide multiple benefits (SDB, sustainability, level of analysis over WRZs, etc.)  |
| Least cost – economical design | Lowest Net Present Value (NPV) cost in terms of Capital, Operational, Environmental and Social and Carbon Costs                              | Lowest Net Present Value (NPV) cost in terms of Capital, Operational, Maintenance, Investment, Carbon, Resource, and Environmental Costs (details in the section ‘cost of water services’) and Social cost in terms of utility maximisation through the provided services. | The modern Water Resources Management has moved beyond the traditional perception of engineering costs towards the delivery of services with the overall maximum benefits, ensuring a standard performance level. (according to criteria, priorities and goals, already set) <sup>14</sup> . |

<sup>12</sup> Also according to the Explanatory Booklet of IW’s Capital Investment Plan 2020-2024. [Capital-Investment-Plan-2020-2024-Explanatory-Booklet.pdf \(water.ie\)](https://www.water.ie/Capital-Investment-Plan-2020-2024-Explanatory-Booklet.pdf)

<sup>13</sup> More approaches can be used to understand the operation and the interlinkages among different actors to achieve resilience. For example, this recent approach applied in the UK:

Ward, S., Meng, F., Bunney, S., Diao, K., & Butler, D. (2020). Animating inter-organisational resilience communication: A participatory social network analysis of water governance in the UK. *Heliyon*, 6(10), e05069. <https://doi.org/10.1016/j.heliyon.2020.e05069>

<sup>14</sup> For example, an option that reduces losses in a way that minimises energy and can use the extra supply to boost development in a WRZ could be an overall least-cost solution compared to one that assumes less capital costs but does not increase the services provided.

|                               |  |  |  |
|-------------------------------|--|--|--|
| Supply – Water availability   | - no clear definition (assumed as the capacity of IW’s WTPs to supply water) | The renewable water amount per water body (runoff for surface and recharge for groundwater bodies), and then the amount that can be used from IW for supply.   | This will achieve the sustainability from a catchment-based approach, (accounting and securing environmental flows, etc.).   |
| Climate change                | - no clear definition (hypothetical weather conditions)                      | Specific scenarios have been developed by the Intergovernmental Panel on Climate Change (IPCC), that consider actual changes in meteorological parameters as a result of the possible changes in future anthropogenic greenhouse gas emissions | These scenarios can be statistically downscaled (there are various methods depending also on the data availability) and used for the regions of interest. The historic time-series are available from Met Eireann. This will allow to quantify their actual impact on water availability and demand. |
| Multi-Criteria Analysis (MCA) | - no clear definition (a process used)                                       | A mathematical sequence of relations that represent the way that humans make decisions based on different potential rationales (Munier, 2011). There are several MCA techniques with certain characteristics, and modifications.               | MCA methods are based on four basic theories (utility, hierarchical, outranking & ideal solution theory). The selection of the most suitable one for each examined problem must be a result of their comparison (Alamanos and Mylopoulos, 2020).   |

Another example of misinterpretation from the Regional Plan is the term ‘*Preferred option*’, which could be interpreted as being a subjective or biased decision. In contrast, the term ‘*prevailing*’, or ‘*most appropriate*’ is often used in international decision theory (MCA, or Cost-Benefit Analysis, or Optimisation techniques), which can incorporate the preferences of the stakeholders in the mathematical process and for the solution(s).

**The Forum recommends that a Table is added to the Regional EM WRP which includes the definitions of key terminologies used throughout the plan.** In particular using actual MCA with performance criteria (measurable according to the proposed definitions), would allow IW to start to quantify the performance of the systems, with more transparent, objective comparisons and decision-making process.

## Conclusions

The key recommendations made by the Water Forum are presented at the start of the submission; in summary the Forum recommends that Irish Water put more emphasis on the Use Less Pillar in the EM RWRP, with water conservation campaigns that outline water scarcity in the region as a demand management strategy. The Forum recommends that there is transparent and ongoing cooperation between Irish Water and the GSI and EPA to ensure Irish Water plan and develop their proposed plans, in particular the Regional Preferred Option, using accurate hydrological assessments of the catchments to ensure resilient water services and environmental protection throughout the study area. There should be scope and flexibility to amend the proposed projects as more data becomes available. Finally, the Forum recommends greater data transparency on water availability for stakeholders and the public to support informed decision making on water use.

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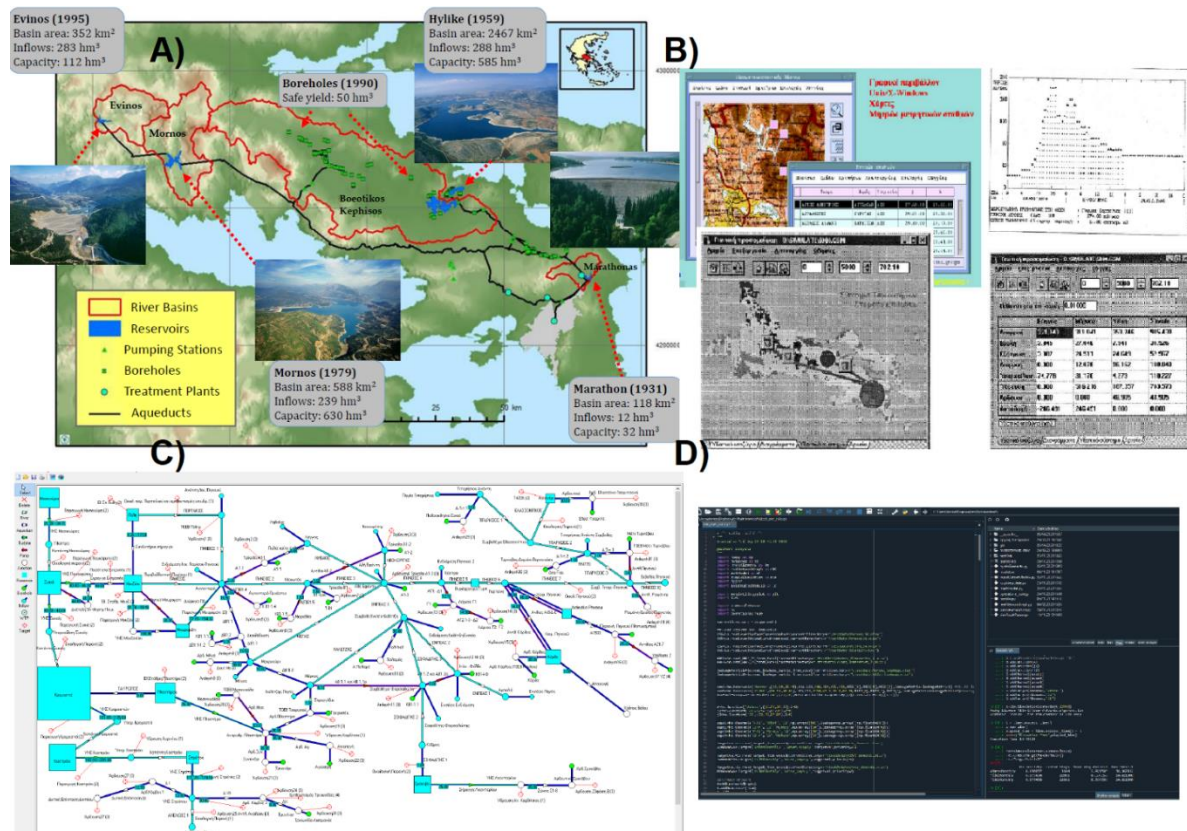
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## Appendix A: Decision Support Systems

The consideration of hydrologic and operation parameters as mentioned, should be based on accurate models that capture the main characteristics of the operation of catchment – technical systems. The existence (or development) of such tools is necessary to make

decisions of large scale and importance, e.g. water transfers. Decision Support Systems (DSS) are used internationally over decades to provide the necessary information, which will then be further evaluated by the stakeholders, before proceeding with the planning – a process that unavoidably does not exist in the draft plans.

To give an example of such a process, a simple and reliable DSS has been evolving over the past years for water transfer (and other) water supply scenarios and options for the urban water demand of Athens, in Greece. The reason that this example is provided here is because this DSS has recently become open-source<sup>15</sup>. The following figure is indicative of the evolution of the tool (called Hydronomeas), until its open-source (script based) form in Python. The Water Utility of Athens (which is public) uses Hydronomeas for the management of its raw water supply system.



**Figure A2.** The water supply system of Athens (A): From retro hydro-informatic applications (B), to modern DSS (C), and to new open-source package (D).

This is only one example, but internationally, such models are used to give answers on whether a transfer or local water reliance is the most resilient and cost-effective option, or similarly any investment decisions, or what alternative solutions can be used<sup>16</sup>. So, decision-makers can get the quantified performance of their alternatives on several criteria in order to compare them fairly and transparently (informed decision-making). Similar examples exist

<sup>15</sup> Karavokiros, G., Nikolopoulos, D., Manouri, S., Efstratiadis, A., Makropoulos, C., Mamassis, N., Koutsoyiannis, D. (2020). Hydronomeas2020: Open-source decision support system for water resources management. European Geosciences Union General Assembly, Vienna, Austria. May, 2020.

<sup>16</sup> Pincetl, S., Porse, E., Mika, K.B., Litvak, E., Manago, K.F, Hogue, T.S., Gillespie, T., Pataki, D.E. & Gold M. (2019). *Adapting Urban Water Systems to Manage Scarcity in the 21st Century: The Case of Los Angeles*. Environmental Management 63, 293–308 (2019). <https://doi.org/10.1007/s00267-018-1118-2>

also in the UK<sup>17</sup>.

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<sup>17</sup> <https://www.waterindustryjournal.co.uk/how-the-power-of-location-is-driving-transformation-for-uk-water>  
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