



# Future considerations for regional coordination of the planning, development and operation of water resources in England

Report for the Regulators' Alliance for Progressing Infrastructure Development (RAPID). September 2022



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## Executive Summary

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In recent years there has been a growing recognition of the need for long-term water resource solutions to address the risk of water scarcity, driven by population growth and climate change. Many parts of the country are forecast to face significant water shortages by 2050.

The aim of this study is to identify potential future considerations for improving the institutional and regulatory framework in England so that it better supports and incentivises the co-ordinated planning, development and operation of new and existing water resources to deliver greatest public value across multiple sectors, in addition to resilient public water supply.

Water resource management has an established approach. The Water Resource Management Plan Guidance focuses on the five-yearly update of 25-year plans by each water company. The National Framework for Water Resources (2020) provides a framework for regionally-coordinated planning, and other key developments in recent years have included the 25-year Environment Plan and the Environment Act. These have an emphasis on integrated, multi-sector supply and demand planning that reflects all elements of water management including public water supply, other water users including agriculture and industry, flood defence, environment and landscape management, and support to housing development and economic growth.

Two routes for development of regional and nationally-significant water resources have been established: 1) Strategic Resource Options (SROs) for nationally-significant water supply and inter-regional transfers, and 2) Five regional water resource supply and demand planning groups with responsibility to represent all sectors including water companies, agriculture, power and other industries.

This study's timing is at the point at which SROs and regional water resource plans are in development, and the Environment Act has recently passed through Parliament. Any potential considerations for further coordination, beyond what will be provided by current and emerging frameworks, would benefit from early consideration to enable their development to support delivery plans.

The study sets out principles, summarises current arrangements, and identifies twelve potential considerations that could develop further coordination beyond the current framework. Many of the considerations are recognised as existing themes. The aim in gathering these together is to provide, in one place, a common set of considerations for review by RAPID and other stakeholders.

The next steps suggested beyond this study are for RAPID to work with other water resource sector participants including government to seek views on the proposed considerations and their priorities, define more tightly a shortlist of priority items, develop a strategy that lays out a roadmap for change, and refine the priority considerations through more detailed evaluation of costs and benefits.

Twelve potential considerations are identified, grouped into three sets of priorities:

## Priority 1: Potential considerations that could support near-term delivery of current plans, including proposed SROs and implementation of the regional water resource plans.

- 1.1 Commercial incentives framework:** Review existing and potential future arrangements and ‘stress test’ their robustness against a framework for commercial incentives, including capacity management, utilisation, and system-wide incentives for water supply and demand. RAPID is working with other participants on a more consistent approach to developing commercial arrangements.
- 1.2 Data sharing:** Increase open access to water resource demand and supply information, and consider the requirements for design and ownership of a common set of data standards and exchange mechanisms to support planning and operation.
- 1.3 Managing expertise, knowledge and capacity for planning and delivery:** Combine resources and capacity to support all sectors and participants (not just water companies and the Environment Agency), facilitating more integrated plans and supporting stakeholders in under-represented sectors (e.g. agriculture) to engage meaningfully on the decision-making process. Engage with infrastructure supply chains to determine efficient phasing of major schemes to avoid risk of delivery delays to major new supplies and transfers.
- 1.4 Funding models and cost allocation:** Develop clarity of funding models for multi-party SRO development. Expand funding opportunities for multi-sector solutions at the catchment or landscape level, including aggregation of funding demand in under-represented sectors. Review cost allocation principles regarding the alignment between those benefitting from investment and those paying for it.

## Priority 2: Potential considerations that could have significant impact for future planning, delivery and operation.

- 2.1 Planning hierarchies and governance:** Clarify the overall planning governance framework, building on elements that already exist including the National Framework for Water Resources, to improve visibility of the links between multi-sector plans at all levels, and identify opportunities to improve synergies and avoid overlap.
- 2.2 Consistent planning methodology:** Extend existing guidance, including the Water Resource Management Plan guidelines, to develop a system-wide, multi-sector common planning approach, considering use of systems-based and multiple capital evaluation to improve alignment, including common definitions of value.
- 2.3 Certainty of inter-regional transfer needs:** Explore options to increase levels of certainty for strategic water supply transfers between regions, reducing uncertainty risk for planners and developers of major infrastructure schemes. The need for this, beyond arrangements in the current framework, could be determined by whether any further transfer needs are expected beyond those already proposed.

- 2.4 Roles and risk allocation:** Develop a risk management framework that allocate responsibilities to organisations with the capability to manage commercial and operational risks, reflecting the fact that there is a diverse set of risk appetites between different sectors. This could consider the concept of balancing roles to manage demand and supply, inputs and outputs, for both multi-party SROs and at regional or catchment levels.
- 2.5 Legacy abstraction rights:** Recognising longstanding discussions on abstraction rights, and the effort that would be required to make further changes, there remains opportunity to update the framework, for instance to enable water resource planning groups to explore constraints, and an approach to legislative and legal changes that could support a move from absolute entitlements to proportional and dynamic rights.
- 2.6 Public interest and support:** With significant public interest in the construction of major infrastructure schemes, and potential views on redistributing water between regions during times of scarcity, considerations include development and promotion of a narrative to build public support for investment, and involvement in wider reforms to Development Consent Orders.
- 2.7 Operational capabilities:** Experience of operating multi-party, multi-sector water resource solutions exists in some examples, but would need to be expanded to provide the capability to deliver the SROs and regional plans. This would cover operational and commercial management across water supply and demand activities.

### **Priority 3: Potential considerations to refine future planning, delivery and operation.**

- 3.1 Alignment of planning bodies, cycles and boundaries:** Alignment of planning cycles (currently on different timelines), between various regulatory drivers including water supply, flooding, catchment management and licensing, and of physical planning boundaries. This is recognised as high effort and of potentially marginal benefit.

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# 1 Introduction

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The aim of this project is to identify potential future considerations for improving the institutional and regulatory framework in England so that it better supports and incentivises the co-ordinated planning, development and operation of new and existing water resources to deliver greatest public value across multiple sectors, in addition to resilient public water supply.

## Context

England's established water resource planning framework is the Water Resource Management Plan Guidance<sup>1</sup>, focused on the activities of the water companies. Each water company updates a 25-year Water Resource Management Plan (WRMP) every five years to identify options for balancing water supply and demand. Following consultation and regulatory approval, the water resource options form the basis of each water company's business plan. Ofwat reviews water company business plans as part of the five-yearly price review process.

The discussion of coordinating water resources beyond water company boundaries, on a regional and national level, is not new. The Water Resources Board (1964-73) developed regional plans and proposed national strategic transfers. Following privatisation of the water industry in 1989, several strategies were developed in the 1990s and 2000s by the National Rivers Authority, Environment Agency and Defra. In the last decade, the drought of 2010-12 was one of the most significant in the last century<sup>2</sup>. This coincided with a suite of reviews and reforms in the water sector including the Water for Life White Paper of 2011<sup>3</sup> that made commitments to reforms of water abstraction and increases in interconnection between water companies and with river and canal systems. At that time, Ofwat commissioned several reviews of options for water system operation<sup>4</sup>, informing a strategy that focused on incentivising water companies to engage in coordination activities, both across their boundaries with other water companies, and with a wider set of sectors<sup>5</sup>.

There has been a growing recognition of the need for long-term water resource solutions to address the risk of scarcity, driven by population growth and climate change. In 2019 the Environment Agency highlighted that many parts of the country will face significant water shortages by 2050, creating pressure on economic development and environmental protection<sup>6</sup>.

The National Framework for Water Resources (2020) provided a framework for regionally-coordinated planning, including exploration of the development of nationally-significant strategic water resource options. Other key developments include the 25-year Environment Plan and the Environment Act, which has recently passed through Parliament. The legislation, policy and guidance for water resource planning are summarised in Appendix A of this document.

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<sup>1</sup> <https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline>

<sup>2</sup> <https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2012/england-and-wales-drought-2010-to-2012---met-office.pdf>

<sup>3</sup> [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/228861/8230.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/228861/8230.pdf)

<sup>4</sup> [https://webarchive.nationalarchives.gov.uk/20130804102932/http://www.ofwat.gov.uk/future/monopolies/fpl/prs\\_web110317sysop](https://webarchive.nationalarchives.gov.uk/20130804102932/http://www.ofwat.gov.uk/future/monopolies/fpl/prs_web110317sysop)

<sup>5</sup> <https://www.ofwat.gov.uk/regulated-companies/price-review/price-review-2014/future-price-limits/>

<sup>6</sup> <https://www.gov.uk/government/speeches/escaping-the-jaws-of-death-ensuring-enough-water-in-2050>

Two routes for development of regional and nationally significant water resources have been established:

1. Strategic Resource Options (SROs) to develop nationally significant resources and inter-regional transfers (linking areas of surplus with those of deficit). These are being developed by water companies under a framework provided by the Regulators' Alliance for Progressing Infrastructure Development (RAPID), a joint body between Ofwat, the Environment Agency and the Drinking Water Inspectorate, working with Natural Resources Wales for any Welsh considerations. These proposals are currently in a gated review process with the expectation that approved schemes will be construction-ready between 2025 and 2030.
2. Five regional water resource planning groups that have responsibility for long-term regional water resource plans that represent the interests of all stakeholders in water resources including water companies, agriculture, power and other industries. The first regional plans are due to be finalised in 2023.

Defra's Strategic Priorities for Ofwat (2022) reinforces support for the contents of the National Framework for Water Resources including regional planning <sup>7</sup>.

## Study aims

The National Framework for Water Resources in England <sup>8</sup> describes the policies and framework for the regional water resource planning groups to work within, emphasising the need to provide a secure and sustainable water supply developed across sectors and neighbouring regions, and to explore strategic water resource options.

RAPID's responsibilities include the development of commercial and regulatory frameworks for strategic water resource options. In June 2021 it published a discussion document on the regulatory and commercial framework for strategic water resource solutions <sup>9</sup>, which explains work to date and future plans, of which this study is one part.

The aim of this study is to identify potential future considerations for improving the institutional and regulatory framework so that it better supports and incentivises the co-ordinated planning, development and operation of new and existing water resources to deliver greatest public value across multiple sectors in addition to resilient public water supply.

The scope is wide, including: Water supply and environmental protection (including interactions with flooding); National, regional and local activities; each lifecycle stage of planning, delivery and operations; the Strategic Resource Options, Regional Planning Groups and range of other participants across sectors.

The timing is at the point at which SROs and regional water resource plans are in development, and the Environment Act has recently passed through Parliament. Any potential considerations for further coordination, beyond what will be provided by current and emerging frameworks, would benefit from early consideration to enable their development to support delivery plans.

This study's focus is on the identification of these potential further considerations, based on a review of the current and emerging framework against a set of principles, and through examples and case

<sup>7</sup> <https://www.gov.uk/government/consultations/water-industry-governments-strategic-policy-statement-for-ofwat>

<sup>8</sup> <https://www.gov.uk/government/publications/meeting-our-future-water-needs-a-national-framework-for-water-resources>

<sup>9</sup> <https://www.ofwat.gov.uk/wp-content/uploads/2021/06/RAPID-regulatory-and-commercial-framework-discussion-document.pdf>

studies from current practice and other countries and sectors. It is also intended to bring together existing strands of discussion regarding proposed models into a single document so that they can be reviewed together, including an initial view of their priority, how they could add value, and any timing considerations. It is not intended to be a set of fixed recommendations. The aim is to identify areas for further discussion and prioritisation.

The next steps, as part of RAPID's future plans to support water resource planning and development, are expected to include consultation on the considerations and their priorities, before agreement of any that are to be taken forward by regulators and government for more detailed development and evaluation.

## Structure of this report

The report is structured as follows:

- 1. Introduction:** A summary of the context and aims for this study.
- 2. Principles:** The basis of reviewing the current and emerging framework to identify potential future considerations.
- 3. Current and Emerging Framework:** Summarises the existing framework for water resource planning, development and operation.
- 4. Potential Future Considerations:** Identifies the main considerations, based on the detailed review included in Appendix A, and provides an initial view of their priority, how they add value and any timing considerations.
- 5. Next Steps:** Proposed sequence to review and develop the considerations.
- 6. Appendix A:** A more detailed review of current and emerging arrangements, including examples.
- 7. Appendix B:** Case studies from other countries and sectors.

## 2 Principles

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This section sets out principles to which any future approaches to coordination in water resources should adhere, to better support and incentive the coordinated planning, development and operation of new and existing water resources to deliver greatest public value across multiple sectors in addition to resilient public water supply. The overriding aim is to ensure water is available when required.

Any principles should support the role of RAPID<sup>10</sup>. A key role of RAPID is to act as an enabler to the effective implementation of the National Framework for Water Resources, including coordinating collaboration between the five regional water resources groups, and supporting the development of regional plans and coordinating across governments and regulators in England and Wales<sup>11</sup>.

Following discussion with RAPID and the engagement group for this study, six principles are proposed as follows, and described in Table 1 below:

- 1. Provide public value through using resources efficiently, and appropriately allocate costs and benefits between groups (distributional) and over time (intergenerational)**
- 2. Improve the environment and water quality through every lifecycle stage**
- 3. Enable multi-sector solutions, with local adaptability and flexibility**
- 4. Provide a framework for transparent, efficient markets to be used wherever appropriate**
- 5. Assign rights and roles and allocate risks appropriately giving clear accountability and responsibility**
- 6. Be implementable in the short and long-term**

Section 4 identifies potential considerations for further coordination beyond the current and emerging framework, and how these considerations align to the principles. Section 5 proposes evaluation criteria for each of these principles which could be used in further stages of review and development.

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<sup>10</sup> <https://www.ofwat.gov.uk/wp-content/uploads/2020/01/RAPID-FINAL-ToR.pdf>

<sup>11</sup> [https://www.ofwat.gov.uk/wp-content/uploads/2021/03/RAPID-Forward-programme-2021\\_22.pdf](https://www.ofwat.gov.uk/wp-content/uploads/2021/03/RAPID-Forward-programme-2021_22.pdf), Section 1.2

**Table 1 – Principles**

Principle	Reasoning
<b>1. Provide value through using resources efficiently, and appropriately allocate costs between groups and over time</b>	<ul style="list-style-type: none"> <li>▶ Approach should minimise costs for a given set of outcomes (this is <b>not</b> necessarily the same as being the least cost solution).</li> <li>▶ Approach should benefit consumers compared to the current approach, assign costs to those who benefit, and where possible internalise externalities.</li> <li>▶ Approach should appropriately considered intergenerational and distributional equity issues in assigning costs over time and between groups.</li> </ul>
<b>2. Improve the environment and water quality through every lifecycle stage</b>	<ul style="list-style-type: none"> <li>▶ Any approach must be consistent with environmental and drinking water quality legislation/ regulation, and ‘bake this in’ at each stage of national/regional/local planning and each project’s lifecycle.</li> </ul>
<b>3. Enable multi-sector solutions, with local adaptability and flexibility</b>	<ul style="list-style-type: none"> <li>▶ Water resource planning should take into account the influence on multiple systems including public water supply, flood defence, agriculture, industrial water consumption (including power), housing development, economic growth, environmental protection and landscape management.</li> <li>▶ The ‘six capitals’ approach is one approach that can be considered, which includes natural, human, financial, intellectual, manufactured, and social and relationships <sup>12</sup></li> </ul>
<b>4. Provide a framework for transparent, efficient markets to be used wherever appropriate</b>	<ul style="list-style-type: none"> <li>▶ Create conditions for resources to be funded (including tradeable opportunities, revenue streams and defined rights).</li> <li>▶ Competition is a proven method of driving innovation and cost reduction in utilities but may not be helpful in all circumstances (e.g. where local collaboration is most effective).</li> <li>▶ Clearly define markets that are simple enough and low-friction to be used in practice, and that manage conflicts of interest.</li> <li>▶ It is for the relevant appropriate actors to define and make judgements on whether a specific approach is ‘transparent’ and ‘neutral’ in context.</li> </ul>
<b>5. Assign rights and roles and allocates risks appropriately giving clear accountability and responsibility</b>	<ul style="list-style-type: none"> <li>▶ Risks should be placed on consumers only when necessary; different public and private organisations can manage and mitigate risks in different ways at different costs.</li> <li>▶ Rights (e.g. access, capacity allocation) are a fundamental building block of a coherent system.</li> <li>▶ Good governance requires roles, responsibilities and accountabilities to be clear and unambiguous, the nature and status of consultation, engagement and decision making needs to be made clear at each stage, so as to reduce the risk of challenge over process.</li> </ul>
<b>6. Be implementable in the short and long-term</b>	<ul style="list-style-type: none"> <li>▶ Any approach to coordination should be deliverable, and support the near-term delivery of activities currently in progress including SROs and delivery of the regional water resource plans.</li> </ul>

<sup>12</sup> <https://integratedreporting.org/wp-content/uploads/2021/01/InternationalIntegratedReportingFramework.pdf>

## 3 Current and emerging framework

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This section summarises the current framework for water resource planning, development and operation. This framework includes established activities, such as the water industry's Water Resource Management Plans, and those in earlier stages including Strategic Resource Option and Regional Planning.

The description is based on two classifications:

- ▶ The lifecycle stages of: 1) Planning, 2) Procurement and Delivery, and 3) Operation.
- ▶ Three geographic levels: National, Regional and Within-Region.

The main elements related to water resource supply are highlighted below and summarised in Table 2, which captures the headline arrangements for each geographic level, at each lifecycle stage. Appendix A contains a more detailed review of the current and emerging framework, including examples.

### 1. Planning

The first group of planning activities includes the development of planning standards, targets, guidelines and expectations. Key elements include:

#### *National Framework for Water Resources<sup>13</sup>*

In 2020 the Environment Agency set out a national framework for managing water resources in England. The framework focusses on regional coordination and planning; and describes the policies and framework for regional water resource planning groups. The national framework emphasises the need for the regional planning groups to determine the right strategic options to provide a secure and sustainable water supply, developed with other sectors and neighbouring regions, which will support wider national needs. It reflects currently proposed strategic resource options including inter-regional transfers.

#### *Water Resource Management Plan (WRMP) Guidance<sup>14</sup>*

The Environment Agency, Ofwat and National Resources Wales produce joint guidelines for water companies and regional groups to develop best value water resource plans, which are updated every five years. Following consultation and regulatory approval, the water resource investment identified in the WRMPs forms the basis of the company business plan submissions.

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<sup>13</sup>[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/872759/National\\_Framework\\_for\\_water\\_resources\\_main\\_report.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/872759/National_Framework_for_water_resources_main_report.pdf)

<sup>14</sup> <https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline>

A second group of planning activities includes the definition of requirements, funding allocations and/or solutions for water resources. These include:

### *Regional Water Resource Groups*

In 2018, government challenged the water companies to be more ambitious and to demonstrate coordinated leadership across the industry<sup>15</sup>. This included formalising the requirement for five regional planning groups responsible for producing plans that are not confined to water company boundaries, in order to identify the optimum solutions for the region. Regional groups are also expected to take responsibility for exploring the role of markets to deliver strategic water resource solutions. The approach for reconciliation between regional water resource groups is in development ahead of its first iteration in 2021. There are national and regional coordination groups established to help the plans develop in an integrated and coordinated manner, and to ensure that this new process is aligned to deliver the national need.

### *Water company plans*

Water companies in England are the principal actors within regions. Water companies interface with activities at the regional level through the five regional planning groups. Following the Water Resource Management Plan Guidelines, each company develops a WRMP every five years to demonstrate how water resource needs will be met over a time horizon of at least 25 years. WRMPs, alongside other plans such as Drought Management Plans and Drainage Water Management Plans, inform the water company's five-year business plan that sets out the overall performance targets and investment requirements.

The last group of planning activities is the coordination and assessment of market-generated proposals against standards and guidelines, including:

### *Ofwat review of water company plans*

Ofwat reviews water company WRMPs and company business plans as part of the five-yearly price review process.<sup>16</sup> At the last price review (PR19), in addition to funding water company WRMP investments, Ofwat allocated additional funding for companies to collaborate and work together to investigate and develop integrated strategic regional water resource solutions to be construction-ready between 2025 and 2030<sup>17</sup>.

### *RAPID assessment of Strategic Resource Options (SROs)*

All of the SROs that are being promoted in PR19 have been proposed by water companies and will be assessed by RAPID (a joint regulatory body between Ofwat, the Environment Agency and the Drinking Water Inspectorate). On the basis of RAPID's assessment, Ofwat will determine whether or not they should continue to receive ring-fenced funding. RAPID publishes guidance and manages the gated process<sup>18</sup> that will run to 2025 to assess the proposed SROs.

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<sup>15</sup> <https://www.ofwat.gov.uk/wp-content/uploads/2018/08/Building-resilient-water-supplies-letter.pdf>

<sup>16</sup> <https://www.ofwat.gov.uk/regulated-companies/price-review/>

<sup>17</sup> <https://www.ofwat.gov.uk/wp-content/uploads/2019/12/PR19-final-determinations-Strategic-regional-water-resource-solutions-appendix.pdf>

<sup>18</sup> <https://www.ofwat.gov.uk/regulated-companies/rapid/the-rapid-gated-process>

The elements described above are focused on water supply and water company activities. Other water resource planning activities include other drivers and other water users, for example the National Flood and Coastal Erosion Risk Management Strategy, Internal Drainage Board plans, the National Farmers Union Integrated Water Management Plan, Canal and River Trust plans, and multi-sector Catchment Partnership plans. These are described in more detail in Appendix A.

## 2. Procurement and Delivery

Procurement and delivery activities cover the sourcing and decision-making on how to procure and implement solutions, once confirmed in plans.

This covers all variations to reflect construction of infrastructure and other non-construction solutions (including examples of SROs, within-region water company infrastructure development, and land-use changes). It includes all stages of delivery encompassing studies, design, construction, engagement and communication, and commission of changes in working practice across multi-sector participants.

### *National procurement and delivery*

There are no procurement or delivery options at a national level for water resource supply, though there can be inter-relationship with flood defence schemes procured by the Environment Agency as a national body.

### *Existing bulk transfers*

There are a range of contracts and statutory arrangements for existing bulk transfers between adjacent regions. These were reviewed in 2020 by NERA for RAPID to evaluate the potential for standardisation of contracts and other potential improvements.<sup>19</sup>

### *Strategic Resource Options and Direct Procurement*

Ofwat allocated additional funding in the final determination for companies to collaborate to investigate and develop integrated strategic regional water resource options to be construction-ready between 2025 and 2030. Procurement of the majority of is expected to be through Direct Procurement for Customers (DPC), with competitively appointed providers (CAPs) bidding for some or all phases of funding, delivery and operation. DPC is a procurement model for competitive tendering services for the delivery of large infrastructure projects, outside of a water company's normal contractor framework arrangements. Ofwat intend that the process of competitive tender can achieve greater benefits through more innovation and lower costs.<sup>20</sup>

### *Water Companies*

Water companies procure and manage delivery of infrastructure solutions within their operating area, typically through a combination of long-term framework agreements with engineering and construction firms, and stand-alone tenders for large and complex delivery. Water companies also

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<sup>19</sup> <https://www.ofwat.gov.uk/publication/nera-economic-consulting-report-review-of-bulk-supply-contracts-and-pricing-in-the-english-welsh-water-sector/>

<sup>20</sup> <https://www.ofwat.gov.uk/regulated-companies/markets/direct-procurement/direct-procurement-for-customers/>

each run a bid assessment framework that advertises requirements for water resource solutions (supply, demand and leakage management) and invite bids from third parties to provide services. <sup>21</sup>

### *Other procurement and delivery routes within-region*

There is a range of other procurement delivery routes including trading platforms, catchment-based stakeholder engagement and coordination, Landscape Enterprise Networks, Catchment Based Approach (CaBa) partnerships, and informal sharing schemes between water users. These are described in Appendix A.

## **3. Operation**

Operational activities include the in-life running of mechanisms to redistribute water resources, including the integration of multiple solutions to deliver overall outcomes for all water consumers and protection of the environment. This includes both day-to-day operational decision making (for example choosing supply options to meet demand) and physical implementation of these decisions.

### *National and regional-level operations*

There are no operational activities for water resources at a national-level, nor coordinated at a regional-level (under the definition of the five regional water resource planning groups).

### *River regulation schemes, Environment Agency and third party transfers*

The majority of major rivers in the United Kingdom are regulated directly or indirectly by impoundments, transfers, pumped storage reservoirs or groundwater abstraction. There are examples of river basin management to meet multiple requirements including downstream abstraction for public water supply, flood management, fisheries, recreation and hydropower, for instance for the River Dee and the River Severn. The Environment Agency owns and operates multiple existing transfer schemes, including the Ely-Ouse transfer (as one example).

### *Bulk transfers*

Bulk transfers between water companies exist between adjacent regions. They represent c. 4% of total water volume into supply. Operation is managed between the adjacent water companies, according to the bulk supply agreements or statutory arrangements (which vary in form, as noted above).

### *Strategic Resource Options*

Operation of SROs will involve supplying and receiving water companies, some will involve conveying parties (water companies and canal and river managers), and competitively appointed providers (CAPs) under DPC. Arrangements for operations are developing as the SRO plans progress.

### *Water company operations within-region*

Water company operations comprise the abstraction, storage, treatment and distribution of water, and (for water and sewerage companies) the collection, treatment, discharge (and proposed reuse in some instances) of waste water. Typically, they manage operations through system control functions

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<sup>21</sup> <https://www.ofwat.gov.uk/regulated-companies/markets/water-bidding-market/company-bid-assessment-frameworks/>

that forecast demand and utilise different sources and network management options to meet demand.

### *Other within-region operations*

Other operational activities include the Environment Agency's flood defence operations, local authority land-use and watercourse management, Internal Drainage Board management of water levels, Canal and River Trust waterway operation, water consumption and changes in land-use by agriculture, other land-owners, power and other industries, and catchment partnerships that bring together multi-sector participants in a variety of arrangements. These are described in Appendix A.

**Table 2 – Summary of Current and Emerging Framework**

Geography	Planning	Procurement & Delivery	Operation
<b>National</b>	<ul style="list-style-type: none"> <li>▶ Legislation and policy includes the Water Resources Act, 25-year Environment Plan, and the Environment Bill.</li> <li>▶ The National Framework for Water Resources provides the policies and framework for regional water resource planning.</li> <li>▶ Water Resource Management Plan (WRMP) guidance for water companies to develop 25 year plans, and the Environment Agency and Ofwat assess these as part of water company business plans.</li> <li>▶ RAPID assesses proposals from water companies for nationally-significant strategic resource options.</li> <li>▶ Other activities include other drivers, e.g. the National Flood and Coastal Erosion Risk Management Strategy and other water users, e.g. the NFU Integrated Water Management Plan and Canal and River Trust.</li> </ul>	<ul style="list-style-type: none"> <li>▶ There are no procurement or delivery options expected at a national level for water supply.</li> <li>▶ Environment Agency as a national body procures and manages delivery of flood defences within regions.</li> </ul>	<ul style="list-style-type: none"> <li>▶ There are no national-level operations in current or emerging arrangements.</li> </ul>
<b>Regional</b>	<ul style="list-style-type: none"> <li>▶ Five regional water resource planning groups, representing all sectors, jointly reconciled on a collaborative basis.</li> <li>▶ Regional planning through River Basin Management Plans and Regional Flooding and Coastal Committees.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Range of contracts and statutory arrangements for bulk transfers between water companies.</li> <li>▶ SRO procurement and delivery is expected to include use of the Direct Procurement for Customers (DPC) route.</li> </ul>	<ul style="list-style-type: none"> <li>▶ There are no regionally-coordinated operational activities (under the definition of the of the five regional water resource planning groups).</li> <li>▶ River regulation schemes and Environment Agency transfers manage river basin and watercourse transfers.</li> <li>▶ Some of the SROs will provide inter-regional transfers, involving supplying and receiving water companies, conveying parties (water companies or canal and river managers) and competitively appointed providers (CAPs) under DPC.</li> <li>▶ Existing bulk transfers between adjacent regions include those between Wales and the North West and Midlands.</li> </ul>
<b>Within-Region</b>	<ul style="list-style-type: none"> <li>▶ Water company Water Resource Management Plans, Drought Plans and Drainage and Wastewater Management Plans, all contributing to the water company 5-year business plans.</li> <li>▶ Other planning activities within-region include Internal Drainage Boards, Local Authority, Local Resilience Forums for flooding, Local Enterprise Partnership plans and Catchment Partnership Plans.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Water companies procure and manage delivery of infrastructure solutions within their operating area.</li> <li>▶ Water companies also run bid assessment frameworks, inviting water resource solutions from third parties.</li> <li>▶ Other procurement and delivery routes within-region include trading platforms, Landscape Enterprise Networks, CaBa partnerships and informal sharing schemes between water users.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Water company operations to abstract, store, treat and distribute water, and collect, treat, discharge (and reuse) waste water.</li> <li>▶ Other within-region operational activities include the Environment Agency flood defence operations, Local Authority land &amp; watercourse management, Internal Drainage Board management of water levels for flood-risk, agriculture &amp; environment, Canal and River Trust waterway operation. water consumption and changes in land use from agriculture, power and other industries, and catchment partnerships to integrated land and water management within a catchment.</li> </ul>

## 4 Potential future considerations

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The following points present a summary of potential future considerations, beyond the current and emerging framework. This is based on the review of the current framework (see Appendix A) and case studies from other countries and sectors (Appendix B), which are recommended for further detail and supporting references beyond this summary.

Each consideration is cross-referenced to the principles and lifecycle stages, includes a view of how they would add value, and any timing considerations. They are grouped under an initial view of three priority groupings:

- ▶ **Priority 1:** Potential considerations that could support near-term delivery of current plans, including proposed SROs and implementation of the regional water resource plans.
- ▶ **Priority 2:** Potential considerations that could have significant impact for future planning, delivery and operation.
- ▶ **Priority 3:** Lower priority considerations that could refine future cycles of planning, delivery and operation.

Table 3 at the end of this section summarises the considerations.

## Priority 1: Potential considerations that could support near-term delivery of current plans, including proposed SROs and the regional water resource plans

### 1.1 Commercial incentives framework

#### *Description*

There is a potential consideration to review existing and potential future arrangements and ‘stress test’ their robustness against a framework for commercial incentives for water supply and demand. This would have the value of identifying commercial incentives at an early stage of planning for major infrastructure investment through the SROs, before there are significant sunk costs. RAPID and other parties are developing commercial and legal models including, for example, multi-sector reservoir systems.

Examples where commercial incentives are well aligned between parties (e.g. Cumbria with Nestle and Iggesund) are the exception not the norm, and rely on bespoke arrangements. The current framework does not support this systematically or create conditions for large investment in such multi-sector schemes. Commercial incentives cannot always be aligned to common outcomes, for instance where, in a period of scarcity, consumption by one party impacts commercial drivers (or erodes acceptable risk) for another. When there is a requirement to move water from an area of surplus to one of deficit, local commercial alignment will be required. There is a risk that multi-sector collaboration principles not backed up by contractual arrangements may become difficult to enforce.

Most water resources schemes do not yet have the clarity routinely found in power, regarding capacity, utilisation, and a full set of incentives and rights. Commercial incentives for SROs will need careful consideration of the balance of revenue and asset value through supplying company, conveyers (where relevant), CAPs under DPC, and receiving (and benefiting) company.

A related point is that there is a limited merit order in place (i.e. who has precedence over water use), described through the Water Resource Act, the treatment of Drought Orders and the Civil Contingencies Act. Previous reform proposals have been made for increasing flexibility regarding allocation of water.

There is a potential consideration to expand this merit order approach to support clearer definition of commercial arrangements. This would need to: Include a wider range of water users from all sectors; Increase applicability to the planning stage (from the current operational focus); Consider proportional reductions across water user groups, as well as absolute cut-offs in times of scarcity; Clarify of responsibilities for setting and maintaining the merit order.

Including a clearer merit order would benefit planning for different supply and demand scenarios. For instance, helping to articulate the risk and estimate the economic impact of applying merit-order based reductions to the full range of water users, as an alternative to the cost of investment to avoid restrictions.

#### *Relevant Principles*

- ▶ 1. Provide public value through using resources efficiently, and appropriately allocate costs and benefits between groups (distributional) and over time (intergenerational)

- ▶ 4. Provide a framework for transparent, efficient markets to be used wherever appropriate
- ▶ 5. Assign rights and roles and allocate risks appropriately giving clear accountability and responsibility

### *Lifecycle stages*

1) Planning, 2) Procurement and Delivery, 3) Operation

### *Timing and implementation considerations*

Alignment of commercial incentives is tied to the model adopted to roles, rights and risk allocation. A model may develop organically – an extension of current innovation and novel approaches at an SRO or local level being adopted more widely as their learning and successes spread more widely. However a more central approach could be developed, particularly in relation to SROs ahead of their delivery phase. RAPID is working with other participants on a more consistent approach.

Review of the merit order could be considered as part of the next iteration of the National Framework for Water Resources, which would be expected in 2025. To update legislation containing current merit order provisions would require amendments to primary legislation, subsequent secondary legislation and licensing changes, led by government. This consideration could also be addressed on a case-by-case basis for local schemes and individual SROs, recognising that the relative importance of different water uses (based on economic and environmental factors) is likely to vary based on local factors.

## **1.2 Data sharing**

### *Description*

Data is needed to enable effective planning at the right level of granularity. Current industry processes to data sharing may not deliver future system needs. Gaps in data availability and quality will make it difficult to maximise system benefits and provide evidence for planning and operational decisions. Approaches are emerging organically but may need to be “designed” and hence owned at a system level.

There is a potential consideration to improve the granularity and transparency of data sharing across all lifecycle stages of planning, delivery and operation. Where data is pooled into common ownership, protocols for responsibility and liability for accuracy will need to be established in relation to planning and investment decisions. Open access would likely increase the levels of collaboration and innovation across all lifecycle stages, however, the system of data sharing will likely need to be designed and owned rather than trusting that a solution will evolve. As system management becomes increasingly digital then consistent data categories (e.g. taxonomy and potentially platforms for data exchange) will be required to ensure communication between different system management organisations. Incentives for accurate data sharing within systems could be considered.

### *Relevant Principles*

- ▶ 1. Provide public value through using resources efficiently, and appropriately allocate costs and benefits between groups (distributional) and over time (intergenerational)
- ▶ 3. Enable multi-sector solutions, with local adaptability and flexibility
- ▶ 4. Provide a framework for transparent, efficient markets to be used wherever appropriate

### *Lifecycle stages*

1) Planning, 2) Procurement and Delivery, 3) Procurement

### *Timing and implementation considerations*

There is potential for future updates to the National Framework for Water Resources (or other parts of the current framework) to include a data sharing strategy, describing a target model for data sharing, and a sequence of developing maturity towards this model. Specific plans for progressing along this maturity profile could then be developed within the regional planning process.

For SROs, data sharing requirements will need to be established as part of contracting for delivery and operation, with supplying, receiving and conveying organisations agreeing to data sharing obligations.

The next steps would be to review with interested parties, consider options for ownership within the current framework, build detail of more specific requirements, benefits, costs, and delivery arrangements.

## **1.3 Managing expertise, knowledge and capacity for planning and delivery**

### *Description*

The majority of expertise and knowledge of water resource planning sits in teams across the water companies and the Environment Agency. There are more limited resources available to support other sectors such as agriculture. New approaches to integrated, multi-sector and multi-driver catchment management are emerging, but this is not yet at the same scale as single-sector and driver disciplines (for example water company water resource planning, or flood defence engineering).

There is a potential consideration to better combine planning resources and capacity to support all sectors. This could facilitate more integrated planning and avoid information and expertise asymmetry between sectors, supporting stakeholders to understand and engage meaningfully on the decision making process.

There is also a consideration of making best use of existing water resource planning skills, which can be in short supply during peak periods (e.g. for finalising regional plans or water company water resource management plans). One option could be to review the phasing of different planning cycles to introduce a staggered programme. This could also help provide capacity between organisations for independent review of proposals, rather than risking conflicts of interest from advisors and infrastructure providers involved in both reviewing plans and bidding for their delivery.

For the procurement and delivery stage of SROs, timelines may be constrained if multiple major infrastructure schemes of a similar nature (e.g. including major tunnels) come to the market at the same time. This may require an early engagement programme with supply chains to set out phasing of work and skills requirements across the combined set of regional water resource plans.

### *Relevant Principles*

- ▶ 3. Enable multi-sector solutions, with local adaptability and flexibility
- ▶ 5. Assign rights and roles and allocate risks appropriately giving clear accountability and responsibility

### *Lifecycle stages*

1) Planning, 2) Procurement and Delivery

### *Timing and implementation considerations*

Extending the availability of support to all sectors could largely be driven by market factors. If there is sufficient demand for services, then supply could emerge to meet this. Aggregation of this demand to a sufficient level to drive supply could be the challenge (linked to potential consideration 1.4). Assessment of the need to help drive this aggregation could become part of the regional planning process.

As part of the gated process for SROs, an assessment of resource availability across the market could be considered to understand any implications for phasing of projects.

## **1.4 Funding models and cost allocation, including aggregation**

### *Description*

#### *Clarity of funding models*

Funding models are defined for many types of water resource solutions, including development of infrastructure as part of water companies' business plans, the Environment Agency's flood defence investment programme, and the expectation that SROs will consider the Direct Procurement for Customers model.

However, there is a potential consideration about improving the clarity of funding arrangements for two scenarios:

1. Multi-party SRO development, which will require development of new and (probably) bespoke funding models. The novel and bespoke nature of these models introduces a challenge of assessing their value for money.
2. Multi-dimensional interventions at catchment or landscape level, where a broad range of funding strategies need to be mobilised. Existing examples include Manchester Natural Capital Plan's blended finance model, Landscape Enterprise Networks, Catchment Based Approaches and United Utilities CaST model. There is a potential consideration of the role of central bodies in coordinating funding, for instance regional planning groups and the Environment Agency.

The lack of clarity over funding arrangements and the bodies that coordinate them has the potential to create a risk premium in organisations bidding for the delivery of complex water resource solutions.

### *Aggregation to enable funding at scale for smaller players*

There is also a potential consideration to develop approaches to aggregate demands from multiple smaller players in sectors other than public water supply and flood defence, to enable funding at scale. The Catchment Based Approach has been effective with small scale funding and mobilising third sector contributions. There is a potential consideration to mobilise a wider range of actors for ecosystem services, in order to mobilise capital at scale to support efficient funding of interventions.

### *Cost allocation*

Related to funding, costs are not always allocated consistently. A water resources scheme that benefits a particular region could be paid for by a water company (and ultimately, the customers in its supply area), by local interested parties (e.g. large water users or business groups), or, for flood defences, by the Environment Agency (and ultimately taxpayers) and local public bodies. In each case, the beneficiaries are the same, but the costs paid by a different group. This applies to operating costs with fixed and variable components, as well upfront investment. SRO cost allocations may be developed on a case-by-case basis, but there is a potential consideration for a common framework to support investor confidence in the treatment of ongoing running costs.

Building on best value principles from the WRMP guidelines, there is a potential consideration for a policy decision on whether costs should be allocated more consistently, through establishing common principles (e.g. on fairness, affordability, distributional outcomes) or rules (e.g. prescriptive approaches). If a policy decision is made for more consistency, wider reaching reform would be needed, to change how specific bodies obtain their funding.

### *Relevant Principles*

- ▶ 1. Provide public value through using resources efficiently, and appropriately allocate costs and benefits between groups (distributional) and over time (intergenerational)
- ▶ 2. Improve the environment and water quality through every lifecycle stage
- ▶ 4. Provide a framework for transparent, efficient markets to be used wherever appropriate
- ▶ 6. Be implementable in the short and long-term

### *Lifecycle stages*

1) Planning, 2) Procurement and Delivery, 3) Operation

### *Timeline and implementation considerations*

Multi-party SRO development will require development of funding models ahead of being construction ready between 2025 and 2030.

Opportunities for greater involvement of regional planning groups and the Environment Agency in coordinating funding of multi-sector solutions and aggregation of demand could be considered as part of development of the Water Industry National Environment Plan (WINEP), as well as the

regional plans and National Framework for Water Resources. This would be in parallel with the development of Environmental Land Management and the innovation in models for blended financing of natural capital/ecosystem services, which is an ongoing process.

SRO cost allocation approaches will be developed for each scheme. A common framework including operating costs, ahead of significant investment decisions, could help the sector plan for the operating phase. A wider review of cost allocations would be a substantial undertaking and a major policy decision, and subject to public consultation. For flooding for example, Environment Agency funding mechanics could need to be revisited – with a key role for Defra and HM Treasury. For water resources, it could form part of the SRO process, or part of the next price review process, though this would be challenging in time for PR24 methodology in 2022 and so may need to wait until PR29.

## Priority 2: Potential considerations that could have significant impact for future planning, delivery and operation

### 2.1 Planning hierarchies and governance

#### *Description*

There is a potential consideration to clarify the overall governance framework for water resource planning. There are many different plans and the relationships between each part of the framework are not always clear.

This is not to say that it would be cost-beneficial to have a single integrated framework, where cause-and-effect relationships can be tracked up and down a strict hierarchy. The range of plans related to water management is complex. Plans serve different drivers (including water supply, water quality, flooding and environmental protection) and the solutions used vary from “hard” engineering infrastructure to “soft” land management approaches. None of these operate as closed systems, having the need to accommodate natural externalities (the amount of rainfall, soil adsorption rates, and so forth). This is complicated further by the parallel routes for funding and decision making for different plans and solution types. There are complex trade-offs between factors including water availability, social benefit, landscape protection and the economy.

A governance framework that links these plans could provide clarity over the range of plans that exist, their phasing, ownership and inter-relationships. The value this could create includes identification of opportunities to streamline the planning process across short and long-term horizons, and also identify where contingency is held (and whether this is duplicative across multiple plan levels). It may also identify potential synergies across plans and the potential to combine funding streams.

One option to clarify the governance framework could be to build on the National Framework for Water Resources, which includes elements of the overall framework already. This could be extended to encompass multi-sector and multi-driver requirements at all levels from national to local, with the aim of indicating where planning hierarchies already exist (for instance in the WRMP to Regional Planning process), where new arrangements could be helpful (and can be supported with data and documentation), and where there is too much complexity to put meaningful governance in place.

#### *Relevant Principles*

- ▶ 1. Provide public value through using resources efficiently, and appropriately allocate costs and benefits between groups (distributional) and over time (intergenerational)
- ▶ 5. Assign rights and roles and allocate risks appropriately giving clear accountability and responsibility
- ▶ 6. Be implementable in the short and long-term

#### *Lifecycle stages*

1) Planning, 2) Procurement and Delivery

### *Timing and implementation considerations*

Development of a governance framework that helps to align the interfaces between plans would be supportive of the implementation of the regional plans and the delivery phase of the SROs from 2025. It should be informed by the development of approaches for natural capital and landscape management with the development of the Environmental Land Management approach, for which full roll out is scheduled for 2024 to 2028.

## **2.2 Consistent planning methodology**

### *Description*

There is a potential consideration for a common, system-wide, multi-sector approach to planning that incorporates water resources, water quality, flooding, environment and public value perspectives at the landscape level. This has the potential to develop system synergies, drive down costs and mobilise blended finance.

Currently, planning methodologies are defined within each part of the framework, and vary across drivers (including water supply, flooding and environmental protection), and for solution types (including engineering systems and landscape management). Where problems are well defined with fewer number of variables then established planning methods (e.g. cost benefit analysis) are well suited to optimising investment programmes. Where systems are more complex, as with catchments, water companies and regional groups are using more innovative and collaborative approaches to planning, funding and operation such as working in partnership with landowners, businesses and catchment partnerships.

Recognising the need for regional and local variation in approaches, there is a risk that the various planning approaches are not aligned. Additionally, the planning framework is evolving but is not yet considered holistic across all drivers. As an example, decarbonisation as well as water resource availability will influence infrastructure plans (this can be significant, e.g. for pumped transfers), and its relative importance will vary across the decision-making bodies.

A common, system-wide, multi-sector approach to planning could help to align shared definitions of value, a common set of shared objectives related to water resources (whatever the driver or solution type), recognition of competing priorities, and definitions of inter-related systems and trade-offs. It would need to allow flexibility in approach at a detailed level. This could benefit from a systems-based approach. As an example, the concept of multiple capitals allows a categorisation of different types of value in natural, engineering and social systems. A natural capital approach is the foundation of the 25-Year Environment Plan and has been articulated in Defra's Enabling a Natural Capital Approach<sup>22</sup>. Work on the Oxford Cambridge Arc Integrated Water Management Framework<sup>23</sup>, as well as with the Environment Agency and Imperial College<sup>24</sup>, has laid out a method by which this integration could be achieved.

### *Relevant Principles*

- ▶ 3. Enable multi-sector solutions, with local adaptability and flexibility

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<sup>22</sup> <https://www.gov.uk/guidance/enabling-a-natural-capital-approach-enca>

<sup>23</sup> <https://static1.squarespace.com/static/5e85a98d5277001874963880/t/62ea52115e5a9c535902898d/1659523647859/OxCam+IWMF+Phase+1+Report+inc+ICL+annex.pdf>

<sup>24</sup> [https://www.imperial.ac.uk/media/images/non-standard-dimensions/SARWP\\_FINAL\\_publish\\_Sep-2022.pdf](https://www.imperial.ac.uk/media/images/non-standard-dimensions/SARWP_FINAL_publish_Sep-2022.pdf)

- ▶ 6. Be implementable in the short and long-term

### *Lifecycle stages*

#### 1) Planning

### *Timing and implementation considerations*

Aligning planning methodologies could be considered alongside point 2.1 (planning hierarchies and governance). Adoption would require development of skills and culture. Timing would need to consider implementation of the Enterprise Land Management approach, scheduled for completion by 2028, as a driver of reorganisation of integrated approaches to catchments and landscapes.

## **2.3 Certainty of inter-regional transfer needs**

### *Description*

This point is specific to SRO development of inter-regional transfers, which are one part of the emerging framework. The national view of inter-regional transfers is drawn from bottom-up proposals by water companies and will be reviewed as part of the RAPID gated process and through reconciliation of the regional water resource plans. But it is not a statutory plan, which creates uncertainty risk for planners and developers.

A potential consideration is to explore options to increase levels of certainty for these strategic transfers. Increasing the certainty for planners and developers of major infrastructure schemes can reduce risk and improve financeability. Changes in plan late in the development process, or parallel development of multiple options to the high level of detail required to gain cost and benefit certainty, can create significant wasted planning and investigation costs. Low utilisation of strategic transfers through insufficient assessment of the need would be costly on a national basis.

This study is not recommending a specific approach, and recognises that the concept of central planning is contentious. The consideration suggested here is to explore options to increase certainty early in the process. As an example, one option could be to focus efforts on a shared view of inter-regional transfer “needs” rather than “solutions”. This could identify requirements for transfers from areas of surplus to those of scarcity. Solution options could then be developed to meet these requirements, with a higher degree of certainty than currently. It is recognised that separating need from solution is not always easy, and that such an approach would need to be tightly integrated with the regional plans that encompass in-region resource development and a wider range of solutions. The timing considerations noted below are also important.

### *Relevant Principles*

- ▶ 1. Provide public value through using resources efficiently, and appropriately allocate costs and benefits between groups (distributional) and over time (intergenerational)
- ▶ 3. Enable multi-sector solutions, with local adaptability and flexibility
- ▶ 4. Provide a framework for transparent, efficient markets to be used wherever appropriate

### *Lifecycle stages*

1) Planning, 2) Procurement and Delivery

### *Timing and implementation considerations*

The regional reconciliation process between regional water resource planning groups, and the conclusion of the RAPID gated process, will inform a bottom-up national plan. This could be captured in the next iteration of the National Framework, expected in 2025.

Any approach to increase certainty for the need for inter-regional transfers (particularly if it gained statutory status), would be influenced by the pace of development of future requirements. If current proposals for transfers are all that could be anticipated for the coming decades, then the plan is already there. However, if there are likely to be future iterations that propose new solutions, perhaps in line with the WRMP cycles, then consideration might be given to alternative approaches such as a “needs” focused approach.

This consideration may also rest on the need to tightly control water allocation across sectors and regions in future sustained periods of high scarcity. A prolonged drought might prompt a more interventionist approach to redistribute water resources across regions, as has happened in other geographies and has parallels in other sectors.

## **2.4 Roles and risk allocation**

### *Description*

There is a potential consideration to develop risk management frameworks that allocate responsibilities to organisations with the capability to manage the risks involved in planning, delivering and operating water resources across all sectors. This reflects different risk tolerance levels across different sectors. For example, the power industry or manufacturing such as paper mills have a low tolerance of variable water supplies and therefore seek to control their resources with secure water rights. Other sectors such as canals have a higher risk tolerance. Agriculture is a diverse sector with relatively little capacity for complex risk analysis related to water resources and the tolerance of risk differs from one part of the sector to another (tolerance of failed water resources is very low in the livestock or protected cropping sectors, but may be higher elsewhere). Public water supply, with its framework of targets and incentives for security of supply, has a low risk tolerance.

Defra’s report “Systems analysis for water resources” categorised different approaches to managing risk that are appropriate to different challenges in a complex system and reflect respective strengths of different actors in the water and environmental sectors. There is a potential consideration for further work to develop coordination mechanisms to accommodate the diversity of organisational risk strategies, capacities and risk tolerances that are needed for a genuinely multi-sector approach.

There is also a consideration regarding the roles of organisations in risk management. Regional planning groups are currently primarily a coordination function, enabling collaboration across different sectors and companies. In the operational phase, there is no ownership of balancing at regional or catchment level. Such a balancing role would involve governing operational decisions to balance demand and supply, inputs and outputs. This role does exist within water companies, though typically water and wastewater are managed separately rather than as a combined system. This creates a question of whether full system benefits can be achieved, and operational risks managed,

in practice. There is a potential consideration for whether there is a need for such balancing ownership and (if needed) who to appoint to such a role. This should build on existing responsibilities and previous discussions, including: For SROs, the concept of water company system operators <sup>25</sup>; and for regions or catchments, a river basin or catchment system operator model <sup>26</sup>.

Bringing these considerations together in an illustration: Risk tolerances for access to water by sector (and/or by specific organisation) could be explored further as part of the regional planning process and captured in a risk management framework as part of the regional plan. A new balancing role could use these tolerances to inform the management of allocations between water users in the operational phase.

### *Relevant Principles*

- ▶ 5. Assign rights and roles and allocate risks appropriately giving clear accountability and responsibility

### *Lifecycle stages*

1) Planning, 2) Procurement and Delivery, 3) Operation

### *Timing and implementation considerations*

Development of risk management responsibilities could require significant institutional reform, whether this is in amendment of the responsibilities for existing organisations, or in creating new, independent ones.

If taken forward, the timeline for this should not be considered independently, but needs to be developed as an integral part of other considerations. The use of pilots would be strongly recommended to develop and test concepts, recognising that this would require several years to consider results.

## **2.5 Legacy abstraction rights**

### *Description*

Discussions concerning abstraction rights are longstanding and were debated recently when government developed the abstraction reform plan.

Legacy abstraction rights (and other contracts and statutory arrangements including bulk transfers) could be treated in broadly two ways in the water resource planning process: i) As constraints around which future plans need to be constructed, which could risk a sub-optimal plan. ii) As options open to review, though this would present a requirement for changes to primary legislation, licences and other legal arrangements that could present implementation challenges.

Additional considerations include: Retaining headroom in permitted abstraction to manage during drought (e.g. agriculture) or provide investment confidence (e.g. manufacturing); The status of rights in relation to unused abstraction licences, including ability to trade for a different purpose; The interaction in planning scenarios in times of scarcity between managing legacy rights (based on

<sup>25</sup> [https://www.unitedutilities.com/globalassets/z\\_corporate-site/about-us-pdfs/looking-to-the-future/what-role-for-system-operators-in-the-water-sector-november-2017.pdf](https://www.unitedutilities.com/globalassets/z_corporate-site/about-us-pdfs/looking-to-the-future/what-role-for-system-operators-in-the-water-sector-november-2017.pdf)

<sup>26</sup> <http://www.dieterhelm.co.uk/assets/secure/documents/Catchment-Management-Abstraction-and-Flooding.pdf>

absolute volumes) and future allocations (that may be a proportion of capacity and require a more dynamic management approach).

Potential considerations include updates to the planning framework to include a consistent approach to treatment of legacy rights, a challenge process to enable planning groups to explore constraints, and an approach to the legislative and legal changes to existing rights to support changes from absolute entitlements to proportional and dynamic rights. These steps could help to provide confidence that plans represent best value through making use of all available resources.

### *Relevant Principles*

- ▶ 1. Provide public value through using resources efficiently, and appropriately allocate costs and benefits between groups (distributional) and over time (intergenerational)
- ▶ 4. Provide a framework for transparent, efficient markets to be used wherever appropriate
- ▶ 5. Assign rights and roles and allocate risks appropriately giving clear accountability and responsibility

### *Lifecycle stages*

1) Planning, 3) Operation

### *Timing and implementation considerations*

Any change to legacy abstraction rights and other legal arrangements is likely to be complex and could present implementation challenges, including primary legislative change. Changes to the current abstraction licensing system would require extensive consultation, primarily from Defra, which undertook extensive work on water abstraction reform in 2013<sup>27</sup>. This included proposals to link access to water with water availability, measures for incentivising abstractors, support to enable trades and updates to the process to review licences. The potential considerations described in this study should be considered alongside these proposals, changes to environmental permitting, and the role of Catchment Abstraction Management Strategies.

## **2.6 Public interest and support**

### *Description*

Large water resources schemes, alongside other major infrastructure, attract considerable public interest. This helps to provide a wider range of views and important considerations into the options development and detailed design processes. For example, the South East Strategic Reservoir Option is recognised as part of the solution to water scarcity, but faces organised opposition. Other sectors such as offshore wind have found planning consents increasingly challenging to obtain in recent years.

Once new resources have been built, their operation to redistribute water between regions has potential to meet local opposition. Public interest is likely to be particularly heightened during drought when customers in one region may be facing different levels of constraint or restriction than

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<sup>27</sup> [https://consult.defra.gov.uk/water/abstraction-reform/supporting\\_documents/abstractionreformconsultcondoc20131217.pdf](https://consult.defra.gov.uk/water/abstraction-reform/supporting_documents/abstractionreformconsultcondoc20131217.pdf)

others. During such times the idea of water being transferred from one region to another could divide opinion.

Whilst surfacing public opinion is an important part of the planning process, it can create delivery and operational risk. Potential considerations could include: a) Development and promotion of a narrative to build public support for investment, which could reference the national situation to provide context for local discussions, and b) Involvement in the wider reforms to Development Consent Orders (DCOs) being undertaken by the Ministry of Housing, Communities and Local Government (MHCLG), recognising the strategic value and essential nature of water resources infrastructure.

The value would be in reducing the risk of delays to planning and delivery processes, helping delivery of new resources in sufficient time to both maintain resilient water supplies and protect the environment from over abstraction.

### *Relevant Principles*

- ▶ 1. Provide public value through using resources efficiently, and appropriately allocate costs and benefits between groups (distributional) and over time (intergenerational)

### *Lifecycle stages*

1) Planning, 3) Operations

### *Timing and implementation considerations*

Work to gain public support is non-regulatory and non-legislative and so does not need to adhere to a specific timetable. However, it would be beneficial to conduct any such activity (whether led by industry, government or otherwise) prior to it being a ‘blocker’, which is most likely at the planning permissions stage of major projects.

Regarding the planning process itself, Defra is responsible for the National Policy Statement for Water Resources Infrastructure, which is currently in draft at the time of writing following consultation in 2018/19. This may need to be updated, which requires consultation and parliamentary scrutiny. The Ministry of Housing, Communities, and Local Government (MHCLG) is responsible for planning policy, which is undergoing a period of significant change, and a Planning Bill for 2022/23 was announced in the Queen’s speech in May 2021.

## **2.7 Operational capabilities**

### *Description*

Operation of complex water resource systems at a regional level is an evolving area, for which there are both existing responsibilities (including those of the Environment Agency) and new ones (e.g. regional planning groups and SROs). Different sectors involved in water resource management have different capabilities to manage risk and coordinate operational responses. This variation in operational and commercial management capability will influence the approach they take in engaging with regional coordination of water resources during the operational phase. The potential consideration is to develop frameworks that define and support development of operational capabilities across all relevant sectors.

Operational responsibility for SROs will need to be defined as part of their delivery plan and commercial arrangements. For those that span water company boundaries, this should include the responsibilities of supplying, conveying and receiving parties, including requirements for managing variations in water quality and environmental impact, commercial and operational considerations include modes of operation encompassing ability to ramp-up and down volumes, standby and “hot standby”, sweetening flow and mothballed states. It should also consider where overall systems operation accountability and capability will be developed, whether within one of the existing organisations, or separately within a dedicated systems operator.

Regional water resource plans, representing multi-sector interests, require a model of collaborative operation for use in practice that builds upon existing responsibilities. Operation of water resource infrastructure that transcends multiple water company and river basin management boundaries, and supports different sectors (e.g. power and agriculture), will require clear accountability and a consistent set of rules and frameworks. This may require establishment of protocols related to a range of drought and operational resilience challenges as part of a planned collaboration model. This should consider the role of existing and potential new bodies (including regional planning groups, water companies and the Environment Agency) to undertake regional or catchment based operational coordination. The value is in supporting the capability to deliver regional plans in practice and support participants’ commercial objectives.

### **Relevant Principles**

- ▶ 2. Improve the environment and water quality through every lifecycle stage
- ▶ 3. Enable multi-sector solutions, with local adaptability and flexibility
- ▶ 5. Assign rights and roles and allocate risks appropriately giving clear accountability and responsibility

### **Lifecycle stages**

#### 3) Operation

### **Timeline and implementation considerations**

Operational capabilities for SROs will need to be set out as part of their delivery plans and commercial arrangements, to allow sufficient time for resolution of responsibilities, including system operation across multiple parties, and development of operational capabilities.

For multi-sector solutions at a regional or local level, operational capabilities could be set out in a dedicated section of the regional water resource plans, describing how the various elements of the plan will be managed operationally in practice. This may help to clarify how each part of the complex regional system is either linked operationally or can function independently, as well as identify areas for further development as part of delivering the plan.

## Priority 3: Lower priority considerations that could refine future cycles of planning, delivery and operation.

### 3.1 Alignment of planning bodies, cycles and planning boundaries

#### *Description*

It is recognised that this consideration is not new and has been reviewed previously.

There is not full alignment between planning for different drivers (e.g. water resources, environmental improvements, flooding) or across different sectors. There are multiple statutory planning frameworks currently in place for water management within the water sector in England. The Environment Agency is responsible for producing River Basin Management Plans and Flood Risk Management Plans on a 6-year cycle; whilst water companies are responsible for Water Resource Management Plans and Drainage and Wastewater Management Plans on a 5-year cycle and the Catchment Abstraction Management Scheme and time-limited abstraction licensing creates a 12-year cycle. Water company plans have only recently started to engage with other sectors beyond public water supply through the regional planning groups. The Water Industry National Environment Plan (WINEP) is the programme of requirements that the Environment Agency requests from water companies to meet environmental obligations, notably from a water resources perspective including changes to what they can abstract from and discharge to the environment. The sequence of the WINEP process in relation to developing requirements to be included in WRMPs and the water companies' business plans has recently been reviewed in order to better align the development of respective plans<sup>28</sup>.

There is a potential consideration for planning cycles to be better aligned between the various regulatory drivers to support integrated planning and funding and deliver whole system benefits. This would provide the value of exploring solutions that deliver against multiple drivers on a systematic and coordinated basis within the planning process.

There are inconsistent, over-lapping and non-hierarchical boundaries between different planning bodies, drivers and sectors. The potential consideration here is to reduce the risk of misalignment where a single location is governed by several definitions of region for multiple drivers related to water resource management.

This could provide value through clearer cost allocation and trade-off decisions and greater consistency in local multi-sector plans for the areas with overlapping jurisdictions. It may also reduce the effort in managing dependencies across the overlapping boundaries, traded-off against the effort of re-alignment.

#### *Relevant Principles*

- ▶ 1. Provide public value through using resources efficiently, and appropriately allocate costs and benefits between groups (distributional) and over time (intergenerational)
- ▶ 3. Enable multi-sector solutions, with local adaptability and flexibility

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<sup>28</sup> <https://www.gov.uk/government/consultations/review-of-the-water-industry-national-environment-programme-winep>

### *Lifecycle stages*

#### 1) Planning

#### *Timing and implementation considerations*

The Environment Act requires water companies to work together closer on strategic water resource management, if directed. Regional (multi-sector) plans could be made statutory which would require an amendment to the Water Resources Act. Drainage and Wastewater Management Plans (DWMP) have become statutory and further consideration could be given to further integrating these plans with the Water Resources Management Plans (WRMP) to provide systems or catchment-based plans. The mismatch between planning cycles and boundaries would require changes to legislation to align the current 5-year and 6-year difference between the EA plans (River Basin Management Plan and Flood Risk Management Plans) and water company plans (WRMP and DWMP). The effort to do so would be high and benefits may be marginal, and so this consideration is the lowest priority of those reviewed in this study.

**Table 3 – Summary of potential consideration beyond the current and emerging framework**

	Planning	Procurement and Delivery	Operation	1. Provide public value	2. Improvement environment and water quality	3. Enable multi-sector solutions	4. Transparent and efficient markets	5. Assign rights, roles and risks appropriately	6. Implementable in short and long term
<b>Priority 1: Potential considerations that could support near-term delivery of current plans, including proposed SROs and the regional water resource plans</b>									
1.1 Commercial incentives framework	X	X	X	X			X	X	
1.2 Data sharing	X	X	X	X		X	X		
1.3 Expertise, knowledge & capacity (planning and delivery)	X	X				X		X	
1.4 Funding models and cost allocation including aggregation	X	X	X	X	X		X		X
<b>Priority 2: Potential considerations that could have significant impact for future planning and operations</b>									
2.1 Planning hierarchies and governance	X	X		X				X	X
2.2 Consistent planning methodology	X					X			X
2.3 Certainty of inter-regional transfer needs	X	X		X		X	X		
2.4 Roles and risk allocation	X	X	X	X				X	
2.6 Legacy abstraction rights	X		X	X		X	X		
2.7 Public interest and support	X		X	X		X			
2.8 Operational capabilities			X		X	X		X	
<b>Priority 3: Lower priority considerations that could refine future cycles of planning, delivery and operation.</b>									
3.1 Alignment of planning bodies, cycles and boundaries	X			X		X			

## 5 Next steps

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This study sets out principles, summarises current arrangements, and identifies potential considerations that may be needed to better meet the principles. The aim is to provide, in one place, a common set of considerations for development by RAPID and other participants in water resource planning.

The following points suggest potential next steps that could form the basis of a roadmap for implementing any required changes:

As a first stage, there may be benefit in a Call for Evidence (CfE) to seek views on the considerations set out in this study, prioritisation based on incremental benefit versus effort, and any additional considerations identified by stakeholders. The intent here is to define the considerations more tightly, and to agree there is benefit in the individual items and the overall outcome being sought.

Second, this could be followed by a strategy document that lays out a fuller roadmap for change. This should include a clear allocation of responsibilities and accountabilities for leading on specific considerations to individual departments, regulators, agencies, or other public bodies.

Third, options to address the refined considerations can be developed, focused on the higher priority items. These may be ‘packages’ of changes which are internally consistent and address multiple needs, or ‘standalone’ changes designed to tackle a specific item. If an integrated approach is pursued, there may be benefit to some form of water resources ‘review’ to provide a framework and drive for change. This could be similar to those adopted for major network changes in Energy, such as the Integrated Transmission Policy Review (ITPR) and the Offshore Transmission Network Review (OTNR).

Fourth, these more refined considerations are likely to then require an iterative policymaking process, owned by the relevant organisation (or jointly between organisations, where appropriate), involving rounds of public consultation, detailed qualitative and potentially quantitative analysis of detailed options, and implementation. Cost-benefit analysis will be needed. To assist any comparison of options, Table 4 below sets out possible evaluation criteria to be used, aligned to each of the principles defined in Section 2.

Some changes may be relatively modest, for example requiring changes to operational processes or minor amendments to licence conditions to codify approaches already adopted in practice. Such changes may require only one or two rounds of consultation (for example on the specific policy change, then on the detailed text for implementation), and could be implemented in less than two years from the decision to pursue a change to fulfil the requirement.

Other changes could, in principle, require updates to primary legislation, secondary legislation and then detailed governance (including license changes, guidance documentation and detailed industry codes). Such changes can take five years or more, even if parliamentary time is available for an appropriate bill vehicle.

**Table 4 – Principles and evaluation criteria**

Principle	Evaluation criteria	Reasoning
<b>1. Provide value through using resources efficiently, and appropriately allocate costs between groups and over time</b>	a. Does it result in solutions which provide value for an agreed set of outcomes, for the full project lifecycle? b. Are costs assigned to those who benefit from them being incurred? c. Does it balance short and long-term costs?	<ul style="list-style-type: none"> <li>▶ Approach should minimise costs for a given set of outcomes (this is <b>not</b> necessarily the same as being the least cost solution)</li> <li>▶ Approach should benefit consumers compared to the current approach, assign costs to those who benefit, and where possible internalise externalities.</li> <li>▶ Approach should appropriately considered intergenerational and distributional equity issues in assigning costs over time and groups</li> </ul>
<b>2. Improve the environment and water quality through every lifecycle stage</b>	a. Does it build in end-to-end environmental protection? b. Does it safeguard the wholesomeness of public water supply?	<ul style="list-style-type: none"> <li>▶ Any approach must be consistent with environmental and drinking water quality legislation/regulation, and ‘bake this in’ at each stage of national/regional/local planning and each project’s lifecycle</li> </ul>
<b>3. Enable multi-sector solutions, with local adaptability and flexibility</b>	a. Does it take a multi-sector, whole-system approach? b. Does it enable regional and local flexibility wherever beneficial?	<ul style="list-style-type: none"> <li>▶ Water resource planning should take into account its cut across multiple systems, e.g. through the ‘six capitals’<sup>29</sup> approach</li> <li>▶ At the least, solutions should not inhibit the development of such solutions</li> <li>▶ Some decisions (e.g. large scale infrastructure) may be best made nationally. However many challenges are unique and local, or may require collaboration rather than competition and market frameworks.</li> </ul>
<b>4. Provide a framework for transparent, efficient markets to be used wherever appropriate</b>	a. Does it make resources investible? b. Is competition used, where beneficial? c. Does it facilitate transparent, neutral and transparent markets?	<ul style="list-style-type: none"> <li>▶ Create conditions for resources to be funded (e.g. tradeable, revenue streams, defined rights etc.)</li> <li>▶ Competition is a proven method of driving innovation and cost reduction in utilities but may not be helpful in all circumstances (e.g. where local collaboration is most effective)</li> <li>▶ Does it clearly define markets for actors to participate in? Is it</li> </ul>

<sup>29</sup> The six capitals are natural, human, financial, intellectual, manufactured, and social and relationships.  
<https://integratedreporting.org/wp-content/uploads/2021/01/InternationalIntegratedReportingFramework.pdf>

Principle	Evaluation criteria	Reasoning
		<p>simple enough and low-friction to be used? Are conflicts of interest managed?</p> <ul style="list-style-type: none"> <li>▶ It is for the relevant appropriate actors to define and make judgements on whether a specific approach is 'transparent' and 'neutral' in context.</li> </ul>
<b>5. Assign rights and roles and allocates risks appropriately giving clear accountability and responsibility</b>	<ul style="list-style-type: none"> <li>a. Does it allocate risk to those best placed to manage it?</li> <li>b. Does it assign rights (or a process to define and assign rights)?</li> <li>c. Does it assign clear roles for actors?</li> <li>d. Is there a clear governance and decision-making framework?</li> </ul>	<ul style="list-style-type: none"> <li>▶ Risks should be placed on consumers only when necessary; different public and private organisations can manage and mitigate risks in different ways at different costs</li> <li>▶ Rights (e.g. access, capacity allocation) are a fundamental building block of a coherent system</li> <li>▶ Good governance requires roles, responsibilities and accountabilities to be clear and unambiguous, the nature and status of consultation, engagement and decision making needs to be made clear at each stage, so as to reduce the risk of challenge over process</li> </ul>
<b>6. Be implementable in the short and long-term</b>	<ul style="list-style-type: none"> <li>a. How easy is it to implement?</li> <li>b. Does it enable immediate priorities to be delivered?</li> <li>b. 6.3 Does it support a transition to achieving long-term priorities?</li> </ul>	<ul style="list-style-type: none"> <li>▶ Any approach to coordination should be deliverable, and support the near-term delivery of activities currently in progress. This includes legislative/regulatory prerequisites, systems, data requirements etc.</li> </ul>

## 6 Appendix A: Review of current and emerging framework

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This appendix describes the current and emerging framework and consider potential considerations for further regional coordination. This includes examples that either highlight the consideration or refers to case studies of how the consideration has been addressed elsewhere. It is structured by lifecycle stage: Planning, Procurement and Delivery and Operation. This appendix is summarised in section 3 of the report. More detail on case studies from other geographies and sectors is included in Appendix B.

### 6.1 Planning

#### 6.1.1 Current and emerging arrangements for planning

##### 6.1.1.1 *National*

National legislation, policy and guidance defines roles and responsibilities, provides frameworks and sets standards and targets.

##### *Water Resources Act*

The Water Resources Act<sup>30</sup> of 1991 covered water resources, water quality and pollution, and flood defence. The Act provided the general structure for the management of water resources. It also provided information on mitigation through flood defence. The Water Resources Act is enforced by the Environment Agency. It is supported through provisions relating to water quality and pollution have been moved to the Environmental Permitting (England and Wales) Regulations 2016<sup>31</sup>.

##### *Water Industry Act*

The Water Industry Act<sup>32</sup>, also 1991, provided legislation for the regulation and supply of water and wastewater services by the privatised water industry, including the preparation of water resource management plans and drought plans and the management of bulk supply agreements between companies.

##### *Water Framework Directive*

The Water Environment (Water Framework Directive)(England and Wales) Regulations 2017<sup>33</sup> implement the Water Framework Directive, creates a single system of water management, based around a natural river basin (which may cross local authority boundaries). The directive sets objectives and deadlines for improving water quality. It looks overall at both the ecology of the water and its chemical characteristics. This is then applied/implemented at the catchment level, including river basin management plans

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<sup>30</sup> <https://www.legislation.gov.uk/ukpga/1991/57/contents>

<sup>31</sup> <https://www.legislation.gov.uk/uksi/2016/1154/contents>

<sup>32</sup> <https://www.legislation.gov.uk/ukpga/1991/56/contents>

<sup>33</sup> <https://www.legislation.gov.uk/uksi/2017/407/regulation/1>

### ***Water UK Water Resource Long Term Planning Framework***

The 2016 framework<sup>34</sup> involved water companies, Defra and Welsh Government. It provided a 50-year forecast of requirements for public water supply considering climate change, population growth and environmental protection. It included supply, transfer and demand management options.

### ***National Infrastructure Commission – “Preparing for a Drier Future” – Advisory Plan***

In 2018 the National Infrastructure Commission<sup>35</sup> presented the case for taking a more integrated and multi-sector approach to water resource planning at a regional and national level. It set out a range of recommendations for investment in supply infrastructure, reducing leakage, increasing efficient use of water, increasing metering, and developing plans for a national water network.

### ***25-Year Environmental Plan***

In the 25-year Environment Plan<sup>36</sup> from 2018, the UK Government highlighted the need to increase resilience in the water sector to address water supply demands in response to population growth, climate change and environmental pressures. The plan also sets out expectations for water companies to improve partnership working with local authorities to manage flood risk.

### ***Drinking Water Quality***

Drinking water quality is regulated by the DWI via The Water Supply (Water Quality) regulations<sup>37</sup> and associated guidance. In 2020, the DWI issued long-term water resource planning guidance<sup>38</sup> including the management of raw and treated water transfers and bulk supplies. The Water Industry Act 1991 also includes provisions relating to water quality.

### ***Defra National Policy Statement***

Defra consulted on a draft National Policy Statement<sup>39</sup> for water resources infrastructure between November 2018 and January 2019. This sets out the need and government policies for the development of nationally significant infrastructure projects associated with water resources in England, including new reservoirs and water transfers. The National Policy Statement is material for all planning applications for new water resources infrastructure, and relates to the grant of a development consent order under the Planning Act 2008, to allow a project to proceed.

### ***Environment Act***

The Environment Act<sup>40</sup> has recently passed through parliament, and aims to clean up the country’s air, restore natural habitats and increase biodiversity. The Act amends the current statutory water resources planning process to ensure that there is more effective collaboration between water companies and other sectors, with additional powers that could direct companies to produce joint proposals, water resource management plans and drought plans. It also reinforces the 25-Year

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<sup>34</sup> <https://www.water.org.uk/publication/water-resources-long-term-planning/>

<sup>35</sup> <https://nic.org.uk/app/uploads/NIC-Preparing-for-a-Drier-Future-26-April-2018.pdf>

<sup>36</sup> [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/693158/25-year-environment-plan.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/693158/25-year-environment-plan.pdf)

<sup>37</sup> <https://www.legislation.gov.uk/wsi/2018/647/contents>

<sup>38</sup> <https://cdn.dwi.gov.uk/wp-content/uploads/2020/11/03135404/Long-term-planning-guidance-Water-Resources-and-Sufficiency-of-Supplies.pdf>

<sup>39</sup> Draft National Policy Statement for Water Resources Infrastructure - GOV.UK ([www.gov.uk](http://www.gov.uk))

<sup>40</sup> <https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted>

Environment Plan Commitments through reform of the water abstraction processes outside of the water sector and greater powers to address water quality issues.

### ***National Framework for Water Resources***

In 2020 the Environment Agency set out a national framework<sup>41</sup> for managing water resources in England. Though it does not yet have a statutory basis, this framework focusses on regional coordination and planning; and describes the policies and framework for the regional water resource groups to work within to develop ‘ambitious and cohesive plans’ to address the challenges identified. The national framework emphasises the need for the regional planning groups to determine the right strategic solution to provide a secure and sustainable water supply developed with other sectors and neighbouring regions which will support wider national needs, as appropriate.

### ***Water Resource Management Plan (WRMP) Guidance***<sup>42</sup>

The Environment Agency, Ofwat and National Resources Wales produce joint guidelines for water companies and regional groups to develop best value water resource plans, which are updated every five years and following consultation and regulatory approval, the identified water resource investment forms the basis of the company business plan submissions.

### ***Water abstraction plan***

Defra, in 2017, set out policy to reform water abstraction management<sup>43</sup> to address unsustainable abstraction, develop a stronger catchment focus and regulating abstraction.

### ***Water Industry National Environment Programme (WINEP)***<sup>44</sup>

The programme of requirements that the Environment Agency requests from water companies to meet environmental obligations, notably from a water resources perspective including changes to what they can abstract from and discharge to the environment. It is supported by WISER (the Water Industry Strategic Environmental Requirements) for environmental, resilience and flood risk planning.

### ***Ofwat review of water company plans***

Ofwat reviews water company WRMPs and company business plans as part of the five-yearly price review process.<sup>45</sup> At the last price review (PR19), in addition to funding water company WRMP investments, Ofwat allocated additional funding for companies to collaborate and work together to investigate and develop integrated strategic regional water resource solutions to be construction-ready between 2025 and 2030<sup>46</sup>.

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<sup>41</sup>[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/872759/National\\_Framework\\_for\\_water\\_resources\\_main\\_report.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/872759/National_Framework_for_water_resources_main_report.pdf)

<sup>42</sup> <https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline>

<sup>43</sup> <https://www.gov.uk/government/publications/water-abstraction-plan-2017/water-abstraction-plan>

<sup>44</sup> <https://data.gov.uk/dataset/a1b25bcb-9d42-4227-9b3a-34782763f0c0/water-industry-national-environment-programme>

<sup>45</sup> <https://www.ofwat.gov.uk/regulated-companies/price-review/>

<sup>46</sup> <https://www.ofwat.gov.uk/wp-content/uploads/2019/12/PR19-final-determinations-Strategic-regional-water-resource-solutions-appendix.pdf>

### ***RAPID assessment of Strategic Resource Options (SROs)***

All of the SROs that are being promoted in PR19 have been proposed by water companies and will be assessed by RAPID (a joint regulatory body between Ofwat, the Environment Agency and the Drinking Water Inspectorate). On the basis of RAPID's assessment, Ofwat will determine whether or not they should they should continue to receive ring-fenced funding. RAPID publishes guidance and manages the gated process<sup>47</sup> that will run to 2025 to assess the proposed SROs.

### ***National Flood & Coastal Erosion Risk Management Strategy***<sup>48</sup>

The Environment Agency (under the Flood and Water Management Act 2010) sets out the national strategy for flood management by parties including local authorities, Internal Drainage Board and water companies. Flood and coastal investment is governed by the government's central comprehensive spending review.<sup>49</sup> The Flood Risk Regulations 2009 require the Environment Agency and the lead local flood authorities to produce Flood Risk Management Plans (FRMPs) every 6 years. The FRMPs support the goals set out in the national strategy including identification of integrated water management and nature based solutions.

### ***Environmental Land Management schemes (ELMs)***<sup>50</sup>

These include the Sustainable Farming Incentive, Local Nature Recovery and Landscape Recovery, through which farmers and other land owners can enter into agreements for delivering clean and plentiful water and protecting against flooding. This is an emerging national-level scheme, with consultations and pilots planned from 2021.<sup>51</sup>

### ***Other national plans***

As an example of national plans produced by non-public water supply bodies, in 2021 the National Farmers Union published an Integrated Water Management report<sup>52</sup> calling for long-term investment in infrastructure for water supply and flood protection. The Canal and River Trust water resources strategy is another example<sup>53</sup>.

### ***Defra Strategic Policy Statement for Ofwat***

In 2022 Defra published an updated set of strategic priorities for Ofwat<sup>54</sup> that includes support for the contents of the National Framework for Water Resources including regional planning. In parallel, the WINEP process was reviewed<sup>55</sup>, including the sequence of developing requirements to be included in WRMPs and the water companies' business plans for PR24.

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<sup>47</sup> <https://www.ofwat.gov.uk/regulated-companies/rapid/the-rapid-gated-process>

<sup>48</sup> <https://www.gov.uk/government/publications/national-flood-and-coastal-erosion-risk-management-strategy-for-england--2>

<sup>49</sup> <https://www.gov.uk/government/publications/spending-review-2020-documents/spending-review-2020>

<sup>50</sup> <https://www.gov.uk/government/publications/environmental-land-management-schemes-overview/environmental-land-management-scheme-overview>

<sup>51</sup> [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/954283/agricultural-transition-plan.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/954283/agricultural-transition-plan.pdf)

<sup>52</sup> <https://www.nfuonline.com/cross-sector/environment/water/irrigation-and-water-resources/nfu-calls-for-urgent-action-on-integrated-water-management-in-new-report/>

<sup>53</sup> [24335-water-resources-strategy.pdf](https://www.gov.uk/government/publications/24335-water-resources-strategy.pdf) ([canalrivertrust.org.uk](https://canalrivertrust.org.uk))

<sup>54</sup> <https://www.gov.uk/government/consultations/water-industry-governments-strategic-policy-statement-for-ofwat>

<sup>55</sup> <https://www.gov.uk/government/consultations/review-of-the-water-industry-national-environment-programme-winep>

### 6.1.1.2 Regional

#### *Regional Water Resource Groups*

In 2018, government challenged the water companies to be more ambitious and to demonstrate coordinated leadership across the industry<sup>56</sup>. This included formalising the requirement for regional planning groups responsible for producing plans that are not confined to water company boundaries in order to identify the optimum solutions for the region. Regional groups are also expected to take responsibility for exploring the role of markets to deliver strategic water resource solutions, with Ofwat leading the work to facilitate the development of new markets.

There is guidance on regional planning in the National Framework for Water Resources and the WRMP guidelines, but this did not set any prescribed approach to regional planning and acknowledged that regional groups would need to be flexible in terms of governance and structure, so that each could meet the challenges they face at a regional level. As a consequence, there are different models of regional planning representing the different needs and opportunities in different parts of the country.

Water Resources South East (WRSE) faces the greatest pressures on public water supplies and extensive environmental challenges, notably the protection of chalk streams. WRSE was originally set up in 1996 to develop strategies and identify options to increase resilience between the six water companies operating in the south east of England. WRSE has recently restructured to allow wider stakeholder engagement in the decision making process. WRSE uses a coordination model and undertakes a full supply demand balancing model and best-value planning exercise to develop a 75-year adaptive plan. WRSE does not procure schemes or projects themselves, but they act in a convening role that is funded by the core membership of the contributing water companies.

Water Resources East (WRE) faces significant pressure on water resources from multiple water users, primarily public water supply and agriculture, in addition to multiple environmental challenges. WRE was formed in 2014 and in 2019 became an independent (not for profit) company. WRE has set itself up as a membership organisation, with the Primary Funding Members forming the Board of Directors and Standard Members forming the Strategic Advisory Group. The Board comprise members of the water companies, power companies, drainage boards, councils, trade bodies and NGOs. There are over 100 organisations who are then members of the Strategic Advisory Group and eligible to vote on key matters.

WRE has a broad multi-sector membership and a wide-reaching remit. WRE has a number of strategic priorities beyond just producing a regional plan, including the delivery of multiple pilot projects aimed at local, catchment and landscape scale multi-sector collaborative initiatives. WRE has developed a capacity to procure and implement schemes, working with members and partners to secure funding (including exploration of innovative funding and delivery models).

Water Resources West (WRW), Water Resources North (WRN) and West Country Water Resources (WCWR) have comparatively less pressure on water resources and the potential to transfer resources to neighbouring regions. These groups were all in place by October 2018 and are made up of a core membership of the relevant water companies, other water users and the Environment Agency, with support from advisory groups.

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<sup>56</sup> <https://www.ofwat.gov.uk/wp-content/uploads/2018/08/Building-resilient-water-supplies-letter.pdf>

## Regional Reconciliation

The approach for reconciliation between regional water resource groups is in progress. There are national and regional coordination groups established to help the plans develop in an integrated and coordinated manner, and to try and ensure that this new process is aligned to deliver the national need. The regional groups are expected to take a multi-sector approach and look beyond regional boundaries. Whilst there is currently no statutory requirement for companies to work together, the Environment Act includes a clause giving Defra the power to direct two or more companies to make a joint proposal for improving the management and development of water resources. Government and regulators have also set out their expectations that water companies will collaborate in this way and can challenge any water resource management plans that do not follow this process.

## Regional Flood & Coastal Committees

There are 12 regional flood and coastal committees (RFCCs)<sup>57</sup> that play an important role in helping to protect communities from flooding and coastal erosion. They support the Environment Agency and other partners to understand local issues better, and to balance local and national priorities.

## River Basin Management Plans (RBMPs)<sup>58</sup>

RBMPs cover the environmental protection of holistic river basin districts (eleven in England and Wales). They are updated every 6 years, with the next consultation due to start in 2021.

### 6.1.1.3 Within Region

#### Water Company Plans

Water companies in England are the principal actors at the regional and sub-regional level. Water companies interface with activities at the regional level through the five regional planning groups. The main statutory planning requirement for water resource planning in England is the water resource management plan (WRMP) under the Water Industry Act 1991 and associated regulation. WRMPs must demonstrate how water resources will be met over a time horizon of at least 25 years. In addition to demonstrating how the supply demand balance will be met in the most cost-effective manner, the WRMP 'least cost' plan, companies must also demonstrate how this can be enhanced for greater public benefit with a 'best value' plan<sup>59</sup>, defined as follows, "A best value plan is one that considers factors alongside economic cost and seeks to achieve an outcome that increases the overall benefit to customers, the wider environment and overall society."

Water companies also produce: 1) Drought Management Plans, using guidelines set by the Environment Agency<sup>60</sup>, that set out how they will manage water supplies during times of scarcity; 2) Drainage Water Management Plans (DWMPs), using a framework developed by Water UK with Defra, Welsh Government, Ofwat, the Environment Agency and others<sup>61</sup>, for long-term and collaborative planning of drainage and flood protection.

<sup>57</sup> <https://www.gov.uk/government/publications/regional-flood-and-coastal-committees-map>

<sup>58</sup> <https://www.gov.uk/government/collections/river-basin-management-plans-2015>

<sup>59</sup> <https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline>

<sup>60</sup> <https://www.gov.uk/government/collections/how-to-write-and-publish-a-drought-plan>

<sup>61</sup> <https://www.water.org.uk/policy-topics/managing-sewage-and-drainage/drainage-and-wastewater-management-plans/>

WRMPs, Drought Plans and DWMPs all inform the water company's five-year business plan that sets out the overall performance targets and investment requirements. These are assessed by Ofwat and the regulatory settlement is covered in the price review process.<sup>62</sup>

Other than water companies there are a wide range of bodies involved in planning at catchment and landscape levels, including:

### ***Internal Drainage Boards (IDBs)***

Internal Drainage Boards (IDBs) are public bodies that manage water levels within internal drainage districts. Each IDB sets a budget for its planned work in the forthcoming year and any investments it needs to make for future project<sup>63</sup>. Essential functions are predominantly funded by the local beneficiaries of the water level management work they provide.

### ***Local Authorities***

Lead Local Flood Authorities manage local flood risks, preparing a strategy for the local area and helping to coordinate the activities of organisations with flood risk management responsibilities and the communities impacted by flooding.<sup>64</sup>

### ***Local Resilience Forums***

Local resilience forums are multi-sector partnerships, including utilities, that plan for localised incidents including flooding.<sup>65</sup>

### ***Catchment Abstraction Management Strategy (CAMS)***

The Environment Agency manages planning of abstraction at a catchment level, controlling use of existing and issue of new licences. It is linked with the introduction of time-limited licensing with a common end date to allow the review of licences at the same point in time to help ensure that abstraction within a catchment remains sustainable.<sup>66</sup>

### ***Landscape Enterprise Networks***

The Landscape Enterprise Network model brings together businesses to pool investment in a healthy landscape to create multiple benefits. The model features separate demand and supply aggregators.<sup>67</sup>

### ***Catchment partnerships***

The Catchment Based Approach (CaBA)<sup>68</sup> is an NGO led stakeholder engagement and coordination mechanism. The approach generally comprises a catchment management partnership who undertake participatory planning to develop catchment plans and then mobilise funding and coordinate activities to achieve the catchment objectives.

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<sup>62</sup> <https://www.ofwat.gov.uk/regulated-companies/price-review/>

<sup>63</sup> [https://www.ada.org.uk/wp-content/uploads/2017/12/IDBs\\_An\\_Introduction\\_A5\\_2017\\_web.pdf](https://www.ada.org.uk/wp-content/uploads/2017/12/IDBs_An_Introduction_A5_2017_web.pdf)

<sup>64</sup> <https://www.local.gov.uk/topics/severe-weather/flooding/local-flood-risk-management/managing-flood-risk-roles-and>

<sup>65</sup> <https://www.gov.uk/guidance/local-resilience-forums-contact-details>

<sup>66</sup> <https://www.gov.uk/government/collections/water-abstraction-licensing-strategies-cams-process>

<sup>67</sup> <https://landscapeenterprisenetworks.com/>

<sup>68</sup> <https://catchmentbasedapproach.org/about/>

### *Navigation authorities*

Bodies with statutory or other legal responsibilities for the management, maintenance and operation of navigable inland waterways. They include the Environment Agency, Canal and River Trust, county councils and other bodies.<sup>69</sup>

## **6.1.2 Potential considerations for planning**

This section sets out potential considerations for further regional coordination for planning activities, based on a review of the current and emerging arrangements.

### **1. Multiple bodies and planning cycles for multiple drivers**

There is not full alignment between planning for different drivers (e.g. water resources, environmental improvements, flooding) or across different sectors. There are multiple statutory planning frameworks currently in place for water management within the water sector in England. For example, the Environment Agency is responsible for producing River Basin Management Plans and Flood Risk Management Plans on a 6-year cycle; whilst water companies are responsible for Water Resource Management Plans and Drainage and Wastewater Management Plans on a 5-year cycle, and the Catchment Abstraction Management Scheme and time-limited abstraction licensing creates a 12-year cycle. Water company plans have only recently started to engage with other sectors beyond public water supply through the regional planning groups. The Water Industry National Environment Plan (WINEP) is the programme of requirements that the Environment Agency requests from water companies to meet environmental obligations, notably from a water resources perspective including changes to what they can abstract from and discharge to the environment. The sequence of the WINEP process in relation to developing requirements to be included in WRMPs and the water companies' business plans has recently been reviewed in order to better align the development of respective plans<sup>70</sup>.

There is a potential consideration for planning cycles to be better aligned between the various regulatory drivers to support integrated planning and funding and deliver whole system benefits. This would provide the value of exploring solutions that deliver against multiple drivers on a systematic and coordinated basis within the planning process.

Beyond the regulatory cycles, the sequencing of decision-making across industries is also not precisely aligned, resulting in planning challenges for solutions driven by industry that have water resource implications. As an example, long-term planning for the power sector (as a major industrial consumer of water), such as the Electricity Ten Year Statement (ETYS)<sup>71</sup> and the annual Network Options Appraisal (NOA)<sup>72</sup> does not always consider water resources as a major factor in long-term investment and decision-making.

### **2. Inconsistent definition of regions and boundaries**

There are inconsistent, overlapping and non-hierarchical boundaries between regions. As examples, catchments, river basin districts, aquifers and water supply/wastewater systems have different boundaries. A catchment has a river as its central focus and its boundaries run along the higher

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<sup>69</sup> Association of Inland Navigation Authorities (AINA)

<sup>70</sup> <https://www.gov.uk/government/consultations/review-of-the-water-industry-national-environment-programme-winep>

<sup>71</sup> <https://www.nationalgrideso.com/document/181711/download>

<sup>72</sup> <https://www.nationalgrideso.com/document/185881/download>

ground of watershed boundaries. Water supply networks, by contrast, can radiate out from a higher ground.

Other boundaries matter too. For example, the Manchester Natural Capital Investment Plan is significant in bringing together actors across the region reflecting the importance of integrated management of natural resources for multiple objectives (flooding, amenity, water resources etc) in a major conurbation.

The potential consideration would relate to removing the risk of misalignment where a single location is governed by several definitions of region for multiple drivers related to water resource management.

As an example of a different approach, water management in France is coordinated at river basin level<sup>73</sup>. In each of the main six hydrographic basins in mainland France, one Water Agency and one Catchment Board ensure the guiding principles of the European Union Water Framework Directive are followed. River basins are effectively operating as regions defined hydrographically with numerous water supply and catchment schemes undertaken within each basin. The development of Integrated Water Resources Management Plans (Schéma Directeur d'Aménagement et de Gestion des Eaux - SDAGE and Schéma d'Aménagement et de Gestion des Eaux - SAGE) is the key process for defining objectives and a set of priority actions within each hydrographic basin and sub-basin. A programme of investments is defined on an inter-annual basis by each Water Agency within their respective hydrographic basin. The decentralised approach ensures that the Integrated Water Resources Management Plans is tailored to the conditions and challenges specific to each hydrographic basin. It also ensures a programme of investments that is developed specifically to respond to the challenges and objectives defined at catchment level.

### **3. Complex interfaces between layers**

The range of plans related to water management is complex. It is not a single planning system, where each level of plan has a direct cause-and-effect relationship with those at higher and lower levels. The range of plans serve different drivers (including water supply, water quality, flooding and environmental protection) and the solutions used vary from “hard” engineering infrastructure to “soft” land management approaches, none of which operate as closed systems, having the need to accommodate natural externalities (the amount of rainfall, soil adsorption rates, and so forth). This is complicated further by the parallel routes for funding and decision making for different plans and solution types. There are complex trade-offs between factors including water availability, social benefit, landscape protection and the economy.

For example, United Utilities has responsibility to provide water resources to Greater Manchester using infrastructure such as the Haweswater Aqueduct and their local treatment and distribution networks. Under proposed SROs, they would need to coordinate planning of infrastructure in their supply region with nationally-significant transfers. However, United Utilities also works in partnership with the Greater Manchester Combined Authority, the Greater Manchester Natural Capital Group and others to implement the Greater Manchester Natural Capital Plan. United Utilities’ in-area water supply infrastructure is controlled by themselves with a focussed objective around the provision of water resources and public health. The collaboration around natural capital addresses a more diverse system or set of systems with multiple objectives. In this case, the interface between United Utilities engineering system and the broader natural capital objectives in Greater Manchester means that a

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<sup>73</sup> <https://www.ecologie.gouv.fr/gestion-leau-en-france>

more complex type of interaction at different levels is required – the interaction between levels is more complex and may not fit neatly into a cascade of system controls between the different levels.

An example from another sector of this complexity can be found in power. At a national level the Electricity System Operator (ESO) sets out long-term investment needs, based on an assessment of proposals from the onshore Transmission Owners (TOs). This is also informed by long-term scenarios for demand and generation, for example from the Committee for Climate Change (CCC) and government targets for decarbonisation. At a regional level and below, the local Distribution Network Owner (DNO) is responsible for planning the network to accommodate supply and demand – this can require planning at a regional and local level. As a further complexity, a major source of power generation is natural gas. There is considerable uncertainty on the future demand for natural gas needed for power generation, which in turn is considered for gas sectoral planning.

The potential consideration for water is not to suggest implementation of a strict and managed hierarchy across all areas, but to clarify the overall governance framework. The National Framework for Water Resources includes elements of this, particularly around coordination between the regional groups. This could be extended to encompass multi-sector and multi-driver requirements at all levels from national to local, with the aim of indicating where planning hierarchies already exist (for instance in the WRMP to Regional Planning process), where new arrangements could be helpful (and can be supported with data and documentation), and where there is too much complexity to put meaningful governance in place.

The value this could create includes identification of opportunities to streamline the planning process across short and long-term horizons, and also identify where contingency is held (and whether this is duplicative across multiple plan levels). It may also identify potential synergies across plans and the potential to combine funding streams. (principle 1).

#### **4. Consistent planning methodology**

Plan development and assessment methodologies are defined within each part of the current framework, varying across drivers including water supply, flooding and environmental protection, and for solution types including engineering systems and landscape management. Where problems are well defined with fewer number of variables than established planning methods (e.g. cost benefit analysis) are well suited to optimising investment programmes. Where systems are more complex, as with catchments, water companies and regional groups are using more innovative and collaborative approaches to planning, funding and operation such as working in partnership with landowners, businesses and catchment partnerships.

Recognising the need for regional and local variation in approaches, there is a risk that the various planning approaches are not aligned. A system-wide, multi-sector approach to planning that incorporates water resources, water quality, flooding, environment and public value perspectives at the landscape level has the potential to develop system synergies, drive down costs and mobilise blended finance.

This could benefit from a systems-based approach, utilising a common set of shared objectives related to water resources (whatever the driver or solution type), agreeing shared definitions of value, recognising competing priorities, developing definitions of inter-related systems and the trade-offs that might take place, and allowing flexibility in approach at a detailed level.

As an example, the concept of multiple capitals allows a categorisation of different types of value in natural, engineering and social systems. As indicated above, national and regional transfers reflect a system principally comprising water infrastructure assets, whereas catchment systems comprise a broad range of natural and social assets. The following frameworks are beginning to provide a common language and indicators that are relevant across these different types of system:

- ▶ The 25-Year Environment Plan provides a common set of objectives and indicators for environmental benefits.
- ▶ A multiple capitals approach is emerging in different sectors and provides a framework that bridges between them. A natural capital approach is the foundation of the 25-Year Environment Plan and has been articulated in Defra's Enabling a Natural Capital Approach<sup>74</sup>. Approaches to different forms of capital are being facilitated by the Capitals coalition<sup>75</sup>. Within business, the leading multi-capital framework has been developed by the International Integrated Reporting Council<sup>76</sup>. The Integrated Reporting Framework is commonly referred to as the Six Capitals framework in the water sector where it has been gaining traction.
- ▶ Aligned with the above is the development of systems approaches to water resource and catchment issues. Ofwat's Resilience in the Round report proposed that "Water and wastewater services are made up of a complex set of operational, corporate, and financial systems. They are also linked with a wide range of other systems. These include the broader natural environment, social systems, the economy, and agriculture."<sup>77</sup> This systems approach has been developed by Defra and the Environment Agency at the catchment level and provides a basis for showing how a holistic perspective can be developed.<sup>78</sup>

While the adoption of systems thinking and multi-capital approaches is enabling a more holistic understanding of water resource and environmental management, the challenges of planning, procurement and operation across these complex areas remains. Different approaches to planning are required for different types of system. Where problems are well defined with a smaller number of variables then engineering planning (e.g. cost-benefit analyses) are useful in optimisation. Where systems are more complex with a wide range of variables then there may be a need for a broader more participatory approach to planning so that a wider range of objectives can be considered in making a plan. This is recognised in catchment planning approaches, which comprises both a clear analytical aspect with the WFD objectives and monitoring programme and participatory systems coordinated by catchment partnerships under the CaBA arrangements. Participation and collaboration may therefore be well understood as a significant means of developing a more holistic approach to planning at the level of complex, multi-variable systems. Water companies and regional planning groups are increasingly working to bridge the gap between engineering systems and wider more complex systems that require innovative approaches to planning, funding, and operation as will be further discussed below.

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<sup>74</sup> <https://www.gov.uk/guidance/enabling-a-natural-capital-approach-enca>

<sup>75</sup> <https://capitalscoalition.org/>

<sup>76</sup> <https://integratedreporting.org/resource/international-ir-framework/>

<sup>77</sup> <https://www.ofwat.gov.uk/wp-content/uploads/2017/09/Resilience-in-the-Round-report.pdf>

<sup>78</sup> [http://sciencesearch.defra.gov.uk/Document.aspx?Document=14947\\_WT15121.FinalReport.pdf](http://sciencesearch.defra.gov.uk/Document.aspx?Document=14947_WT15121.FinalReport.pdf)

<https://www.gov.uk/government/publications/a-systems-based-approach-to-catchment-water-management>

The planning framework is evolving but is not yet considered holistic across all drivers (principle 3). It is significant that the identification of value criteria is undertaken to be specific for each WRMP. This is appropriate in order to develop context specific regional plans however there may be some elements that could usefully be standardised across the regional planning processes. The risk is a lack of alignment from cycles/drivers that could be addressed through design of a system-wide, multi-sector approach to planning.

Catchment system management considers the integrated planning and operation of responses to flood risk as well as water supply. Example interfaces between water resources and flood management include:

- ▶ Operation of abstraction / reservoirs to discharge water from a catchment to a treatment works and the network. With sufficient available storage and network flexibility, it may be possible for a river abstraction to abstract excess flows during flood conditions and transfer water out of the catchment if the connectivity is good. Other abstractions would subsequently reduce to compensate.
- ▶ Emergency procedures – reservoir draw down areas combined with other intermittent storage facilities such as flood washes.
- ▶ Potential dual use of reservoirs with a flood storage and water supply role. Such opportunities are being enhanced as technology develops to allow reservoirs to discharge before a storm, thereby creating storage capacity for use in flood control.
- ▶ Concurrent impacts of high groundwater levels on high raw water availability but increased risk of flooding resulting from increased infiltration into the wastewater network.
- ▶ Pumped drainage to manage flood risk stored for use as water resources (for example the Felixstowe peninsula scheme).

The requirement for regional coordination will likely point to common planning standards and collaborative operating principles between participants. Integrated planning across these domains has potential to develop system synergies, drive down costs and mobilise blended finance across different benefitting stakeholders. Work on the Oxford Cambridge Arc Integrated Water Management Framework <sup>79</sup>, as well as with the Environment Agency and Imperial College <sup>80</sup>, has laid out a method by which this integration could be achieved.

An additional aspect is the degree of non-water specific environmental focus within planning frameworks. Water resource availability is not the only factor to influence infrastructure plans. For example, the role that decarbonisation plays for various participants will influence their requirements at various stages of decision-making that may involve more or less carbon intensive decisions, including the embodied carbon required for construction of new transfer schemes, and emissions from intensive pumping during drought periods to access and redistribute water. Individual sectors will have different decarbonisation targets and approaches, so the framework will need to account for this and align involved parties around common goals. It is likely that there are a range of different assumptions and inputs being used to account for the cost of carbon across various

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<sup>79</sup><https://static1.squarespace.com/static/5e85a98d5277001874963880/t/62ea52115e5a9c535902898d/1659523647859/OxCam+IWMP+P+hase+1+Report+inc+ICL+annex.pdf>

<sup>80</sup> [https://www.imperial.ac.uk/media/images/non-standard-dimensions/SARWP\\_FINAL\\_publish\\_Sep-2022.pdf](https://www.imperial.ac.uk/media/images/non-standard-dimensions/SARWP_FINAL_publish_Sep-2022.pdf)

sectors. The framework would need to consider carbon specifically, and align any assumptions used that will inform decisions.

A case study is state-level water planning in Nebraska, which is designed to account for conflicting environmental priorities (e.g. ground water and surface water). This is a relevant example which provides insights for how to consider conflicts in similar priorities (e.g. water supply and flooding)<sup>81</sup>. The Nebraska Department of Natural Resources (NeDNR) is a state agency responsible for surface water, groundwater, natural resources planning, water planning and integrated management, and the storage of natural resources and administration of state funds<sup>82</sup>. Water resources are managed at the local level by natural resources districts (NRDs), who work collaboratively to develop integrated management plans to manage the demand and capacity of water resources for each specific region. Nebraska also participates in six interstate water agreements which allocate water among states and often impact state water planning activity. These are primarily administered by NeDNR with support from NRDs and other state agencies. This is an example of collaborative planning which combines organisations responsible for all elements of natural resources (including agriculture, food, and water) to allow for a more integrated response to resource challenges, as well as energy and climate targets. NRDs control ability to deliver multi-benefit schemes at a localised level (e.g. planning for ground and surface water issues).

## 5. *Certainty of inter-regional transfer needs*

The national view of inter-regional transfers is drawn from bottom-up proposals by water companies and will be reviewed as part of the RAPID gated process and through reconciliation of the regional water resource plans in 2021. But it is not a statutory plan, which creates uncertainty risk for planners and developers.

Regional plans are currently in development by the regional water resource planning groups. These set out both requirements and solutions, and provide a framework for delivery within regions. The regional reconciliation process will help to drive aspects of a national plan through agreement between regions, and high-level modelling has been done at a national level. However, at the national level, and particularly in relation to SROs, there is a gap between the guidance, framework and targets in national frameworks, and the market-generated proposals to meet those targets. The National Framework for Water Resources sets out the targets and notes the development of SROs, but relied on existing options that were generated from water company plans and previous studies including the National Rivers Authority (1994). The national framework did not develop the transfer options as a plan, it only reflects their intentions.

A potential consideration is to explore options to increase levels of certainty for these strategic transfers. Increasing the certainty for planners and developers of major infrastructure schemes can reduce risk and improve financeability. Changes in plan late in the development process, or parallel development of multiple options to the high level of detail required to gain cost and benefit certainty, can create significant wasted planning and investigation costs. Low utilisation of strategic transfers through insufficient assessment of the need would be costly on a national basis.

This study is not recommending a specific approach, and recognises that the concept of central planning is contentious. The consideration suggested here is to explore options to increase certainty early in the process. As an example, one option could be to focus efforts on a shared view of inter-

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<sup>81</sup><https://apps.wr.ecology.wa.gov/docs/WaterRights/wrwebpdf/WaterBankingandWaterMarketinginSelectWesternStates.pdf>

<sup>82</sup> <https://dnr.nebraska.gov/about>

regional transfer “needs” rather than “solutions”. This could identify requirements for transfers from areas of surplus to those of scarcity. Solution options could then be developed to meet these requirements, with a higher degree of certainty than currently. It is recognised that separating need from solution is not always easy, and that such an approach would need to be tightly integrated with the regional plans that encompass in-region resource development and a wider range of solutions. The timing considerations noted below are also important.

A parallel with the UK power sector is the source of proposals for major investments to solve national level supply-demand challenges. Under the current regulatory framework, the three Transmission Owners make proposals (e.g. a new overhead line and associated infrastructure connecting A in Scotland to B in England). The Electricity System Operator (ESO) then compares these proposals and makes recommendations on which proposals together are the least-cost way to solve the supply-demand challenge. Very recently, the Offshore Transmission Network Review (OTNR) has led to offshore wind developers proposing alternative approaches to delivering offshore transmission, for example creating offshore ‘bootstraps’ including offshore wind farm infrastructure. These alternatives could provide new and potentially better ways to solve supply-demand challenges.

Whether the potential consideration is an important one to address, or not, may depend on the pace of development of future requirements. If the current proposals for SROs are all that could be anticipated for the coming decades, then the plan is already there. However, if there are likely to be future iterations that propose new solutions, perhaps in line with the regional plans and WRMP cycles, then consideration might be given to alternative approaches to develop a plan of requirements. The Water UK long-term planning framework considered the case for a national level adaptive plan that would “identify the key ‘trigger points’ that will determine which set of investments and policy interventions would be needed...depending on how risks materialise”. This consideration may also rest on the need to tightly control water allocation across sectors and regions in future sustained periods of high scarcity. A prolonged drought might prompt a more interventionist approach to redistribute water resources across regions

Two international examples include the concept:

South Africa has a centralised, guiding plan that sets principles for the development of water resources and strategies<sup>83</sup>. Central government control of water transfers is married up with devolved planning at the catchment level getting a balance of central and local control. This is an example of an approach that considers environmental factors as a part of decision-making (e.g. carbon is embedded in decision making process for construction of water infrastructure). The National Water and Sanitation Plan guides investment planning for the development of water resources and the delivery of water and sanitation. A set of integrated functions are responsible for developing national strategies and procedures for the reconciliation of water resources, as well as the requirements to meet national social and economic development objectives. It is recognised that there have been resource challenges in South Africa.

In Israel there is a functional central planning body that is integrated with the regulator, which provides a working example of a centralised body that is responsible for planning across geographic levels of the sector<sup>84</sup>. The Ministry of Energy and Water sets policy and an inter-agency Water Authority is responsible for planning and regulating the water and sewage sectors, whose responsibilities include a 40-year Master Plan updated every 5 years, determination of allocations,

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<sup>83</sup> <https://www.dws.gov.za/iwrrp/>

<sup>84</sup> [https://www.gov.il/he/departments/about/about\\_water\\_authority](https://www.gov.il/he/departments/about/about_water_authority)

and tariffs. Israel's approach also notes that price signals can be insufficient to guide plans. The value of water is not enough on its own for markets to operate effectively at regional and national level, nor for all participants across sectors for whom water is a larger or smaller proportion of profit drivers. This requires a higher degree of intervention in the determination and enforcement of water allocations, rather than relying on the effectiveness of market forces (principle 4).

It is also worth noting an example from pre-privatisation of the water industry in England and Wales. The Water Resources Board (WRB) was a fairly short-lived national planning body dedicated to water resources management in England and Wales. In their first Annual Report, the WRB described itself as "the master planner of water resources in England and Wales", there were many at the time who felt that the water supply landscape did not necessarily lend itself to national planning. In 1971, the Director of WRB Planning conceded that large areas of England and Wales were best served by local planning of water resources. The WRB only had limited advisory authority and was not well placed to reconcile local issues with national policies for domestic, industrial or agricultural growth.

## 6. *Cost allocation and efficiency*

The planning process does not necessarily assign or align costs appropriately, particularly in how costs incurred in one region would result in benefits in another. Additionally, in relation to principle 1, significant investment can risk being deferred, leaving a gap in investment in the mid-term, challenging the balance between short and long-term costs.

Two examples that show different aspects of cost allocation and efficiency are:

The Kielder Water reservoir scheme in Northumbria, was completed in 1982 and is one of the largest man-made lakes in Northern Europe. It was the first example in the UK of a 'regional water grid' but has been described by many as a 'white elephant' as it sat more or less unused for 20 years, and today is still not used to its full potential. Kielder Water was conceived in the 1960's by the Northumbrian River Authority with support from the Water Resources Board. The Water Resources Board set out plans to create large inter-basin transfers and potentially a national water grid (modelled on the electricity grid). The Kielder Water scheme was promoted on the basis of the industrial expansion of Teesside which never materialised. The construction and subsequent operating costs were centrally funded, and the industrial customers for whom the infrastructure was originally intended were not required to input any costs. The associated debt that was incurred during a time of rapid inflation and high interest rates with lack of return on that investment, had serious implications for the management of water in England at the time. The water industry was subsequently privatised in 1989, with financial regulation and far greater scrutiny on expenditure.<sup>85</sup>

One of the potential advantages of taking a systems perspective to water resources is the potential to drive down costs of interventions by identifying funding streams that correspond to all of the benefits of a particular intervention. Flood prevention projects routinely draw on different revenue streams where particular assets are protected from flooding (e.g. the Environment Agency funding requirement may not be met for a scheme, but by augmenting funding from other sources such as local government then schemes may be viable). An important precedent for drawing on multiple revenue streams for a single intervention was the collaboration between the Ministry of Transport and Huddersfield Water Authority who built the Scammonden Dam, in 1970, to supply water for Huddersfield and provide a route for the M62, thereby making both projects economically viable.

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<sup>85</sup> <https://britishdams.org/2006conf/papers/Paper%2010%20Mcculloch.PDF>

## 7. Commercial incentives

Examples where commercial incentives are well aligned between are the exception not the norm, and rely on bespoke arrangements. The current framework does not support this systematically or create conditions for large investment in such multi-sector schemes. Commercial incentives cannot always be aligned to common outcomes, for instance where, in a period of scarcity, consumption by one party impacts commercial drivers (or erodes acceptable risk) for another. When there is a requirement to move water from an area of surplus to one of deficit, local commercial alignment will be required. There is a risk that multi-sector collaboration principles not backed up by contractual arrangements may become difficult to enforce (principle 4 – effective markets).

An example where alignment exists include Cumbria, where Nestle, United Utilities and Iggesund paper mill all work with farmers to enhance the landscape and increase the resilience of their milk, water and box-board supply chains<sup>86</sup>. Iggesund pays farmers to produce willow coppice which is sited in locations that enhance water quality which they need for their mill and also benefits United Utilities, the water company. Nestle works with farmers to enhance pasture productivity and reduce nutrient runoff, also improving water quality. Forestry and soil interventions also reduce flood risks which are a threat to local businesses and communities.

Most water resources schemes do not yet have the clarity routinely found in power, regarding capacity, utilisation, and a full set of incentives and rights. Commercial incentives for SROs will need careful consideration of the balance of revenue and asset value through supplying company, conveyers (where relevant), CAPs under DPC, and receiving (and benefiting) company.

There is a potential consideration to review existing and potential future arrangements and ‘stress test’ their robustness against a framework for commercial incentives. This would have the value of identifying commercial incentives at an early stage of planning for major infrastructure investment through the SROs, before there are significant sunk costs.

## 8. Merit order

There is a limited merit order in place (i.e. who has precedence over water use), through the Water Resource Act, including the treatment of Drought Orders and the Civil Contingencies Act, and previous proposals have been made for increasing flexibility regarding allocation of water.

However, there is a potential consideration to expand this to: Include a wider range of water users from all sectors; Increase applicability to the planning stage (from its current operational focus); Consideration of proportional reductions across water user groups, as well as absolute cut-offs in times of scarcity; and clarification of responsibilities for setting and maintaining the merit order.

Including a clearer merit order would benefit planning for different supply and demand scenarios. For instance, helping to articulate the risk and estimate the economic impact of applying merit-order based reductions to the full range of water users, as an alternative to the cost of investment to avoid restrictions.

As a parallel, the UK power sector has a clear process through the Low Frequency Demand Disconnection (LFDD) arrangements, part of the Grid Code, for what demand is disconnected during a period of under-supply. There is also the Electricity Supply Emergency Code, which sets out how electricity is to be used during periods of emergency, including priority access for Protected Sites

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<sup>86</sup> <http://www.3keel.com/wp-content/uploads/2018/01/healthy-ecosystems-cumbria-lens.pdf>

such as hospitals and airports. “In the event of an emergency, ESEC enables an equal distribution of electricity supply to customers as far as reasonably practicable, whilst ensuring that pre-designated Protected Sites maintain supplies for as long as possible.”<sup>87</sup>

However, alignment between planning and operation in practice is an important consideration. Despite the merit order present in power, there are examples where this has not delivered in practice. In August 2019 two large generators simultaneously went offline. The LFDD was enacted and for the most part worked as expected. However some essential services were not prioritised – for example Newcastle Airport lost supply for 18 minutes until its back-up generation capabilities could be utilised, and some DNOs disconnected sites that were providing important grid services<sup>88</sup>.

## 9. Roles and risk allocation

Risk should be managed by organisations with appropriate capability and strategy for the role they are mandated. Different actors have different tolerances of accepting residual risk. Regional planning groups are currently primarily a coordination function, enabling collaboration across different sectors and companies. There is a potential consideration to develop appropriate blends of risk management strategy and allocated responsibilities to organisations with the capability to manage the risk they are allocated. The four-fold categorisation of risk management: controlling, capitalising, collaborating/pooling and accepting risk is useful in identifying different comparative advantages of different actors across the water resource and environmental systems.

Coordination of multi-sector systems requires that the comparative risk management strategies and capacities of different sectors is accommodated. The power industry or manufacturing such as paper mills have a low tolerance of variable supplies and therefore seek to control their resources with secure water rights. Other sectors such as canals have a higher risk tolerance (accepting that navigation ceases during the 1 in 20 year drought). Agriculture is a diverse sector with relatively little capacity for complex risk analysis related to water resources and the tolerance of risk differs from one part of the sector to another (tolerance of failed water resources is very low in the livestock or protected cropping sectors, but may be higher elsewhere). There is a potential consideration for coordination mechanisms to accommodate the diversity of organisational risk strategies, capacities and risk tolerances that are needed for a genuinely multi-sector approach. Designing coordination arrangements that acknowledge the plurality of approaches to risk across different sectors will create a coordination mechanism that is fit for purpose.

Defra’s report “Systems analysis for water resources” categorised different approaches to managing risk that are appropriate to different challenges in a complex system and reflect respective strengths of different actors in the water and environmental sectors:

- ▶ Engineers and regulators have strengths in controlling risk through the provision of infrastructure or the establishment of regulations that limits or directs the way a system operates.
- ▶ The private sector has an ability to capitalise and mitigate risk, taking advantage of the opportunities that risk creates to drive innovation and achieve a profit by handling risk more effectively than other actors.

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<sup>87</sup> Electricity Supply Emergency Code, paragraph 1.2

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/995049/esec-guidance.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/995049/esec-guidance.pdf)

<sup>88</sup> Ofgem 9 August 2019 power outage report

<https://www.ofgem.gov.uk/publications/investigation-9-august-2019-power-outage>

- ▶ The third sector has comparative advantages in pooling risk, in enabling collective action to share problems and achieve collective benefits.

Much can be achieved through a combination of the public and private sectors where regulations for a market are established by government and private sector actors seek innovative ways to produce the intended outcomes as efficiently as possible. Systems with fewer variables such as infrastructure procurement can be optimised through controlled markets of this type. More complex multi-dimensional systems like catchments have too many variables to be optimised in this way – interventions in these systems are likely to have externalities that mean that optimising them for one objective comes with significant costs, undermining their performance in other functions. The comparative advantage of using a blend of approaches to complex problems has been discussed above with respect to the complementarity of CaBA and the WFD in addressing catchment problems.

The participatory element of CaBA is capable of mobilising collective action across a catchment that balances the different objectives of the actors represented in the catchment partnership. This is a risk pooling approach, which aims for a clear measurable set of objectives reflecting an approach more aligned with controlling risk. A relative gap in the approach to management of catchments is the role of the private sector in effecting major change in catchments.

Defra's report describes the relative strengths of different actors with respect to flooding and catchments. The Environment Agency's asset management team determine what infrastructure is required in a catchment (risk control). They commission private sector actors to implement flood control infrastructure (risk capitalisation). By contrast a catchment partnership comprising a network of third party organisations is able to undertake landscape level interventions such as natural flood management that pool risk among the actors. While the catchment partnership is able to mobilise a broad collaboration around a collection of benefits (flood control, nature recovery, carbon sequestration, public value) in a way that is beyond the ability of the private sector, it does not have the same capacity in capitalising risk for major interventions. The flood partnerships provide an interesting hybrid between these approaches being led by the Environment Agency thereby bringing greater capacity to implement measures at scale, but also comprising a partnership element that mobilises collaboration around a shared objective.

### **10. Legacy abstraction rights**

Legacy abstraction rights (and other contracts including bulk transfers) could be treated in broadly two ways in the planning process:

- i) As constraints around which plans need to be constructed, which risks a sub-optimal plan (principle 1).
- ii) As options open to review, though this would present a requirement for changes to licence and other legal arrangements that could present implementation challenges (principle 6).

Additional considerations include:

- ▶ Retaining headroom in permitted abstraction to manage during drought (e.g. agriculture) or provide investment confidence (e.g. manufacturing) – see for example: NFU reaction to the Environment Bill's proposed squeeze on abstraction rights ([nfuonline.com](http://nfuonline.com)).

- ▶ The status of rights in relation to unused abstraction licences, including ability to trade for a different purpose. As an example, RWE has indicated to Ofwat that it is engaging with water companies and the regional planning groups to maximise the use of unused water allocation and explore option for cross sector water sharing. The company has successfully entered into a dynamic water sharing agreement with Thames Water and is seeking other opportunities via a bilateral market option.<sup>89</sup>
- ▶ The interaction in planning scenarios in times of scarcity between managing legacy rights (based on absolute volumes) and future allocations (that may be a proportion of capacity).

Potential considerations include updates to the planning framework to include a consistent approach to treatment of legacy rights, a challenge process to enable planning groups to explore constraints, and an approach to the legislative and legal changes to existing rights to support changes from absolute entitlements to proportional and dynamic rights. These steps could help to provide confidence that plans represent best value through making use of all available resources.

## 11. Data

Data is needed to enable effective planning and other activities (e.g. contract enforcement) at the right level of granularity. Current industry processes to data sharing may not deliver future system needs. Gaps in data availability and quality will make it difficult to maximise system benefits and evidence planning decisions and analysis (principle 1). Approaches are emerging organically, for example, Yorkshire Water has partnered with the Open Data Institute to publish data related to water resources, consumption and leakage amongst others<sup>90</sup>. Data solutions may need to be “designed” and hence owned at a system level.

Where data sharing is established at regional levels, interoperability between water regions and alignment with national water resource modelling to guide SRO decision making will be a key factor.

Where data is pooled into common ownership, protocols for responsibility and liability for accuracy will need to be established in relation to planning and investment decisions.

There may be consideration of a role to facilitate the availability of data for future planning, and to enable third parties to participate where they have solution options. This will require 1) the necessary data policies, standards and infrastructure to capture and disseminate information, 2) support and participation from all sectors, consumers, planners and operators, 3) sufficient granularity to guide decision-making, which may vary between lifecycle stage, regions and levels.

Internationally, in Israel, availability of data at a national level is managed through a dedicated unit within the Water Authority. In Texas, The Water Development Board is responsible for collecting data to prepare the state flood and water plan, and administering cost-effective financial programmes<sup>91</sup>. In California, the state Water Plan takes an integrated approach to water resource management and seeks to align agencies across jurisdictional boundaries to ensure greater collaboration and efficiency in addressing the water challenges, including a consistent approach to the management of data<sup>92</sup>.

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<sup>89</sup> [https://www.ofwat.gov.uk/wp-content/uploads/2019/06/RWE\\_Redacted.pdf](https://www.ofwat.gov.uk/wp-content/uploads/2019/06/RWE_Redacted.pdf)

<sup>90</sup> <https://www.yorkshirewater.com/about-us/open-data/>

<sup>91</sup> <https://www.twdb.texas.gov/publications/shells/RegionalWaterPlanning.pdf>

<sup>92</sup> [https://www.ppic.org/content/pubs/report/R\\_314EHR.pdf](https://www.ppic.org/content/pubs/report/R_314EHR.pdf)

## 12. Expertise, knowledge and capacity

The majority of skills for water resource planning sit in the water industry and the Environment Agency for water supply and flooding respectively.

This creates potential considerations of:

i) Increasing experience and capacity to support other sectors (for example agriculture and power) and their needs (principle 5).

ii) Sharing experience across drivers of water supply and flooding, for overall outcome (principle 3). For example, by managing both drivers at a lower level within the planning framework than currently, as happens in multiple international case studies.

There is also a potential consideration for phasing planning activity so that expertise that is available is best utilised and not overloaded by overlapping planning cycles.

## 13. Public interest

Large water resources schemes, alongside other major infrastructure, attract considerable public interest. This helps to provide a wider range of views and important considerations into the options development and detailed design processes. For example, the South East Strategic Reservoir Option is recognised as part of the solution to water scarcity, but faces organised opposition.<sup>93</sup> Other sectors such as offshore wind have found planning consents increasingly challenging to obtain in recent years.

To support the planning application process, potential considerations could include: a) Development and promotion of a narrative to build public support for investment, which could reference the national situation to provide context for local discussions, and b) Involvement in the wider reforms to Development Consent Orders (DCOs) being undertaken by the Ministry of Housing, Communities and Local Government (MHCLG), recognising the strategic value and essential nature of water resources infrastructure.

## 6.2 Procurement & Delivery

### 6.2.1 Current and emerging arrangements for procurement and delivery

#### 6.2.1.1 National

##### *Water Supply*

***There are no procurement or delivery options expected at a national level for water supply.***

##### *Flood Defence*

*The Environment Agency as a national body procures and manages delivery of flood defences to deliver the Flooding and Coastal Erosion Risk Management programme. Under its Next Generation Supplier Arrangements, there are six regional hubs in a Collaborative Delivery Framework, each with an engineering consultant and construction delivery firm. These arrangements cover the majority of*

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<sup>93</sup> <https://www.abingdonreservoir.org.uk/>

the programme<sup>94</sup>. An example project delivered through this arrangement is the Boston Barrier flood gate.<sup>95</sup>

### 6.2.1.2 Regional

*There is no whole-system body to procure solutions at a regional level.*

#### *Existing bulk transfers*

There are a range of contracts and statutory arrangements for existing bulk transfers between adjacent water companies, some of which span regional boundaries. These bulk transfers were reviewed in 2020 by NERA for RAPID to evaluate the potential for standardisation of contracts and other potential improvements.<sup>96</sup>

#### *Inter-regional Strategic Resource Options (SROs)*

Some of the proposed Strategic Resource Options involve inter-regional transfers over two or more planning regions (for example the Severn to Thames transfer). Ofwat allocated additional funding in the final determination for companies to collaborate to investigate and develop integrated strategic regional water resource solutions to be construction-ready during AMP8. Procurement of the majority of SROs is expected to be through Direct Procurement for Customers (DPC), with competitively appointed providers (CAPs) bidding for some or all phases of funding, delivery and operation. DPC is a procurement model for competitive tendering services for the delivery of large infrastructure projects, outside of a water company's normal contractor framework arrangements. Ofwat intend that the process of competitive tender can achieve greater benefits through more innovation and lower costs. A DPC type model was first used in the water sector on Thames Tideway and several schemes were proposed at PR19. Ofwat recently modified the licenses of five water and sewerage companies to allow for DPC to take place and for Ofwat to be able to regulate DPC projects.<sup>97</sup>

### 6.2.1.3 Within-Region

#### *Within-Region SROs*

As well as the inter-regional SROs, the within-region SROs (to develop supply resources) are also expected to consider Direct Procurement as a procurement and delivery route.

#### *Water Companies*

Water companies procure and manage delivery of solutions within their operating area, typically through a combination of long-term framework agreements (Anglian Water's @one Alliance is one example<sup>98</sup>) and stand-alone tenders for large and complex delivery.

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<sup>94</sup> <https://www.gov.uk/government/news/environment-agency-announces-new-green-legacy-for-26bn-flood-and-coastal-risk-management-programme>

<sup>95</sup> <https://www.gov.uk/government/news/boston-barrier-flood-gate-fully-operational>

<sup>96</sup> <https://www.ofwat.gov.uk/publication/nera-economic-consulting-report-review-of-bulk-supply-contracts-and-pricing-in-the-english-welsh-water-sector/>

<sup>97</sup> <https://www.ofwat.gov.uk/regulated-companies/markets/direct-procurement/direct-procurement-for-customers/>

<sup>98</sup> <https://www.onealliance.co.uk/>

### ***Bid Assessment Framework***

Water companies also each run a bid assessment framework that advertise requirements for water resource solutions (supply, demand and leakage management) and invite bids from third parties to provide services.<sup>99</sup>

### ***Reverse Auctions***

Auction platforms are an emerging route for water companies to procure multi-sector catchment management solutions. Entrade<sup>100</sup> has established an online auction for farmers to deliver environmental benefits. They developed a proof of concept with a project that removed 40 tonnes of nitrogen from the Poole Harbour catchment each year at 30% less cost than building a new wastewater treatment works. Entrade has implemented the approach to other parts of the country, supporting clients to procure other environmental results in other catchments. Other examples exist such as NaturEtrade<sup>101</sup>, specialising in reverse auctions for natural flood management.

### ***Catchment Based Approach (CaBA)***

The Catchment Based Approach is an NGO led stakeholder engagement and coordination mechanism that mobilises funding and coordinates procurement and delivery. Funding decisions are made at the catchment level by a collective group of interested parties, and is ultimately funded through blend of private and public finance.

### ***Landscape Enterprise Networks (LENs)***

LENs are Network to create business value from healthy landscapes, where funding decisions are made through a coordinated landscape group. There tends to be more private investment in solutions.

### ***Internal Drainage Boards (IDBs), Local Authorities and Canal and River Trust***

Each of these bodies procure and manage delivery within their areas and for their assets. Smaller bodies, including some of the IDBs<sup>102</sup>, can use associated organisations to help manage procurement, for example local councils. Larger bodies including the Canal and River Trust<sup>103</sup> run their own delivery framework contracts at national and regional level.

### ***Farmers / Landowners***

Growers dependent on abstracted water are increasingly working together in catchment abstractor groups to manage their water requirements as a collective. These groups allow farmers to set up informal water sharing arrangements, agreeing on the timeframes over which different farms will abstract water. Abstractor groups are in much stronger positions to negotiate water management solutions with the Environment Agency, but also in the future will be more like to secure financial support for building reservoir schemes that serve multiple users. Sharing schemes give local flexibility, and the interface between markets, blended finance schemes and sharing arrangements is

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<sup>99</sup> <https://www.ofwat.gov.uk/regulated-companies/markets/water-bidding-market/company-bid-assessment-frameworks/>

<sup>100</sup> <https://www.entrade.co.uk/>

<sup>101</sup> <https://nfmea.sylva.org.uk/>

<sup>102</sup> <https://ted.europa.eu/udl?uri=TED:NOTICE:422253-2019:TEXT:EN:HTML>

<sup>103</sup> <https://ted.europa.eu/udl?uri=TED:NOTICE:606002-2020:TEXT:EN:HTML>

currently an evolving process. There is some exploration of new approaches to water trading on a peer-to-peer basis.

## 6.2.2 Potential considerations for procurement and delivery

### 1. Roles and risk allocation

There are three potential considerations relating to uncertainty on roles for procurement of solutions delivered by, or benefitting, multiple parties. These are described below.

The overriding risk relates to principle 5 (assignment of roles, rights and risks) and principle 1, that cost allocation is not assigned to those who benefit, on the principle that the procuring body pays. In principle there are two options to consider: 1) Creation of new bodies for procurement that represent the interests of all parties, or 2) Development of accompanying contracts that either subdivide the work or transfer risk, costs and benefits between a lead procurement organisation and the other parties

The first consideration relates to procurement of SROs that comprise transfers spanning multiple water companies. Assuming that this uses the DPC route, the ownership of procuring the CAP is evolving thinking, but not yet set (in part as the proposals are subject to the gated review process, so not yet approved). The multi-party nature includes supplying water company, receiving water company, and in some cases conveying party (either another water company or a river or canal manager). This means there are multiple options for individual parties or combinations to own the procurement. Potential considerations could be either: a) Appointing a lead party among the group (with accompanying contracts to transfer costs, risks and benefits) or b) establishing a joint special purpose vehicle. The UU-Severn Trent-Thames paper from 2017 considers the role of joint ventures including development responsibilities for interconnectors. This model is considered more fully under Section 3.4 for Operations.

From a delivery perspective there are a range of models to consider. One example for major and systems-oriented infrastructure is the Institution of Civil Engineer's Project 13 framework<sup>104</sup>: The outcomes for the ultimate customer are the driver for the work. The project is delivered by an enterprise, led by the asset owner. The enterprise is made up of integrated and collaborative teams of partners and suppliers with each organization delivering according to its capacity and with an emphasis on digital collaboration.

Development of Glasgow's Smart Canal (North Glasgow Integrated Water Management System<sup>105</sup>) was procured under a multi-agency strategic drainage partnership that included Scottish Water, Glasgow City Council, and Scottish Canals, and uses this digital approach to manage flood risk and support economic regeneration.

The second set of considerations concerns procurement of multi-sector solutions, typically at catchment level. At August 2021, RAPID and other parties are procuring support to develop a commercial and legal model for multi-sector reservoir systems. The potential considerations include:

Firstly, there is no underlying set of common principles on who procures (and pays for) the full range of solutions across sectors. There is a risk of too much flexibility at local levels, with a range of actors assuming different roles based on gaps for their situation (criteria 5.3), leading to varied outcomes

<sup>104</sup> <https://www.project13.info/about-project13/>

<sup>105</sup> <https://www.scottishwater.co.uk/About-Us/News-and-Views/2021/05/280521-Glasgow-Smart-Canal-Award>

and misallocation of costs (criteria 1.2 and 1.3) and risk (5.1). It is recognised that this flexibility also presents an opportunity that this arrangement enables the emergence of best practice. Willingness to bear the risk varies by participants: Established water companies may feel comfortable doing so, others (e.g. NGOs) may not. The consideration is that while there are examples of organic development of arrangements, where this has not happened (for example due to lack of resources, alignment, or risk appetite) there could be a need for a recognised framework to coordinate parties.

Secondly, there is a lack of a common framework for aggregation of requirements in agriculture, power and other industries, with variation in risk appetite and hence lower buying power. The LENS model can be used as demand and supply aggregator, but private sector engagement at the catchment level can be a challenge. By contrast, demand aggregation is increasingly common in power, with specialist aggregators capable of pooling the resources of multiple smaller generators and industrial demand users to offer services to balance the grid. These are typically short-term services (e.g. reducing demand for 30 minutes) though the commercial contracts can set out the terms of the provision of these services for multiple years. This is potentially more challenging in water due to the longer-duration of supply-demand imbalances, and the greater reliance on local geographic proximity.

The third potential consideration is that, beyond examples of local catchment collaboration, there is, more generally no whole-system body to procure solutions at a regional level.

Helm's papers on catchment system operator (2015<sup>106</sup>, 2019<sup>107</sup>) propose a regional body with responsibilities including procurement and coordinated delivery of a catchment plan. This could provide independence from delivery and operations and provide benefits from a systems-based procurement, including aggregation of demand to buy at scale, and ability to deliver across multiple sectors through one solution. It would require significant institutional and regulatory reform. A parallel is the arrangement in France, where regional Water Agencies redistribute funds to support local investments in water resources.

It is relevant to highlight how the role of the Electricity System Operator (ESO) has evolved and continues to evolve given the needs of the electricity system in GB. The current policy direction of travel is to carve out the ESO in its existing form into a Future System Operator<sup>108</sup>, that could parallel arrangements in the US energy system.<sup>109</sup> The ESO procures increasingly complex services from the market to manage the national grid, including various levels of frequency response, reserve services, and system security services. At a regional level, Distribution Network Operators are increasingly undertaking System Operator type-functions, including going to market to procure flexibility over multiple years that can be used instead of capital-intensive solutions.<sup>110</sup> These regional solutions are developing relatively organically, leading to rapid innovation and trialling of new approaches. However this decentralised approach can also lead to uneven usage and inefficient outcomes in some regions.

## 2. Funding models

The lack of clear procurement bodies (in addition to uncertainty over requirements and future usage levels for new assets) creates uncertainty on funding models. This has the potential to create risk

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<sup>106</sup> [http://www.dieterhelm.co.uk/regulation/regulation/the-systems-regulation-model/#\\_ftnref1](http://www.dieterhelm.co.uk/regulation/regulation/the-systems-regulation-model/#_ftnref1)

<sup>107</sup> <http://www.dieterhelm.co.uk/assets/secure/documents/Catchment-Management-Abstraction-and-Flooding.pdf>

<sup>108</sup> <https://www.gov.uk/government/consultations/proposals-for-a-future-system-operator-role>

<sup>109</sup> <https://www.ofgem.gov.uk/electricity/transmission-networks/gb-electricity-transmission-network>

<sup>110</sup> For example, see <https://smartgrid.ukpowernetworks.co.uk/flexibility-hub/>

premium in bidding for solutions, where solution providers may include higher than needed contingency in their prices to guard against the risk that capital finance cannot be provided at an attractive rate (principle 4: transparent, efficient markets).

The development of funding models for catchment and landscape based interventions is an area of active innovation. In the discussion above we identified the challenge of aggregating small scale interventions up to the kind of scale of interest for private sector engagement. Aggregation is needed in two ways, firstly where a single objective has been identified for a catchment and a wide range of actors are mobilized to achieve that objective -as evidenced in the Entrade example in Poole Harbour above. Water companies are increasingly taking up this kind of approach to achieve catchment objectives. Secondly there may be a need to aggregate demand for catchment outcomes in which case there is a need to bring together different actors to purchase outcomes from a market. The Landscape Enterprise Network model involves both demand and supply aggregation. Catchment groups come together to identify a range of objectives for auctions. The Greater Manchester Combined Authority has established a Natural Capital fund that is supporting the implementation of a diverse range of projects. The model seeks to operate with a range of procurement methods including grants, equity, concessionary and commercial debt.<sup>111</sup>

United Utilities CaST programme is also interesting in its approach to procurement. Recognising the benefits of grass-roots and third party collaborations for catchment outcomes they have established a fund for community and environment groups to implement environmental projects in river catchments. This method harnesses the creativity of small-scale interventions mobilising larger numbers of smaller organisations who, on their own, would not have capacity to bid to deliver specified results. In this model UU retain the risk against overall outcomes but achieve less secure benefits in an effective manner. This type of action influences culture and behaviour change which contributes more broadly to water resource resilience. The programme has a long-term strategy to develop organisations at catchment level with collaborative catchment system operators led by catchment commissioners brokering projects and trading of ecosystem services.

Internationally, the Sites Reservoir is a proposed \$5 billion reservoir in the Sacramento Valley of northern California, to be built by the California Department of Water Resources and operated by the California SWP. A proportion of the reservoir would be funded by the State with the remainder provided by water districts or agencies (of the 30 agencies the majority are agricultural, notably for high value crop producers, and some urban). In 2018, the State Water Commission awarded \$800 million of the \$2.7 billion voter-approved bond money for water supply projects in California. This is half the amount that the project was seeking from the state, which may reduce the final scale of the reservoir unless the additional funding can be secured from an alternative source, potentially including federal loans. 75% of the remaining funding will need to be secured before the state bond will be released but backers remain confident that the project will begin in 2023 and complete in 2030. The state fund equates to some 16% of the project costs and is being provided in exchange for rights to 9% of the yield per year to meet environmental needs. The remaining water would be allocated to each water agency that commits funding to the construction in proportion to the amount invested.

### **3. Commercial incentives**

There is a complex set of commercial incentives to manage in developing procurement strategies, including returns on new asset value, future revenue opportunities from water resource transfers,

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<sup>111</sup> <https://naturegreatermanchester.co.uk/project/greater-manchester-natural-capital-investment-plan/>

direct contribution of water to current profit (e.g. growing crops, producing paper), and accounting for the risk of reducing resilience by exporting water.

There may be a consideration here for development of whole system incentives to align participants. The power sector uses a wide range of different commercial models for large network infrastructure assets depending on their use and ownership. This includes cap and floor interconnection, competitive OFTO processes and (to come) onshore competition. Each of these includes numerous requirements around asset availability, demand forecasting (with incentives for accuracy), and access timing and rights. Water faces all of these challenges and more, including lower meter penetration and variability in input quality. It is recognised that it may not be possible to align incentives in every situation, but that whole society benefits may outweigh costs.

#### **4. Data**

There are two aspects related to the availability and transparency of data as it concerns procurement:

1) Provision of bidders with a level playing field. Given the emerging nature of many solutions, and the relatively small number of participants, this extends beyond the formal process to include earlier involvement in development of solutions. As a consequence there is a risk that potential delivery partners may preclude themselves from early stage development in order not to be conflicted from the larger opportunity to support later stage delivery (principle 4, markets). This is not unique to water resource development.

2) Data availability between procurer and deliverer (both ways) has implications for the ability to effectively manage risk to deliver the overall system outcome (principle 5, allocation of risk).

There is a potential consideration in providing open access to required data to increase levels of collaboration and innovation in procurement and delivery.

#### **5. Complex interfaces**

Heterogeneous challenges and solution types at landscape/catchment level create a challenge to aggregate demand and solutions. There are risks that definition of requirements may either become too general as to miss targeted niche opportunities, or too sub-divided as to miss synergies. This is particularly relevant in the context of full use of a natural capital framework, for example in the interplay with land-use.

The ongoing development of common languages and indicators with comparable forms of valuation across different capitals and the uptake of a systems perspective is enabling the management of these complex interfaces.

In particular, there is scope for further development of practice for nature-based solutions to demonstrate value for money for the plurality of benefits they provide. The use of participatory systems mapping and similar approaches to handling the complexity of attribution of benefits to this type of project is significant and merits further support, and could be supported through government and regulator to develop common frameworks.

There are also important examples where multiple benefits of infrastructure has been articulated with standardised indicators such as the analysis of the contribution of the Boston Barrier to achievement of the UN Sustainable Development Goals.<sup>112</sup>

## **6. Expertise, knowledge and capacity**

Also a potential consideration for procurement and delivery is the range and availability of skills for concurrent delivery of SROs (e.g. reservoirs, regional transfers, treatment plants, etc). The nature of the works requires specialist knowledge and experience, and availability may be constrained if multiple large scale infrastructure projects are to be delivered in succession. The SRO schemes are expected to engage early with the market but will require certainty in order to do so.

## **6.3 Operation**

### **6.3.1 Current and emerging arrangements for operations**

#### **6.3.1.1 National**

There are no national-level operations in current or emerging arrangements.

#### **6.3.1.2 Regional**

##### ***Bulk transfers***

Bulk transfers between water companies exist between adjacent regions as well as within-regions between adjacent water companies. They represent c. 4% of total water volume into supply, with the majority of investment having been placed on within-supply area infrastructure. Operation is managed between the adjacent water companies, according to the bulk supply agreements (which vary in form, as noted above). An important consideration for managing transfers in times of scarcity is that adjacent regions may be in similar positions regarding availability of water.<sup>113</sup>

##### ***Inter-regional Strategic Resource Options***

Operation of inter-regional SROs will involve supplying and receiving water companies, some will involve conveying parties (water companies and canal and river managers), and competitively appointed providers (CAPs) under DPC. Arrangements for operations are developing as the SRO plans progress.

There are requirements for managing variations in water quality and environmental impact, and operational considerations include modes of operation encompassing ability to ramp-up and down volumes to respond to changing demand, operate in a standby mode, be securely mothballed to allow for future use, be ready in a “hot standby” mode for near-term use and provide low volume sweetening flows to maintain water quality. These are considered as inherent to the design and operation of transfers, rather than barriers to their delivery.

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<sup>112</sup> <https://www.icevirtuallibrary.com/doi/full/10.1680/jcien.20.00069>

<sup>113</sup> <https://www.ofwat.gov.uk/regulated-companies/markets/water-bidding-market/water-trading/>

### *River regulation schemes*

The majority of major rivers in the United Kingdom are regulated directly or indirectly by impoundments, transfers, pumped storage reservoirs or groundwater abstraction. The Dee Regulation Scheme is a good example of river basin management to meet multiple requirements including downstream abstraction for public water supply, flood management, fisheries, recreation and hydropower. The Dee Regulation Scheme is managed by a consortium of United Utilities, Welsh Water and Severn Trent Water, together with the Canal and River Trust and Natural Resources Wales. Major abstractors and river interests are represented on a Consultative Group, established under an Act of Parliament. The scheme relies on storage of water in Welsh reservoirs which is released to the River Dee to maintain flow requirements downstream. The Natural Resources Wales and the Environment Agency manage the flows and operate the scheme.

Flows in the River Severn are also regulated, and the Environment Agency is responsible for balancing the needs of water users with the protection of the Environment. The Act of Parliament supporting the construction of Llyn Clywedog reservoir included a minimum flow requirement for the River Severn, which must be maintained by releases from the upstream reservoir, along with inputs from Lake Vyrnwy if required. Water levels, flows and abstraction must be closely monitored by the Environment Agency in conjunction with major water abstractors, notably Severn Trent Water and South Staffordshire Water.

### *Environment Agency and Third Party Transfers*

The Environment Agency and other third parties, including the Canal and River Trust and navigation authorities own and operate multiple existing inter-regional and within-region transfer schemes. Ongoing operational costs for these schemes are generally funded through existing abstraction licence arrangements where the beneficiary abstractor pays an additional 'supported' element of their abstraction licence fee.

The Trent-Witham Ancholme River Transfer is an example of a scheme that transfers water from the River Trent in the Midlands region, via multiple pumping stations and rivers, to support abstraction and meet demand for public water supply and agriculture in the Anglian region. In this instance, whilst Anglian Water has an agreement in place with the Environment Agency<sup>114</sup>, under Section 20 of the Water Resources Act 1991, this does not provide any guarantee of supply and the water is provided as far as is reasonably practicable. The Environment Agency is responsible for maintenance and operation of all related infrastructure and apparatus being operated to supply the water.

The Ely-Ouse Essex Transfer scheme is an example of a within region transfer that is included within an Act of parliament (Ely Ouse Essex Water Act 1968)<sup>115</sup>. This scheme transfers surplus water from the Ely Ouse at Denver in Norfolk, via a series of pumping stations, tunnels and rivers, to Essex where it is abstracted to fill reservoirs owned and operated by Essex and Suffolk Water. The construction of this scheme also incorporated a Fens flood protection scheme at Denver, through construction of the Cut Off Channel.

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<sup>114</sup> <https://www.anglianwater.co.uk/siteassets/household/about-us/aws-final-drought-plan-2019---appendix-1.pdf>

<sup>115</sup> <http://environmentdata.org/archive/ealit:4162/OBJ/20003164.pdf>

### **6.3.1.3 Within-region**

#### ***Water company operations***

Water company operations comprise the abstraction, storage, treatment and distribution of water, and (for water and sewerage companies) the collection, treatment, discharge (and proposed reuse in some instances) of waste water. Typically, they manage operations through system control functions that forecast demand and utilise different sources and network management options to meet demand. This can include bulk transfers within region between adjacent water companies.

#### ***Within-region water company collaboration***

There are examples of water company water resource sharing arrangements that written into Acts of Parliament, for instance the River Medway Scheme between Southern Water and South East Water. Under the terms of the original Medway Water (Bewl Bridge Reservoir) Act, the allocation of water from the scheme is defined for each company and they work together to define the yield and operation.

Water companies also coordinate between themselves and other sector participants to deliver a range of catchment solutions including changes to land-use. These may be procured for specific objectives such as reverse auctions as described above, or through a more comprehensive approach supporting the development of catchment management activities as with the United Utilities CaST programme.

#### ***Water company operating agreements***

There are examples of operating agreements between water companies and the Environment Agency, such as the Lower Thames Operating Agreement (LTOA) which is set out as a “Section 20 Agreement” under the Water Resources Act 1991. The agreement regulates the licensed abstraction of water from the lower River Thames and provides a management framework for operational decisions ensuring sufficient environmental flow passes over Teddington weir relative to the prevailing reservoir storage for public water supply. The LTOA relies on close monitoring of river flows and reservoir levels to set abstraction rates, with daily liaison between the Environment Agency and Thames Water.

#### ***Environment Agency flood defence operations***

The Environment Agency has strategic overview of all sources of flooding and coastal erosion (as defined in the flood and Water Management Act 2010). The Environment Agency is also responsible for associated flood and coastal erosion risk management activities on main rivers and coast, including delivery of projects to manage flood risks.

#### ***Local authority land-use and watercourse management***

The Lead Local Flood Authorities (LLFAs) are county councils and unitary authorities, and they are responsible for managing local flood risks from surface water, groundwater and minor watercourses. The LLFAs carry out works to manage local flood risks in their areas and work closely with the Environment and other risk management authorities.

### *Internal Drainage Board management of water levels*

IDBs manage water levels for flood-risk, agricultural and environmental needs. They do this through management and operations of watercourses and infrastructure including pumps and weirs. Some are also responsible for watercourse navigation rights.

### *Canal and River Trust waterway operation*

The Canal and River Trust maintain and manage operations for their network of waterways, including navigation, flood-risk, leisure amenity and abstraction of water. The Canal and River Trust are increasingly engaging with water resource stakeholders to provide water for different needs such as cooling or emergency needs such as firefighting, as well as supply to water companies (for example Bristol Water). The Canal and River Trust aim to operate canals unless a drought of more than 1 in 20 year severity occurs. Canals have capacity for moving water as well as supplying water and are therefore relevant to providing long distance transport of water.

In Scotland, development of Glasgow's Smart Canal (North Glasgow Integrated Water Management System <sup>116</sup>) was procured under a multi-agency strategic drainage partnership including Scottish Canals (rather than the Canal and River Trust which covers England and Wales) and uses a digital approach to manage flood risk and support economic regeneration. Using predictive weather technology the level of the canal can be regulated to allow additional storm water capacity that reduces the risk of surface water flooding in the city.

### *Agricultural and other land-owner actions*

Agriculture and other land-owners play an operational role in two ways: 1) through direct water use, including abstraction, storage and discharge, and particularly operational decisions regarding the volume and timing of usage, and in variability of flows, and 2) via changes in land-use that impact water flows in a catchment, for example that impact of different types of vegetation cover on run-off rates into rivers.

Approaches to sharing water at the catchment level are developing. Water sharing is often undertaken through informal arrangements among farmers who are able to negotiate a dynamic schedule for their abstractions in response to the weather and each other's respective needs while maintaining Hands off Flows in the river. This informal arrangement is effective in that it has low transaction costs and maximises the use of local contextual knowledge of the river, soils and irrigation demands.

### *Power and other industry*

Power and other industry's role in operation relates principally to the choices around consumption, the volumes and timing, and how much they are able to use their own sources or rely on transfers from other parties. They can also have requirements in terms of water quality

### *Catchment partnerships*

Catchment partnerships work with different projects operating over different time scales with different partners. Their work is organic and participatory, with different partners bringing different skill-sets. Catchment partnerships produce a plan for their work through a consultative process and

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<sup>116</sup> <https://www.scottishwater.co.uk/About-Us/News-and-Views/2021/05/280521-Glasgow-Smart-Canal-Award>

raise funds from a variety of private and public sources. Planning and implementation is undertaken in a cyclical manner: Building partnerships, Using data and evidence to develop the catchment plan, Implementing catchment management interventions, Measuring outcomes and adjusting delivery, and Improving the plan.

## 6.3.2 Potential considerations for operations

### 1. *Balancing role*

There is no consistent ownership of balancing for regional, catchment and (in prospect) inter-regional SROs, governing operational decisions to balance demand and supply, inputs and outputs.

This role does exist in parts in the current framework: A) Within water companies, though typically water and wastewater are managed separately rather than as a combined system, B) Supported by the Environment Agency for river regulation schemes (for example the Severn) and considering navigation, flooding, abstraction, fisheries and other drivers, C) At the local level with Internal Drainage Boards considering flood protection, agricultural consumption and abstraction.

Without a balancing role at regional, catchment or for inter-regional SROs, operational decisions may be ungoverned. This creates a question of confidence that full system benefits can be achieved in practice. This has potential implications under multiple principles including: 1) efficient use of resources, 3) holistic approach, 4) transparent and efficient markets, and 5) risk allocations.

Recognising that power networks have many differences to water resource management, the power sector has clearer definition of these balancing roles. There is clear accountability at different geographical levels and regions, and commercial terms between all of the parties involved, many of which are governed by detailed industry codes and standards.

Considering the two scenarios in water: Inter-regional transfers and regional or catchment balancing:

A) For inter-regional transfers, the participating organisations will need to agree arrangements, most likely on a bottom-up case-by-case basis, with an option of an overall guidance framework.

Water Company System Operator - Balance et al (2017) describe a collaborative, incremental approach with JVs established by water companies to run interconnectors. This approach provides a strong downwards interface with the existing systems operated by the water companies. This option highlights the need for transfers between water companies to be coordinated with water company network decisions. Two coordination gaps are identified: 1) The efficiency with which water resources can be developed, accessed and traded; 2) The efficiency of coordination between water company network development decisions (and the development of interconnectors for water trading between companies). System operators would be joint ventures between different water companies, and therefore well placed to address the two coordination gaps identified above. There would be a number of SOs combining two or more water companies as the situation requires. Each is established as a for-profit company.

B) For regional or catchment balancing, the requirements are more complex from an operational perspective, with multiple participants (who may or may not be aligned with catchment boundaries) and an open rather than closed system.

Helm's catchment system operator model would place responsibility with an independent body for security of supply, abstraction management, water distribution (and storage) for flood defence. Their

coordination duties would therefore span drivers and sectors, enabling holistic benefits and fair competition. It would require significant institutional reform, including separation of responsibilities from existing bodies, including the Environment Agency and water companies (principle 6).

## **2. Cost allocations and commercial incentives**

A process of allocating operating costs to those who benefit from them being incurred is not clear, outside of new connections. This has the potential to disincentivise whole system solutions (principle 1).

For within-region operations, an example is changes in land-use upstream to prevent flooding downstream. Nature based approaches such as natural flood management have benefits and whole life costs that are difficult to quantify and therefore hard to procure. Collaborative approaches and individual Payment for Ecosystem Service schemes are important in this sector. More work is needed on effective aggregation for these schemes to be scaled up to bring transformative impact. The development of the ELM scheme will enable suitable funding for this kind of environmental stewardship activity by landowners. An important tenet of ELM is that public money should be available for public goods. Operation of catchment and landscape schemes will remain a combination of blended approaches including payments made by interested parties such as industry and water companies, local government and local interest groups. Planning, implementation and evaluation of schemes will reflect the diversity of interested parties operating in this field.

For inter-regional transfers that cross multiple water companies, the transfer of operating costs including fixed and variable components requires development as part of the individual arrangements for each SRO. A common framework could support investor confidence (criteria 4.1). This consideration could also apply to bilateral arrangements where industry-owned sources contract to water companies (or direct to consumers).

Commercial incentives cannot always be aligned to common outcomes, for instance where, in a period of scarcity, consumption by one party impacts commercial drivers (or erode acceptable risk) for another. When there is a requirement to move water from an area of surplus to one of deficit, local commercial alignment will be required. There is a risk that multi-sector collaboration principles not backed up by contractual arrangements may become difficult to enforce.

## **3. Data**

Gaps in data availability and quality will make it difficult to maximise system benefits and evidence operational decisions (principles 1, 3). Availability of data, willingness to share it and capability to process it varies by region and market participant.

Open data approaches are emerging organically, including for example the Wheatley Watersources platform.<sup>117</sup> This is in pilot phase and provides access on abstraction licence requirements through “needs” and “offer” posts to identify trading opportunities. However, it notes that information needs are complex, and as such it cannot provide full operational support, rather supporting the identification of opportunities.

WRE and partnering organisations are working closely with IDBs on the Lincolnshire European Structural and Investment Fund project which is aiming to install instruments to monitor flows and

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<sup>117</sup> <https://www.wheatleysolutions.co.uk/products/wheatley-watersource/>

provide real time data. This smart water system will aim to deliver a reduction in flood risk, secure water resources and improve water quality.

Data solutions may need to be designed rather than trusting in the evolution of such solutions, and hence owned at a system level. “Design” might comprise standardised principles for data exchange, provision of platforms to facilitate exchanges, system models to reflect inputs/outputs, and digital twins that can be used to model and support operational decision making. Commercial incentives may also be required to encourage data sharing. There will be a range of uses for such data, which may be complex in some areas (for example forecasting economic impact of low water availability to different sectors), which should be considered in the design of data solutions.

#### **4. Roles and risk allocation**

Access and capacity allocation are a fundamental building block of a coherent system. Different drivers result in varied risk and operational resilience appetite, and potential liability challenges where participants rely on the actions of removed third parties.

There is a risk of conflict between legacy abstraction and bulk transfer rights (based on absolute volumes) and future allocations (that may be a proportion of capacity).

Different actors have different capacity to control risk and different preferences to risk management strategies. The power sector has considerable capacity to mobilise expertise and control risk. The sector seeks robust rights due to the high costs of developing and operating power stations. Secure water rights are needed in order to attract capital for the type of major investment needed as the sector transitions to carbon net zero technologies. The paper sector needs continuous reliable supplies and is therefore reluctant to rely on water trading for its supplies. While major industrial water users are generally unwilling to rely on traded water for their own supplies, they are likely to be willing to act as water vendors to consumers with a higher tolerance of risk than their own.

Agriculture is a diverse sector. Tolerance of failed water resources is very low in the livestock or protected cropping sectors, but may be higher elsewhere. Irrigators are increasingly concerned about multi-year droughts and are therefore many are interested in creating farm storage that allows storage for more than one year. The role of food purchasers is important in the development and management of farm irrigation and abstraction, because they are able to collaborate with a network of farmers and therefore develop interventions at a scale. The work of Nestle in the LENS process demonstrates this. Farmers of protected crops benefit from connection to the public water supply network as a resilience measure for costly crops. Should a farmer lose a crop, then they may lose either their contract for future sales into the food value chain or they may lose their regular network of seasonal labour. This makes protected croppers particularly vulnerable to the impacts of drought and therefore willing to pay a premium for water resource resilience. Farmers who trade on the open market and do not rely on seasonal labour are more able and willing to cope with water resource variability.

The potential consideration is greater levels of cross-sector coordination, which might include collaborative frameworks and guidance or coordinating bodies with operational responsibilities across sectors.

## **5. Operational capabilities**

Skills in optimising water resource operation outside of public water supply operations and flood defence are not sufficiently aggregated to represent other sectors interests.

As discussed above different sectors have different capabilities to manage risk, coordinate responses and apply technological or institutional means for the resilience of their water supplies. This variation in operational capacity will influence the approach they take in engaging with the water sector to achieve the water security that they wish to achieve.

## **6. Public interest**

Redistribution of water resources (particularly at times of scarcity) has potential to meet local opposition. Public interest is likely to be particularly heightened during drought when customers in one region may be facing different levels of constraint or restriction than others. During such times the idea of water being transferred from one region to another could divide opinion.

## 7 Appendix B: Case studies

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### 7.1 Other Geographies

#### 7.1.1 Australia

In Australia there is a functioning example of similar regulatory environment to the UK, and the emergence of the National Water Grid Authority forms an example of a national body to identify, plan and deliver national and regional water requirements.

- ▶ **Description of high-level approach and responsibilities**<sup>118</sup>: The National Water Grid Authority (NWGA) works in partnership with Australia's states and territories to identify, plan and deliver a program of national water infrastructure investments in attempt to improve reliability and security of water for its regions and primary industry sectors. Various agencies regulate water supply in each state, with different arrangements found throughout Australia. Basin state governments must ensure water resource plans meet the requirements of the wider Basin Plan, as well as address the local requirements for water resource management.
- ▶ As an example, the Commonwealth Environmental Water Holder (CEWH) is a key stakeholder in the Murray Darling Basin (MDB), which is a basin that crosses 5 jurisdictions. The CEWH is a statutory position established by the Water Act to manage environmental water resources, managing water licences for the purposes of providing environmental outcomes (note that remaining licences are held by irrigators and town water utilities). An annual Water Management Plan is created by The Commonwealth Environmental Water Holder (CEWH) for how it will make optimum use of Commonwealth water resources at both basin and catchment scale. The rules governing the entitlements vary across states and valleys, but are subject to the same fees, allocations and other rules as equivalent entitlements held by other water users. The MDB is governed by the MDB Authority (MDBA) – a statutory body. The MDBA administer the MDB Plan, which has each of the 5 jurisdictions as a signatory. One could consider the MDBA as a 'system operator'.<sup>119</sup>
- ▶ **Benefits**: The National Water Grid Authority provides water infrastructure that is tailored to regional needs. It aims to unlock agricultural opportunities in new regions and increase water security in established agricultural areas. Localised water resource plans outline how each region will achieve community, environmental, economic, and cultural outcomes, as well as ensuring that state water management rules are aligned to wider Basin Plan objectives.
- ▶ **Underlying principles**: Planning and decision-making approaches that identify the different actions to match supply to demand in changing scenarios, collaboration with third parties and learning from past actions underpinned by robust monitoring and reporting processes.

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<sup>118</sup> <https://www.environment.gov.au/system/files/resources/fa59d94f-fc17-4391-a1e3-a8c3da947d26/files/water-mgt-plan-2020-21.pdf>

<sup>119</sup> <https://www.agriculture.gov.au/water/policy>

- ▶ **Conditions:** Decisions must be based on detailed consideration of conditions such as environmental demands in both the short and long term, various climatic condition scenarios, as well as operational and delivery constraints.
- ▶ **Enablers:** The Water Act, National Water Initiative and Water Management Plan set out the legislation, policy reform agendas and strategy for national water resources management in Australia.
- ▶ **Initial considerations:** A ‘system operator’ type role working in partnership with regional areas can help with identification, planning and delivery of a programme of regional water infrastructure investments, combined with national-level allocation of funding.

### 7.1.2 South Africa

South Africa has a centralised, guiding plan that sets principles for the development of water resources and strategies. This is an example of an approach that considers environmental factors as a part of decision-making, due to pressing climate challenges (e.g. carbon is embedded in decision-making process for construction of water infrastructure).

- ▶ **Description of high-level approach<sup>120</sup>:** The National Water and Sanitation Plan guides investment planning for the development of water resources and the delivery of water and sanitation services as far as 2030. A set of integrated functions are responsible for developing national strategies and procedures for the reconciliation of water resources, as well as the requirements to meet national social and economic development objectives. Regional sub-directorates perform national water resource planning functions on a regional level, as well as providing catchment area support.
- ▶ **Responsibilities<sup>121</sup>:** The National Department of Water and Sanitation’s (DWS) Integrated Water Resource Planning directorate works to ensure the availability of water resources is fit for purpose in the context of a changing climate through holistic planning, and the development and management of water resources and systems. It includes of a subset of functions responsible for national water resource planning, options analysis, system planning and climate change. Water boards primarily provide bulk water, some retail services and operate some wastewater treatment plants, as well as supporting with water resources management. Municipalities provide most retail services and own some supply infrastructure. At the lower levels there is a major emphasis on catchment management. Initially South Africa were leading in the IWRM agenda, but were over ambitious and ended up with a few good examples of catchment management organisations. They have since retreated from the full implementation of the IWRM approach
- ▶ **Benefits:** At the national level, holistic, centralised decision-making which encompasses wider environmental challenges such as climate change allows for more effective planning and a future-proof response. At the local level, there are examples of integrated participatory systemic planning.
- ▶ **Underlying principles:** Integrated planning, detailed appraisal of water resource options and development of response strategies which are effective towards both water resources and climate change challenges.

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<sup>120</sup> <https://www.dws.gov.za/iwrp/>

<sup>121</sup> <https://www.dws.gov.za/National%20Water%20and%20Sanitation%20Master%20Plan/default.aspx>

- ▶ **Conditions:** Water resources options which reconcile imbalances in bulk water supply and demand, as well as meeting climate change requirements for the future.
- ▶ **Enablers:** The National Water Act, National Water and Sanitation Plan and Integrated Water Resource Planning directorate provide the legislation, strategy and governance required for successful water resources management.
- ▶ **Initial considerations:** Centralised guiding plan and decision-making which encompasses wider environmental challenges (for example: embodied carbon in construction of water infrastructure) allows for a more holistic response to energy & climate initiatives such as net-zero by 2050. Whilst the framework is considered a positive model, lessons include the need for resources to deliver on the plans.

### 7.1.3 France

France has adopted a decentralised approach to water management where the state has transferred responsibilities and competences to local authorities, departments and regions that act with legal and financial autonomy.

- ▶ **Description of high level approach<sup>122</sup>:** Water management in France is coordinated at catchment level. In each of the main six hydrographic basins in mainland France, one Water Agency and one Catchment Board ensure the guiding principles of the European Union Water Framework Directive are followed. The development of Integrated Water Resources Management Plans (Schéma Directeur d'Aménagement et de Gestion des Eaux - SDAGE and Schéma d'Aménagement et de Gestion des Eaux - SAGE) is the key process for defining objectives and a set of priority actions within each hydrographic basin and sub-basin. A programme of investments is defined on an inter-annual basis by each Water Agency within their respective hydrographic basin.
- ▶ **Responsibilities<sup>123</sup>:** Water Agencies act as representative of the State and follow the principle that 'polluter pays'. Water Agencies raise environmental taxes and redistribute funds to support local investments by local authorities and groups of water users. Catchment Boards act as consultative structures and are the key institutions ensuring an integrated management of the water resource and a planification that engages all users. Catchment Boards are responsible for writing the Integrated Water Resources Management Plans (SDAGE) for their respective hydrographic basin for approval by the State. Local authorities hold the responsibility of water supply and treatment of wastewater but can transfer the responsibility onto private operators under a time-bounded contract (e.g. Veolia, Saur). Similarly, local authorities also are responsible institutions for the management of aquatic ecosystems and the prevention of flooding.
- ▶ **Benefits:** The decentralised approach ensures that the Integrated Water Resources Management Plans is tailored to the conditions and challenges specific to each hydrographic basin. It also ensures a programme of investments that is developed specifically to respond to the challenges and objectives defined at catchment level.
- ▶ **Underlying principles:** France follows the guiding principles of the Water Framework Directive for obtaining good status of water for all water bodies and builds on the principles previously established by the Water Act (1992 revisited in 2006). The

<sup>122</sup> <https://www.ecologie.gouv.fr/gestion-leau-en-france>

<sup>123</sup> <https://www.eaufrance.fr/sites/default/files/documents/pdf/OIEau - Gestion de l'eau en France.pdf>

organisation of consultation and coordination of actions is ensured via the Catchment Boards whilst the mobilisation of financial resources is the responsibility of Water Agencies.

- ▶ **Conditions:** Management of the water resource in alignment with the guiding principles of the European Union Water Framework Directive.
- ▶ **Enablers:** Strong dialogue between all stakeholders through representation within both the Catchment Boards and the Water Agencies. The representation of water users and group of water users (including agriculture and industry) within the catchment Boards is 40%, local authority representation is 40% and state representatives comprise 20%. This representation ensures coordination of actions and the definition of Water Resources Management Plans that account for all water uses and needs.
- ▶ **Initial considerations:** France has taken a decentralised approach to water management at catchment level as well as an integrated approach that accounts for all water users and usage, environmental needs, pollution prevention and control of natural risks and hazards. This can support multi-sector prioritisation and trade-off decisions, including approach to management in times of scarcity.

#### 7.1.4 Abu Dhabi

In Abu Dhabi new policy goals have been set to create a centralized body, the National Water Council, that would be singularly responsible for strategic planning across all water sources and users. Given the complex nature of the interaction between sector bodies in Abu Dhabi, there are likely relevant learnings from this policy for the GB context.

- ▶ **Description of high level approach<sup>124</sup>:** Abu Dhabi has no natural fresh water sources, so there are larger needs for water production – with scarcity of groundwater reserves and high costs of producing drinking water. New policy focus on decoupling power generation from water generation. One of the highest per capita water consumption rates in the world. Recently launched a ten-year integrated water resources management plan to 2030<sup>125</sup> to tackle water scarcity in the long term. This plan proposes the creation of an Abu Dhabi Water Council which would be responsible for strategic planning and development across all water sources and users. Alongside this, an establishment of environmental agency to maintain alignment with environmental and water resource management goals
- ▶ **Responsibilities<sup>126</sup>:** The Water sector is fully government owned, regulated by a number of agencies, including the Environment Agency and other agricultural organisations. Current approach is siloed with limited strategic communication between various major management groups and user groups. There is a single utility company (EWECC) responsible for provision of water and power to a single Transmission company (TRANSCO), who operates Abu Dhabi's transmission networks for both water and energy, and two distribution companies centrally owned by the regulatory body, the Department of Energy (DOE). TRANSCO distributes via two companies, which are both wholly owned by DOE - Abu Dhabi Distribution Company (ADDC) and Al Ain Distribution Company (AACD).

<sup>124</sup> <https://u.ae/en/information-and-services/environment-and-energy/water-and-energy/water->

<sup>125</sup> <https://www.yumpu.com/en/document/read/34140387/abu-dhabi-water-resources-master-plan-published>

<sup>126</sup> <https://www.trade.gov/knowledge-product/united-arab-emirates-water>

- ▶ **Benefits:** Centralised-decision making to address scarcity challenges allows for alignment of efforts in the mid-term. The proposed Water Council would ensure integrated water policies and provide independent guidance to determine economically preferred solutions to meet water needs, and balance them with water and energy policy objectives.
- ▶ **Underlying principles:** Contracts are granted by both federal and emirate-level governments, with a rigid bidding process. The current structure is cross-organisation and complex in nature, so simplicity will be key for AD water council to enable planning at least cost/best value.
- ▶ **Conditions:** High level of scarcity, and investment in innovative solutions to water production. Ample government funding available to establish and guarantee national water infrastructure.
- ▶ **Enablers:** Heavy investment from both public and private sector to deliver clean water. Water Security Strategy 2036 aims to ensure sustainability and continuous access to water during normal and extreme emergency conditions. Strong policy and regulatory drive from environmental regulator is required to make water council successful.
- ▶ **Initial considerations:** Role of an integrated/centralised body for planning is emerging in new strategy. The current structure is cross-organisation and complex in nature, so simplicity will be key for the Abu Dhabi Water Council to enable planning at least cost/best value – and would replace existing structures.

### 7.1.5 Israel

In Israel there is a functional central planning body that is integrated with the regulator, which provides a working example of a centralised body that is responsible for planning across geographic levels of the sector.

- ▶ **Description of high level approach<sup>127</sup>:** Israel has a level of demand for water approximately twice that of natural water supply, with a large disparity in distribution between regions. The infrastructure response has included strategic regional and national transfers, demand management, aquifer recharge, wastewater reuse and desalination to bridge the supply/demand gap. Central and integrated planning is provided by the Water Authority.
- ▶ **Responsibilities<sup>128</sup>:** Ministry of Energy and Water sets policy. Inter-agency Water Authority is responsible for planning and regulating the water and sewage sectors, whose responsibilities include a 40-year Master Plan updated every 5 years, determination of allocations, and tariffs. The Water Authority reports to a council including members from Ministries of Finance, Agriculture (allocations between agriculture and ecology), Energy & Water, Health (water quality), Environment (water resource protection), and Local Affairs (local government). Merkorot national water company responsible for bulk water supply and transmission, including strategic transfers. Regional and municipal water responsible for distribution of potable water, sewage collection and treatment. Drainage and river authorities responsible for river basin management including flooding.

<sup>127</sup> <https://documents1.worldbank.org/curated/en/657531504204943236/pdf/Water-management-in-Israel-key-innovations-and-lessons-learned-for-water-scarce-countries.pdf>

<sup>128</sup> [https://www.gov.il/he/departments/about/about\\_water\\_authority](https://www.gov.il/he/departments/about/about_water_authority)

- ▶ **Benefits:** Ability to tightly control water allocation across sectors and regions in an area of high scarcity. Central planning of resources to areas of demand and to promote economic development.
- ▶ **Underlying principles:** Water resources are public property, managed by the state on behalf of consumers to support development. Enforcement of central allocations are required in addition to price incentives which are not sufficient alone. Uniform tariff level and increasing block tariff structure across the country, creating cross-subsidies between regions (and disincentive for high consumption).
- ▶ **Conditions:** High level of scarcity, including water rationing through droughts, creating high public interest. Sufficient government funding available to establish and guarantee national water infrastructure.
- ▶ **Enablers:** Cornerstone legislation dates from the 1950s including the Water Law of 1959, amended 2006. Water and Sewerage Corporations Law of 2001 to regionalise municipalities and ahead of establishing the Water Authority in 2007. Government funding and subsidies for nationally critical water infrastructure, with government guarantees remaining for privately-financed assets (attracting investment). Availability of data at a national level through a dedicated unit within the Water Authority.
- ▶ **Initial considerations:** The role of an integrated central planning and regulation body. Determination and enforcement of water allocations, not relying solely on price signals.

### 7.1.6 Netherlands

The Dutch take a phased planning approach to account for emerging needs across the country, which results in continuity in planning across all geographic levels which are relevant learnings for GB.

- ▶ **Description of high-level approach<sup>129</sup>:** The Rijkswaterstaat (the executive branch of the Ministry of Infrastructure and Water Management) and the district water boards are responsible with water management in the Netherlands. Their responsibilities include ensuring a sufficient supply of water and keeping the country protected against flooding. Provinces and municipalities are also involved in water management. The National Water Plan defines the Dutch flood risk management and freshwater supply policies. It examines optimum ways to accommodate water in the spatial planning of the Netherlands and the associated costs. The Management & Development Plan for National Waters translates the National Water Plan and the National Policy Strategy for Infrastructure and Spatial Planning into the management and maintenance of national water resources.
- ▶ **Responsibilities<sup>130</sup>:** Responsibility for water management in the Netherlands sits with Rijkswaterstaat and the regional water authorities. The provinces are responsible for translating national water policy into regional measures. Regional water authorities draw up management plans regarding the water quality of the waters within their local areas.
- ▶ **Benefits:** The National Water Plan provides a holistic view of the water management strategy across The Netherlands allowing for coherent planning and management at every geographic level

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<sup>129</sup> <https://www.government.nl/binaries/government/documents/policy-notes/2015/12/14/national-water-plan-2016-2021/national-water-plan-2016-2021.pdf>

<sup>130</sup> <https://www.government.nl/binaries/government/documents/policy-notes/2014/12/23/summary-management-plan-for-national-waters-2016-2021/summary-management-plan-for-national-waters-2016-2021.pdf>

- ▶ **Underlying principles:** Parties involved anticipate future developments based on a comprehensive but adaptive approach, through phased decision-making and flexible strategies.
- ▶ **Conditions:** Continuity at all levels of geography is defined as an important requirement for managing and maintaining national waters in the Netherlands.
- ▶ **Enablers:** The Water Act, The National Water Plan and The Management & Development Plan for National Waters define the responsibilities and strategy for the national waterways and water systems in the Netherlands.
- ▶ **Initial considerations:** Adoption of flexible strategies, phased decision-making and an adaptive approach to water resources management, including its links with flood defence, would provide help to provide planning tolerances for the varying degrees of asset health, geographical challenges and resource availability experienced by regions within the United Kingdom.

### 7.1.7 Texas

In Texas, the state water plan is built using a ‘bottom-up’, consensus-driven approach whereby regional planning groups develop and agree localised plans which later inform state water resources planning.

- ▶ **Description of high-level approach<sup>131</sup>:** The Texas Water Development Board (TWDB) supports the development of regional water plans and incorporates them into a state water plan for the development, management, and conservation of Texas’ water resources. Regional water plans are developed by regional planning groups and reviewed for approval by the TWDB. The TWDB then incorporates information from the approved regional water plans and other sources to develop the state water plan. The regional water planning process consists of tasks such as quantifying current and projected population and water demand and evaluating impacts of water management strategies on water quality, agricultural and natural resources both in the short and long-term.
- ▶ **Responsibilities<sup>132</sup>:** The TWDB is responsible for collecting data, preparing the state flood and water plan, and administering cost-effective financial programmes for water construction projects. Sixteen regional planning groups exist to administer localised planning processes and manage contracts related to developing regional water plans.
- ▶ **Benefits:** Greater public participation, public education, and public awareness are listed as benefits of directly involving local and regional stakeholders and the public in water planning.
- ▶ **Underlying principles:** Texas’ state water plan is built using a ‘bottom-up’, consensus-driven approach whereby regional planning groups develop and agree localised plans which later inform state water resources planning.
- ▶ **Conditions:** Regional planning group members adopt plans by voting at open meetings in accordance with the respective bylaws. Consensus building between parties is crucial to ensure sufficient support for adopting plans developed.

<sup>131</sup> <https://www.twdb.texas.gov/waterplanning/swp/index.asp>

<sup>132</sup> <https://www.twdb.texas.gov/publications/shells/RegionalWaterPlanning.pdf>

- ▶ **Enablers:** The state water plan serves as a guide to state water policy and includes legislative recommendations to facilitate voluntary water transfers. The plan also identifies river and stream segments of ecological value and sites for the construction of reservoirs recommended for protection.
- ▶ **Initial considerations:** A ‘bottom-up’, consensus-driven approach to regional water resources planning could allow for greater public participation, education, and awareness of water stewardship across the United Kingdom.

### 7.1.8 California (1)

In California, the state plan is very similar to Texas in that it is made up of more local integrated plans. However, these schemes have resulted in challenges and impacts on the wholesomeness of water – so there are learnings on what not to do in this case.

- ▶ **Description of high-level approach:** The principles of integrated water resources management (IWRM) planning are used by most states in the US and by Federal Authorities to plan the future development and use of water resources. IWRM planning initiatives address water supply requirements across all sectors, in addition to water quality, flood risk management and environmental needs. In California, the long-term strategic plan for managing and developing water resources is provided by the California Water Plan, which is updated every five years. The Water Plan does not propose specific projects or authorise funding, but in accordance with State laws is the “the master plan which guides the orderly and coordinated control, protection, conservation, development, management and efficient utilization of the water resources of the state.” California spends some \$30 billion per year on maintaining the water system – with over 85% of that investment with the water and wastewater providers, who are entirely locally funded.
- ▶ **Responsibilities:** State of California policy encourages local land and water-use planning entities to work collaboratively within a region to establish common water resource management goals and objectives. Cities, counties, water districts, community/environmental groups, tribes and other key stakeholder have established 48 regional IWRM planning groups across California. Each group is responsible for developing local IWRM plans and strategies. The California Water Plan then provides a regional planning framework to integrate land, water and habitat projects. The 2018 update includes an investment strategy and finance plan that track and prioritise investments, providing recommendations for financing methods.
- ▶ **Benefits:** The California Water Plan takes an integrated approach to water resource management and seeks to align agencies across jurisdictional boundaries to ensure greater collaboration and efficiency in addressing the water challenges. This includes a consistent approach to the management of data, planning, policy-making and regulation across local, State, tribal and Federal governments.
- ▶ **Underlying principles:** Preparation of the California Water Plan is a collaborative and transparent process that seeks consensus from all stakeholders.
- ▶ **Conditions:** Locational mismatch of supply and demand due to size, climate and geography; need for water to be transported long distances from north to the south to meet demand for differing sectors (e.g. agriculture and urban area).

- ▶ **Enablers:** The planning and management of water in California is subject to a vast number of laws, regulations, management plans, and historic water rights. The state agency responsible for water planning is the California Department of Water Resources.
- ▶ **Initial considerations:** IWRM is still in its infancy in the United Kingdom and learning from the United States is being used to inform regional planning. The complex nature of the planning groups in California is likely a reflection of the water resources challenges faced by across the State, however the coordination at local level with regional consistency could be well applied in England and Wales.

### 7.1.9 California (2)

In California, major infrastructure is managed at State or federal level and there are examples of different operating and funding models for multi-sector users.

- ▶ **Description of high-level approach<sup>133</sup>:** Water system management in California is provided at different scales through many different government structures. In addition to the state and federal systems, there are thousands of special districts or agencies in charge of water supply, wastewater management and flood protection. Investment in infrastructure is somewhat complicated in such a complex system. State and federal governments are responsible for the large-scale water supply and flood protection projects, in addition to having regulatory oversight to protect public health and the environment. Two such schemes include the California State Water Project (SWP) and the Central Valley Project (CVP). The SWP is the largest multi-purpose state-built water project in the US, comprising some 29 dams, 18 pumping stations, five hydroelectric power plants and 600 miles of canals and pipelines completed in 1973. The Central Valley Project (CVP) is a federal power and water management project operated by the US Bureau of Reclamation and is one of the largest managed water systems in the world completed in 1944. Sites Reservoir is a newly proposed \$5 billion reservoir in the Sacramento Valley of northern California, to be built by the California Department of Water Resources and operated by the California SWP. A proportion of the reservoir would be funded by the State with the remainder provided by water districts or agencies (of the 30 agencies the majority are agricultural, notably for high value crop producers, and some urban). In 2018, the State Water Commission awarded \$800 million of the \$2.7 billion voter-approved bond money for water supply projects in California. This is half the amount that the project was seeking from the state, which may reduce the final scale of the reservoir unless the additional funding can be secured from an alternative source, potentially including federal loans. 75% of the remaining funding will need to be secured before the state bond will be released but backers remain confident that the project will begin in 2023 and complete in 2030. The state fund equates to some 16% of the project costs and is being provided in exchange for rights to 9% of the yield per year to meet environmental needs. The remaining water would be allocated to each water agency that commits funding to the construction in proportion to the amount invested.
- ▶ **Responsibilities:** Large infrastructure projects rely on state bonds for funding, requiring voter approval to be issued. Californians are directly responsible for agreeing how funds are allocated between water infrastructure projects. In most cases, however, this is only partial funding and other agencies need to make up the shortfall.

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<sup>133</sup> [https://www.ppic.org/content/pubs/report/R\\_314EHR.pdf](https://www.ppic.org/content/pubs/report/R_314EHR.pdf)

- ▶ **Benefits:** The basis for funding and investment is that the beneficiary of the water is paying, which for the Sites Reservoir example will likely include multiple water agencies. Some agencies may only be able to afford a small proportion, whilst other producers of high value crops such as pistachios or almonds may be able to afford a greater share. Urban agencies will also be able to spread costs amongst a large customer base. The higher the input from the State the higher the potential environmental benefits.
- ▶ **Underlying principles:** Use of state bonds to fund infrastructure projects stretches out payment duration, providing intergenerational equity. A multi-sector funding model with the State responsible for the environmental allocation and remaining shares based upon the investment from each user.
- ▶ **Conditions:** Successful funding for major infrastructure projects relies on voter agreement. State funding is only committed once backing is secured from beneficiaries.
- ▶ **Enablers:** Water investment is reliant on locally generated revenues, and various constitutional changes have impacted on the funding options available.
- ▶ **Initial considerations:** Similar funding models and environmental allocations could be considered in the United Kingdom. The current batch of strategic resource options are considering how to fund multi-sector schemes and a model where water companies are responsible for the proportion of public water supply, whilst other agencies (or users) pay their share may help to promote greater collaboration. In this model, government would fund the parts of the scheme that would benefit the environment.

### 7.1.10 Nebraska

State level water planning in Nebraska is designed to account for conflicting environmental priorities (e.g. ground water and surface water). This is a relevant example which provides insights for how GB might consider conflicts in similar priorities (e.g. water supply and flooding).

- ▶ Description of high-level approach<sup>134</sup>: Most water in Nebraska is sourced from groundwater (80%) of total volume abstracted in Nebraska each year. The Nebraska Department of Natural Resources (NeDNR) is a state agency responsible for surface water, groundwater, natural resources planning, water planning and integrated management, and the storage of natural resources and administration of state funds<sup>135</sup>. Water resources are managed at the local level by natural resources districts (NRDs), who work collaboratively to develop integrated management plans to manage the demand and capacity of water resources for each specific region. Nebraska also participates in six interstate water agreements which allocate water among states and often impact state water planning activity. These are primarily administered by NeDNR with support from NRDs and other state agencies.
- ▶ Responsibilities<sup>136</sup>: Water management in Nebraska is governed by the NeDNR state agency. The state is split into NRD areas to develop localised planning, modelling and research relating to water management. University of Nebraska-Lincoln Conservation and Survey Division collects, manages, and distributes groundwater data, whilst the Natural Resources Commission State commission are charged with helping to conserve, protect, and use the water and related land resources of the state.

<sup>134</sup><https://apps.wa.gov/ecology/docs/WaterRights/wrwebpdf/WaterBankingandWaterMarketinginSelectWesternStates.pdf>

<sup>135</sup> <https://dnr.nebraska.gov/about>

<sup>136</sup> <https://dnr.nebraska.gov/water-planning>

- ▶ **Benefits:** Recognition of the inter-connectivity of groundwater and surface water across both regional and state geographies.
- ▶ **Underlying principles:** Collaborative and flexible resource planning, decentralised processes that integrate both groundwater management, surface water management and regulatory processes by region and state level, as well continuous process improvement.
- ▶ **Conditions:** No funds are to be allocated to a district until the disbursing agency has determined that such funds are for activities which are in conformance with wider NeDNR plans.
- ▶ **Enablers:** The Annual Evaluation of Availability of Hydrologically Connected Water Supplies report provides information about the expected long-term availability of hydrologically connected water supplies throughout the Nebraska state. The Clean Water Act provides national governance for surface waters, but Nebraska maintains state responsibility for day-to-day implementation of the law.
- ▶ **Initial considerations:** A collaborative arrangement which combines organisations responsible for all elements of natural resources (including agriculture, food, and water) could allow for a more integrated response to resource challenges across the United Kingdom, as well as energy and climate targets. NRDs control ability to deliver multi-benefit schemes at a localised level (e.g. planning for ground and surface water issues)

## 7.2 Energy

### 7.2.1 GB Energy Transmission & Distribution

It is relevant to highlight how the role of the Electricity System Operator (ESO) has evolved and continues to evolve given the needs of the electricity system in GB. The current regulatory direction of travel is to carve out the ESO in its existing form into an Independent System Operator (ISO) that would parallel what exists in the US energy system. Given the regulatory environment is similar for this sector to the water sector, there are some natural parallels to call attention to.

- ▶ **Description of high level approach<sup>137</sup>:** The GB approach is characterised by a centralised transmission planning process which is run by the Electricity System Operator (ESO), with increasing input from incumbent and new Transmission Operators (TOs), with significant decision-making power sitting with the regulator, Ofgem. Distribution Network Operators (DNOs) in GB carry electricity from the high voltage transmission grid to industrial, commercial and domestic users.
- ▶ **Responsibilities:** The system planning role in GB is split between the ESO and TOs – with the ESO responsible for producing overall system plans to meet system needs, and the TOs responsible for designing options and delivering investment. The governance arrangements in GB continue to develop. The Current direction of travel in policy/regulation is to develop an independent system operator (ISO) whose responsibilities will include both real time system level balancing and top-down system planning<sup>138</sup>. DNOs are responsible for independently planning for investment within their license areas and justifying the investment as a part of the price control process that is

<sup>137</sup> <https://www.ofgem.gov.uk/electricity/transmission-networks/gb-electricity-transmission-network>

<sup>138</sup> [https://www.ofgem.gov.uk/system/files/docs/2017/08/future\\_arrangements\\_for\\_the\\_electricity\\_system\\_operator\\_-\\_response\\_to\\_consultation\\_on\\_so\\_separation.pdf](https://www.ofgem.gov.uk/system/files/docs/2017/08/future_arrangements_for_the_electricity_system_operator_-_response_to_consultation_on_so_separation.pdf)

managed by Ofgem. The Energy Networks Association (ENA) is a trade body made up of all the networks in GB that influences decision-makers on key issues, and acts as a strategic focus and channel of communication for the industry

- ▶ **Benefits:** Strikes a balance in terms of top-down planning and detailed options development, with flexibility to adapt options to new information; Standardisation of processes enables better market access and more efficient outcomes.
- ▶ **Underlying principles:** Transparency and regular engagement with stakeholders, iterative/future-looking development of methodology based on available data; Drive for clear separation of roles and responsibilities; Simulated competition through price control mechanism for regional monopolies, transparency in roles and responsibilities, decentralised planning processes
- ▶ **Conditions:** Top-down, non-binding, planning process with detailed network and non-network options developed by TOs. Some limited innovation in transmission ownerships through competitive tendering for simpler connection options. Before privatisation and deregulation, energy generation and delivery was traditionally the responsibility of publicly owned and government controlled institutions. It is only as these countries have moved to functionally separate and privatise these entities that there is now a need to develop new institutions and processes to ensure that these private businesses balance their obligations to shareholders with the public interest.
- ▶ **Enablers:** Standardised planning process, strong role of regulator, clear process for options development through the Network Options Assessment (NOA) process
- ▶ **Key considerations:** The emergence of centralised body (ISO) to manage the whole system, and policy development to support this is driving the industry at this stage and will enable key industry outcomes (e.g. net zero and decarbonisation) if timing is right. Standardisation of contracts and products for trading electricity have enabled easier market access for more players, and have also led to willingness to pay being the driver of the market – making the case for standardisation of products/processes.

## 7.2.2 GB Energy Interconnectors

There are some parallels between interconnectors and bulk transfer of water resources that enable us to learn from the varying degrees of interaction between the developers, the regulator (Ofgem), and the system operator (National Grid ESO) that are designed in order to align on best outcomes for customers. The current regulatory trend is toward the system operator taking a more active role in identifying new options, moving away from a pure-development led approach.

- ▶ **Description of high level approach<sup>139</sup>:** GB electricity interconnectors, the electricity transmission cables that cross national borders, are key strategic infrastructure for the GB power market. Historical underinvestment in capacity since privatisation led to Ofgem, the energy regulatory, developing a new developer-led approach to investment, first implemented in 2009. Prior to this, GB interconnector was limited to one project to France (IFA, 1986), one project between Scotland and northern Ireland (Moyle, 2001) and one project to the Netherlands (2009). Under this developer-led regime, project developers, legally separate to the owners of the onshore network, but demonstrate the economic benefit of a new connection in return for regulatory underwriting.

<sup>139</sup> <https://www.ofgem.gov.uk/electricity/transmission-networks/electricity-interconnectors>

- ▶ **Responsibilities:** Ofgem is responsible for the licensing and regulation of electricity interconnectors as part of its duties as the electricity regulatory authority for GB, and decides when to open a regulatory assessment window for new projects. During this window (typically 3-6 months), Ofgem will accept applications from project developers who meet minimum eligibility requirements (e.g. can show sufficient levels of maturity and project readiness). Ofgem then assesses the submissions to determine which projects are in the consumer interest and demonstrate a positive regulatory decision. The interconnector developer must agree connection terms and location with National Grid ESO, the System Operator, in GB and the corresponding network company in the connecting market/network. Ofgem has started to ask NG ESO to take a more active role in identifying new beneficial options for GB, moving away from a pure developer-led approach (the policy work on these arrangements is ongoing).
- ▶ **Benefits:** Ofgem designed the developer-led regime to provide a route for third party investment in GB transmission. This follows success of the offshore transmission investment regime that demonstrated the benefits of the competitive route for network investment. This route also expressly excluded National Grid, as the onshore network owner, from building new interconnectors as an extension to its existing onshore asset base. One of the benefits of the developer-led route is that it passed the economic investment decisions to project developers, who would only develop a project with sound economic credentials. This removed the need for a central planner to decide where to build new projects, and take the risk on.
- ▶ **Underlying principles:** Developer-led approach, introducing third party network owners and operators. Requires collaboration with neighbouring network companies (i.e. pre-condition for application). 25-year regulatory regime, with revenues guaranteed above a lower bound (the Floor) and limited in period of very high revenues (the Cap).
- ▶ **Conditions:** Project developers taking decisions on when and where to invest based on their own analysis of project and social benefits. Ofgem deciding which projects to accept and reject based a range of conditions that ensured that only well-developed and credible projects would apply for a Cap and Floor regime. These conditions included maturity conditions, presentation of sufficient project benefits (focussing on consumer welfare), a strong business case that limited the risk that the project required revenue top-ups from consumers (which would be paid for by all consumers and network users through their network tariffs). Opportunity (legal and regulatory) for new network companies to own and operate transmission, in addition to incumbent onshore network owners
- ▶ **Enablers:** Clear framework for investment set by the Regulatory Authority (i.e. a window that allows for investment). A clear developer understanding of the benefits of connections to different borders and the value to the UK. Access to network connection locations and connection options from the System Operator. A regulatory regime that is sufficient to attract a range of financing solutions for both the development and operational phase of the project.
- ▶ **Initial considerations:** Demonstration of the role of third party project developers as competitive alternatives to incumbent network owners. The critical coordination role for infrastructure that spans regional or national borders – requiring cooperation between developers, connecting parties (i.e. incumbent network owners), decisions makers and regulatory authorities. Ability for a new policy/regulatory regime to build investor confidence to deliver infrastructure at scale

### 7.2.3 US Regional Transmission Organisations

The RTOs in the US are responsible for regional electricity system planning at the transmission level, and interact with the distribution levels of the network to facilitate markets. Because these are well established entities there are learnings to derive from the centralised planning processes and how they interact with other entities.

- ▶ **Description of high level approach<sup>140</sup>:** In the US, Regional Transmission Organisations (RTOs) are tasked with operating the electricity transmission system and managing the centralised electricity markets, and the regional transmission planning processes.
- ▶ **Responsibilities:** RTO is responsible for operating the wholesale energy markets within their area (through Independent System Operators, ISOs), plan transmission upgrades, allocate costs, and coordinate adjacent regions. RTOs do not own any transmission assets themselves, the RTO members, Transmission Operators (TOs) retain ownership of the lines and equipment. Where the RTO identifies system needs, it must classify these as network or non-network (but note that non-network can include generation solutions directly). These needs will then be delivered by various TOs based on the pre-determined RTO plan.
- ▶ **Benefits:** RTOs take member satisfaction very seriously, and as a result, many of the RTO functions, including transmission planning, are member driven. The result is that we see a more transmission owner centric planning process than elsewhere.
- ▶ **Underlying principles:** Transparent and open regional planning process that encourages innovation in developing alternatives and broad participation. Characterised by a high level of stakeholder engagement in the RTO planning process
- ▶ **Conditions:** Member engagement with centralised planning process, results in transmission-driven planning
- ▶ **Enablers:** Open Access Transmission Tariff (OATT) is the governing entity that specifies in detail how the RTO will perform the various functions and allocate costs. They are subject to the Federal Energy Regulatory Commission (FERC) approval.
- ▶ **Initial considerations:** The RTOs and associated ISOs across the US are well established examples of a centralised system operator that is responsible for regional planning and coordinating with the distribution levels of the grid.

### 7.2.4 Baltic States Gas Grid

The gas grid in the Baltic states of Estonia, Finland, Latvia and Lithuania represent a functional example of regional Transmission System Operators (TSOs) that coordinate investments in the transmission grid across the various countries, and create a long-term investment plan that outlines planning and coordination across the region.

- ▶ **Description of high level approach:** The governments and Energy Regulators of the Baltic States of Estonia, Finland, Latvia, and Lithuania had a number of strategic concerns related to the existence and operation of the individual, national gas markets – that these were individually not material, that access to gas storage and the LNG terminal was economically disadvantaged for the countries, and that this made energy independence

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<sup>140</sup> <https://www.ferc.gov/market-oversight/mkt-electric/overview.asp>

from Russia difficult to achieve. The decision was made to aggregate the four national markets into one regional market through the creation of a single entry-exit model of tariffs rather than separate ones for each country. This would deliver a single virtual balancing point across the region with the benefits of the creation of a much larger and integrated market, greater competition in balancing, and provide for more general access to the large-scale gas storage facility and the LNG import and regasification terminal. A new tariff model was constructed to enable this, including the design criteria of limiting disruption through winners and losers, and inter-company transfers of revenue.

- ▶ **Responsibilities:** The four TSOs and industry regulators were set up to agree the tariff model, with coordination of investments across the single zone, and the periodic recalculation of the tariffs in line with the regulatory asset base of each TSO. A combined long-term network development plan is utilised to signal longer term network development for planning and coordination across the region and neighbouring countries.
- ▶ **Benefits:** The creation of a single gas market, improved competition in supply, and improved security through the enabling of common access to key infrastructure. And with a managed impact on costs for consumers in different countries.
- ▶ **Underlying principles:** Overall cost recovery, with some resetting of transmission tariffs to deliver the regional market.
- ▶ **Conditions:**
- ▶ **Enablers:** Coordination between the four TSOs and the four regulators on investments, long-term plans, and the tariff model.
- ▶ **Initial considerations:** Regional TSOs interact across regional lines that manages planning and coordination across a singular gas market

## 7.3 Other relevant sectors

The following high level case studies are provided for additional parallels, including those explored in depth in the paper published by United Utilities, Severn Trent Water, and Thames Water that explored the role of the system operator in the water sector<sup>141</sup>.

### 7.3.1 Payment Systems Operators

Payment System Operators<sup>142</sup> have been developed over time as a means of delivering coordination efficiencies in the provision of payment services. A number of different systems (and System Operators) have been developed that typically focus on different types of payment (e.g. BACS, cheque and credit).

### 7.3.2 Air traffic management providers

Air traffic management involves a number of activities that could be regarded as system operation such as airspace design, air traffic flow management, and air navigation service provision. Similar to

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<sup>141</sup> [https://www.unitedutilities.com/globalassets/z\\_corporate-site/about-us-pdfs/looking-to-the-future/what-role-for-system-operators-in-the-water-sector-november-2017.pdf](https://www.unitedutilities.com/globalassets/z_corporate-site/about-us-pdfs/looking-to-the-future/what-role-for-system-operators-in-the-water-sector-november-2017.pdf)

<sup>142</sup> <https://www.bankofengland.co.uk/news/2018/may/consolidation-of-three-uk-payment-system-operators>

payment system operators – these functions evolved to meet specific needs, which could have parallels to the GB water sector.

### 7.3.3 Telecommunications

In GB, Openreach<sup>143</sup> is an independent division of BT Group that runs the UK's phone line-based broadband infrastructure. Openreach is responsible for planning, build and operation of the physical broadband infrastructure at all levels across GB. They are not a System Operator as such, but are responsible for a number of similar functions, and manage planning and operation across all scales of the physical infrastructure across GB.

### 7.3.4 Rail

In GB, Network Rail functions as the System Operator and ensures that the national rail network operates as one. They work as a partner across the railway to support the delivery of safe and efficient railways, and focus on improving what the network is capable of by planning for the future; providing high quality analysis and advice; producing the timetable; and managing industry wide relationships.

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<sup>143</sup> <https://www.openreach.com/about-us/who-we-are>