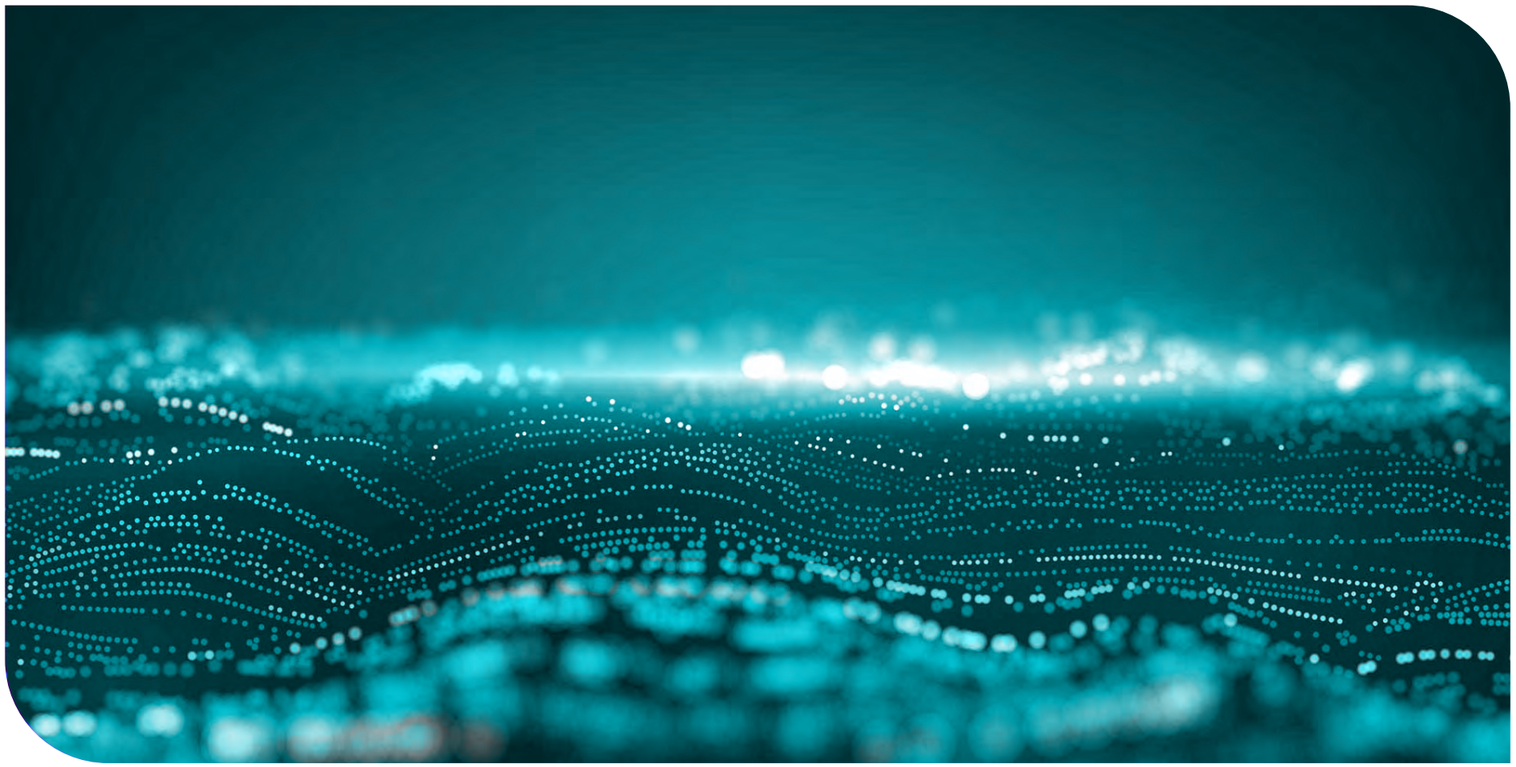
water.ie

Vision 2050

Stage 2



water.ie

Uisce Éireann
Irish Water

Vision 2050

Stage 2

Contents

Ballymore Eustace Biodiversity © Uisce Eireann

Executive Summary

Uisce Éireann (UÉ) operates in a highly complex water sector ecosystem with an uncertain future operating environment. Given this context, we recognise a need to change how we collaborate and plan for the future to achieve our long term desired outcomes. In Stage 1 of Vision 2050 we developed desired outcomes. These reflect our wider stakeholder aspirations for the sector and UÉ, defining and driving **WHY** we want to change in the long term. We will need to develop and adopt collaborative approaches that place these long term outcomes at their centre, recognise the systemic nature of our operating environment and respond to the challenges and opportunities we may face. Stage 2 demonstrates such a collaborative approach, drawing on systems thinking to deliver change in a holistic manner, and foresight techniques to plan by using the desired future state as our starting point.

A summary of our approach is shown below, highlighting how various elements relate to each other in a systemic manner. A core element of our approach are the opportunity pathways, which describe the **WHAT** we will do to achieve our desired outcomes. The pathways build on the opportunities, challenges and risks identified using a series of 2050 scenarios that were developed in Stage 1.The opportunity pathways use a foresight technique called backcasting. This technique first considers the preferred future state, and then works backwards to identify what needs to happen to realise that future. This technique is an alternative to a more traditional forecasting planning approach which predicts and plans for a most likely future. Our approach also identifies strategic enablers, to be delivered in combination with the opportunity pathways. These cut across the opportunity pathways and describe **HOW** we will achieve the desired outcomes. Some enablers are more internally focused where we will need to show leadership. Others are more externally focused and will require high levels of collaboration with the wider water sector.

Our aim for Stage 2 is to demonstrate how systems thinking, foresight and backcasting may be applied to UÉ's planning and collaboration to deliver long term desired outcomes.

1. Introduction

Uisce Éireann (UE) operates in a highly complex water sector ecosystem with an uncertain future operating environment. Given this context, we recognise a need to change how we collaborate and plan for the future to achieve our long term desired outcomes.

This report provides an overview of Stage 2 of Vision 2050. Our aim for this Stage is to demonstrate how a novel collaborative approach, drawing on systems thinking and foresight techniques, can be applied to support planning for the future. Stage 2 builds on Stage 1, which focussed on distilling insights from a sectoral perspective to define shared desired outcomes for the wider water sector, developed a series of shared sectoral 2050 scenarios and used these to identify future opportunities, challenges and risks. These opportunities, challenges and risks are further developed in Stage 2 to identify a series of opportunity pathways and strategic enablers.

The approach described within this report (along with the scenarios developed in Stage 1) could be used by UÉ and the wider sector, to inform and test the resilience of strategic plans and priorities that evolve from The Water Services Strategic Plan (WSSP). Furthermore, while Vision 2050 is not part of the WSSP process, Stage 2 has identified opportunities that could be considered for inclusion within the WSSP.

2. Stage 1 Summary

Stage 1 of Vision 2050 ascertained sectoral insights to determine desired outcomes for the wider water sector, trends and drivers of change and how they may plausibly interact to shape alternative future scenarios.

Desired Outcomes

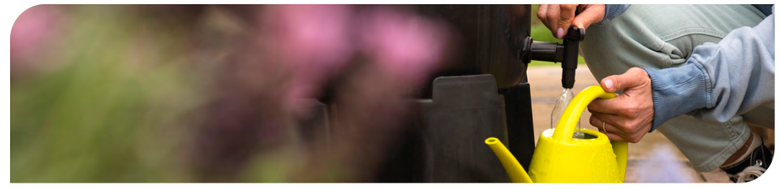
With insight from stakeholders, we developed a set of desired outcomes for the water sector in Ireland in 2050. These provide a common direction of travel and a reference to identify possible future opportunities, challenges and risks. Stage 2 uses the desired outcomes as described further in Section 3.

The Desired Outcomes are outlined fully in the Stage 1 report and summarised here:

All citizens have access to trusted, safe and equitable water and wastewater services

The water sector enhances the environment and biodiversity

The water sector is a leader in climate adaptation and mitigation in Ireland



Society places a high value on water as a resource and service

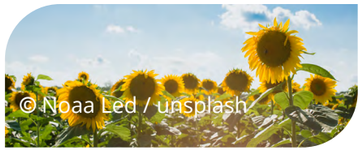
Stakeholders work in partnership to maximise common benefits for Ireland

Water services enable and support economic prosperity in Ireland

Water network infrastructure and operations are efficient, secure, resilient, and adaptable

Scenarios

Working collaboratively with stakeholders and using a structured foresight approach, the following scenarios were developed to describe three plausible futures for the water sector in Ireland in 2050. Whilst we cannot predict the future, the scenarios aim to consider and manage future uncertainty. By testing strategies and plans against these and other possible scenarios we can envisage how different futures impact on them. The scenarios were used to identify low and no regret opportunities which are further developed in Stage 2. The scenarios could also be used further in the future for adaptive planning purposes.



Suaimhneas
Sunny outlook

Climate has been the centre of policy agenda for Ireland and most global nations for decades. Policy makers, governments and businesses have implemented complementary strategies to reverse the historic rise in atmospheric carbon, along with measures to adapt to climate change impacts. The global economy has largely transitioned to net zero, and circular economy principles are integrated across the water sector and associated industries in Ireland.

Rírá
Storms forecast

A so-called climatic tipping point has been transcended, resulting in irreversible and unpredictable climate-related chain reactions. There are extremely poor economic conditions in Ireland corresponding with a global and European Union wide recession, and aggregate economic losses accelerate with increasing temperatures and extreme weather events.

Gan ord ná eagar
Cloudy with a chance of rain

Development is haphazard across Ireland, with misalignment between planning, government policy and existing water and wastewater infrastructure. The location of rapid population and industrial growth, for example hydrogen production, is piecemeal and unpredictable. There is a fundamental difference between where water is available and where Ireland's development is centred. At the same time, Ireland is experiencing more extreme weather patterns, following a middle climate pathway.

Opportunities and challenges

The opportunities, challenges and risks associated with achieving the desired outcomes in each of the future scenarios were identified in collaboration with stakeholders. To provide the reader with an overview, the long list of opportunities and challenges were clustered into themes common across all future scenarios, summarised below.

The long list of opportunities, challenges and risks identified in Stage 1 are further developed and refined in Stage 2, as outlined in Appendix A. However, the themes are not utilised in Stage 2.

Collaboration and Influence

Resilience

Compliance with regulation and fitness for purpose

Net Zero carbon

Innovation and integrating new technologies

Data and Digital Technology

Blue-green infrastructure, nature-based solutions and catchment initiatives

Demand on Water Resources and Services

3. Collaborating to achieve systemic change

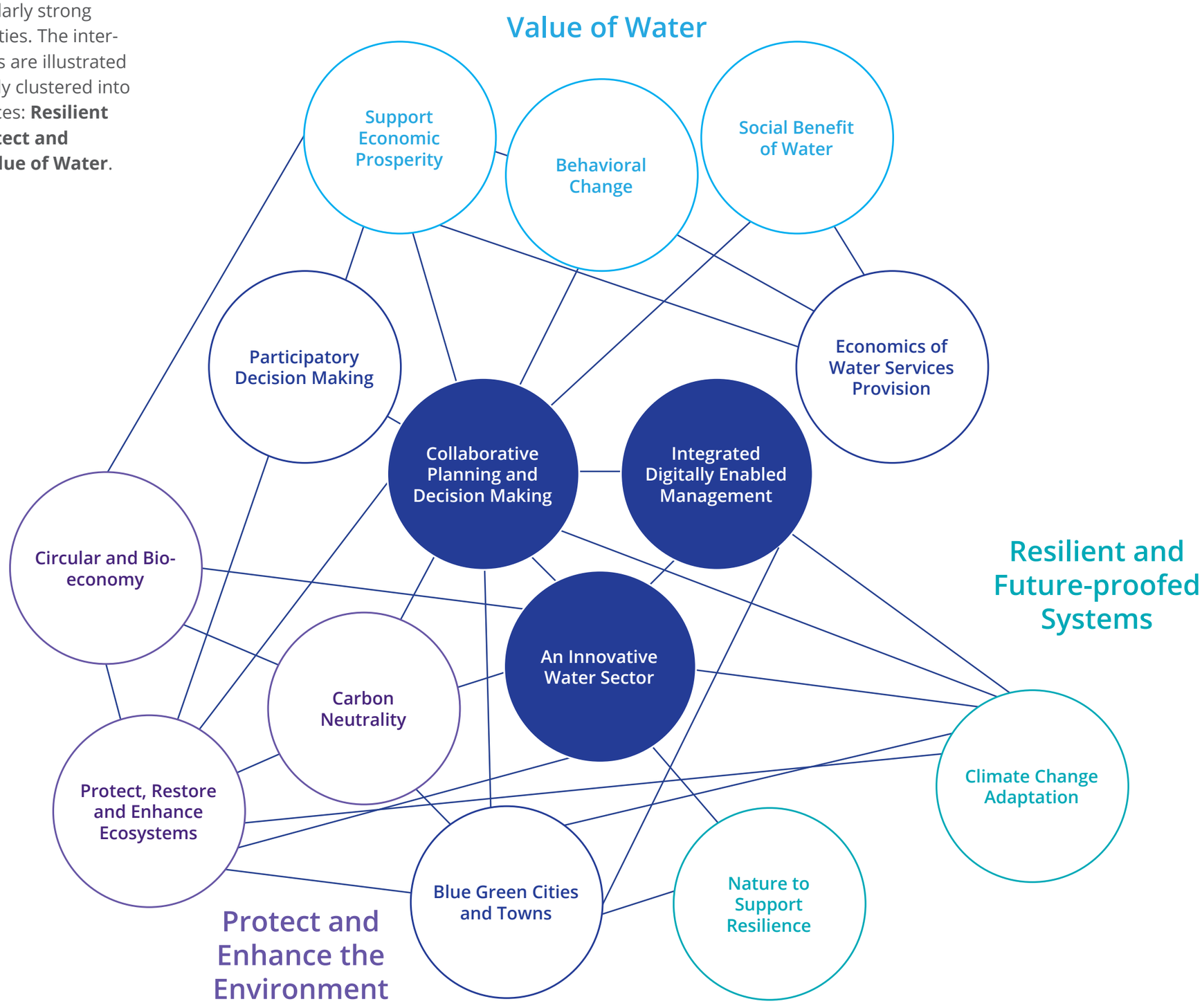
Understanding the system

The first step in our Stage 2 approach identified and prioritised low and no-regret opportunities on which the sector could collaborate to achieve long term desired outcomes. These were developed by building on and synthesising a long list of opportunities, challenges and risks identified in Stage 1. The methodology of how the Stage 2 opportunities were developed is outlined in **Appendix A**, while **Appendix B** provides a detailed summary of what each opportunity encapsulates.

As a next step, our original approach aimed to work collaboratively with stakeholders to develop a pathway for each desired outcome, identifying which opportunities best support that specific outcome. However, in a collaborative workshop with stakeholders (see **Appendix C**), it became clear this approach would not work due to the systemic nature of achieving desired outcomes. We concluded that the opportunities support achieving multiple desired outcomes, and outcomes will only be achieved by leveraging multiple opportunities as illustrated opposite. The original approach would therefore mean developing pathways for each desired outcome would likely result in repeating opportunities and associated actions.

		2050 Desired Outcomes						
	Opportunities	All citizens have access to trusted, safe and equitable water and wastewater services	The water sector is a leader in climate adaptation and mitigation in Ireland	Stakeholders work in partnership to maximise common benefits for Ireland	Water network infrastructure and operations are efficient, secure, resilient, and adaptable	The water sector enhances the environment and biodiversity	Society places a high value on water as a resource and service	Water services enable and support economic prosperity in Ireland
1	Blue-Green Cities and Towns							
2	Integrated Digitally Enabled Management							
3	Encourage Demand Reduction							
4	Circular and Bio-economy							
5	Collaborative Sustainable Outcomes							
6	Climate Change Adaptation							
7	Carbon Neutrality							
8	Nature to Support Resilience							
9	Community Participation and Ownership							
10	An Innovative Water Sector							
11	Economics of Water Services Provision							
12	Protect, Enhance and Restore Ecosystems							
13	Support Economic Prosperity							
14	Social Benefit of Water							

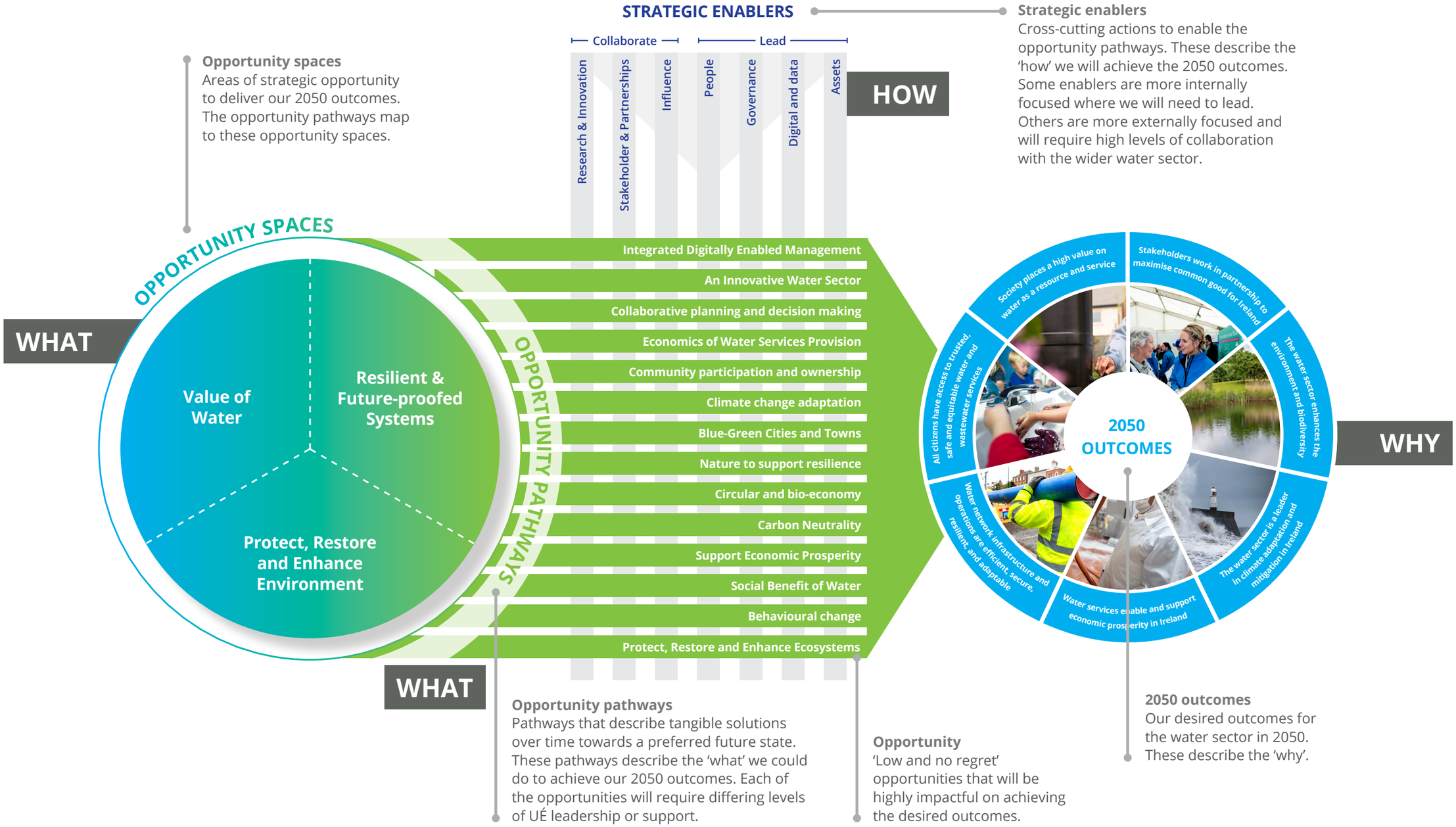
In addition, it became clear the opportunities impact on one another with particularly strong linkages between certain opportunities. The inter-relationships between opportunities are illustrated below, with the opportunities loosely clustered into three overarching Opportunity Spaces: **Resilient and Future-proofed systems**, **Protect and Enhance the Environment** and **Value of Water**.



Our stage 2 approach

Our revised Stage 2 approach focuses on systems thinking and collaboration as a means to achieving the desired outcomes. We can leverage the interconnectedness of opportunities, enablers and desired outcomes to deliver change in a collaborative, systemic and holistic way. In a complex system such as the water sector in Ireland, the ability for a single organisation or body to realise the desired outcomes in isolation is limited, emphasising the need for a collaborative approach to the opportunities. In addition each of the opportunities will require differing levels of UÉ leadership or support.

We summarise our approach in the graphic below, providing an explanation of the different components. The opportunity spaces, opportunities and opportunity pathways can be considered as **WHAT** we need to do, the enablers are **HOW** we should do it and the desired outcomes provide the **WHY**.



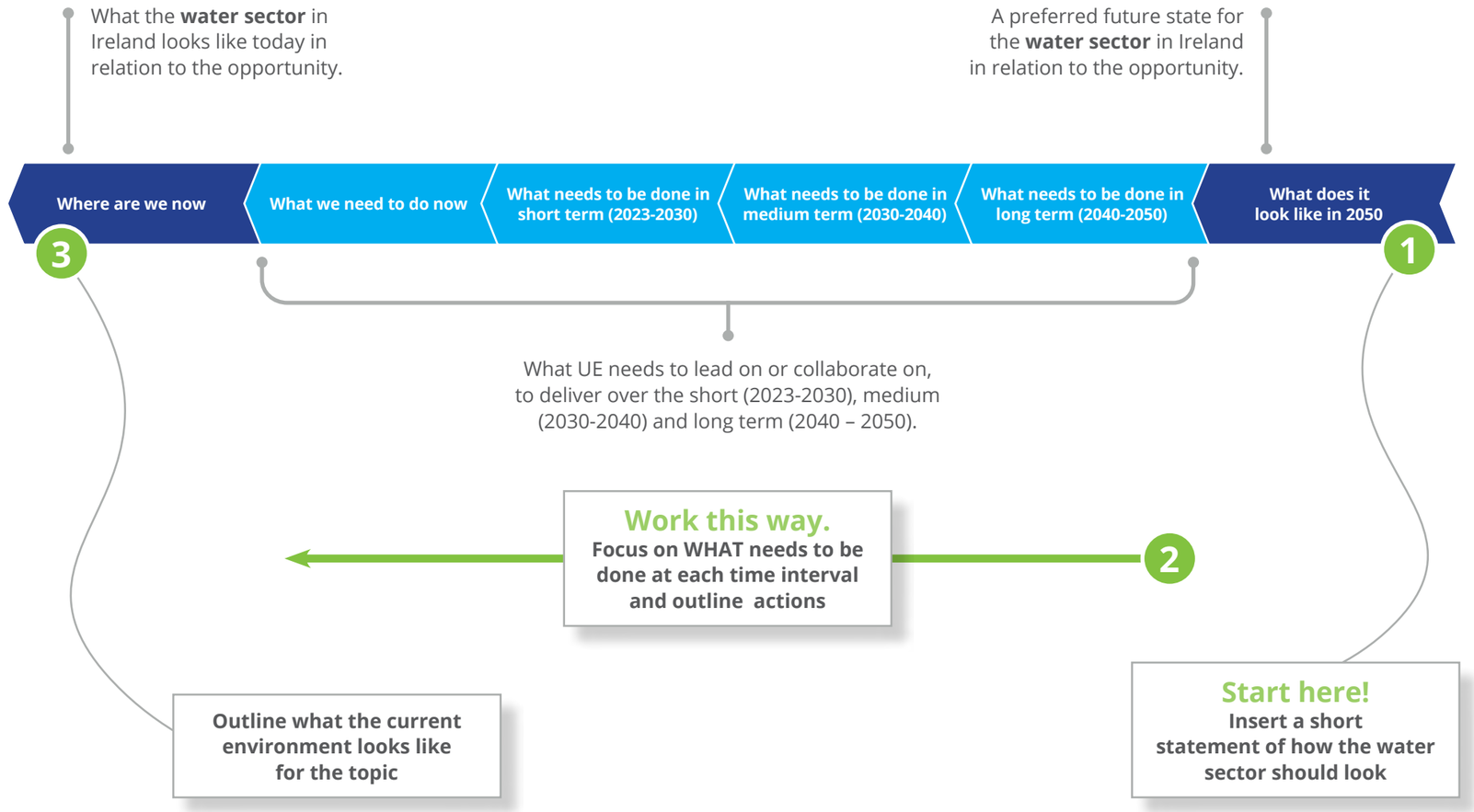
4. Changing how we plan for the future

Developing the opportunity pathways

Traditional approaches to developing plans and strategies tend to plan forward from the present into the future, focusing on timeframes in the not-too-distant future. However, to achieve transformational change whilst minimising disruption, a 30-year plus view is required to allow actions to be identified that need to be started now to achieve that future. An alternative approach is backcasting. This technique first considers the preferred future state and then works backwards to identify what needs to happen to realise that future. The benefit is that action can be taken to influence achieving a preferable future. This approach could be used with collaborators to test opportunities or initiatives, or internally to test existing plans and strategies, or those in development.

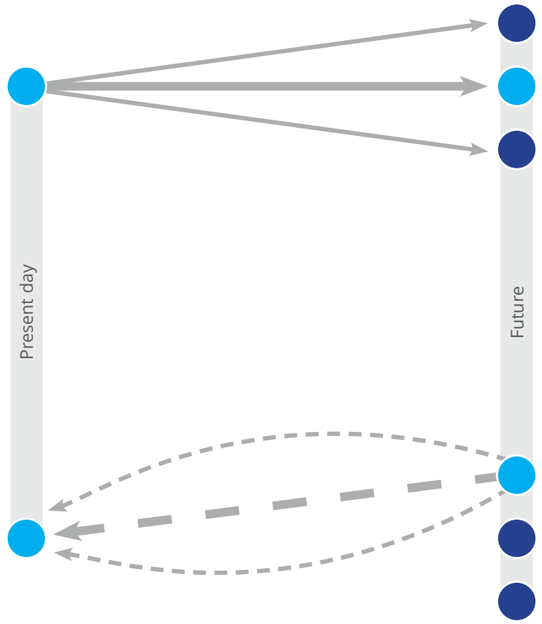
We apply backcasting to develop the opportunity pathways. The pathways developed in this way highlight tangible solutions over the short, medium and long term that align with attaining desired outcomes.

These could be solutions UÉ lead on, collaborate in delivering or otherwise support. They describe the **WHAT** we could do to achieve our 2050 outcomes and are explained further below:



Forecasting
A traditional approach that predicts and plans for a most likely future, based on historic trends.

Backcasting
An alternative approach that identifies a preferable future and makes plans to shape that future, based on monitoring key trends that will influence the future.



Illustrative opportunity pathways

The WSSP was chosen as a strategy which is under development to initially frame and thereafter build out our approach to a 2050 vision. We leveraged some members of the WSSP team to test how these pathways may be built out for the opportunities identified. The aim is to demonstrate the approach and evidence examples of how this approach can be applied and replicated going forward. The opportunities were reviewed with a small portion of the WSSP team and examples are built out for illustrative purposes. However, these were developed with limited consultation which did not cover all relevant parts of UÉ and the wider water sector so should not be taken as complete.

We give examples of illustrative opportunity pathways below. As mentioned previously, there are strong linkages between certain opportunities which adds both complexity in the delivery of actions and potential trade-offs between actions.

1. Blue-Green Cities and Towns

Implementation and widespread integration of blue-green infrastructure to exploit regenerative urban design opportunities, adapt to weather extremes and support urban water cycle management, while enhancing the wider environment.

Where are we now	What we need to do now	What needs to be done in short term (2023-2030)	What needs to be done in medium term (2030-2040)	What needs to be done in long term (2040-2050)	What does it look like in 2050
Human engineered "grey" infrastructure design.	Commitment to collaborate with key stakeholders on **integrated drainage planning** with Blue Green Infrastructure as a key element.	Progress integrated drainage planning. **Retrofit** existing assets and deliver **blue and green spaces** that benefit environmental, ecological and human health.	Transform urban areas into **sponge cities with abundant natural areas** that benefit resilience and environmental, ecological and human health.	Implement **regenerative design at master planning scale** to create resilient and equitable systems that mimic natural ecosystems.	A system which has **net positive water and net positive biodiversity.**

2. Integrated Digitally Enabled Management

Development of a shared platform to allow more integrated water cycle management and improve water services resilience through monitoring and access to data.

Where are we now	What we need to do now	What needs to be done in short term (2023-2030)	What needs to be done in medium term (2030-2040)	What needs to be done in long term (2040-2050)	What does it look like in 2050
Limited **data sharing, catchment monitoring and integrated water cycle management.**	Improve **data quality and standardisation** of data sets to enable effective data usage. Leverage data and technology to reduce leakage.	Manage data sources including citizen engagement and develop and implement **asset scale monitoring** and modelling to inform decision making.	Develop and implement **catchment scale monitoring** and modelling of assets, networks and rivers to inform decision making.	Implement **a national scale platform and coordinated approach** to enable evidence based decision-making that maximises broad outcomes.	**Integrated water cycle management** that optimises impact on water services as well as environmental, social, health and economic outcomes.

3. Behavioural change
Influence and enable society to actively reduce water demand.

Where are we now	What we need to do now	What needs to be done in short term (2023-2030)	What needs to be done in medium term (2030-2040)	What needs to be done in long term (2040-2050)	What does it look like in 2050
Facilitating behavioural change is under resourced and water usage is unsustainable in the long term given anticipated population and industrial growth.	Facilitate **a national conversation** around the wider value of water to influence public attitude and behaviour. Commence demonstration projects relating to demand management and engage with key stakeholders to influence the provision of regulatory enablers.	Improve and validate **water usage data collection and demand analysis**. Improve our understanding of demand through the use of data and insights to engage with consumers and stakeholders and drive an ongoing national conversation around the value of water.	Work with stakeholders and partners to deliver **targeted usage campaigns and education initiatives**, update building regulations and enable specific solutions, including 50L homes that reduce usage.	The intrinsic value and impacts of water wastage are **widely accepted and integrated** into wider sectoral and societal day-to-day decision making.	The public and industry **understand the value of water** as a vital resource and use water efficiently.

4. Water Reuse, Circularity and Bio-economy
Deliver initiatives to maximise circular opportunities, water and wastewater reuse and develop an urban bioeconomy through the recovery of biosolids and other resource streams.

Where are we now	What we need to do now	What needs to be done in short term (2023-2030)	What needs to be done in medium term (2030-2040)	What needs to be done in long term (2040-2050)	What does it look like in 2050
Resource efficiency through operations and leakage management.	Develop understanding and identification of **circular economy and bioresource** related opportunities.	**Explore and develop selected opportunities** with the wider industry and others to harness circular economy and bioeconomy opportunities.	Use **specific types of water for specific needs**, including water reuse, within targeted industry sectors to ensure future demand is met and further evolve and implement circular economy opportunities.	**Water recovery and reuse at city or town level**, enabled by water transfers, to ensure future demand is met. Ensure capacity is in place for upstream, internal and downstream integration with the circular economy.	**A circular water economy and bioeconomy.**

5. Collaborative Planning and Decision Making

Fostering partnerships and understanding wider sectoral impacts and interdependencies to support the water sector in putting natural capital at the centre of water management planning and decision making.

Where are we now	What we need to do now	What needs to be done in short term (2023-2030)	What needs to be done in medium term (2030-2040)	What needs to be done in long term (2040-2050)	What does it look like in 2050
Water services planning **does not maximise symbiotic opportunities** with stakeholders or put natural capital at its centre.	**Collaboratively map policy linkages and strategic initiatives** across stakeholder groupings to understand symbiotic opportunities.	Facilitate **integrated national planning for water together with agriculture, energy, industry and housing** to identify roles and realise symbiotic and alternative water use opportunities.	Implement a **decision making framework** with stakeholders that values natural capital.	**Long-term collaborative scheduling, planning and monitoring** which optimises natural capital and achievement of outcomes.	Water management planning and decision making is **collaborative, integrated and puts natural capital at its centre.**

6. Climate Change Adaptation

Improve resilience of water and wastewater systems to meet climate change adaptation needs through adaptive planning around extreme weather and changing water availability.

Where are we now	What we need to do now	What needs to be done in short term (2023-2030)	What needs to be done in medium term (2030-2040)	What needs to be done in long term (2040-2050)	What does it look like in 2050
A **vulnerable water and wastewater system** unable to adapt to extreme weather and a changing climate.	With stakeholders, **map and assess system hazards and vulnerabilities**, including impacts across sectors, to understand adaptation priorities.	**Adapt and upgrade the most vulnerable aspects of the systems** to enable resilience to extreme weather.	Implement monitoring framework **and adaptive planning approach**, in collaboration with stakeholders to support future investments.	**Integrate flood management and water services** provision to enable resilience to extreme weather.	**A resilient water and wastewater system** able to endure a variety of climate scenarios and conditions using adaptive planning.

7. Carbon Neutrality

Achieve carbon neutrality during infrastructure construction and operations by reducing energy consumption and emissions, capturing process emissions for reuse and sequestering carbon through the restoration of ecological systems.

Where are we now	What we need to do now	What needs to be done in short term (2023-2030)	What needs to be done in medium term (2030-2040)	What needs to be done in long term (2040-2050)	What does it look like in 2050
A **net positive carbon water sector** where more carbon is emitted than sequestered.	**Reduce operational energy demand and carbon intensity** through renewable energy usage and heat generation from wastewater residuals.	**Reduce embodied carbon** throughout the water sector by implementing circular design principles.	**Restore ecological systems**, such as wetlands, to maximise the removal of carbon from the atmosphere. Deploy low carbon technologies in replacing existing assets.	**Remove carbon through technologies or enhanced natural processes** and permanently store it.	**A net negative carbon water sector** where more carbon is captured than emitted, delivering a range of co-benefits.

8. Nature to Support Resilience

In partnership with wider stakeholders, utilise innovative catchment management solutions and holistic catchment data to integrate and scale nature-based solutions that restore and enhance ecosystem health and support wider system resilience.

Where are we now	What we need to do now	What needs to be done in short term (2023-2030)	What needs to be done in medium term (2030-2040)	What needs to be done in long term (2040-2050)	What does it look like in 2050
Conventional technical solutions that have limited benefit to ecosystem health.	**Implement sustainable drainage systems** that enhance ecosystem health and resilience.	**Implement nature-based solutions** that incorporate wider opportunities to enhance ecosystem health and resilience.	**Scale nature-based approaches** that integrate water services provision, ecosystem health and resilience including flood management.	**Smart management of nature-based solutions** that optimise ecosystem health and resilience.	Nature-based systems that **restore and enhance ecosystem health and support wider system resilience** are central to our 'standard' solution.

9. Community Participation and Ownership

Maximise outcomes at national, catchment or local levels through engaging in community decision-making and ownership.

Where are we now	What we need to do now	What needs to be done in short term (2023-2030)	What needs to be done in medium term (2030-2040)	What needs to be done in long term (2040-2050)	What does it look like in 2050
Engagement processes lack clarity, **communities are often disengaged from decision making and have limited ownership** over water resources.	**Establish partnerships and identify programmes** with stakeholders regarding local water resources. Continue developing our understanding of natural capital decision making principles and tools.	Develop **processes and encourage communities to engage in decision making regarding** local and national water resources and engage with stakeholders to integrate natural capital principles in UE decision making.	Implement incentives to **encourage communities to take ownership** of small-scale nature-based solutions and green infrastructure. Develop common models for natural capital decision making and share them across the sector to facilitate co-delivery of cross-sectoral benefits.	Develop and implement a **common framework across collaborators** that is broadly accepted by society to enable quantification and visibility of value.	**Communities are included in decision making, and shape and take ownership** of acceptable solutions that meet local needs.

10. An Innovative Water Sector

Drive innovation, and work with researchers to identify and implement new technologies and systems-based approaches to improve how water services are delivered, managed and protected.

Where are we now	What we need to do now	What needs to be done in short term (2023-2030)	What needs to be done in medium term (2030-2040)	What needs to be done in long term (2040-2050)	What does it look like in 2050
The water sector is **largely focused on traditional solutions.**	Continue to develop **innovative solutions for water conservation and usage traceability.** Investigate opportunities for **digital technologies.** Develop an **innovation ecosystem** through partnerships and collaboration arrangements and reinforce development of innovation culture.	Develop opportunities in the area of **nature-based solutions** through a wider catchment perspective in conjunction with sectoral partners and other systems-based solutions such as carbon abatement, leakage and biosolid recovery. Harness **open innovation and citizen science.**	Position competencies and facilities to **integrate digital solutions at a systems level across all activities.** Establish common sectoral protocols and arrangements to facilitate information sharing, co-creation and collaboration in research and innovation.	An evolved **collaborative cross-sectoral approach to solving cross-cutting challenges** enabled by research and innovation.	**The water sector is highly innovative** through deploying new technologies and systems based approaches.

11. Economics of Water Services Provision

Secure access to sustainable funding streams in the long term to ensure water services development and operation, and incentivise behaviours that reduce the cost of provision.

Where are we now	What we need to do now	What needs to be done in short term (2023-2030)	What needs to be done in medium term (2030-2040)	What needs to be done in long term (2040-2050))	What does it look like in 2050
Water service provision is almost **fully reliant on public expenditure, non-domestic tariffs and the development sector.**	Further develop understanding and optimisation around **excess use and its drivers** and investigate how conservation could be incentivised in the long term.	Develop **interventions** to deliver more equitable outcomes and explore mechanisms for managing impacts of economic oscillations on service delivery.	Develop and evolve **wider market opportunities within the circular economy** and leverage data to **reinforce behavioural change** through educational, physical and economic interventions.	Continue to evolve from a core infrastructure management entity to a **service provider based on holistic delivery mechanisms** operating on stable investment streams.	**Sustainable and stable funding model** utilising a diverse set of tools to incentivise behaviours and optimise the service provision model.

12. Protect, Enhance and Restore Ecosystems

Work collaboratively with stakeholders to implement technical solutions to protect, restore and enhance rivers and catchment areas and regenerate ecosystem integrity and connectivity.

Where are we now	What we need to do now	What needs to be done in short term (2023-2030)	What needs to be done in medium term (2030-2040)	What needs to be done in long term (2040-2050)	What does it look like in 2050
Approximately 50% of rivers and lakes in **unsatisfactory condition** (less than good status under the Water Framework Directive (WFD)).	Facilitate **stakeholder discussions** around environmental issues, opportunities to restore ecosystems and the potential value delivered.	Commitment to **share data and develop shared catchment models** to enable the most cost effective achievement of WFD objectives.	**Refine data and models.** Develop improved mechanisms for the collaborative delivery of WFD objectives.	Continue to **optimise and refine data and shared models**. Collaboratively co-create and deliver measures that optimise ecosystem outcomes.	Ireland has achieved the **WFD environmental objectives** within the prevailing climate constraints.

13. Support Economic Prosperity

Support economic prosperity of Ireland through multi-stakeholder collaboration to ensure water services and future development (housing / industrial / agriculture / commercial) are available and accessible when needed.

Where are we now	What we need to do now	What needs to be done in short term (2023-2030)	What needs to be done in medium term (2030-2040)	What needs to be done in long term (2040-2050)	What does it look like in 2050
Water services investment has not always followed national spatial planning objectives and development pressures.	Facilitate **better information sharing with stakeholders** to support greater alignment between spatial planning, future development, infrastructure availability and environmental capacity.	Maximise **the use of existing infrastructure through water efficiency, reuse and circularity**. Facilitate multi-stakeholder planning and the development of pathways to work together effectively.	**Improve planning policy** to ensure the alignment of delivery of water, wastewater and wider infrastructure to streamline the delivery of future development.	Facilitate **inter-catchment transfers and sectoral based prioritisation and initiatives** to provide sustainable supplies.	Water availability and quality **attracts business and supports housing and jobs.**

14. Social Benefit of Water

Maximise the social benefit of water services through public health, community, well-being and recreational initiatives.

Where are we now	What we need to do now	What needs to be done in short term (2023-2030)	What needs to be done in medium term (2030-2040)	What needs to be done in long term (2040-2050)	What does it look like in 2050
Opportunities to enhance social value through the provision of water services **are not maximised.**	Assess key risk areas amongst assets and outfalls to **address immediate health and safety concerns.**	Share data, support community initiatives and collaborate with key stakeholders to **improve public health responses.**	Support community well-being through **incorporation of public realm spaces or amenity value into projects.**	Enhance community health and well-being by **transforming existing assets to public use.**	**Water services improve social outcomes of communities** through providing valuable public assets and services.

5. Enablers

We identified a common set of strategic enablers that cut across the opportunity pathways and describe **HOW** we will achieve the desired outcomes. Some enablers are more internally focused, while others are more externally focused requiring high levels of collaboration with the wider water sector.

These enablers are crucial to long term planning as they will apply irrespective of the opportunities that are considered. For each enabler a set of actions were partially developed in the form of a transformation map that works towards the desired outcomes. However, as with the opportunity pathways these were developed with a small cohort of stakeholders not representative of the full sector, and have therefore not been included within this report. These will be made available to facilitate further mapping at a later date.

Research and Innovation

Research and innovation is essential to better understand the opportunities and challenges the water sector faces. Research and innovation allows us to develop, implement and exploit new ideas, services, systems and processes. We must identify and test ideas quickly, fail fast, iterate and scale innovation. This enabler considers how we can collaborate, the processes and technology we need in place and how we need to develop our people and culture. A specific example could be the development of a centre for water excellence that would research, develop and explore new technology and solutions with third level institutes and companies within and outside of Ireland to inform policy and drive new solutions.

Stakeholders and Partnerships

Critical to enabling long term desired outcomes is working collaboratively with stakeholders and partners. We need to better identify, grow and manage these relationships to drive mutual value. We also need to collaborate across industry, communities, government and regulators on specific key issues such as pollution reduction, flood management, circular economy and development. For example, seamless systems and structures in place for working with Local Authorities to ensure the delivery of water services and future development are appropriately aligned.

Influence

Influencing public policy, regulation, industry and public behaviours is key to achieving our long term desired outcomes. This enabler recognises how we need to collaborate with government and regulators to influence on topics such as water conservation, blue green infrastructure, planning, building regulations and social value. It also considers influencing customers and industry regarding key messages, considering the way we communicate. For example, to shift perceptions on reusing greywater and generate urgency on net zero carbon.

People

As an organisation and across the sector we need the right skills, capabilities and culture to face the opportunities and challenges of the future. We need to work with schools, further education and higher education to engage, inspire and develop the skills of the future workforce. We also need to identify and develop capabilities in specific areas, for example basic digital literacy, climate change modelling, data analytics, systems thinking and natural capital decision making. Our organisations must attract a more diverse workforce, for example creating alternative routes into the sector, and foster a culture of diversity of thought.

Governance

To achieve our long term desired outcomes we must have the supporting plans, processes and organisational structures. Importantly our decision making will need to evolve. For example, how we value social and natural capital and how we facilitate catchment management approaches. To be resilient in the long term we will also need to respond to new and emerging threats such as cyber security and climate change, and think adaptively in the way we plan to manage future uncertainty. This enabler also considers the mechanisms to work effectively with partners and stakeholders, for example through shared procurement processes or undertaking joint impact assessments.

Digital and Data

Digital transformation and creating value from data underpins our ability to achieve our long term desired outcomes. A significant aspect to this enabler is the collection and analysis of data, and ensuring it is aligned with long term desired outcomes. For example, the need to collect real-time data and improve our insight on customer behaviours. The sharing of data is also essential to facilitate catchment level decision making and drive innovation across the sector. This enabler also considers assets and technology, for example the implementation of predictive maintenance and autonomous networks.

6. Conclusion and next steps

Uisce Éireann will need to change how we collaborate and plan for the future to achieve our long-term desired outcomes. By recognising the systemic nature of our operating environment and the wider water sector in Ireland, as well as the inter-dependencies, we can work with stakeholders in a more effective way to achieve long term transformation of the water sector in Ireland.

Complex systems by their nature become fragile when they are fragmented, and difficult or even impossible to understand. A systemic approach founded on collaboration will better co-ordinate interdependencies, identify and fill gaps, reduce uncertainty and complexity.

The proposed systemic approach allows plans and strategies to be developed and tested against long-term outcomes in a collaborative manner. In addition, by using a backcasting approach, we can shape a preferred future with our desired outcomes at the centre of our focus. The approach could lead to greater shared understanding, a more integrated delivery of resilience, better and more holistic solutions at lower cost and improved overall levels of service.

The approach described within this report could be used by UÉ and the wider sector in a number of ways, as shown opposite. This could include informing and testing the resilience of strategic plans and priorities that evolve from The Water Services Strategic Plan (WSSP). Furthermore, while Vision 2050 is not part of the WSSP process, Stage 2 has identified opportunities that could be considered for inclusion within the plan.

How we could use Vision 2050

Challenging assumptions and improving forecasts

Leveraging collaboration opportunities

Identifying the easy wins

Knowledge and information gaps

Competency and capability gaps

Tools for testing our strategies and plans

Developing wider choices and understanding trade offs

Guiding our research and strategic innovation

Evolving our approach to risk and resilience

Appendices

water.ie

Uisce Éireann
Irish Water

Appendix A

Scenario Development Methodology

water.ie

Uisce Éireann
Irish Water

Appendix B

Opportunity Cards

water.ie

Uisce Éireann
Irish Water

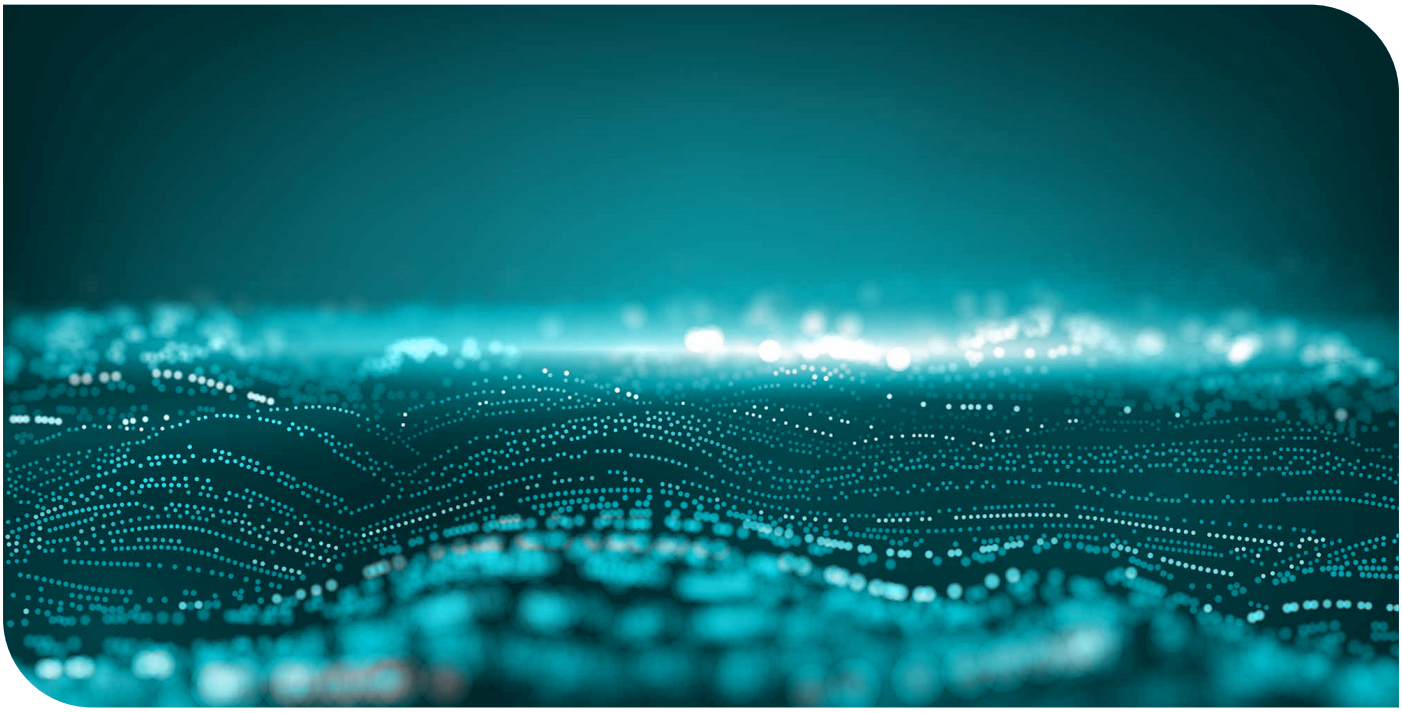
Appendix C

Workshop #1 Outputs

Uisce Éireann
Irish Water

Appendix A

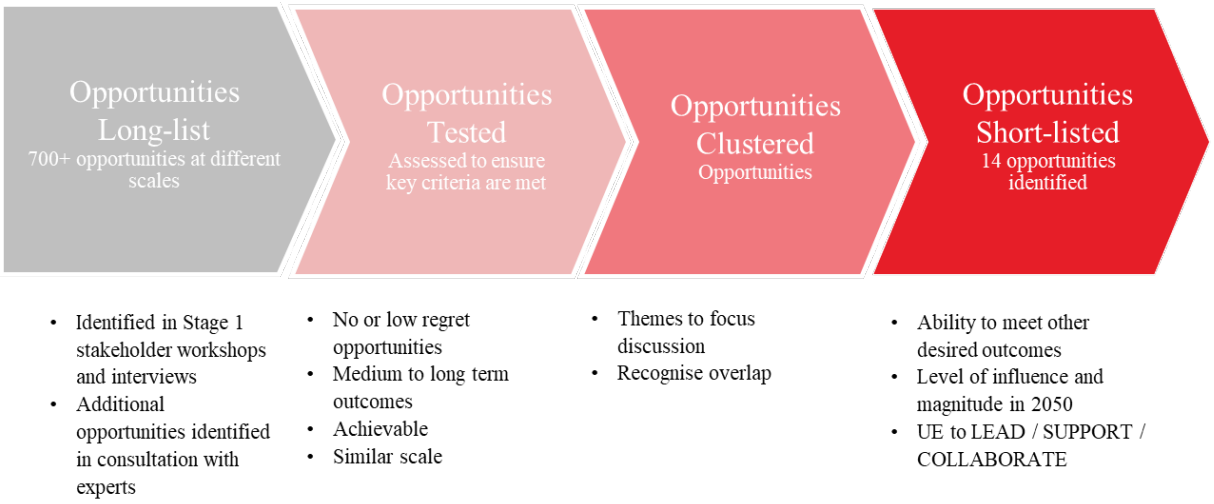
Scenario Development Methodology



Appendix A: Stage 2 Methodology

Step 1: Opportunities

The first step in the methodology was to identify a shortlist of low and no regret opportunities that through UE leading, supporting or collaborating would be highly impactful in achieving the 2050 desired outcomes. This first step is summarised in the figure below.



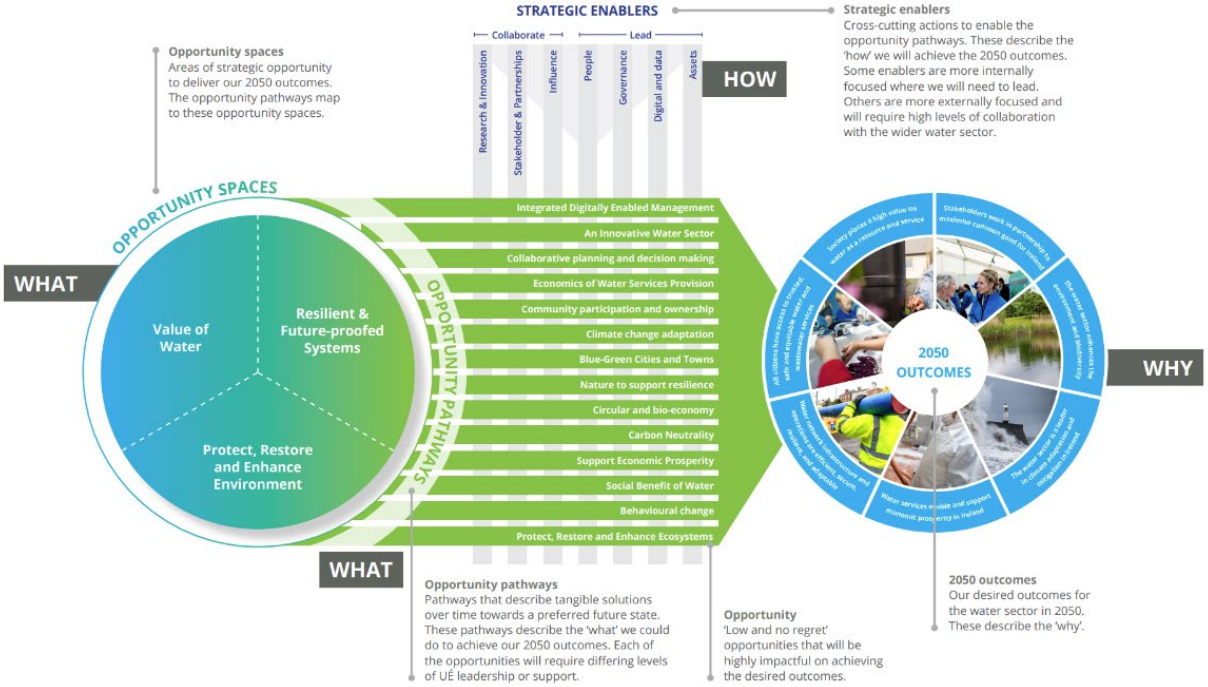
Initially a long-list of 700+ opportunities were identified. These were a combination of those identified in Stage 1 through stakeholder interviews and workshops, and additional opportunities identified by experts in Stage 2. The opportunities were then assessed to ensure they were all no and low regret opportunities, medium to long term, achievable and of a similar scale. The remaining opportunities were further assessed and scored for magnitude / impact on achieving the desired outcomes, and the ability for UE to influence the opportunity. The highest scoring opportunities were then clustered thematically. Clustering ensured they were at a scale that recognises the overlap in topics and their strategic nature.

The output of step 1 was 14 short-listed opportunities that through leading, supporting or collaborating UE would have influence, and would be highly impactful in achieving the 2050 desired outcomes. Appendix B provides a summary of what each opportunity encapsulates.

Step 2: Testing and adapting our approach

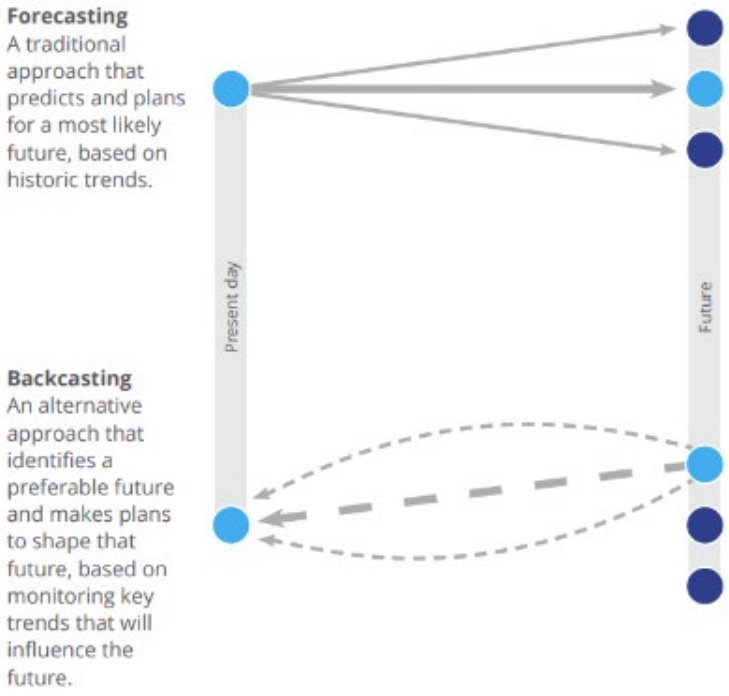
The second step in Stage 2 involved testing and adapting our approach. Our original approach was to develop a pathway for each desired outcome, identifying which opportunities best support that specific outcome. This approach was tested using one of the desired outcomes in a collaborative workshop (#1) with stakeholders (see Appendix C). Through this testing, it became clear this approach would not work due to the systemic nature of achieving a desired outcomes. We concluded that the opportunities support achieving multiple desired outcomes, and outcomes will only be achieved by leveraging multiple opportunities. We also identified that opportunities impact on one another with particularly strong linkages between certain opportunities. Furthermore, the opportunities loosely clustered into three overarching Opportunity Spaces: Resilient and Future-proofed systems, Protect and Enhance the Environment and Value of Water.

As a result, we revised our Stage 2 approach focussing on the development of pathways for each of the shortlisted opportunities, as well as the development of strategic enablers (explained further in Step 4.). The graphic below provides an overview of the finalised approach.

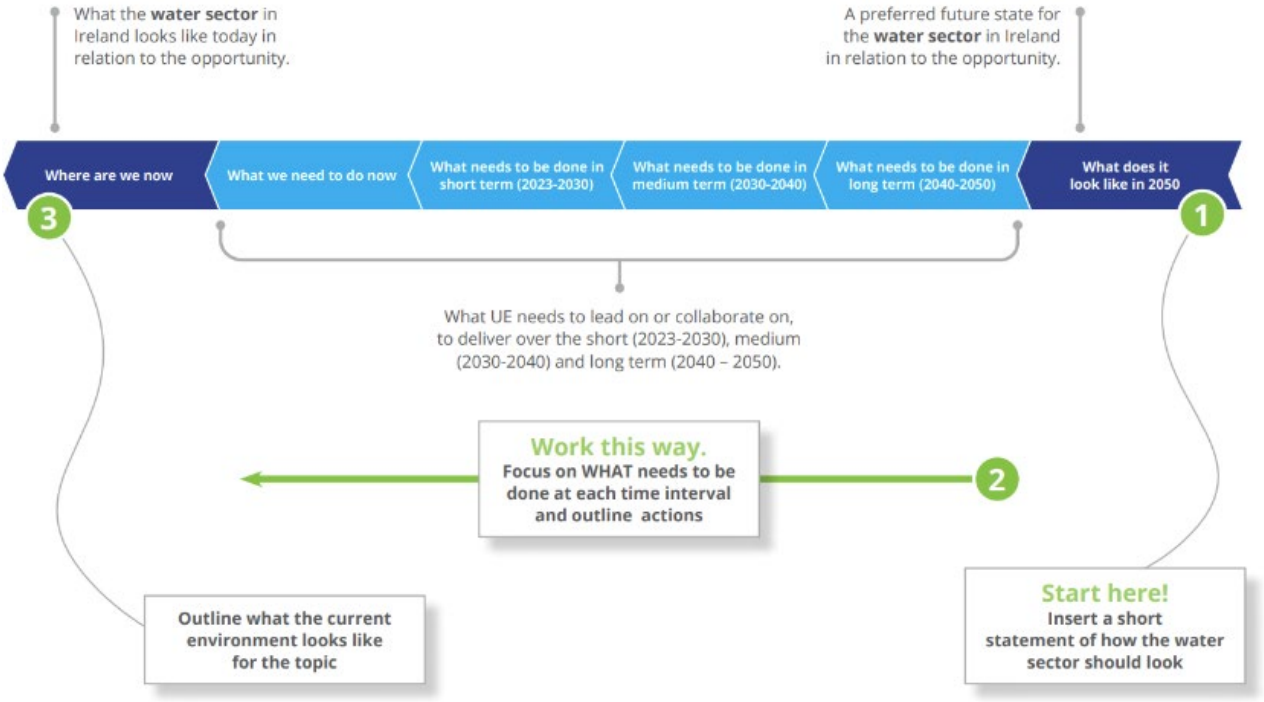


Step 3: Opportunity pathways

For each of the opportunities we developed an opportunity pathway using a technique called backcasting. This technique first considers the preferred future state and then works backwards to identify what needs to happen to realise that future.



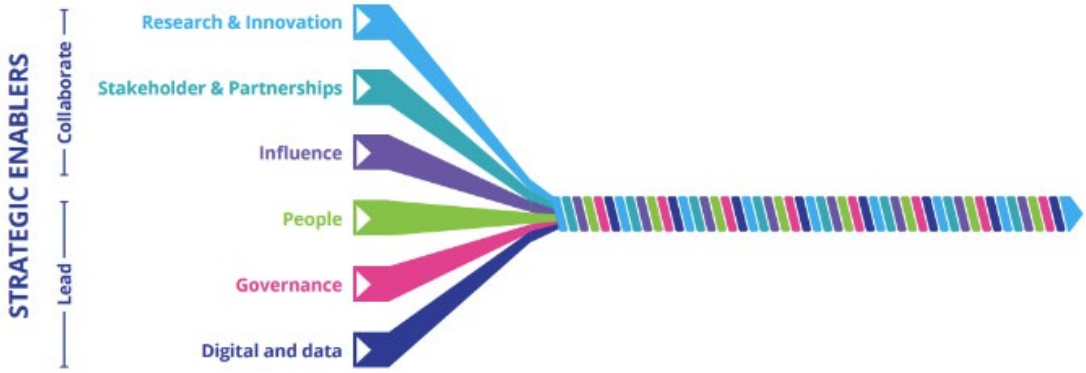
We identified tangible solutions over short, medium and long term UE could lead or collaborate on with partners and stakeholders. The pathways aim to describe what UE will do to achieve the 2050 outcomes and are explained below.



The content was developed through a literature review, interviews with key Arup experts (for example to cover technical insight around digital and innovation) and discrete focus groups within Uisce Eireann. It should be noted, that the pathways were developed for illustrative purposes to demonstrate the approach. Therefore the research, consultation and review process was limited to develop their content.

Step 3: Strategic Enablers

Similar to the opportunity pathways, strategic enablers were developed through a literature view and Arup expert interviews. The strategic enablers cut across the opportunity pathways and describe how we UE will achieve the desired outcomes. We identified short-, medium- and long-term enablers across six themes and also tested these in workshop #2 with the WSSP team. Again, it should be noted, that the enablers were developed for illustrative purposes to demonstrate the approach. Therefore, the research, consultation and review process was limited to develop their content. The strategic enablers were presented in the style of a transformation map.



Uisce Éireann
Irish Water

Appendix B

Opportunity Cards

ARUP

Opportunity Cards

ARUP

1.1 Blue-Green Cities and Towns

Developing policy, capabilities and other enablers for the implementation and widespread integration of blue-green infrastructure to exploit regenerative urban design opportunities, adapt to weather extremes and support urban water cycle management, while enhancing the wider environment

Influence: Very High

Magnitude: Major Beneficial

Priority score: 5

Example Initiatives

- Develop strategic plan for water reuse at a town / city scale predicated by understanding demand and cost of alternatives
- UE commit to supporting sustainable water with stakeholders
- Multi-stakeholder working to understand synergies in a blue-green environment, develop enablers such as capabilities, requirements, policy and regulation, frameworks, processes, etc.
- Communication with and education of leaders and society
- Demonstration projects to develop capabilities and garner wider societal support e.g. pilot community rainwater schemes
- Define, understand and optimise Urban Water Cycle management
- Incorporating AI and automation into planning and operation e.g. developing and testing distributed interventions and integration into wider networks
- Maximising blue-green spaces e.g. roofs, community spaces, transport corridors as transport modes evolve
- Shifting cities/towns to 'sponge cities' to reduce surface water flooding and improve river health.
- Daylighting urban streams to improve downstream flooding and regeneration of habitats while reducing nutrient pollution and degradation of habitats.
- Identify solutions to reduce / eliminate storm water overflows and mitigate adverse impacts

ARUP

1.2 Integrated Digitally Enabled Management

Develop a publicly available platform to allow more integrated water cycle management and improve water services resilience through monitoring and access to data

Influence: Extremely High

Magnitude: Major Beneficial

Priority score: 5

Example Initiatives

- An accessible, integrated and engaging data platform and resource base that supports wide engagement in active management and protection of water
- Enhanced and better supported citizen engagement and collaboration e.g. Citizen Science
- Catchment scale monitoring and modelling of assets, networks and rivers to facilitate understanding of the water cycle. Develop and apply national shared catchment simulation modelling capabilities (evidence-based decision making) to identify the most cost-effective combination of options and trade-offs.
- Planned and co-ordinated approach to assessing actions and delivering measures to maximise/optimise outcomes
- Open-source sharing of data to encourage innovation
- Developing ecosystem health monitoring metrics to inform land use planning that optimises the protection, restoration and enhancement of environment and biodiversity
- Use Digital Twins at asset and catchment level to bring together the physical and the digital realms, enabling a new level of insight and decision-making to ultimately optimise systems operations
- Improve monitoring and data analytics capabilities to better understand emerging contaminants and develop solutions
- Encourage the standardisation and integration of stakeholder datasets to better inform proactive integrated planning
- Using advances in sensors and telemetry, and developing integrated infrastructure to gather data and consolidate data at a central hub to enable UE and others to develop key insights and make informed decision making.

ARUP

1.3 Behavioural change

Form partnerships to engage and influence society to achieve a greater recognition of the value of water and hence reduce usage

Influence: Very High

Magnitude: Major Beneficial

Priority score: 5

Example Initiatives

- Facilitate national conversation around the wider value of water to influence public attitude and behaviour
- Influence European and national legislation to encourage water conservation though water efficiency labelling of goods, building regulations requirements for water conservation (smart meters in new homes) etc
- Collaborate with agriculture and industry to communicate the value of water, consider the different types of water and encourage water reuse
- Utilise data to project future water stressed areas and encourage reduction in consumption and deploy new technologies to mitigate impacts
- Community and education initiatives to encourage thinking of water as a valuable resource
- Create awareness around the value of environment issues and biodiversity and the linkage between consumer behaviour and environmental degradation
- Balancing the rights of property owners, resource consumers and the value that water and nature provide to society
- Promote concept of 50L home
- Develop a strengthened relationship with the public, stakeholders and customers due to excellent performance and service, leading to reputation as a trusted provider
- Influence acceptability and / or to sustain environmental flows of proposed inter-catchment transfers to provide sustainable supplies in high demand areas and / or to sustain environmental flows
- Communication strategy using validated data to promote the value of water, and to ensure value of resilient water services provision is recognised

ARUP

1.4 Water reuse, Circularity and the Bio-economy

Influence policy and initiatives to maximise circular opportunities, to promote water and wastewater reuse and to encourage the development of an urban bioeconomy

Influence: Extremely High

Magnitude: Moderate Beneficial

Priority score: 5

Example Initiatives

- Develop Circular Economy Strategy which targets the minimization of carbon embedded in our process inputs and seeks to maximise the benefits accrued from by-products of our activities
- Investigate and develop our understanding of the viability of water reuse at town /city level and based on outcomes, develop a framework for its roll out.
- Influence building regulations to maximise water reuse and usage reduction for new and existing domestic, commercial and industrial properties and garner support for retrofit initiatives
- Promote the requirements laid out in the UWWD as a means to encourage water and wastewater reuse and reduce discharges
- Promote bioeconomy through use of wastewater and residuals as bioeconomy feedstock
- Production of heat energy from wastewater for reuse on-site or off-site heating
- Develop strategy for water reuse within specific industry sectors - agriculture, data centres, pharma, etc.
- Influence policy to encourage cohesion between development planning policy and sector requirements to maximise symbiotic water usage e.g. locate water heavy industry near WWTP or sewage pipeline to allow wastewater to be extracted, treated and used in industry
- Communication initiative to encourage acceptability of reused water

ARUP

1.5 Collaborative Planning and Decision Making

Fostering partnerships and understanding wider sectoral impacts and interdependencies to support the water sector in putting natural capital at the centre of water management planning and decision making

Influence: Very High

Magnitude: Major Beneficial

Priority score: 5

Example Initiatives

- Map policy linkages and strategic initiatives across stakeholder groupings to ensure cross-sectoral holistic outcomes are achieved e.g. water, energy, waste, environment
- Identify and establish new relationships and channels to influence policy and ensure efficient and holistic outcomes are achieved
- Enable the efficient and effective delivery of catchment initiatives and nature-based solutions
- Multi-stakeholder collaboration to understand wider water issues
- Enable policy to allow a common value framework to be applied
- Enabling and identification of opportunities for positive biodiversity outcomes such as:
  - ❑ Blue-green infrastructure
  - ❑ Nature-based solutions
  - ❑ Pollution apportionment models
  - ❑ Seasonal licencing
  - ❑ Future farming practices
  - ❑ Water/effluent reuse
  - ❑ Bio-based fertilizers

ARUP

1.6 Climate Change Adaptation

Improve resilience of water and wastewater systems to meet climate change adaptation needs through adaptive planning around extreme weather and changing water availability

Influence: Extremely High

Magnitude: Major Beneficial

Priority score: 5

Example Initiatives

- Gain a better understanding of Uisce Eireann's infrastructure vulnerabilities to enable climate change adaptation.
- Build adaptive planning capacity including identifying items to monitor and trigger points for when changes in approaches are needed
- Understanding impact of climate on source and receiving waters (e.g. reduced baseflows to rivers, less dilatation in streams) and associated impacts on systems to develop future resilience
- Assess how climate change functions can be incorporated into each business stream
- Engage with stakeholders to communicate the potential impacts on water services in the future and tailor the message to the audience
- Assess how climate change will change associated demand from industry and agriculture and adapt infrastructure accordingly
- Promote sustainable water use to agriculture and business
- Work with OPW to integrate flood management and water services provision using nature-based approaches to protect society. Examples include incorporating upstream storage in flood relief schemes and leading to improvement in overall water quality, its treatability , resilience to pollution and assimilative capacity
- Ensure adequate funding is available to adapt and protect water services
- Develop skills and capacity in climate change modelling to ensure future changes in weather patterns and associated impacts are understood (e.g. drier south east, wetter west)
- Collaborate with stakeholders to ensure land use planning for future developments (housing, commercial or industrial) and water services planning are compatible with each other and potential future changes in climate are considered in long term planning

ARUP

1.7 Carbon Neutrality

Reduce overall energy consumption and emissions to achieve carbon neutrality during infrastructure construction and operations and capture process emissions for reuse

Influence: Very High

Magnitude: Major Beneficial

Priority score: 5

Example Initiatives

- Map co-benefits of energy efficiency/carbon reduction measures to promote wider value of achieving net zero
- Adopt systems approach to mapping carbon to best explore intervention options, their costs and trade-offs. These should be considered at a catchment rather than a local scale for accounting and reporting. Examples include catchment interventions in vulnerable areas to protect water quality, resulting in less energy intensive treatment and less sludge to dispose of and better overall carbon outcomes than increasing treatment capacity of a plant.
- Adopt renewable energy sources (on-site production or PPA model)
- Utilise alternative solutions with lower carbon or water footprints for infrastructure renewal e.g. low carbon concrete, carbon neutral construction materials
- Promote bioeconomy through use of wastewater as bioeconomy feedstock
- Production of heat energy from wastewater
- Utilise AI and automation to maximise efficiencies between inter-related systems
- Innovate and use new treatment technologies to substitute with low carbon alternatives where possible and reduce need for carbon-producing chemical treatment
- Maximise carbon offset value of our outputs e.g. biogas may be better as a feedstock than as a CHP fuel.
- Work with stakeholders to facilitate green hydrogen production if required
- Achieve net zero carbon throughout the business
- Incorporate nature-based solutions such as wetlands or peat restoration to reduce carbon footprint and enhance biodiversity

ARUP

1.8 Nature to Support Resilience

In partnership with wider stakeholders, utilise innovative catchment management solutions and holistic catchment data to integrate and scale nature-based solutions that restore and enhance ecosystem health and support wider system resilience.

Influence: Very High

Magnitude: Moderate Beneficial

Priority score: 4.5

Example Initiatives

- Improve system resilience by incorporating low carbon, nature-based systems
- Novel solutions leveraging circularity
- Integrating and scaling up solutions- right solutions in right places
- New and innovative catchment management solutions
- An integrated approach to data sets and modelling to enable smart management (visibility of the system and ability to remotely influence)
- Developing our understanding of efficacy and effects (good and bad) of nature-based solutions
- Contributing to national and global targets for human well-being, climate change, biodiversity and human rights
- Collaborate to develop appropriate solutions to mitigate sewer network impacts e.g. surface water & wastewater separation
- Establishment of riparian woodlands and forests as part of flooding management strategies
- Identifying and incorporating opportunities to enhance ecosystem integrity and connectivity into nature-based solutions
- Establish an evidence base for 'value' of integrated wetlands and develop design guidance and standards
- Incorporating nature-based solutions and soft-engineered solutions at local and catchment level that restore ecosystems
- Implement nature-based treatment solutions operated in partnership with wider stakeholders.

ARUP

1.9 Participatory Decision Making

Maximise outcomes at national, catchment or local levels through engaging in participatory decision making

Influence: Very High

Magnitude:
Moderate Beneficial

Priority score: 4.5

Example Initiatives

- Understanding drivers / pressures at different scales (local, catchment, national) through public consultation initiatives to develop right and acceptable solutions for different communities
- Community engagement & influencing around the understanding of behaviour and outcome linkages
- Joined-up, novel education & and integrated marketing initiatives
- Innovative volunteering/community conservation initiatives
- Develop capabilities in natural capital decision making so we can fully understand the value of the environment, and its role in our service.
- Partner with environmental stakeholder groups to develop our natural capital understanding, as well as our public value framework.

ARUP

1.10 An Innovative Water Sector

Drive innovation, and work with researchers to identify and implement new management processes, technologies and systems-based approaches to improve how water services are delivered, managed and protected

Influence: Very High

Magnitude:
Moderate Beneficial

Priority score: 4.5

Example Initiatives

- Partner with research bodies and other stakeholders to develop a National Water Research and Innovation Strategy
- Support the development of a centre for water excellence that would research, develop, and trial new technology and solutions with third level institutes and companies within and outside of Ireland to inform policy and drive adoption of new solutions.
- Within an integrated system use AI to test interactions of multiple interventions at a catchment scale
- Pilot projects to investigate "distributed treatment systems" that might overlay on existing centralised systems to extend their capacity.
- Innovative catchment real time monitoring and management solutions to improve environmental outcomes and water quality
- Wastewater treatment solutions - using a wider systems perspective
- Water recycling and demand management to reduce abstractions
- Destressing our networks and treatment facilities
- Biosolids, by products and soil improvement
- Deliver innovation to improve water quality (e.g. Silver nanoparticle disinfection for drinking water application) while minimising chemical treatment
- Innovation to promote decentralization in WW networks
- Accelerate the use of GIS and Digital Twins to produce a highly coordinated view of the network and use to improve the efficiency and effectiveness of delivery.

Lead

1.11 Economics of Water Services Provision

ARUP

Secure access to sustainable funding streams in the long term to ensure water services development and operation

Influence: High

Magnitude: Major Beneficial

Priority score: 4.5

Example Initiatives

- Establish and evaluate our long-term strategic challenges to funding streams e.g. network deterioration
- Understand long term costs (+20 years) across scenarios to identify where funding needs are likely to arise and identify alternative solutions if necessary
- Assess whether funding streams are viable on a long-term basis and identify alternatives sources to be investigated
- Mobilise public sentiment to promote the value of water and ensure value of resilient water services provision is represented in policies and is adequately funded
- Work with stakeholders and regulator to streamline governance around access to funding
- Secure funding to meet future challenges utilising sustainable finance initiatives (Green Bonds, Sustainability Performance Linked Lending, etc
- Utilise a multi-capitals or total value approach to prioritise funding
- Utilise innovation to become more cost efficient in delivering services

1.12 Protect, Enhance and Restore Ecosystems

ARUP

Working collaboratively with stakeholders to implement technical solutions to protect, restore and enhance rivers and catchment areas and regenerate ecosystem integrity and connectivity.

Influence: High

Magnitude: Major Beneficial

Priority score: 4.5

Example Initiatives

- Creating awareness around wider benefits of healthy ecosystems and sectoral actions to support same.
- Enhanced collaboration with stakeholders: LA's, farmers, developers, road builders, industry etc. in delivering protective measures
- Influence regulation
- Understanding and implementing sustainable solutions for chemicals of emerging concern
- Better predict demand by monitoring FDI flows and working closely with companies who are investing in large capital intense projects.
- New ways of reducing the environmental impact of wastewater treatment and storm overflows
- Habitat and conservation actions that warrant compensation and mechanisms to deliver this
- Incorporating nature-based solutions and soft engineered solution at local and catchment level that restore ecosystems
- Understanding and enhancing ecosystem connectivity
- Collaborative and integrated planning and delivery of initiatives to enhance ecosystems
- Integrated wetlands
- Evolving agricultural practices
- Evolving afforestation practices
- Understanding and improving ecosystem resilience

ARUP

1.13 Support Economic Prosperity

Support economic prosperity of Ireland through multi-stakeholder working to ensure water services and future development (housing / industrial / agriculture / commercial) are appropriately co-located.

Influence: Very High

Magnitude:
Moderate Beneficial

Priority score: 4.5

Example Initiatives

- Work in partnership with stakeholders to ensure future development and water services are developed in an integrated manner, through education, sharing data (e.g. asset constraints) and influencing (e.g. regulation)
- Facilitate relationships between stakeholders to allow for maximum water reuse / by-product circularity, including planning for future developments e.g. co-locating industries, treatment plants, power generation, district heating, agriculture, sharing of by-products etc
- Work in partnership with industry and agriculture to understand future water demand and how changing customer demands or future innovations in their fields which may change water demand in the future
- Support IDA in marketing Ireland as a location with resilient, sustainable and adaptable water services
- Integrated data sharing with stakeholders and predictive modelling to understand where development will arise in the future and understanding where water services can be developed and ensuring effective communication of same to all parties
- Develop adaptative planning capacity including trigger points to monitor for e.g. changing demand profile in an industry or innovative solutions that can be adapted,
- Apply early for planning / environmental consents or link permissions to development plans
- Map regulation to understand interlinkages and influence to remove barriers to growth e.g. land-use planning, ww by-product reuse & streamline planning and environmental consents process
- Develop concurrent programs to drive demand down
- Influence the development of sectoral based prioritisation of water during periods of water pressures (i.e. drought) – similar to Dutch model
- Manage and plan for changing water demand due to changing population size and population movement trends on a regional and national level (movement in the Belfast-Dublin corridor)

ARUP

1.14 Social Benefit

Maximise the social benefit of water services through public health, community, well-being and recreational initiatives.

Influence: High

Magnitude: Moderate Beneficial

Priority score: 2.5

Example Initiatives

- Develop wastewater epidemiology protocols to detect emerging public health trends and improve public health responses e.g. areas of increased antimicrobial resistance, usage and efficacy of medicine, disease detection
- Co-sharing of data with Garda to support identification of risks such as illegal drugs, explosive material etc
- Support provision of data to allow comparison with other indicators (e.g. areas with high asthma medication prescriptions versus environmental air quality data) to obtain a better understanding of community health and associated drivers
- Support community well-being through incorporation of public realm spaces or amenity value into projects
- Enhance community well-being by providing infrastructure to transform existing assets to public use e.g. waters for recreational use, integrated constructed wetlands (ICW)
- Engage communities through supporting local initiatives e.g. citizen science and collaboration with tidy towns
- Support community initiatives to address circular economy opportunities e.g. heat harvesting from sewers
- Enhanced use of water quality data to generate information that society values eg SWIM safe initiatives

ARUP

Uisce Éireann
Irish Water

Appendix C

Workshop #1 Outputs

Uisce Éireann

Vision 2050

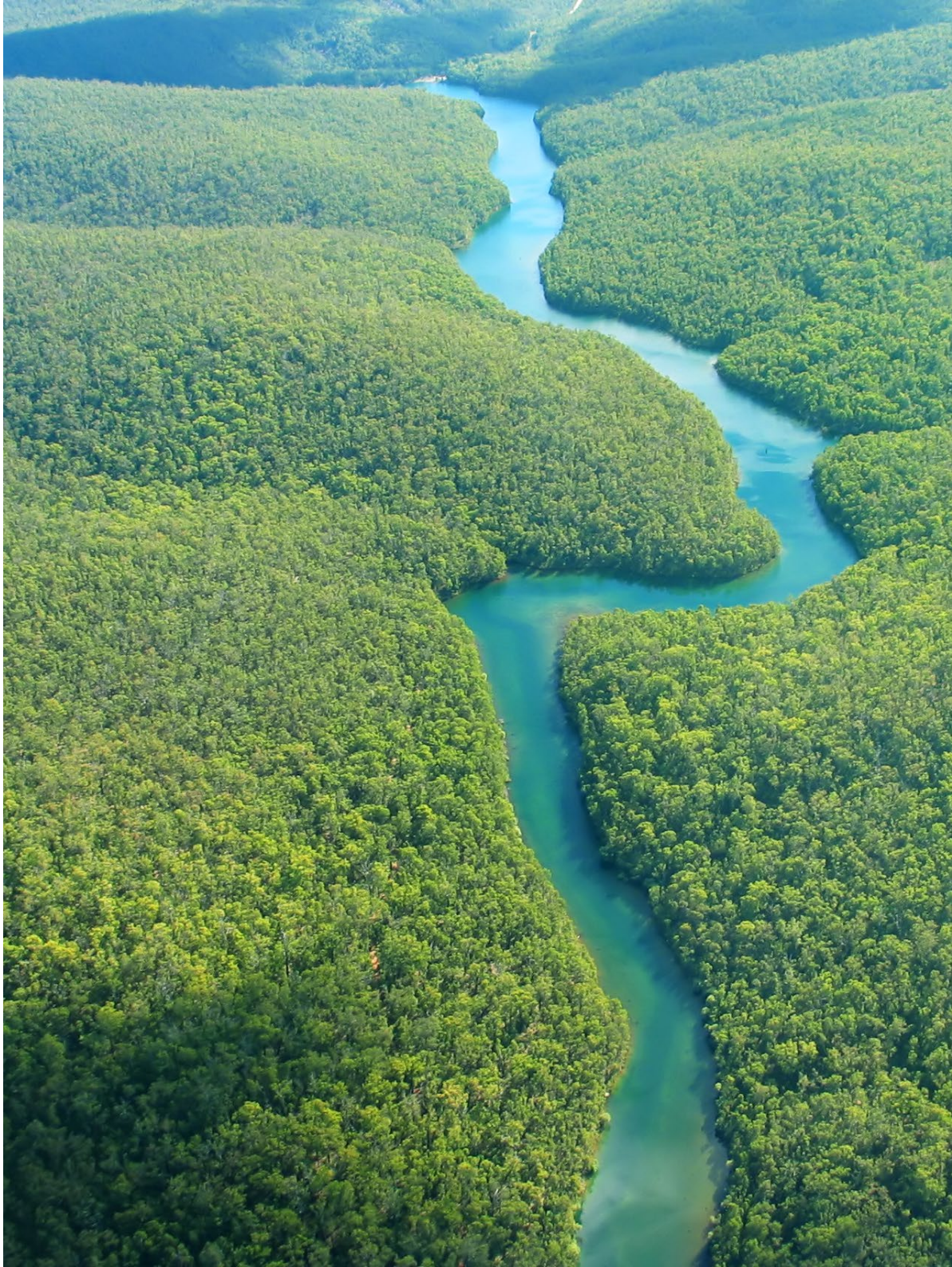
Roadmap Development: The water sector enhances the environment and biodiversity

Workshop

Summary Report

June 2023

ARUP



Vision 2050 – Roadmap Development

Introduction

Background

Building on the work delivered in Stage 1 of the 2050 vision project, the aim for Stage 2 is to demonstrate how an alternative approach, drawing on systems thinking and foresight techniques, can be applied to support planning for the future. This alternative approach could be used by Uisce Éireann (UE) and the wider sector to inform plans and priorities, where appropriate.

The first step in the Stage 2 approach identified and prioritised low and no-regret opportunities on which the sector can collaborate to achieve long term desired outcomes. These were developed by building on and synthesising the opportunities, risks and challenges identified in Stage 1.

As a next step, this workshop aimed to work collaboratively with stakeholders to develop a pathway for a specific desired outcome: The water sector enhances the environment and biodiversity, the supporting sub-outcomes of which are summarised below:

Desired Outcome:
The water sector enhances the environment and biodiversity

- The water sector works collaboratively to place biodiversity and ecosystem health at the centre of water services planning and decision making
- Partnerships work to protect, restore and enhance natural ecosystems and biodiversity
- Promoting and operating an integrated blue/green/grey asset base while optimising the use of nature-based solutions

Workshop Objectives

To bring together water sector stakeholders and Arup subject matter experts to elicit insights that support the development of a holistic and deliverable long -term roadmap to achieve the desired outcome. The workshop aimed for participants to:

- Collectively agree the highest priority 'no-and low- regret' long term opportunities for UE to achieve the desired objective, to be taken forward for road-mapping
- Identify possible strategic actions in the short, medium and long term to realise the opportunity
- Assess factors regarding deliverability such as timescale to deliver outcomes , cost (relative and profile), complexity around delivering , likelihood of success and state of readiness
- Identify stakeholders and partners to be involved to deliver the strategic action
- Identify indicators that could be monitored to understand when UE may need to adapt.

Workshop Output Context

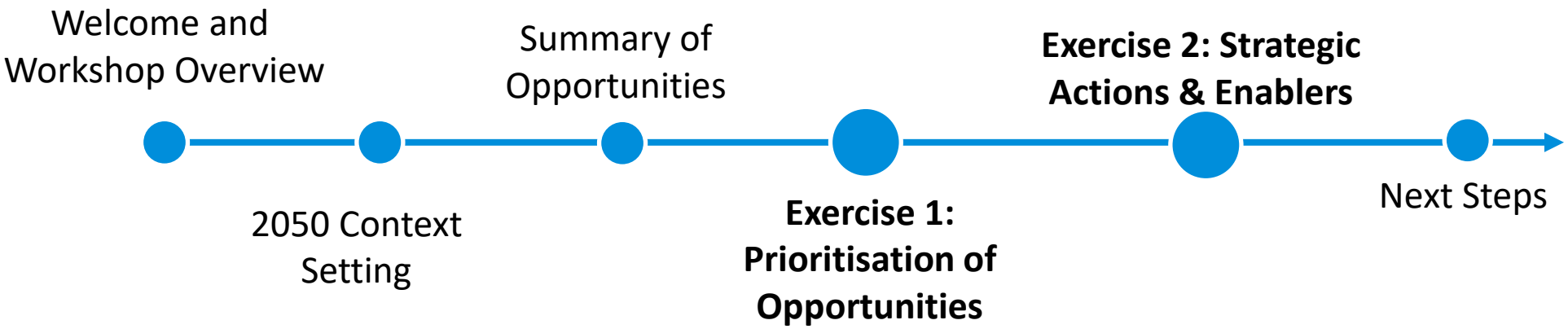
The initial approach for Stage 2 aimed to work collaboratively with stakeholders to develop pathways for each desired outcome with the first workshop centred on the outcome, "The water sector enhances the environment and biodiversity".

After assessing the outcomes of the first workshop, a shift in method resulted in the methodology described in Stage 2. Despite this reframing, the workshop still provided valuable insights into opportunities and challenges for the future of the water sector and these outputs were used to inform the final methodology.

Vision 2050 – Roadmap Development

Workshop Structure

Participants of the workshop included Uisce Éireann personnel and a wide variety of stakeholders including representatives from IHBA, DCC, NPWS, OPW, NWF, OPR, EPA and academia. Uisce Eireann are very grateful to all participants for the valuable insights provided.



Vision 2050 – Roadmap Development

Exercise 1: Prioritisation of Opportunities

In exercise one, participants were split into scenario working groups and asked to consider 12 opportunity cards. The opportunities were clustered under 3 headings to help participants navigate the list of opportunities. Participants were then asked within their group which five opportunities they felt would likely contribute most to achieving the desired outcome, "The water sector enhances the environment and biodiversity" and to explain their choice. The results of the group voting is summarised in the table below.

Ranking	Sunny outlook	Storms forecast	Cloudy with a chance of rain
1	Influencing policy and regulation	Influencing policy and regulation	Restoring and enhancing ecosystems
2	Integrated knowledge platform	Integrated knowledge platform	Integrated knowledge platform
3	Investing in research and development	Blue-green infrastructure (BGI) in urban settings	Community engagement
4	Restoring and enhancing ecosystems	Integrated water management	Infrastructure and network transformation
5	Integrated water management	Investing in research and development	Investing in research and development

Collaborative Water Services planning and Decision Making

Protect, Restore and Enhance

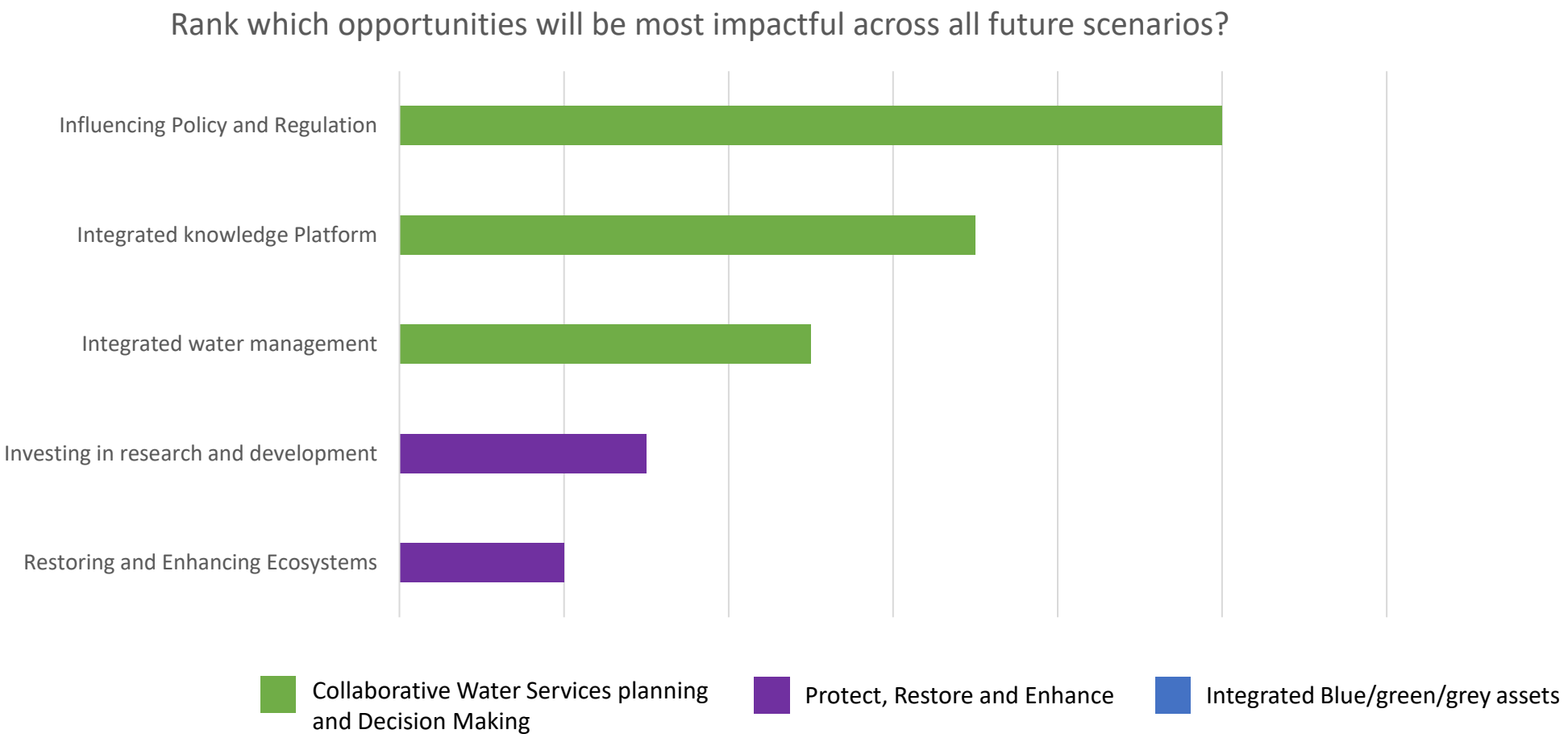
Integrated Blue/green/grey assets

Vision 2050 – Roadmap Development

Voting

After prioritisation, the working groups came back together and explained their choices to the entire group of participants. Finally, all participants were asked to vote via electronic poll to rank which 5 opportunities would be most impactful in any scenario.

The final ranking is shown in the figure.



Vision 2050 – Roadmap Development

Strategic Actions & Enablers

In Exercise 2, participants were broken into 3 groups to develop strategic pathways for the most impactful opportunities across all scenarios as voted for in Exercise 1. These were:

Group 1	Group 2	Group 3
○ **Integrated knowledge platform** ○ **Investing in research and development**	○ **Integrated water management** ○ **Restoring and enhancing ecosystems**	○ **Influencing policy and regulation**

Each group worked together to identify strategic actions and enablers required to achieve the desired outcome for these opportunities in the short, medium and long term under the following headings:

1) strategy & governance,
2) policy & regulation,
3) partnership, customers & communities,
4) people & capabilities,
5) assets, operations, technology & innovation, and
6) processes, information, data and systems.

Vision 2050 – Roadmap Development

Strategic Actions & Enablers

Influencing Policy & Regulation

	Strategy & Governance	Policy & Regulations	Partnership, Customers & Communities	People & Capabilities	Assets, Operations, Technology & Innovation	Processes, Information, Data and Systems
Short Term (0-10 years)	Create national target for water (similar to Net Zero) Codify water and wastewater as resources Find external stakeholders to support policies	Establish goals for each government dept for what needs to change on the national level Evidence-based policy Legislation audit to determine what new policies are needed Forum on water, climate & biodiversity	Establish shared commitment to values across water sector Integrate circular economy strategies amongst partners New requirements for Irish urban wastewater planning	Identify future skills and establish interconnectivity	Building regulations	Evidence-based policy and collaboration around data Create knowledge-sharing platform Establish innovation hubs
Medium Term (10-20 years)	Alignment of national & EU policy plans Strategy to link climate change to water	Nature-based solutions	Identify management across political landscape Align water and health goals	STEM education in schools		Modelling data to better formulate future policies
Long Term (20+ years)	Water conservation for housing/industry Establish ways to valorise water in monetary terms Review policies and re-plan					
Stakeholder Involvement	Citizens assembly Lobby as a sector Policymakers	Policymakers EU		Academia		

Vision 2050 – Roadmap Development

Strategic Actions & Enablers

	Strategy & Governance	Policy & Regulations	Partnership, Customers & Communities	People & Capabilities	Assets, Operations, Technology & Innovation	Processes, Information, Data and Systems
Short Term (0-10 years)	Open data policy	Open data directive	Share data	Use platform to upskill people	Upgrade telemetry	Data directories
	Data auditing	Understand baseline	Stakeholder & partnership auditing	Identify skills gaps	Improve data capture	Cloud integration
	Data strategy	Funding	Action plan		Increase sampling	Security
	Common vision	Create open data group	Strategy			Invest in systems
	Understand data gaps		Pathfinders			Agree on standards
	Agree on Key Performance Indicators					Develop machine learning capacities
Medium Term (10-20 years)	Monitor Key Performance Indicators	Funding review	Innovation	Hybrid skill sets	Emerging technologies	Continue machine learning development
	Update government policy		Scale up	Dedicated resource sharing		Establish modelling platform
						Integration
						Systems model
Long Term (20+ years)	Automated scenario modelling		User guides		Real-time data	Open data system
	Establish integrated governance across all stakeholders		Publicly available/Open access			
			Accessibility			
Stakeholder Involvement	ALL	Government	National/Regional groups	Staff	Contracted partners	Tech firms
		Policy drivers	Local groups	Academia	Technology partners	

Integrated Knowledge Platform

Vision 2050 – Roadmap Development

Strategic Actions & Enablers

Restoring and Enhancing Ecosystems

Stakeholder Involvement	Strategy & Governance	Policy & Regulations	Partnership, Customers & Communities	People & Capabilities	Assets, Operations, Technology & Innovation	Processes, Information, Data and Systems
Short Term (0-10 years)	Integrate flood risk w/ river basin management plans	Outcome-led design linked w/ existing policies	Mainstream education & knowledge transfer among stakeholders	Investment in expertise & resources needed	Optimise INFA & water recycling	Better communication & sharing data with public
	Benchmarking w/ other countries' strategies	Water framework directive - catchment plans, identify critical source areas	Make info publicly available to communities	3rd level colleges	Nature-based solutions	Better ecosystem monitoring
		Capture cross sector benefits & opportunities		Smart metering	Water conservation & education	Shared database
		WFD RBMP Sectoral Action Plans		Changing mindset	Prioritize investment	Biodiversity data centre
		Low Carbon Act		Gathering local knowledge		Recast DMD communications
Medium Term (10-20 years)						
Long Term (20+ years)						

Vision 2050 – Roadmap Development

Strategic Actions & Enablers

Integrated Water Management

	Strategy & Governance	Policy & Regulations	Partnership, Customers & Communities	People & Capabilities	Assets, Operations, Technology & Innovation	Processes, Information, Data and Systems
Short Term (0-10 years)	Prioritise resources European Green Deal Farm2Fork	Building regulations Update regulations to reflect EU Policy Abstraction regulations Recast drinking water directive Water framework directive River basin management plans	Partnership delivery value Establish water sector ecosystem and synergy Cross-sector connections from top to bottom	Circular economy & shared agenda Diversify education/experience levels Engage public participation	50% reduction of GHGs Develop practices that enable system thinking	Sharing and transparency for national-level data Standardized data practices
Medium Term (10-20 years)		Climate Action Plans			Continued carbon reduction	
Long Term (20+ years)						
Stakeholder Involvement	Farmers – results based payments		Public			

Vision 2050 – Roadmap Development

Strategic Actions & Enablers

Research Development

	Strategy & Governance	Policy & Regulations	Partnership, Customers & Communities	People & Capabilities	Assets, Operations, Technology & Innovation	Processes, Information, Data and Systems
Short Term (0-10 years)	Stakeholder mapping	WFI policy shaping	Stakeholder engagement	Identify capability gaps	Develop a culture of innovation	Identify and fill key data gaps
	Information audit	Secure research funding internally and externally	Common/Joint research call	Plan to address skills and knowledge gaps	Adopt solutions as they emerge	Develop research knowledge capture system
	National Water Research Strategy		Establish role for citizen science			
Medium Term (10-20 years)		Evidence-based research	Establish citizen science program to fill key gaps & community funding schemes	Collaborate with academia to develop training modules (micro credentials)	Adopt research outputs and implement solutions	Develop decision-support tools
Long Term (20+ years)		More targeted research informing policy & practice	Scan for additional partners and fill gaps	Upskilling people in the network and citizen science network		Optimise decision-support tools
Stakeholder Involvement	All	CRU	International partners	Academia	Staff	Staff
		Government agencies (EPA)	EPA, TEPGPSC	Training bodies	Consultants	Tech Firms
		Res Bodies	River trusts	Staff	Suppliers	Other suppliers

Vision 2050 – Roadmap Development

Indicators

Finally, groups were asked what changes should be monitored to understand when Uisce Éireann needs to adapt strategic pathways and if there were indicators that could be used to monitor these changes.

What changes do we need to monitor to understand when Uisce Éireann may need to adapt the strategic pathways?

- **Biodiversity Response to Water Quality Improvements**
  - Explore potential of eDNA
  - Key biodiversity indicators
- **Improvement of river flows**
  - **q50, q80, q95**
- **Concentrations of Pesticides/Pollutants**
  - Indicators of concentrations of pesticides/pollutants
- *Multi-stressor environment**
- **Climate change stressors effects on water quality & quantity/biodiversity**
  - Malfunction of infrastructure
  - Poor effluent quality
  - Increased non-compliance due to flooding of assests

Vision 2050 – Roadmap Development

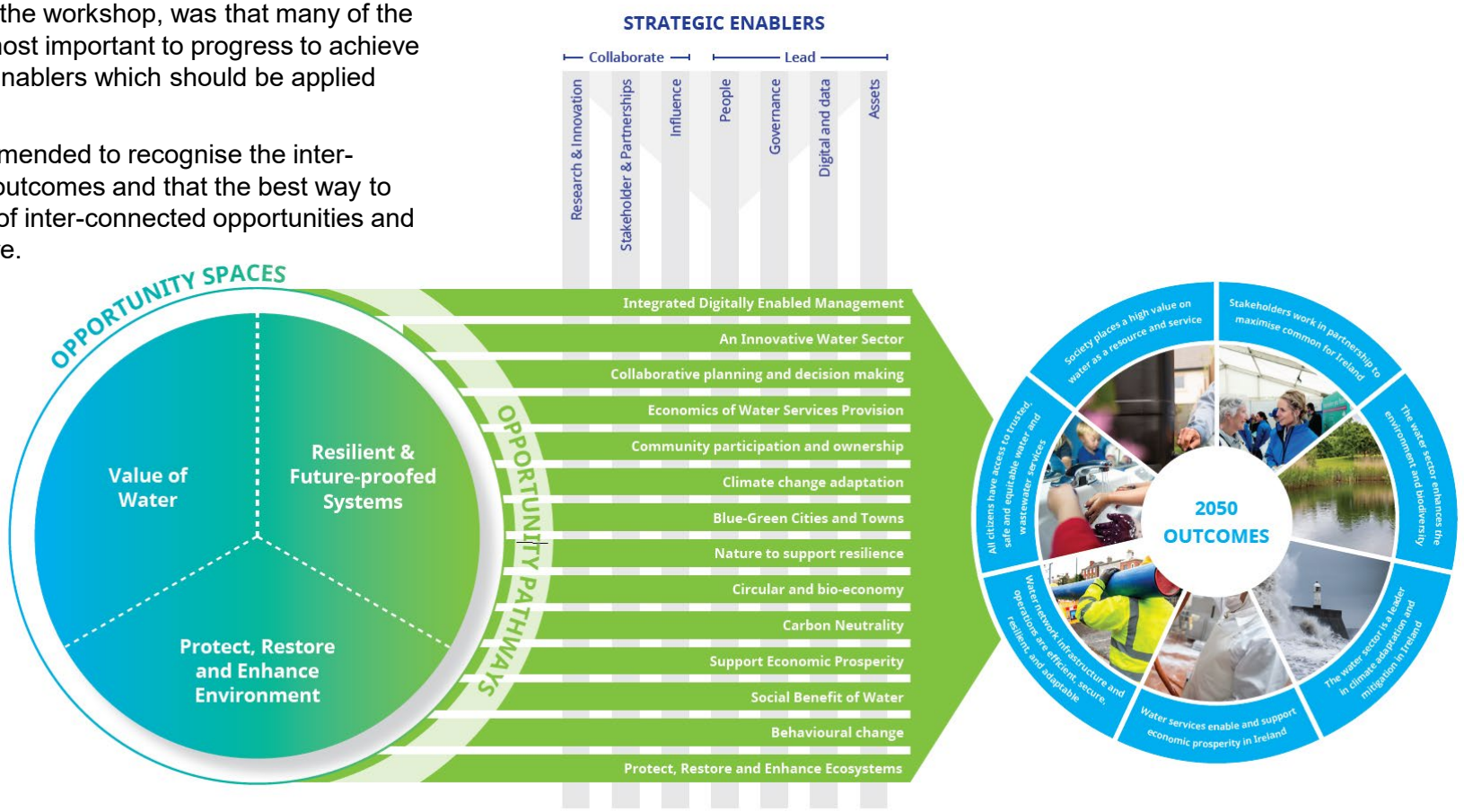
Summary

Workshop Outcome

The outcomes of the workshop allowed additional discrete opportunities to be identified and added to the long list of opportunities generated during Stage 1 stakeholder workshops and interviews. Many of these were incorporated into the 14 grouped opportunity cards presented in Appendix B of the Vision 2050 Stage 2 report.

However, a key insight gained from the workshop, was that many of the topics which participants voted as most important to progress to achieve the specific desired outcome were enablers which should be applied across all the desired outcomes.

For that reason the approach was amended to recognise the inter-dependences between the desired outcomes and that the best way to achieve them was through a series of inter-connected opportunities and over-arching enablers as shown here.



Thank You!

Thank you for your participation!

Any Questions? Please get in touch!

Mark O'Callaghan (mocallaghan@water.ie)
Catherine Buckley (catherine.buckley@arup.com)