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A National Roadmap for Water Stewardship in Industry and Agriculture in Ireland

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Rialtas na hÉireann
Government of Ireland

ENVIRONMENTAL PROTECTION AGENCY

The Environmental Protection Agency (EPA) is responsible for protecting and improving the environment as a valuable asset for the people of Ireland. We are committed to protecting people and the environment from the harmful effects of radiation and pollution.

The work of the EPA can be divided into three main areas:

Regulation: *We implement effective regulation and environmental compliance systems to deliver good environmental outcomes and target those who don't comply.*

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We regulate the following activities so that they do not endanger human health or harm the environment:

- waste facilities *(e.g. landfills, incinerators, waste transfer stations)*;
- large scale industrial activities (*e.g. pharmaceutical, cement manufacturing, power plants)*;
- intensive agriculture *(e.g. pigs, poultry)*;
- the contained use and controlled release of Genetically Modified Organisms *(GMOs)*;
- sources of ionising radiation *(e.g. x-ray and radiotherapy equipment, industrial sources)*;
- large petrol storage facilities;
- waste water discharges;
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- Office of Environmental Enforcement
- Office of Evidence and Assessment
- Office of Radiation Protection and Environmental Monitoring
- Office of Communications and Corporate Services

The EPA is assisted by an Advisory Committee of twelve members who meet regularly to discuss issues of concern and provide advice to the Board.

EPA RESEARCH PROGRAMME 2014–2020

A National Roadmap for Water Stewardship in Industry and Agriculture in Ireland

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EPA Research Report

Prepared for the Environmental Protection Agency

by

Central Solutions Ltd

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DISCLAIMER

The EPA Research Programme addresses the need for research in Ireland to inform policymakers and other stakeholders on a range of questions in relation to environmental protection. These reports are intended as contributions to the necessary debate on the protection of the environment.

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Executive Summary

To establish Ireland as a leader in the use and adoption of water stewardship standards and tools as a means to empower better water management across industry and agriculture (Project Vision).

Water is a critically important resource. It is fundamental to both industrial and agricultural activity. However, water is a limited resource and water shortages have now become a global reality. Despite Ireland being a water-rich nation, managing this national resource will pose some major challenges, from both an economic and an environmental standpoint, in the years ahead. Nevertheless, Ireland's water resources also offer the country some exciting opportunities to further improve its attractiveness as an investment location and Ireland is a leader in water stewardship practices on the international stage.

Following extensive desk research and a process of national and international consultation, this report captures key lessons for Ireland in relation to water stewardship and outlines an integrated roadmap towards establishing the country as a leader in the adoption of water stewardship best practice at both national and local levels in the years ahead.

Recommendations include:

- the development of a national water stewardship policy and associated awareness programme by key stakeholders;
- the establishment of the National Water Stewardship Standards Committee for both industry and agriculture in Ireland;
- enhanced recognition of the Environmental Protection Agency's mandate as the custodian of water in Ireland;
- a new water agreements programme for large industry addressing regulatory and catchment considerations and underpinning innovation for better water stewardship;
- an enhanced ecosystem of supports, incentives and recognition for good water stewards nationally, including small and medium-sized enterprises, farms, processors and the wider industry;
- greater and more explicit linkage of current national initiatives to European and global water stewardship activity;
- additional research and collective action in this area.

Together these recommendations can establish Ireland as a recognised leader in the field, aid its transition to a water-smart economy and enhance the competitiveness of its industry and agriculture on the global stage.

1 The Water Stewardship Landscape

1.1 The International Water Stewardship Landscape

> the use of water that is socially equitable, environmentally sustainable and economically beneficial, achieved through a stakeholder-inclusive process that involves site- and catchment-based actions (AWS, 2017a).

1.1.1 The global challenge

Given that the most recent edition of the World Economic Forum (WEF) global risk survey found that the risk of an emerging "global water crisis" was regarded as the third highest ranked risk, in terms of overall impact, there is a clear need for the implementation of better practices and more holistic measures that can rectify this issue (WEF, 2017).

Global demand for water has increased sixfold in the past century, which is more than double the rate of population growth (IWMI, 2007). The World Bank estimates that water demand may grow by more than 50% between now and 2030 (Damania *et al*., 2017) and the United Nations (UN) estimates that demand will outstrip supply within the 2030 timescale, i.e. within the next 15 years (International Hydrological Programme, 2011). The Organisation for Economic Co-operation and Development (OECD) projects that, under business as usual, water demand will increase by 55% globally by 2050 (OECD, 2016). The increase will mainly come from manufacturing (+400%), electricity (+140%) and domestic use (+130%). Add in competition from agriculture to feed growing populations as well and a potential 40% supply gap by 2030 seems very real.

This emerging gap poses a real threat to the achievement of the UN's Sustainable Development Goals (SDGs) and the dedicated goal on water and sanitation (SDG 6) that sets out to "ensure availability and sustainable management of water and sanitation for all" (UN, 2018). The UN recognises that realising SDG 6 would in fact go a long way towards achieving much of the 2030 Agenda.

1.1.2 The European legislative and policy environment

The Water Framework Directive (WFD; 2000/60/EC) is one of the most comprehensive and ambitious pieces of European Union (EU) environmental legislation to date. It sets out an integrated approach to managing water quality on a river basin basis across Europe and is complemented by a number of other laws governing specific aspects of water policy. It recognises that water presents not just EU-wide but global challenges as previously outlined.

Despite the benefits of having a single integrated European approach for water management, some concerns have been raised on a number of contentious issues that are considered to be detrimental to the continued success of the WFD. There has been a general consensus among current scholarly articles that underlying issues are associated with the complexity of the WFD implementation process and its openness to interpretation, which have hindered its ability to pursue its intended environmental objectives (Tsakiris, 2015; WWF, 2015a; Boeuf *et al*., 2016; Söderberg, 2016).

The *Blueprint to Safeguard Europe's Water Resources* (EC, 2012) sets out the EU water policy in the context of the WFD. The blueprint specifically highlights that water quality and quantity are intrinsically linked and that one cannot be effectively managed in isolation of the other. The blueprint also stresses that water management is not just about environmental protection; it is an economic and competitiveness issue and issues of cost and pricing must be addressed to ensure that all economic sectors that depend on the availability and quality of water can prosper, generate growth and create new job opportunities. The dual dimensions of water policy (economic and environmental) are reflected in the regulatory structures that underpin policy across European countries. In Ireland, for example, the Commission for Regulation of Utilities (CRU) is the economic regulator for water and the Environmental Protection Agency (EPA) is the environmental regulator. But in the context of both, the blueprint calls

for a paradigm shift at all levels away from a focus on water supply to water demand management.

Within the blueprint, the European Commission (EC) calls for the wider use of tools to give water users incentives to make sustainable choices, and explicitly cites its support for the European Water Stewardship (EWS) Standard developed by the European Water Partnership (EWP) as a tool to achieve its aims in industry and agricultural settings.

Elsewhere, the OECD report *OECD Council: Recommendation on Water* (2016) has provided a number of actions that should be taken to address the most pressing water and wastewater issues that were identified as part of the *OECD Environmental Outlook to 2050* report (OECD, 2016). Overall, there was a general consensus that future water policy should be implemented to:

- introduce water demand management at the national or subnational level, which promotes water use efficiency, sustainable water allocation regimes, collective water management actions and improved knowledge of water use and sustainability limits;
- develop a quality management strategy that has enough resources to assess, identify and improve the quality from all sources (diffuse and point) using all appropriate measures and mechanisms in order to protect, restore and promote sustainable use of water-related ecosystems;
- prepare for water-related disasters by introducing a risk management policy that utilises an assessment- and mitigation-based strategy that accounts for the specificities of the water risk;
- enhance the effectiveness and efficiency of, and trust and engagement in, water governance.

1.1.3 The industry and agriculture context

In the context of industrial competitiveness, there are increasing calls (including Reig, 2015; Khalamayzer, 2017; Skroupa, 2017a,b) for the adoption of more transparent governance, increased disclosure on water-related risks, better optimisation of water services and improved collaboration with key stakeholders that are impacted by said water services. This imperative for change is perhaps most vividly illustrated by the fact that, in August 2015, 64 of the world's largest institutional investors wrote to 15 of the world's largest food and beverage organisations calling on them to better manage their water risks:

> we believe that *water scarcity can materially impact portfolio value*, so we want to know how companies are managing and mitigating water risks (emphasis our own) (ICCR, 2015).

The group of signatories of the letter oversees combined assets of US$2.6 trillion and provided seminal evidence of water's increasingly critical role in the investment and risk agenda for business.

According to Newborne and Dalton (2016), internationally an estimated 80% of total global water use is consumed in food production. That makes the role of farmers key. Companies operating as food traders, processors and retailers who aspire to be good water "stewards" are asked to look at their supply chains to understand how farmers are managing water and to find ways to encourage them to secure the sustainability of agricultural products and food ingredients. This has led to initiatives such as the "Smart Water" strategy for the food and drink sector in the UK (The Prince's Responsible Business Network, 2010) and also to efforts to strengthen water stewardship in the agriculture sustainability standards domain (WWF, 2015b).

However, it is not just the agriculture sector that must face these challenges in the years ahead. In fact, economically, the key water-using industrial subsectors collectively have a significantly higher economic impact in terms of gross output value than those of the agricultural sector or any other miscellaneous subsectors (Camp Dresser & McKee Ireland Ltd, 2004). From a national competitiveness perspective, therefore, water-related business issues are set to become an increasingly important component of the industrial investment landscape.

1.1.4 Key trends in international water stewardship

Water stewardship principles (and related frameworks, programmes and standards) have emerged as mechanisms to help address these challenges through integrated water quality and quantity perspectives and through practices that are adopted at national, river basin and production site levels.

Corporates as a catalyst for change

Corporates are recognised as having a potentially unique and powerful role to play in helping governments respond to the water stewardship priority (Reig, 2015). They can act as a catalyst for the greater adoption of water stewardship practices across their value chains and thereby reduce risks and help meet relevant SDGs. According to a recent report published by the Carbon Disclosure Project (CDP) on the current state of European water stewardship practices in 2017, the use of corporate water stewardship practices:

> allows companies to identify and manage the water-related risks and impacts they face in their direct operations and value chain, seizing water related opportunities, and working collaboratively with all water users to ensure sustainable water management (CDP, 2017a).

However, the conclusion drawn from a survey of 288 companies at the time was that, in terms of implementing corporate water stewardship, a persistent gap was developing between the high-level achievers in this space and the majority of water-exposed companies that were considered to be underperforming.

Moving from water management to water stewardship and beyond compliance

In the initial stages of an organisation's water stewardship journey, many organisations focus on regulatory compliance and basic water management. Newborne and Dalton (2016) highlight a growing recognition that organisations need to change their behaviours and attitudes in relation to water from this basic management philosophy to a more holistic water stewardship approach, both within their facility and outside the fence. More progressive water stewards go beyond a basic compliance perspective and aim to achieve excellence in water quality and quantity management while engaging in collective action in their river basin and bringing greater transparency to their water operations through reporting and certification:

> A stewardship approach to water management is increasingly recognized as the most appropriate framework for meaningful action, enabling companies to safeguard their business and finite water supply (CDP, 2017a).

A supply chain challenge and opportunity

Supply chain considerations have attracted an increasing focus on water stewardship (and broader sustainability) in recent times. Consumer pressures and increased stakeholder interest are driving larger global corporations to recognise that, within their sometimes highly complex supply chains, there are significant sustainability challenges, resource risks and efficiency opportunities (CDP, 2017b). However, despite this awareness, supply chain action on water is still at a very early stage, as firms look for the tools to influence behaviours across their suppliers and mechanisms to verify the impacts of such action.

Financing water projects

At a corporate level and despite the fact that water has become a Chief Financial Officer issue (Kambil and Calabro, 2012), financing is scarce for sustainable water management projects because many of the required investments are long term, have longer payback periods and are perceived as risky by commercial lenders (Reig, 2015). The failure to adequately establish the true cost of water at many industrial facilities can contribute to this problem (Henderson ***et al***., 2013).

Water availability and national competitiveness

In recent years, the Scottish Government has been at the forefront of recognising the value of having significant and high-quality water resources at its disposal. As a critical resource for many industries, the potential that plentiful water resources offer to attract foreign direct investment and support indigenous industry has been highlighted by the Hydro Nation initiative, which began with the publication of the Hydro Nation prospectus document by the Scottish Government. This articulates a vision of Scotland as a country that:

> ... recognise(s) water as part of our national & international identity. We understand the sustainable management of our water resource is crucial to our future success and a key component of the flourishing low-carbon economy and the basis of growing international trade opportunities (Scottish Government, 2012).

The Hydro Nation initiative seeks to maximise the economic and non-economic value of Scotland's water resources by more effectively drawing together the different components of Scotland's water sector. The initiative is underpinned by the statutory duty placed on the Scottish Ministers in the Water Resources (Scotland) Act 2013.

From a water supply perspective to water demand management perspective

As highlighted by *A Blueprint to Safeguard Europe's Water Resources* (EC, 2012), the perspective across industry and agriculture must change from a concentration on supply to one that recognises and rewards the successful adoption of demand management initiatives. Generally, this will be achieved only by the collective action of multiple stakeholders (Dziegielewski, 2003), irrespective of the demand management strategy pursued.

The need for collective action

The concept of collective action is well recognised across international water stewardship publications. Water challenges are local in nature but global in relevance and are shared between water users across the catchment or supply chain. For example, pollution discharge within a river basin may initially affect industrial and agricultural water users locally, but may then impact international communities, which may depend on the businesses or farm outputs. Hence, companies are increasingly realising that managing water within the boundaries of their site walls is insufficient. Only co-ordinated collective action can protect water resources and mitigate long-term risks. This approach is central to water stewardship and requires the involvement of multiple stakeholders at the various levels – catchment, supply chain and national.

An example of collective action at the catchment level is the river trusts, a number of which have been established in Ireland, including the cross-border River Blackwater Catchment Trust and the Erne Rivers Trust (the first international river trusts) and the Slaney River Trust, Nore Rivers Trust, Inishowen Rivers Trust, Maigue Rivers Trust and Waterville Lakes and Rivers Trust. At a sectoral level, the Smart Water initiative (The Prince's Responsible Business Network, 2010), devised to guide collective action on water stewardship across the food and drink supply chain in the UK, provides a useful reference.

A particularly insightful example of collective action at the national level is the Sustainable Water Stewardship Collaboratory, convened by the University of Cambridge Institute for Sustainability Leadership (CISL). The programme has brought together forward-thinking organisations, governments and communities to explore better ways of managing and valuing water for today and the future, including issues of finance, water allocations, regulation and behaviour change (CISL, 2013).

Corporate disclosure and the need for independently verifiable water stewardship standards

Global organisations like Nestlé, the Coca-Cola Company and PepsiCo have already implemented strong water stewardship policies within their operations and have made long-term commitments to help reduce their impact on global water resources (Sustainable Brands, 2016; Khalamayzer, 2017). This has not only allowed these companies to gain good publicity within this space, but also has allowed them to navigate all of the potential regulatory, reputational and physical water risks in a manner that promotes improved social, economic and environmental performance for the business.

However, more generally, water stewardship levels of action and reporting lag some way behind those for climate change (CDP, 2017b). Furthermore, although CDP has recently moved to a "name and shame approach", identifying those that have not responded to the CDP self-reporting regime, this has prompted some to question the accuracy of the system and has highlighted that some organisations choose not to use the CDP system but may still implement good practices (D'Hollander, 2017).

Elsewhere, the International Social and Environmental Accreditation and Labelling Alliance (ISEAL) highlights that the concept of "credibility" is key to national policies and standards-based interventions (Cantillion, 2017). To be credible and transformative, standards need a high degree of transparency, impartiality and rigour, and to be based on multistakeholder processes, which neutralise conflicts of interest. In using state resources to support or use a private standard, governments need to be aware of these important differences in governance, processes and effectiveness between different standards.

1.2 Standards and Tools for Water Stewardship

1.2.1 Definition of a "water standard"

In order to create a definitive landscape of standards and tools that currently reside within the water stewardship domain, it is important that a consensus can be reached on what does or does not constitute a water standard. As part of this process, the World Wide Fund for Nature (WWF) provided a good rationale for its definition of water standards as part of its assessment of water stewardship in the agricultural sector. In this study, there was an acceptance that standards are generally defined as "a set of guidelines that outline expected actions or performance" (WWF, 2015b).

However, although most water standards are designed to perform similar functions, they may differ in name, look and feel. Some are specifically identified as a "standard" whereas others may form part of a broader set of legislation, guidelines or practices. Water stewardship certification schemes are part of what the WWF refers to as a "standard system", whereby credibility and rigour are set by trained, qualified third-party auditors (WWF, 2015b).

For the purposes of this report the term "standard" will constitute:

> any voluntary guidelines, that outline expected actions or performance on water stewardship that can be systemically verified, and periodically reviewed, through third party certification (WWF, 2015b)

with a view to distinguishing them from self-assessment and reporting tools, while also distinguishing them from mandatory and/or regulatory compliance regimes.

1.2.2 Evolution of water stewardship standards

Like most standards, water stewardship certification schemes are in a constant state of evolution in order to deal with the ever-changing needs and challenges of the water sector. Initially, these water stewardship standards were specifically aimed at providing a generic framework and guideline that would deliver a best practice methodology to the management of water services in both the direct and indirect operations of a business (Abdel Al *et al.*, 2014).

In recent years, there has been greater collaboration between different institutions to help deliver a more integrated global perspective on water stewardship, as highlighted by the Aquaculture Stewardship Council (ASC, 2015) and ISEAL (2015 a,b), as well as the diversification of operational know-how and best practice in areas such as agriculture (Von Wiren-Lehr, 2011), retail (ESM, 2016), industry (EWP, 2011; Alliance for Water Stewardship, 2017a), transport (EWP, 2012) and even high-level governance and water policy initiatives (Alliance for Water Stewardship, 2017b; EWP, 2017).

1.2.3 Standards

Table 1.1 summarises which water standards can be leveraged towards addressing which step(s) of the WWF water stewardship journey, as cited by the WWF (2017).

1.2.4 Other self-assessment tools and reporting mechanisms

Table 1.2 summarises which tools support which step(s) of the WWF water stewardship journey.

1.3 Supporting and Incentivising Water Stewardship in Industry and Agriculture

When defining water demand incentives, there are four core concepts underpinning any solution: (1) water is local, (2) the need for a coherent regulatory regime, (3) the need for public awareness and (4) the interrelation of incentives. As water is a local issue, the appropriate

Table 1.1. Water standards

	1. Water Awareness	2. Knowledge of Impact	3. Internal Action	4. Collective Action	5. Influence Governance
Alliance for Water Stewardship Standard	✓	✓	✓	✓	✓
European Water Stewardship Standard	✓	✓	✓	✓	✓
ISO 14001:2015 – Environmental Management and accompanying ISO 14046:2014 – Water Footprint	✓	✓	✓		

Table 1.2. Water self assessment tools and reporting mechanisms

	1. Water Awareness	2. Knowledge of Impact	3. Internal Action	4. Collective Action	5. Influence Governance
Water Footprint Guide – Water Footprint Network	✓	✓			
ISO 26000 – Social Responsibility	✓		✓	✓	
Carbon Trust Water Standard	✓		✓		
ISEAL Codes of Good Practice	✓		✓		
CEO Water Mandate	✓				
CDP Water Disclosure	✓		✓		
Ceres Aqua Gauge	✓				
GEMI Water Tools	✓	✓	✓		
Water Action Hub				✓	
WBCSD Global Water Tool	✓				
WWF water risk filter	✓	✓			
WRI Aqueduct	✓	✓			

GEMI, Global Environmental Management Initiative; WBCSD, World Business Council for Sustainable Development; WRI, Water Resources Institute; WWF, World Wide Fund for Nature.

mix of positive and negative incentives to decrease water demand and increase water reuse must be defined in the context of the local conditions or sectoral constraints. For all cases, dynamic government involvement and leadership will lead to improved water stewardship.

To date, governments have largely relied on purely regulatory mechanisms of enforcements, linked to guidelines, permits or licenses, which often include a legal or financial penalty for non-compliance. Examples include standards, water use quotas and best available technologies (e.g. Best Available Techniques reference documents in Europe).[1] Here, however, the focus is on emerging incentive structures where governments are using more innovative combinations that mix standards and requirements with positive incentives and opportunities for investment, so that the practical benefit of improved water stewardship will be quickly realised. A summary incentives framework derived from this review is illustrated in Figure 1.1 and worldwide examples of such approaches are included in Appendix 4.

1.4 Incentive Structures

1.4.1 Priced based

The primary point of interaction between governments and water users is the price of water. Water pricing can be used to reflect scarcity or to integrate external environmental costs. Where the price of water rises in a given region, it might be expected to stimulate

1 Reference documents under the Integrated Pollution Prevention and Control (IPPC) Directive and the Industrial Emissions Directive (IED) (http://eippcb.jrc.ec.europa.eu/reference/).

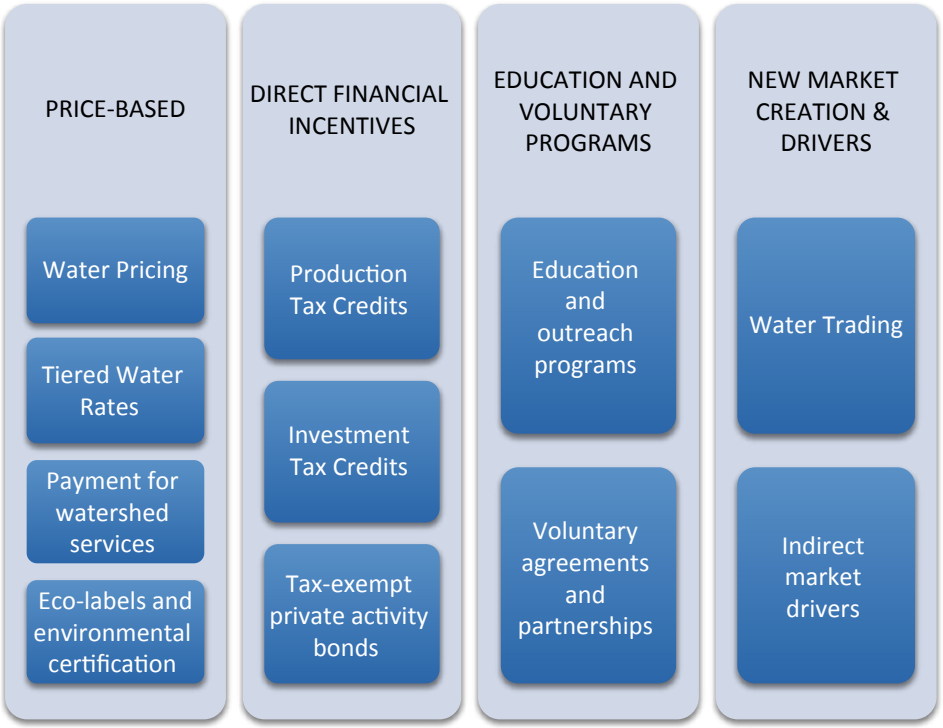

Figure 1.1. Incentives framework.

investment in water efficiency measures and technology. However, raising water tariffs is likely to be extremely unpopular and can often be confronted with significant political resistance. Thus, while water pricing can create a powerful incentive for efficient water use, pricing mechanisms must respond to economic and political realities.

Well-designed tariff structures can meet multiple policy objectives, including supporting the financial stability of the utility, the affordability of water for low-income customers, the efficient allocation of water and other resources, and environmental sustainability. Most water utilities use some form of volumetric tariff to achieve these objectives. There are several types of volumetric tariffs in use around the world:

- uniform tariffs, in which the volumetric tariff is constant regardless of the quantity used;
- increasing block tariffs (IBTs), in which the volumetric tariff increases as the quantity used increases;
- declining block tariffs, in which the volumetric tariff decreases as the quantity used increases.

Tiered water rates, also known as increasing block tariffs, are increasingly popular as an alternative to uniform volumetric tariffs and as a means to encourage conservation. Tiered water rates reflect a user's total demand in the price paid for units of water. In order to avoid making tiered structures punitive for large-scale users, some jurisdictions use different tier structures for different user types, also known as adjusted IBTs. Under adjusted IBTs, baseline water use can be set for small, medium and large commercial users and tiered rates only increase as a user moves above its baseline.

Another option is the payment for watershed services (PWS). This incentive-based instrument seeks to monetise the external, non-market values of environmental services, such as removal of pollutants and regulation of precipitation events, into financial incentives for local actors to provide such services. In practical terms, PWS involves a series of payments to a land or resource manager in exchange for a guaranteed flow of environmental services. PWS arrangements can be intended to prevent the degradation of a watershed or to restore a previously degraded watershed. PWS has no standardised definition. The definition most commonly used in the literature was developed by Wunder (2005) and is based on five criteria: (1) a voluntary transaction where (2) a well-defined environmental service is (3) purchased by at least one environmental service buyer from (4) at least one environmental service provider,

with (5) payment conditional on the service provided. In reality, few projects actually meet all of these criteria. For example, money may come from donors rather than service providers or participation in the programme may be mandatory.

Eco-labels or environmental certifications have also proven to be another form of indirect financial incentives that are linked to the concept of PWS. In some cases, national governments have based their subsidy support to farmers on the basis that the certification of sustainability standards is a type of financial exchange on ecosystem services from farmers. Alternatively, governments can provide financial support to businesses to cover some of the investment costs needed to make the changes to achieve improvement.

1.4.2 Direct financial incentives

Governments can also provide incentives and financing for water efficiency through direct finance or tax measures. Tax credits and exemptions and/or grants can be used to improve the economics of an investment in water efficiency, while tax assessments may be used to help finance public efficiency systems or infrastructure. In recent years, the renewable energy sector in many countries has seen significant growth stemming almost exclusively from the availability of tax credits and, more recently, a cash grant available in lieu of certain credits. Tax financing for renewable energy in the EU provides an example of a successful positive incentive scheme that can be translated to the water sector.

Two examples of energy tax incentives and grants can be translated to the water sector: a production tax credit (PTC) and investment tax credit (ITC).

The PTC involves an income tax credit to supply water by valuing the efficiency of the system and optionally the use of reclaimed water. Some more innovative PTCs are being explored, for example one that reviews taxation of water rates in light of evidence of good water stewardship practices.

An ITC applied to the water sector can take the form of governments offering a corporate business a sales tax refund or tax credit for a certain percentage of the cost of equipment purchased and operated solely for the purpose of beneficially decreasing water consumption in an industrial process. Specific ITC targeting water reuse and/or recycling directly addresses a decrease in water consumption. There are a number of good examples where local governments have given tax rebates to companies demonstrating good water management practices, for example industrial parks in China that are certified against the global water stewardship standard. In agriculture, ITC also has the potential to play an important role, for example where a government can help cover the costs for irrigation improvements or institute rainwater harvesting. Not to forget in this point is the link between energy and water, which should be clearly addressed in the legislation. For instance, water-efficient energy projects or energy-efficient water reuse projects could be eligible for incrementally higher tax credits.

Tax-exempt private activity bonds (PABs) are another way of incentivising private investment in new water-efficient technologies. PABs are issued by, or on behalf of, local governments and the proceeds of their sale are used to finance private projects, including water infrastructure projects. The bondholder's return comes directly from revenues from the financed project.

1.4.3 Education and voluntary programmes

Education and outreach programmes can also be effective for promoting water conservation and efficiency; peer-to-peer or community of practice programmes are good examples of incentives that can help businesses to develop a more cohesive water stewardship strategy. This has already proven to be very successful among groups of large water users, particularly in agriculture, where the exchange of experiences, know-how and even direct support has been shown to be invaluable in improving water management practices. There are a number of examples both inside and outside Europe in which water use or non-point source pollution has been significantly improved merely by training farmers on water stewardship practices and guiding them in farm assessments.

Mechanisms that use voluntary agreements or partnerships between the government and private firms, independent of government requirements, are helping to drive change on both sides of the fence. There are a growing number of examples worldwide of successful collective action private–public partnerships to improve water governance and stimulate water stewardship more broadly at the catchment level. The

success of collective action partnerships in improving water management within a catchment is directly related to the involvement of all types of stakeholders.

Governments play a role in directly supporting or creating incentives for collective actions at the river basin level, which engages a broad base of water users. Opportunities to engage agricultural water users are significant while alliances between public and private actors could also take the form of working together to improve water infrastructure, by improving either wastewater treatment systems or water availability.

1.4.4 New markets creation and drivers

Water trading refers to the temporary or permanent transfer of the right to use water in exchange for some form of compensation. It is perhaps the best known and most widely used method of reallocating water. Water trading occurs within sectors, from agriculture to agriculture and urban to urban, across sectors and, less frequently, from either of these to the environment.

Institutional arrangements are among the most important factors that determine the ultimate success or failure of water trading. Successful water trading requires secure and flexible water rights that recognise and protect users and others from externalities. Such institutional arrangements also need to be flexible enough to adapt to changing physical conditions as well as to changing social norms, such as the growing interest in meeting environmental needs and protecting water quality. Some factors, such as access to timely information about water available to trade, can enable water trading but may not be required. Other factors, such as legal and transferable rights to use water, may be necessary for water trading to occur. The challenge inherent to using water markets to incentivise more efficient water use is how to balance potential water use benefits with the potential social and economic impacts attributable to the same incentive structure.

Veering away from economic or political factors there are some indirect market drivers, such as social or ethical ones, which are also motivating trends in water stewardship, particularly at the corporate level. Failure to address water risks has proven to affect a company's bottom line and investors are increasingly interested to see evidence that companies are prepared to face those risks in order to protect their market share. This demand alone is pushing water users to develop evidence of their risk management and demonstrate their good water management practices. Mechanisms that use the provision and disclosure of information on environmental performance, such as the CDP Water Report, to incentivise producers to reduce their water use is a concrete way that investors are trying to stimulate water stewardship at the corporate level. Disclosure benefits both consumers and investors by gaining access to more data on the water management performance of companies and a wider understanding of the impacts of companies with whom they do business.

On the opposite end of the value set, consumer sentiment continues to gravitate towards demanding that companies operate in a sustainable way. This, too, is an important driver for certain producers to improve water management and prove that they are taking the necessary steps to protect and enhance water resources. A better price for products or access to new markets, for example, is a segment largely driven by customers' interest in sustainably produced products.

1.5 The Research Landscape

At the European level, water is a transversal issue in the new EC Horizon 2020 (2018–2020) work programme, as outlined in Stockil (2015). Water is seen as a key resource, and intervention at the EU level is considered crucial to meet water demand from increased urbanisation and agriculture, and to manage the competition for scarce water from multiple uses and the water–energy nexus. Separately, "standardisation" is identified in the proposal for Horizon 2020 as one of the measures which will support the "market take-up of innovation". Therefore, research and international co-operation related to water standards in general and water stewardship in particular offers considerable potential and relevance for the Horizon 2020 work programme. Looking ahead to the next framework programme (FP9), water will probably continue to be a key consideration.

Water issues including those related to water stewardship and standards are integrated in the work programmes Future and Emerging Technologies (FETs), Leadership in Enabling and Industrial Technologies (LEITs) and Information and

Communication Technologies (ICTs). Key Enabling Technologies (KETs) related to the implementation of standards and best practices are relevant to the SME Instrument and the now permanent Fast Track to Innovation (FTI) parts of the new programme. Within the societal challenge thematic area "climate action, environment, resource efficiency and raw materials", actions to boost water innovation for Europe and beyond are also addressed in the areas of the work programme on the circular economy, sustainable cities, climate services and territorial resilience.

Water stewardship is of particular relevance to the implementation of the objectives of the European Innovation Partnership (EIP) on Water and the Water Joint Programming Initiative (JPI). The EIP Water Strategic Implementation Plan 2012 specifically mentions water stewardship as one of the most important initial actions and invites action groups to develop and test local partnership models that link private sector governance, such as certification, stewardship and round tables, to public sector water governance with a view to achieving sustainable water management (EIP, 2012). The Water JPI (2014) Strategic Research and Innovation Agenda outlines water-related research, development and innovation (RDI) themes in areas of risk management, understanding the energy–water nexus and improving competitiveness in the water sector (Water JPI, 2014).

At the national level, the EPA Research Programme 2014–2020 Water Research Pillar – Research Priorities 2014–2016 outlines five main research themes in which water stewardship has relevance across certain aspects of all themes:

- Theme 1: safe water.
- Theme 2: ecosystem services and sustainability.
- Theme 3: innovative water technologies.
- Theme 4: managing and conserving our water resources.
- Theme 5: emerging and cross-cutting issues.

2 Water Stewardship in Ireland

It is well reported that, despite the perceptions of Ireland as a location with an abundant supply of water, poor supply headroom, flooding and increased pollution risks are resulting in a wide range of ecological, social and competitiveness impacts. Addressing these challenges is an increasingly critical concern for the competitiveness of the Irish Industry and not just for the water-intensive supply chains in the food and beverage sector.

During 2017, the EPA reported that “not enough has been done to prevent deterioration of water quality”, with elevated nutrient concentrations (phosphorous and nitrogen) continuing to be the most widespread water quality problem in Ireland (EPA, 2017a). An increase in the number of reported fish kills and a worrying loss of highest quality river sites were cited as evidence of the significance of this challenge.

Elsewhere there is growing recognition that the security of supply of water services is weak in many areas, with networks reliant on a single source, treatment plant or storage reservoir and low available headroom (spare capacity above normal demand) to cater for emergencies, planned maintenance or equipment failures. Indeed, in their 2015 *Water Services Strategic Plan*, Irish Water (2015a) highlight this issue and report that there is frequently just 2% headroom available to supply water to the Greater Dublin Area.

However, Ireland, and the Irish industry, is not alone in facing such water quality and quantity challenges. As highlighted previously, they are global challenges.

2.1 Legislation and Policies for Water Stewardship in Ireland

The EU WFD (2000/60/EC) is a comprehensive piece of environmental EU legislation that addresses water issues and challenges at the EU community level. Under this directive, all EU Member States are required to identify all individual river basins that reside within their national territory and apply to them the rules that are set forth in the directive. In this way, the WFD was designed to address water management in a more holistic fashion that extends beyond the traditional physical and qualitative aspects of current water management practices. It also complements and reinforces action for the implementation of:

- the Urban Waste-water Treatment Directive (91/271/EEC); and
- the Nitrates Directive (91/676/EEC).

With regard to additional European water legislation and policy, other directives have also been implemented by the EU to support the following thematic areas related to water management and these work in tandem with the WFD:

- the Drinking Water Directive (80/778/EEC), as amended by Directive (98/83/EC);
- the Environmental Impact Assessment Directive (85/337/EEC);
- the Sewage Sludge Directive (86/278/EEC);
- the Bathing Water Directive (2006/7/EC) (repeals 76/160/EEC);
- the Groundwater Directive (2006/118/EC);
- the Floods Directive (2007/56/EC); and
- the Marine Strategy Framework Directive (2008/56/EC).

This legislative system put into place by successive Irish governments has delivered a substantial number of laws and regulations aimed at protecting Ireland’s water bodies. This legislation is extensive, both in scale and variety, in its coverage of specific water-related issues that are relevant to the management and provision of water services in Ireland (see Figure 2.1).

In addition to this legislation, the state has made a concerted effort to keep its water policy at a level that is consistent with current best practice as required by European water policy. For example, in the most recent version of the EU (Water Policy) Regulations (S.I. No. 350 of 2014), several notable changes were made concerning the current national management strategy for the protection of water bodies. These revisions are meant to facilitate Ireland’s continued efforts to enforce its EU water policy requirements, aligned strategically under the WFD (2000/60/EC) as it

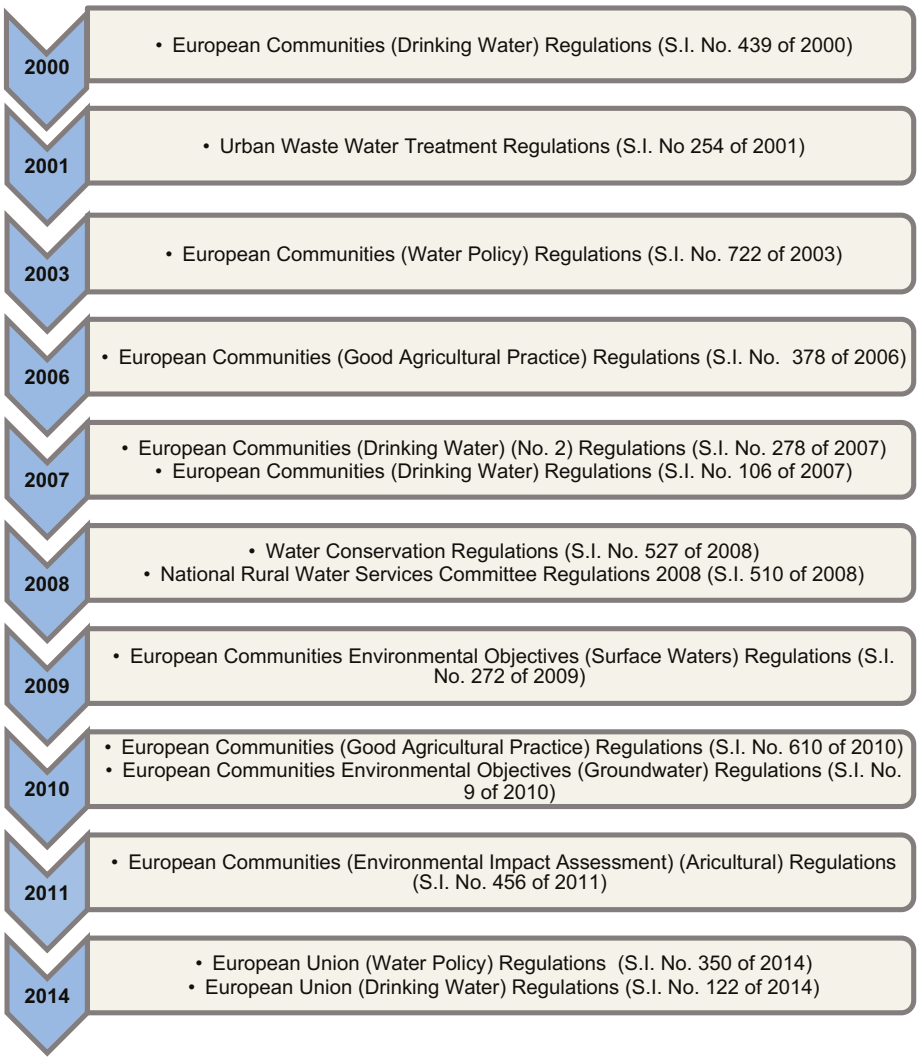

Figure 2.1. Legislation supporting water stewardship in Ireland.

forms the basis for many of Ireland's main water policy targets.

These new changes introduced a more robust governance and management system that will co-ordinate the efforts of the Department of the Environment, Communication and Local Government (DECLG), the EPA, Irish Water and all relevant local authorities to implement and enforce action, at both catchment and sub-catchment levels, which can achieve the overall aims originally set forth in the WFD.

In recent years, similar actions have also been taken to amend current legislation relating to other water issues, such as drinking water, groundwater and agricultural practices, which suggests that there are good foundations in place to try and adapt to the changing landscape and adopt a more proactive approach to water management.

2.2 The Supply versus Demand Management Focus in Ireland

Given that it is a human tendency to increase supply and capacity when something starts running out, coupled with the perception of the value of water being regarded as "free" or "of very little cost" and along with some resistance to water charges, these elements present themselves as a challenge for demand-side management of water at the national level. Overall, we are more likely to spend on new supply than on reducing consumption (Dublin Chamber of Commerce, 2014).

However, Ireland has a mismatch between where the most abundant water supplies exist (i.e. north and west) and where the majority of the population is located (i.e. east). Further water supply and availability problems are inevitable, especially in many of the

larger urban areas, in the near future if the demand-side of the equation is not addressed (Enterprise Ireland, 2017).

Adopting a demand management approach can achieve the most value out of the existing water supply. Better management on the demand-side can help reduce pressure on existing systems, is less environmentally damaging, reduces the risk of supply shocks, and postpones or avoids the necessity for new supply infrastructure. Nurturing a culture of stakeholder engagement, ownership of water resources and "active water citizenship" should be an important part of the development of an effective water demand management system (Curran, 2016).

2.3 Existing Supports and Incentives in Ireland

No comprehensive overarching industrial support framework specifically for corporate water stewardship exists in Ireland. However, there is a range of supports from the main agencies in Ireland under which water-related projects can attract financial and non-financial assistance. Table 2.1 shows some of the main supports and provides a comparison with the main energy management supports available. Stockil (2015) provides a more comprehensive overview of the development of energy management standards and supports, a useful comparator when considering corporate water stewardship supports. It is also worth noting that much of the support for corporate energy management is anchored in the ISO 50001 requirement and can be traced back to the development of the original Irish Energy Standard IS393 in 2005.

2.4 Water Stewardship in Irish Agriculture

During the 18 months since the completion of the small-scale study (Stockil, 2016), there has been considerable activity with regard to water use in agriculture and particularly in relation to farm level activity across the dairy sector.

Collaborative action by departments, local authorities, the dairy co-ops, Teagasc and Bord Bia to address the shared water quality challenge arising from dairy farming has resulted in the recent establishment of the Sustainability Support and Advisory Programme.

Table 2.1. A comparison of energy management versus water stewardship support programmes in Ireland

Support programme	Energy	Water	Organisation
National Services Framework	✓	×	SEAI
Energy/Water Agreements Programme	✓	×	SEAI
Specific Sustainable Energy/Water RD&D	✓	×	SEAI
Accelerated Capital Allowance	✓	×	SEAI
Community of Practice	✓	✓	SEAI LIEN EPA Large Water Users CoP
Green Start	✓	✓	Enterprise Ireland/IDA
Green Plus	✓	✓	Enterprise Ireland/IDA
Technical Feasibility	✓	✓	Enterprise Ireland
Food Sustainability Programme	✓	✓	Origin Green/Bord Bia
Green Seafood Business Programme	✓	✓	Bord Iascaigh Mhara
IDA Environmental Aid Scheme	✓	✓	IDA
Green Enterprise	✓	✓	EPA
Energy Efficiency Obligation Scheme	✓	×	Providers
Demand Side Unit Scheme	✓	×	Providers
Skillnet Training Support	✓	✓	Lean & Green Skillnet
National Standards Committee	✓	×	NSAI

CoP, Community of Practice; IDA, Industrial Development Authority; LIEN, Large Industry Energy Network; NSAI, National Standards Authority of Ireland; SEAI, Sustainable Energy Authority of Ireland.

According to recent press releases (EPA Catchments Unit, 2017), this is a new approach to achieving improvement in water quality and is in essence a pilot scheme at present. It involves the establishment and joint funding of a resource of 30 agricultural sustainability advisors, who will work within a unified partnership structure that encompasses Teagasc, the co-ops and the Local Authority Water and Communities Office (LAWCO).

Although public information on the initiative is only emerging, the programme is expected to target improved nutrient management with more targeted use of fertiliser, better farmyard practice, more widespread use of sustainability approaches developed by Teagasc and the development of new approaches in critical source areas. The new sustainability advisors will proactively advise and work with farmers to protect and improve water quality.

The programme is part of a new approach to river basin management planning for the 2018–2021 cycle. This new approach includes the development of a much strengthened evidence base to understand the full range of pressures affecting water quality and the development of the programmes of measures needed to deliver improvements. Over time, the programme will also address on-farm climate change and biodiversity strategies.

The programme will be jointly funded by government departments, Teagasc, local authorities and the dairy co-ops on a trial basis for 4 years.

3 Stakeholder Consultations

3.1 Methodology

Following the desk review of baseline reports and literature, the consultation methodology used in this project consisted of four main stages as outlined in the following sections. The data collection for this report was completed from January 2017 to December 2017.

3.1.1 Stakeholder mapping

A comprehensive stakeholder mapping exercise was undertaken to identify key stakeholders – both nationally and internationally – ensuring the research (and consultative activities) were fully informed. National and international stakeholders are detailed in the report appendices.

3.1.2 Consultative workshops

In addition to the desk review, a series of consultative workshops were undertaken to qualitatively inform the evaluation. These consisted primarily of key stakeholder groups from a variety of government departments, support agencies, industry and agriculture. The workshops were programmed to ensure consultation with key stakeholders both nationally and internationally.

3.1.3 Stakeholder interviews

Furthermore, in support of the desk review and workshops, a series of stakeholder consultations were undertaken to further inform the evaluation. These consisted primarily of structured interviews with individuals by phone or face-to-face meetings. To ensure the research was fully informed, a wide range of stakeholders from various categories were included for consultation. A triangulation of perspectives was employed to identify common challenges and opportunities, for example employing a three-tier approach for the agricultural sector involved consulting (1) representative bodies and state agencies and (2) European stakeholder experiences and practices and (3) leveraging the supply chain stakeholders, including retailers and those in the processing industry, who are key determinators of adoption at the farm level.

The three main stakeholder categories consulted with were:

1. public bodies: departments, agencies, research bodies, local authorities and semi-state agencies;
2. industry and agriculture: representatives from small and medium-sized enterprises (SMEs), significant/large water users and representative groups;
3. European and international stakeholders.

Participants were advised that individual input would not be identified by either person or organisation and that the context of the consultation was to establish areas of common interest and opportunity, in relation to the development of a national water stewardship roadmap.

3.1.4 Development of findings and recommendations

Drawing from the desk review, stakeholder mapping, workshops and the stakeholder consultation, a triangulation approach was adopted to ensure a range of perspectives was encompassed in the analysis, synthesis and identification of opportunities and recommended actions.

3.2 Summary of Consultation Workshop Outcomes

3.2.1 Introduction

Consultative workshop sessions were conducted as part of the research study, in which key national and international stakeholders participated. The workshops were conducted as part of:

- the Large Water Users Community of Practice Meeting held at Louis Fitzgerald Hotel, Dublin 22, Ireland, on 8 June 2017;
- two focus sessions at the EWP/EWS annual meeting held in Brussels, Belgium, on 6 October 2017;

- the Large Water Users Community of Practice Meeting held at Radisson Blu, Little Island, Co. Cork, Ireland, on 12 October 2017;
- the Alliance for Water Stewardship (AWS) Global Forum held at the Edinburgh Centre for Carbon Innovation (ECCI), Edinburgh, Scotland, on 1 November 2017.

Participants during each workshop were divided into smaller working groups and asked to discuss thematic questions within their individual groups before summarising and reporting back to all workshop participants; this was then followed by some wider group discussion and feedback on the points raised.

Thematic question: "How can business act as a catalyst for better water stewardship practices at their sites and along their supply chains?"

Participants felt that a strong water stewardship policy is required by enterprises and organisations to stimulate positive activity in the area and that buy-in and support from senior management are a must to avoid failure and ensure long-term success. Strong senior management support would help to add or release more resources to address and move forward more quickly with water initiatives. This needs to translate to corporate water targets and key performance indicators (KPIs) in order to assimilate into the organisational culture and day-to-day activities. Standards are useful instruments to act as a supporting management framework to implement the required processes and practices.

The need for greater awareness and appreciation of water and sustainable practices is important; in particular, one sticking point is the need for greater understanding of the true cost and true value of water. Among the groups, the need for greater measurement and mapping of water on-site is a prerequisite step to gaining a more accurate picture of the cost implications of water and greater appreciation of the true value to the organisation.

Although the groups highlighted that a step change in both mindset and behaviours is needed at a wider scale, the sense of urgency was not strong. A change in mindset from a very production-focused prioritisation to more forward-thinking is required; however, as noted by one participant, "sustainability is a nice-to-have until it becomes legislation".

Participants expressed the importance of collective action and gave examples of improving peer-to-peer communications in sharing ideas around water stewardship "outside of the fence" of their own production sites. Organisations should be encouraged more to participate in events that promote dissemination of best practices (such as the EPA-funded Large Water Users Community of Practice). Furthermore, encouraging more/better water stewardship across the entire supply chain was expressed as important; however, one participant commented that contracts of water stewardship with their food suppliers would not be a viable option indicating that a financial push in that regard is still lacking.

Communication, promotion and recognition of water stewardship efforts is important to sustain continuous improvement and realise the goals and targets of water stewardship for organisations. Accreditation and standards would contribute to the marketability of good water practice and management, and be better utilised as selling points, qualities and characteristics for business competitive advantage purposes.

Thematic question: "What actions can government and regulators/development agencies take to encourage better water stewardship practices across industry and agriculture?"

One aspect where the government can strongly influence is legislation and regulation; participants suggested enacting some form of legal obligation [akin to the Irish Statutory Instrument (SI) 426, the EU Energy Efficiency Directive], making it mandatory for many enterprises to identify their energy savings opportunities by way of an energy audit or, alternatively, by way of ISO 50001 certification to meet the obligation. Participants highlighted – in the context of water – the benefits of adopting a similar model to the Energy Savings Opportunity Scheme (ESOS) in the UK, which requires that all large businesses undertake mandatory assessments investigating energy use and energy efficiency opportunities at least once every 4 years.

Review of "old and out-dated" legislation was called for while investigating other country standards and regulations in the area in order to help realise opportunities to save water and money. Participants voiced their concerns that without the enforcement of

domestic water charges (in Ireland), it is difficult for wider society to appreciate that water is a resource that needs to be better managed and that its misuse and/or wasteful usage is not acceptable.

Government and agencies can offer incentivisation and the support ecosystem to enable the adoption and implementation of legislation through, for example, provision of best practices guidelines, knowledge supports and advisory services in the area of water stewardship. An adequate support and advice system/structure needs to be put in place to support business and agriculture to adopt a water stewardship programme. Some participants suggested that more water-specific EPA licensing requirements could help drive uptake and implementation and others suggested setting water targets as part of environmental auditing.

Greater project supports and funding are critical – in particular, grants/schemes/credits that focus specifically on water. Building proactive and progressive water initiatives into planning, permits and licensing would be a step forward. Along with financial supports, training and education supports are also highlighted to be of key importance in order to assist in building great general awareness as well as in providing more specialised training on water stewardship. Participants placed high value on case studies and best practice sharing to better support water programmes and initiatives.

Thematic question: "How can Irish Water encourage/support the adoption of better water stewardship practices by non-domestic customers?"

There was an appreciation among the participants (at the national level) that there is a prioritised need to improve the water network infrastructure to reduce losses now and in the future, which requires capital investment. However, Irish Water could focus on approaches to attract and incentivise more capital investment. Greater incentivisation for good water management practices was put forward by all groups. Irish Water could look to re-invest in organisations and enterprises that demonstrate improvements in water management/stewardship and which, as large water users, can have a significant impact. Adoption of credit schemes similar to energy schemes was proposed to be worth further investigation. While incentives could award good practices, sanctions could be used to deter poor practices. Participants recommended that more strategic planning and funding should be implemented, including ring-fenced capital for projects.

Improved collaboration with stakeholders, more transparency in operations and also greater access to and transparency of data (preferably via web technologies) were proposed by participants. Furthermore, communicating more industry-specific content, case studies and more detail is desirable to stakeholders. Key and significant water users in Ireland need to be clearly identified. There is a need to move away from any silo mentalities between Irish Water and government departments to better utilise water for public services and amenities. Participants felt that current engagement levels were low and that more proactive engagement of advisors and account managers with key personnel in industry (e.g. wastewater personnel, water managers) would result in more opportunities for better water management.

Greater provision of advisory, training and guidance services to stakeholders/customers is needed. Campaign-driven communications and clear descriptions of what is good practice for industry and agriculture (and public) stakeholders would be beneficial. Recent achievements and work should be communicated more to the public and businesses to help support the organisation's own public image.

Increased standardisation and harmonisation of tariffs/licences and permits was also discussed by some of the groups. Participants felt that a "centralised charging system" would be "fairer" and proposed that charging could be calculated as a function of chemical oxygen demand (COD) and biological oxygen demand (BOD) measurements; others proposed that it would be desirable to charge for actual water in and actual water out quantities.

Thematic question: "What are the challenges and opportunities of driving water stewardship in supply chains for industry and agriculture?"

Taking a closer look at some of the challenges and opportunities of driving water stewardship through supply chains, participants debated about the extent to which companies can exert sufficient pressure on suppliers to change their actions; some felt that companies were limited in how they can influence the supply chain while others shared success stories of partnering with third parties to bring the supply

chain along the journey to water stewardship. In order for these partnerships to be developed more widely, participants agreed that significant resource and capacity gaps need to be addressed. Collective action can distribute costs, align different industries/ actors towards the achievement of context-specific targets and promote visibility and recognition of good water and land stewards potentially working as a competitive advantage for a region/catchment/ group.

Much of the workshop's discussion focused on the agricultural supply chain and how partnering with farmers could radically advance water management on the ground. For that to happen, participants noted how working with farmers needs to be grounded in farmers' reality. Actors collaborating with farmers should clearly understand their priorities and concerns and have clear views on local water issues, including external factors, such as governance and perspectives of the wider community.

Some participants also stressed the importance of showing farmers the outcomes of their practices; thus, indicators to measure results (i.e. improvements to water quality) and the collaboration as a whole are important. Regarding certification as a specific incentive, participants felt strongly that the standard holders should aim to simplify and integrate among them to minimise additional investments. Creating visibility of certification via labels is one way to engage consumers and help reduce the burden for farmers to become certified.

Thematic question: "What incentives support the adoption of water stewardship for industry, agriculture and cities?"

Participants looked at how to link bottom-up activity with policy, by incentives and support for best practices on water stewardship and exploring what a roadmap for implementing these best practices would look like.

For industry, it was clear that economic benefits such as savings or operational obligations (e.g. regulatory compliance) were the main incentives. Tools and analytics were needed to help companies to quantify the real price of water as a starting point, while embedding water stewardship into broader corporate targets was necessary to ensure action over the long term.

For agriculture, economic benefits also came up as a clear incentive. For this sector, however, since the price of food is so low, economic benefits usually translate into the proper allocation of subsidies in order to address the "polluter pays" principle. Partnerships between farmers and the end supply chain were also addressed as a means of providing these economic benefits where subsidies were inadequate. Participants agreed that there was a need to combine a "carrot and stick" approach to working with farmers. While incentives such as subsidies, training and rewards are important, the obligation to be a good water manager by regulation and enforcement is also critical.

Participants also agreed that a catchment-based approach and a community of practice of learning mechanism for responsible water management were excellent incentives for both industrial and agricultural water users. There were clear examples by participants where such initiatives, led by water authorities or utilities, were able to create the necessary support infrastructure for the implementation of responsible water stewardship practices.

Thematic question: "What are key considerations and areas to address when developing a national roadmap for water stewardship?"

One of the main discussion points raised in relation to the development of a national roadmap for water stewardship was to consider whether the roadmap is best positioned as a policy or as a strategy document.

A key takeaway was the issue that water is (1) local, (2) multidimensional and (3) lacks a global scientific call to action (e.g. there is a lack of specifics). So, there are challenges in delivering a comprehensive national roadmap; the greater the size of the nation, the greater the variety, differences and challenges to deliver at the local level. Discussions touched on the challenges of setting water targets and, in order for these targets to be more meaningful, they must be "informed by the best available science on hydro-ecological conditions at the basin level, informed by contextual social needs, and aligned with local to global public policy objectives".

Collective action also was a strong theme of the discussions and the importance of bringing key and

wide-ranging stakeholders together early on was noted. Participants noted that leading actors (i.e. corporates) can act as catalysts to help partners to convene; however, it is important to avoid any one stakeholder or subset of stakeholders appearing more dominant and controlling of the collective action/engagement, so as not to exclude any other stakeholders engaging at all or at a later stage. Collaboration is difficult, but setting catchment goals can help bring collaboration along. Collective action and stakeholder engagement can be a transformative experience and create the necessary peer-to-peer networks, learning, channels and active connections to empower and support the key stakeholders to move forward with water stewardship programmes.

Participants stressed the importance of transparent baselines to support thematic areas of a national roadmap on water stewardship.

3.3 Summary of Interview Outcomes

Consultation interviews were conducted with national and international stakeholders during the study across a wide range of sectors and organisations (see stakeholder analysis in Appendices 1 and 2). This section summarises the consultation interview responses.

3.3.1 Awareness

General awareness of water stewardship is low across the wider society. In particular, where there is an abundance of supply, awareness of water challenges/ issues is lower and the perceived value of water is low. This lack of awareness in itself represents a challenge to achieve the scale-up of water stewardship and best practices. However, there is awareness of some exemplar cases cited by stakeholders where water is realised as an opportunity at the national scale (e.g. Scotland's Hydro Nation) and other activities are under way to support water stewardship advancement at national levels (e.g. Finnish Water Stewardship Commitment). Some advocates of water stewardship realise that it is incumbent on them and key stakeholders to better highlight, promote and communicate how water stewardship can help address other economic and social challenges while delivering impact.

Dissemination of more case materials within/across sectors, along supply chains and to wider society would help contribute to building greater levels of awareness and mainstreaming of water stewardship principles and practices. Furthermore, in the age of greater information, availability, transparency and access to water data are improving, which is a positive direction required to accurately monitor, measure and evaluate actions and impacts and support greater awareness building. General awareness of water stewardship standards is seen to be relatively low, with some advocates, early adopters and leaders advancing water stewardship while a majority are lagging behind.

The water quality dimension typically receives the most focus while there is less emphasis on the water quantity dimension when discussing the topic of water stewardship. Water governance, collective action and impact management are addressed in activities to some different degrees, but holistic water stewardship perspectives – rooted in the four principles of water stewardship – are largely fragmented and not well consolidated at national levels and/or across some stakeholder groups and activities.

3.3.2 Drivers

In the past, environmental legislative and regulatory forces typically acted as the main drivers for water management practices, such as WFD and nitrate directives to improve water quality. However, other core sustainability dimensions (i.e. economic and social), drivers and risk factors are increasing in focus and in priority in terms of driving better water management and the uptake of water stewardship activities. Pressure from the public, investors and transparency requirements are ever increasing and stakeholders need to clearly address their water risks and impacts. Focus on water stewardship and greater impact awareness/assessment on water-related areas is becoming more prevalent by investor bodies and is forming part of compliance requirements. Along with legislation and regulation, key drivers include maintaining a "social license to operate" and ensuring "business continuity".

For example, water as a potential future constraint to agriculture is becoming more apparent to stakeholders in the agricultural community. At the local and community level, the agricultural community

is proactive and alert. At the national level, the dairy sector is progressive in terms of collective action to mitigate water risk along with associated economic, social and environmental risks. The dairy sector comprises large water users in terms of water in and out (e.g. cleaning, waste streams). Given the strong farmer–co-op industry producer relationship developed over the years, Dairy Sustainable Ireland (DSI, formerly IDIA) is in a powerful position and is mindful of their impact and influence "outside the farm gate". Internationally, agriculture also receives a large focus given the amount of water utilised in agricultural practices globally and given the driver needs to address the energy–food–water nexus and security global challenge.

Likewise, some industry stakeholders are actively engaging in water stewardship practices and utilising water standards and tools to improve water management practices, in particular "on-site" and transitioning in their water stewardship maturity levels, by engaging more "outside the fence" in collective action with other stakeholders, supply chain third parties and catchment-level actors. For agriculture, verified standards are seen as important in order to back up statements and impacts and as useful tools in their own right as frameworks to support better water management practices.

It was noted that market recognition of the value of water stewardship credentials needs to improve, with rewards for adoption, thus creating a market pull driver. Those stakeholders who are using water stewardship standards as tools and frameworks to implement better water management practices for the most part consider the largest value to reside in the implementation and application of the standards, while others noted that the return or value of progressing through to (intensive) certification is perceived as low.

3.3.3 Challenges

Collective action was one of the strongest themes discussed during consultations and was echoed throughout consultations, workshops, forums, reports, etc., on the topic of water stewardship. It is challenging, but essential, to attain high-functioning and highly mature water stewardship and practices. For example, focusing on addressing operational inefficiencies at an internal level is at the early stage in the water stewardship maturity model and there comes a point where investments become progressively more expensive and the cost versus benefit is prohibitive. Collective action is the vehicle and key to attaining greater water stewardship and achieving greater sustainability and addressing business continuity risks, providing greater social license to operate, supporting greater environmental performance, addressing investor compliance requirements and so on.

The challenges within collective actions arise from the multistakeholder composition that is required and the different objectives, such as political versus economic and greater agricultural production versus environmental impact on account of increased waste management. Where governmental, supporting agency and other stakeholder silos have evolved, there is a greater need to break down these barriers and to ensure greater alignment in policy and objectives. Leading corporates can act as catalysts to drive engagement and bring stakeholders together. It is critically important to ensure inclusive and wide-ranging stakeholder engagement and collective action.

One challenge that consistently emerged is the "water is local" point of view. It is challenging to implement a comprehensive wide-scale strategy or roadmap. Employing co-governance to address local water dimensions is a beneficial approach, as valuable local knowledge can be more easily integrated. Setting contextual water targets at more local levels may better drive collective action engagement and achievement of environmental, economic and social impacts for the key stakeholders involved and wider society.

One similarity between industry and agriculture stakeholders is that, in terms of agenda priorities, "production" takes higher importance compared with "water (quality)" or other water dimensions. This represents a challenge, as the business case for water is often more difficult to represent in financial terms, and there is some activity under way to address this challenge.

4 A Roadmap for Water Stewardship in Industry and Agriculture in Ireland

To establish Ireland as a leader in the use and adoption of water stewardship standards and tools as a means to empower better water management across industry and agriculture (Project Vision).

Ireland's ambition to transition to such an internationally recognised leadership position in water stewardship across industry and agriculture will only be successful if the government, regulators, the water industry and businesses undertake collective action and complementary roles across a number of interlinking strategic action areas including:

- building greater awareness of the benefits of water stewardship;
- integrating water stewardship policy into existing climate change and water policy frameworks;
- developing an enabling environment for industry and agriculture to adopt best practices at local and corporate levels;
- adopting credible, internationally recognised and independently verifiable water stewardship standards;
- transitioning to robust data-driven management of water stewardship nationally;
- spreading the word of Ireland's credentials as a leading water-rich, environmentally friendly, pro-business country.

Although these actions are interlinked and not sequential, a recommended roadmap for Ireland to advance its national water stewardship position is presented in Figure 4.1. Thereafter, a number of key recommendations are outlined based on the research completed herein.

Figure 4.1. A national roadmap for water stewardship leadership in industry and agriculture.

4.1 Recommendation 1: National Water Stewardship Policy

> Water stewardship is an opportunity for improving state alliances, improving relationships, but the role of the government is to allow that to happen. Governments have the role to bring everyone to the table and initiate these discussions around practical solutions, understand what each party wants and work with them together on it. Policy plays a role to improve engagement between public and private, changing the nature of the relationship rather than it just being solely focused on private incentivising. These discussions should also explore opportunities to improve water management beyond just enforcement of regulation (James Dalton, IUCN's Global Water Initiatives EWP Annual Conference, Brussels, 2017).

Speaking at the 2017 EWP annual stakeholder conference "Does Water Stewardship Support the Achievement of Public Policy Goals on Sustainable Water Management and Agriculture?" on 6 October 2017 in Brussels, Peter Newborne highlighted that internationally there are significant gaps in public policy on water stewardship. While considerable work has been carried out on water stewardship across various jurisdictions at a ground level, there remains a lot to be done in bridging the gap to public policy and developing holistic national positions on water stewardship that will unite regulatory regimes, corporate systems and production site operations. This highlights the need for a clear water stewardship national policy if Ireland is to make significant progress in its water stewardship journey. However, it also highlights that the development of such a policy framework in Ireland would place the country at the forefront of water stewardship internationally.

Water stewardship by its very nature bridges both national competitiveness and national environmental performance domains and hence the development of such a policy framework will need to be led by the government and will require cross-departmental action including:

- Department of Housing, Planning, Community and Local Government (DHPCLG), formally the Department of the Environment, Community and Local Government;
- Department of Agriculture, Food and the Marine (DAFM);
- Department of Business, Enterprise and Innovation (DBEI), formally the Department of Jobs, Enterprise and Innovation;
- the EPA as the national environmental regulator for water;
- the CRU as the economic regulator;
- key support agencies including Enterprise Ireland, the Industrial Development Authority (IDA), Teagasc, Bord Bia and Bord Iascaigh Mhara.

The participation of other key stakeholders, such as Irish Water and industry and agriculture representatives, is strongly recommended to ensure a robust policy outcome.

The policy scope will need to:

- address the need to transition from water management to water stewardship nationally;
- address the integration of economic, environmental and social considerations associated with this transition;
- clarify the roles and structures with respect to water stewardship and beyond current roles and regulatory responsibilities for water;
- support the integration with existing catchment management structures and systems;
- build greater awareness of the benefits of water stewardship including the development of detailed economic and environmental analysis of the benefits for agriculture and industry sectors;
- ensure the application of demand management incentive schemes to aid uptake of water stewardship standards and practices in agreed priority sectors;
- design data-driven systems to monitor and report on progress of the water stewardship roadmap.

The policy needs to dovetail with the work of the Water Policy Advisory Committee (WPAC). It must extend beyond WFD environmental objectives and programmes of measures, while recognising that the achievement of WFD objectives is an essential baseline. It should also consider how governments elsewhere are using internationally recognised standards as part of, or in support of, public policy.

4.2 Recommendation 2: National Standards Development

Independently verifiable and international acceptable water stewardship standards are an essential component of establishing the relative performance of industry and agriculture in respect of water efficiency, water quality, environmental impacts and internal governance of individual production sites, multisite corporations and indeed sectors.

The development and adoption of such sustainability standards is an area where Ireland is well recognised internationally (e.g. Energy Standards and the work of the Sustainable Energy Authority of Ireland, SEAI). This track record already positions Ireland to become an early leader in respect of water stewardship and all the associated competitiveness and environmental benefits that can bring. For agriculture in particular, standards offer international buyers an independent benchmark for water stewardship practices from farm to processing site levels. For the wider industry, they offer a means of communicating corporate green credentials, managing business risks and further promoting Ireland as a good location for foreign direct investment. As highlighted by the National Energy Efficiency Action Plan (NEEAP),[2] driving innovation in standards, products and services is essential if indigenous Irish companies are to be positioned to develop and expand markets for green goods and services. In the context of the local nature of water stewardship challenges, this work needs to reflect international best practice as well as locally appropriate measures.

As such, to establish itself as a leader in water stewardship across industry and agriculture, the establishment of a national technical committee for water stewardship standards development with the involvement of industry and key state agencies, including the National Standards Authority of Ireland (NSAI), EPA, Enterprise Ireland (EI), SEAI and Irish Water, is included as a key strategic action in the roadmap. This could potentially be progressed within current NSAI structures and processes[3] to ensure oversight of the independence and integrity of the standard at the national level. Such work should, however, also link to EWS in Brussels and AWS in Edinburgh to build on existing knowledge and standards globally. The work of the committee should adhere to ISEAL principles to ensure resultant standards are considered credible internationally. The recommended scope of the committee should include working with NSAI and other standardisation bodies to develop Irish water stewardship standards and codes of practice. The committee should consider:

- the development of an entry-level national water stewardship standard and associated training for SMEs that can provide them with a stepping stone to full certification against international standards while also supporting national sustainability frameworks;
- a contribution to the further development of existing international water stewardship standards;
- national standards for water stewardship in agriculture (see recommendation 4, section 4.4);
- national standards for specific sectors, e.g. pharmaceuticals, food-processing sector, hospitals, public buildings and cities;
- the development of an NSAI SWIFT Water Stewardship guide for SMES;
- the integration of water stewardship to existing standards programmes such as EXEED;
- the monitoring of the activities of EWP and AWS as well as of relevant CEN (European Committee for Standardisation) (Workshop on Sustainable Integrated Water Use & Treatment in Process Industries – SustainWATER) and International Organisation for Standardisation (ISO) Technical Committees.

The national water stewardship standards committee should comprise industry and agriculture representatives (including both indigenous and multinational processing and production sites).

2 http://www.dccae.gov.ie/en-ie/energy/publications/Documents/8/NEEAP%203%20Executive%20Summary.pdf

3 Note: While there are currently some relevant NSAI consultative committees for Water Supply, Wastewater Treatment and Environmental Standards in general, because the International Organisation for Standardisation (ISO) and the European Committee for Standardisation (CEN) are not the custodians of International Water Stewardship Standards, no Water Stewardship Committee exists.

4.3 Recommendation 3: An Ecosystem of Support for Industry

The increasing importance of water stewardship as a critical driver of international corporate competitiveness and investment decisions internationally highlights the need for Ireland to ensure it evolves its current industry support structures and systems in response.

Given that Ireland is a water-rich nation and is currently grappling with the establishment of Irish Water, addressing infrastructure gaps in its network and introducing new water quality programmes for agriculture and at-risk catchments, it could be forgiven for not prioritising the need to build an industry-focused water stewardship programmes until such actions are completed. However, in doing so, Ireland would miss a significant opportunity to establish itself as a leading investment location and enhance its green credentials further.

Global competitive forces in industry and agriculture will continue to evolve in the near term as water demand starts to outstrip supply internationally, and so Ireland's key industry support agencies and programmes must evolve with this reality and cannot wait until current operational changes have been embedded. Furthermore, such action on water stewardship can contribute directly to resolving current infrastructure challenges through demand reduction and improve water quality outcomes.

Hence, a series of interlinked strategic actions are proposed herein which are focused on building an ecosystem of support for industry while focusing on maximising the impact of any such state investment. No country in the world has such an ecosystem in place, so action on this front will put Ireland at the forefront of international water stewardship in the industry.

4.3.1 Action 3.1: leverage the position of the EPA as the custodian of water in Ireland to develop new water stewardship supports for industry

The EPA is an independent public body established under the Environmental Protection Agency Act, 1992, and has a wide range of functions ranging from regulatory to education and research. In Ireland, it is the custodian of water quality and the agency with primary responsibility for water stewardship nationally, albeit that is not specially referenced in the act. In Ireland, the EPA is, for all intents and purposes, to water what SEAI is to energy efficiency, and in the context of promoting better water stewardship practices across industry, the EPA is critically important as are its support structures and programmes. However, whereas SEAI has developed a series of specific programmes and supports to promote better energy efficiency across industry, much work remains to be done when it comes to developing similar programmes and supports for water stewardship. The EPA is uniquely placed to advance this work and has the necessary separation from water services delivery that is required for effective national water stewardship oversight.

4.3.2 Action 3.2: water stewardship agreements programme for large users

The introduction of a water agreements programme by the EPA that is focused on large industrial water users to maximise its initial impact is recommended as a key pillar of the strategy. Analogous to the Energy Agreements Programme operated by SEAI, this programme has the potential to help move the large industry in Ireland "beyond compliance" in terms of their water stewardship and broader sustainability efforts, assist in addressing the limited supply headroom nationally and add value to enterprise and Ireland's competitive position in securing international investment.

It is recommended that the programme entails large industrial sites committing to:

- active participation in river basin management activities;
- the implementation of systematic water stewardship practices and progressing to standards certification;
- agreed water stewardship targets and milestones;
- communication of water stewardship activity.

In return, it is recommended that the EPA (potentially in conjunction with other agencies) provides:

- training and consulting support on water stewardship;
- access to technical and regulatory support on water innovation projects;

- signposting of relevant funding sources;
- access to peer-to-peer support structures and communities of practice.

The introduction of such a programme would be a world first and would place the EPA and Ireland at the forefront of developments internationally.

4.3.3 Action 3.3: water stewardship start programme

Generally, resource efficiency and waste reduction requires little additional motivation if there is a clear link to greater profit margins. However, in relation to water stewardship and water conservation, it is generally recognised that this is seldom clear to many businesses for a variety of reasons. Without an initial investment that brings clarity to the business case, it is very difficult for commercial enterprises to secure a budget and prioritise action with many other competing site priorities.

In many instances (and for larger sites in particular), it is often a very complex and time-intensive exercise to develop a clear picture of current on-site water lifecycles or significant water users on account of the, often, organic growth of the water network and cost of new metering. Hence, it is proposed that a national programme to support firms is required for early stage intervention across industry, which would focus on the initial stewardship training, water life cycle identification and business case development as a catalyst for follow-on action and investment.

While accepting that, once such initial discovery work is complete, firms may be eligible to attract internal funding or external support (e.g. from the EPA Green Enterprise or Enterprise Ireland/IDA Green offers), it is clear from the feedback received during the consultation that a more consistent and easily accessible support for that discovery effort is needed, if progress is to be made on greater water stewardship adoption across the industry.

4.3.4 Action 3.4: rewards and incentives for good corporate water stewards

Demand-side incentivisation is an underdeveloped area, both nationally and internationally, in respect of water stewardship, whereas it has matured and is used extensively in respect of energy demand management. It is therefore recommended that with guidance from the policy developed under recommendation 1 (section 4.1), and with the support of the lead agencies identified therein, a system of demand-side incentives should be put in place.

The demand-side incentives framework presented herein can help guide this work, but it will require collective action by CRU, Irish Water, the EPA and others, as it is systematically applied to different sectors.

4.4 Recommendation 4: Water Stewardship Standards in Agriculture

The stated ambition for Ireland according to Bord Bia and other agencies is to be the world leader in sustainable agriculture as a differentiating market growth strategy for the food and beverage sector. FoodWise 2025 recognises that environmental sustainability and economic sustainability are complementary in this regard, while both national and international stakeholders are all in agreement that robust evidence-based data are crucial to underpin such efforts and related programmes (such as Origin Green). While accepting that considerable work has been undertaken in recent years in this regard, the actions presented herein aim to complement those efforts and initiatives while focusing on the underdeveloped area of water stewardship and associated internationally recognised standards across those initiatives.

4.4.1 Action 4.1: leverage the work of Teagasc, Dairy Sustainability Ireland and Origin Green

Since the publication of the EPA's small-scale study on water stewardship (Stockil, 2015), there have been significant developments in relation to water management at the farm level in Ireland with a focus on addressing water quality challenges across the dairy sector through the Dairy Sustainability Ireland initiative and the ongoing efforts by Bord Bia to grow and consolidate the Origin Green Programme across multiple sectors. It is imperative to build on such work and involve the associated stakeholders. Looking ahead and in light of the lessons that have emerged from international initiatives in this area, the water stewardship (and indeed broader sustainability)

challenges that will need to be addressed by current and any future initiatives include:

- scalability of initiatives and programmes (geographically and cross-sectoral);
- verification of such interventions (in line with international buyer expectations);
- reduction of complexity to aid adoption at the farm level;
- enhancement of the clarity and communication of the business case for farmers;
- linking to broader river basin water stewardship.

Ireland is not alone in facing such challenges in respect of the implementation of sustainability and water stewardship programmes at the farm level. While there is a variety of examples of pilot schemes being implemented internationally, there is little evidence of such pilots subsequently scaling to deliver broader sustainable and internationally accepted impact. The adaptation and adoption of suitable independently verifiable and non-proprietary internationally accepted standards is likely to be a critical component of addressing this challenge in Ireland.

4.4.2 Action 4.2: water stewardship standards on the farm

While a detailed and robust international standard exists for water stewardship (EWS, AWS), along with some initial implementations at the farm level, it is clear from a detailed review that work remains to further adapt water stewardship standards and develop farm-specific guidelines for implementation and verification. However, such work is essential to avoid short-term pilot efforts in Ireland and other jurisdictions never translating to sustainable, longer term benchmarks to underpin the sector's competitiveness and sustainability.

Elsewhere, the Sustainable Agriculture Initiative (SAI) highlighted that while verification to standards could be a basis for receiving Common Agricultural Policy (CAP) payments, for example, there is general agreement nationally and internationally that introducing new certification schemes is not the most appropriate way to progress water stewardship adoption at the farm level, given that farmers are already faced with considerable administrative work in running their businesses. They cannot be expected to implement multiple sustainability standards at the behest of either state agencies or key suppliers.

Therefore, it is recommended that in addressing this challenge in Ireland, the existing international water stewardship standard is integrated with a broader internationally acceptable and independently verifiable farm level sustainability standard and this then forms part of improved farm level assurance programmes in a manner analogous to how AWS is being integrated into the Better Cotton Initiative.

The work completed to date under Origin Green provides some foundation for this work, but it is recommended that a transition is needed to the adoption of independently governed national or international standards that comply with ISEAL codes of practice.

Overall failure to address this action is likely to result in current programmes (such as Origin Green and the Dairy Sustainability Ireland Programme) failing to meet their overall objectives. Alternatively, addressing this action will set Irish programmes apart internationally in relation to water stewardship and broader sustainability and provide enhanced credibility and verifiability across investors and buyers for farm-based sustainability programmes.

4.4.3 Action 4.3: greater linkage to the international AgriWater and stewardship communities

Greater linkage to the international water stewardship community in relation to global on-farm initiatives and programmes is recommended. During the consultations, examples were cited of national governments that base their support to farmers on their certification against sustainability standards such as Linking Environment and Farming (LEAF), while elsewhere both the EWS and AWS conferences had significant focus and knowledge-sharing opportunities among key stakeholders across the globe. Greater involvement by Irish stakeholders in such fora is desirable if Ireland is to establish its water stewardship position internationally and communicate its own experiences and credentials.

4.4.4 Action 4.4: incentivise adoption of water stewardship in farms

As previously outlined, incentivisation models in respect of good water stewardship are underdeveloped and this is true for the promotion of on-farm best practices. It is therefore recommended that with guidance from the policy developed under recommendation 1 above and with the support of the lead agencies identified therein, a system of demand-side incentives which is linked to existing structures and agencies should also be put in place for agriculture. While market-driven incentives and/or barriers have relevance in this sector, consideration must also be given to other categories of the incentives framework herein, including linking to CAP payments.

4.5 Recommendation 5: Research and Collective Actions

Many significant challenges remain both nationally and internationally in respect of the further development of water stewardship across industry and agriculture. Collective action and further research will be required as Ireland progresses through each stage of the water stewardship journey nationally. Specific areas that emerged during this study as requiring further research include:

- linking policy to action at the national level to move beyond compliance-based perspectives of water management;
- building new knowledge and systems for data-driven water stewardship monitoring and measurement from local to national levels;
- developing integrated water agreements programmes for large industry at the national level;
- integrating international standards into national initiatives in cities, river basins, sectors and production sites;
- integrating water stewardship with catchment management and river basin intervention programmes;
- addressing issues of incentivisation and behavioural change at the corporate and individual levels;
- developing and testing new methods and technologies for water management.

Hence, research programmes will continue to play a significant role in advancing both Ireland's and the international water stewardship communities' ability to address such challenges. In this regard, continued participation by Irish stakeholders in the research programmes outlined in this report is of critical importance, as is the need for increased emphasis on water stewardship initiatives by the EPA research programme and the research and development programmes of other state agencies, such as Enterprise Ireland, if the country is to truly achieve a leadership position in this domain. Furthermore, the principle of collective action is of critical importance if the global challenges are to be addressed, and such collective action must extend from local to national to international co-operation on water stewardship in industry and agriculture.

References

Abdel Al, I., Ahmad, S., Ballestero, M., Bezbaroa, S., Cookey, P., Dourojeanni, A., Galli, C., Langford, J., Mensink, M., Opondo, G., Matilda Park, J., Pinero, E., Ruffier, P., Witmer, L. and Xin, H., 2014. The AWS International Water Stewardship Standard. Available online: http://a4ws.org/our-work/aws-system/the-aws-standard/ (accessed 4 October 2016).

ASC (Aquaculture Stewardship Council), 2015. ASC achieves full ISEAL membership. Available online: https://www.asc-aqua.org/news/latest-news/asc-achieves-full-iseal-membership/ (accessed 22 August 2018).

AWS (Alliance for Water Stewardhip), 2017a. About the Alliance for Water Stewardship. Available online: http://a4ws.org/about/ (accessed 20 November 2017).

AWS (Alliance for Water Stewardship), 2017b. Water stewardship addressing impacts of pharmaceuticals. Available online: http://a4ws.org/whats-new/water-stewardship-addressing-impacts-pharma-primary-chemicals/ (accessed 28 November 2017).

AWS (Alliance for Water Stewardship), 2017c. Projects. Available at: http://a4ws.org/our-work/projects/ (accessed 28 November 2017).

Boeuf, B., Fritsch, O. and Martin Ortega, J., 2016. Undermining European environmental policy goals? The EU water framework directive and the politics of exemptions. *Water* 8: 388. https://doi.org/10.3390/w8090388.

Camp Dresser & McKee Ireland Ltd, 2004. *Economic Analysis of Water Use in Ireland: Final Report*. Available online: http://www.wfdireland.ie/docs/35_Economics/Economic%20Analysis%20of%20Water%20use.pdf (accessed 27 November 2017).

Cantillion, R., 2017. Emissions shaming provokes ire of Irish PLCs. *Irish Times*, 25 November 2017. Available online: https://www.irishtimes.com/business/media-and-marketing/emissions-shaming-provokes-ire-of-irish-plcs-1.3304455 (accessed 12 December 2017).

CDP (Carbon Disclosure Project), 2017a. Catching up with the leaders: accelerating corporate water stewardship in Europe. CDP European water report 2017. Available online: https://www.cdp.net/en/water (accessed 18 September 2017).

CDP (Carbon Disclosure Project), 2017b. *Missing Link: Harnessing the Power of Purchasing for a Sustainable Future*. Available online: https://b8f65cb373b1b7b15feb-c70d8ead6ced550b4d987d7c03fcdd1d.ssl.cf3.rackcdn.com/cms/reports/documents/000/001/500/original/CDP-Supply-chain-report-2017.PDF?1485248719 (accessed 28 June 2017).

CISL (University of Cambridge Institute for Sustainability Leadership), 2013. *Sustainable Water Stewardship Innovation through Collaboration*. Available online: https://www.cisl.cam.ac.uk/business-action/natural-resource-security/natural-capital-impact-group/pdfs/sustainable-water-stewardship-innovation-through-c.pdf (accessed 25 June 2017).

Curran, L., 2016. Driving Innovation in the SME sector in Ireland to help meet global water/wastewater challenges – joining up the dots using an industrial cluster approach. *International Low Carbon Heat & Water Conference and Showcase*. Availabe online: https://www.b2match.eu/system/heat-water2016/files/Breakout3_1_LiamCurran.pptx?1456415057 (acessessed 11 May 2017).

Damania, R., Desbureaux, S., Hyland, M., Islam, A., Moore S., Rodella, A., Russ, J. and Zaveri, E., 2017. *The New Economics of Water Scarcity and Variability*. Available online: https://openknowledge.worldbank.org/bitstream/handle/10986/28096/9781464811791.pdf?sequence=21&isAllowed=y (accessed 20 January 2018).

D'Hollander, D., 2017. Public policy and private standards – bridging the gap to mainstream sustainability. ISEAL Alliance website. Available online: https://www.isealalliance.org/sustainability-news/public-policy-and-private-standards-bridging-gap-mainstream-sustainability (accessed 12 December 2017).

Dublin Chamber of Commerce, 2014. *Submission to Irish Water. Consultation on Water Services Strategic Plan Issues Paper and Environmental Scoping Report*. Available online: http://www.dubchamber.ie/docs/policy-reports/submission-to-wssp-issues-paper.pdf (accessed 11 May 2017).

Dziegielewski, B., 2003. Strategies for managing water demand, water resources update. Available online: http://opensiuc.lib.siu.edu/cgi/viewcontent.cgi?article=1110&context=jcwre (accessed 12 December 2017).

EC (European Commission), 2012. A blueprint to safeguard Europe's water resources. EC, Brussels. Available online: http://ec.europa.eu/environment/water/blueprint/index_en.htm (accessed 5 January 2017).

EIP (European Innovation Partnership), 2012. *Strategic Implementation Plan*. Available online: https://www.eip-water.eu/eip-water-strategic-implementation-plan (accessed 12 December 2017).

Enterprise Ireland, 2017. Build a green and sustainable business. Available online: https://www.enterprise-ireland.com/en/Productivity/Build-a-green-sustainable-Business/ (accessed 11 May 2017).

EPA (Environmental Protection Agency), 2017a. *EPA Water Quality in Ireland (2010–2015)*. Available online: http://www.epa.ie/pubs/reports/water/waterqua/waterqualityinireland2010-2015.html (accessed 12 December 2017).

EPA (Environmental Protection Agency), 2017b. *Green Healthcare Programme*. Available online: http://www.greenhealthcare.ie/ (accessed 11 May 2017).

EPA (Environmental Protection Agency) Catchments Unit, 2017. Launch of new 'Sustainability Support and Advisory Programme' to improve water quality. Available online: https://www.catchments.ie/launch-new-sustainability-support-advisory-programme-improve-water-quality/ (accessed 12 December 2017).

ESM (European Supermarket Magazine), 2016. Edeka collaborates with WWF to protect fresh water resources. *ESM*, 25 August 2016 . Available online: https://www.esmmagazine.com/edeka-wwf-partners-protecting-fresh-water-resources/31522 (accessed 28 November 2017).

EWP (European Water Partnership), 2011. *European Water Stewardship Pilot studies 2011 – Industry*. Available online: http://www.solutionsforwater.org/wp-content/uploads/2012/03/EWS+Communication+Pilot-reports+Industry+2011.pdf (accessed 15 September 2017).

EWP (European Water Partnership), 2012. *European Water Stewardship Pilot Studies 2011 – Airports*. EWS, Leeuwarden, the Netherlands.

EWP (European Water Partnership), 2017. *Demand-driven Innnovation Support for SMEs through the Network of National Water Partnerships for Jobs and Growth in Europe – DIS-SMEs*. EWS, Leeuwarden, the Netherlands.

Henderson, K., Somers, K. and Stuchtey, M., 2013. Measuring the real cost of water. Available online: https://www.mckinsey.com/business-functions/sustainability-and-resource-productivity/our-insights/measuring-the-real-cost-of-water (accessed 12 December 2017).

ICCR (Interfaith Center on Corporate Responsibility), 2015. Leading global investors urge food and beverage companies to better manage water risks. Available online: https://www.iccr.org/leading-global-investors-urge-food-and-beverage-companies-better-manage-water-risks (accessed 18 September 2018).

International Hydrological Programme, 2011. The impact of global change on water resources. Available online: https://en.unesco.org/themes/119755/publications/all?page=2 (accessed 12 January 2018).

Irish Water, 2015a. *Water Services Strategic Plan: A Plan for the Future of Water Services*. Available online: https://www.water.ie/docs/WSSP_Final.pdf (accessed 24 April 2017).

Irish Water, 2015b. *Irish Water Business Plan: Transforming Water Services in Ireland to 2021*. Available online: https://www.water.ie/docs/Irish-Water-Business-Plan.pdf (accessed 24 April 2017).

ISEAL Alliance, 2015a. Alliance for Water Stewardship (AWS). Available online: https://www.isealalliance.org/community-members/alliance-water-stewardship-aws (acessed 22 Augst 2018).

ISEAL Alliance, 2015b. Linking Environment And Farming (LEAF). Available online: https://www.isealalliance.org/community-members/linking-environment-and-farming-leaf (accessed 22 August 2018).

IWMI (International Water Management Institute), 2007. *Water for Food Water for Life: A comprehensive assessment of Water Management in Agriculture*. Available online: http://www.iwmi.cgiar.org/assessment/files_new/synthesis/Summary_SynthesisBook.pdf (acessed 22 August).

Kambil, A. and Calabro, L., 2012. Ripple effects: why water is a CFO issue – CFO insights. Available online: http://deloitte.wsj.com/cfo/files/2012/08/Why_Water_is_a_CFO_Issue.pdf (accessed 26 June 2017).

Kelly-Quinn, M., Bruen, M., Harrison, S., Healy, M., Clarke, J., Drinan, T., Feeley, H.B., Finnegan, J., Graham, C., Regan, J. and Blacklocke, S., 2014. *HYDROFOR: Assessment of the Impacts of Forest Operations on the Ecological Quality of Water*. Environmental Protection Agency, Johnstown Castle, Ireland. Available online: http://www.epa.ie/pubs/reports/research/water/researchreport169.html (accessed 11 May 2017).

Khalamayzer, A., 2017. Nestle, Coca-Cola top list of companies disclosing water risk. *GreenBiz*, 14 September 2017. Available online: https://www.greenbiz.com/article/nestle-coca-cola-top-list-companies-disclosing-water-risk (accessed 11 October 2017).

Newborne, P. and Dalton, J., 2016. Water management and stewardship: taking stock of corporate water behaviour. International Union for ConservatIon of Nature. Available online: https://www.odi.org/publications/10645-private-companies-water-management-water-stewardship-drivers-corporate-water-behaviour-connection (accessed 28 June 2017).

OECD (Organisation for Economic Co-operation and Development), 2016. OECD Council: recommendation on water. Available online: http://www.oecd.org/water/policy-highlights-and-perspectives.htm (accessed 11 October 2017).

Reig, P., 2015. Water stewardship: good for business, good for sustainable development. World Resource Institute. Available online: http://www.wri.org/blog/2015/03/water-stewardship-good-business-good-sustainable-development (accessed 13 October 2017).

Scottish Government, 2012. *Scotland the Hydro Nation – Prospectus and Proposals for Legislation*. Available online: http://www.hydronationscholars.scot/documents/Hydro_Nation_Prospectus.pdf (accessed 12 December 2017).

Skroupa, C.P., 2017a. Time is running out for water – 40% shortfall if we 'continue with business as usual'. *Forbes*. Available online: https://www.forbes.com/sites/christopherskroupa/2017/10/10/time-is-running-out-for-water-40-shortfall-if-we-continue-with-business-as-usual/#34f912186557 (accessed 11 October 2017).

Skroupa, C.P., 2017b. Water insecurities worsen, 43% of companies disclose their exposure to risk. *Forbes*. Available online: https://www.forbes.com/sites/christopherskroupa/2017/09/21/water-insecurities-worsen-43-of-companies-disclose-their-exposure-to-risk/#6bccc7233d7e (accessed 11 October 2017).

Söderberg, C., 2016. Complex governance structures and incoherent policies: implementing the EU water framework directive in Sweden. *Journal of Environmental Management* 183: 90–97. https://doi.org/10.1016/j.jenvman.2016.08.040.

Stockil, K., 2016. *European Water Stewardship Standards. An Investigation into the Opportunities for Ireland*. Environmental Protection Agency, Johnstown Castle, Ireland. Available online: http://epa.smartsimple.ie/files/347278/105474/EWS_FINAL_Report.pdf (accessed 2 October 2017).

Sustainable Brands, 2016. Coca-Cola, PepsiCo exceed water stewardship goals. Available online: http://www.sustainablebrands.com/news_and_views/waste_not/sustainable_brands/coca-cola_pepsico_exceed_water_stewardship_goals (accessed 11 October 2017).

The Prince's Responsible Business Network, 2010. Smart water – a prosperous future for the food and drink supply chain. Spore. Available online: https://www.farminguk.com/KnowledgeCentre/SmartWater-A-prosperous-future-for-the-food-and-drink-supply-chain_812.html (accessed 28 June 2017).

Tsakiris, G., 2015. The status of the European waters in 2015: a review. *Environmental Processes* 2: 543–557. Available online: https://link.springer.com/article/10.1007/s40710-015-0079-1 (accessed 4 September 2017).

UN (United Nations), 2018. *The Sustainable Development Goals Report 2018*. Available online: https://unstats.un.org/sdgs/report/2018/overview/ (accessed 18 September 2018).

Von Wiren-Lehr, S., 2011. *European Water Stewardship Pilot Studies 2011 – Agriculture*. EWS, Brussels.

Water JPI (Water Joint Programming Initiative), 2014. Strategic research and innovation agenda. Available online: http://www.waterjpi.eu/images/SRIA/WATER%20JPI%20%20SRIA%201.0_2014.pdf (accessed 29 July 2017).

WEF (World Economic Forum), 2017. *The Global Risks Report 2017 Insight Report*. 12th edition. Available online: http://reports.weforum.org/global-risks-2017/ (accessed 11 October 2017).

Wunder, S., 2005. Payments for environmental services: some nuts and bolts. CIFOR Occasional Paper No. 42. Available online: https://www.cifor.org/publications/pdf_files/OccPapers/OP-42.pdf (accessed 18 September 2018).

WWF (World Wide Fund for Nature), 2015a. Securing clean and healthly rivers – second cycle river basin management plans – an opportunity for improved water management in Europe. WWF briefing paper. Available online: http://www.wwf.eu/what_we_do/eu_forests/publications_forest.cfm?uNewsID=243990 (accessed 5 August 2016).

WWF (World Wide Fund for Nature), 2015b. *Strengthening Water Stewardship in Agricultural Sustainability Standards – Framing Collaborative Solutions to Mitigate Water Risk*. Available online: http://d2ouvy59p0dg6k.cloudfront.net/downloads/wwf_strengthening_water_web.pdf (accessed 15 July 2017).

WWF (World Wide Fund for Nature), 2017. Steps to better water stewardship. WWF. Available online: http://wwf.panda.org/our_work/water/water_management/stewardship_steps/ (accessed 28 November 2017).

Abbreviations

AWS	Alliance for Water Stewardship
CAP	Common Agricultural Policy
CDP	Carbon Disclosure Project
CRU	Commission for Regulation of Utilities
DAFM	Department of Agriculture, Food and the Marine
EC	European Commission
EIP	European Innovation Partnership
EPA	Environmental Protection Agency
EU	European Union
EWP	European Water Partnership
EWS	European Water Stewardship
IBT	Increasing block tariff
IDA	Industrial Development Authority
ISEAL	International Social and Environmental Accreditation and Labelling Alliance
ITC	Investment tax credit
JPI	Joint Programming Initiative
LAWCO	Local Authority Water and Communities Office
MDB	Murray–Darling Basin
NSAI	National Standards Authority of Ireland
OECD	Organisation for Economic Co-operation and Development
PAB	Private activity bond
PTC	Production tax credit
PWS	Payment for watershed services
SAI	Sustainable Agriculture Initiative
SDG	Sustainable Development Goal
SEAI	Sustainable Energy Authority of Ireland
SME	Small and medium-sized enterprise
UN	United Nations
WEF	World Economic Forum
WFD	Water Framework Directive
WPAC	Water Policy Advisory Committee
WWF	World Wide Fund for Nature

Appendix 1 International Stakeholders

Actors who could have an interest in sustainable water management have been identified. Specific stakeholders can be identified from the sectors outlined in Figure A1.1.

The typology categorises the main actors who most often intervene in the water sector globally. Stakeholder mapping exercises were conducted and these highlighted that important actors, such as watershed institutions, regulators, service providers and enterprise support agencies, are considered to be more relevant at the local level than at the global one and therefore are not within the scope of the present global mapping. Moreover, there are other emerging stakeholders and new players in the specific field of water stewardship, including businesses that have not been considered in the present analysis, as they should be taken locally as examples and end point implementers of water stewardship schemes.

The list compiled for each of these categories along with details on the activities of each stakeholder are outlined in the international stakeholder table (Table A1.1).

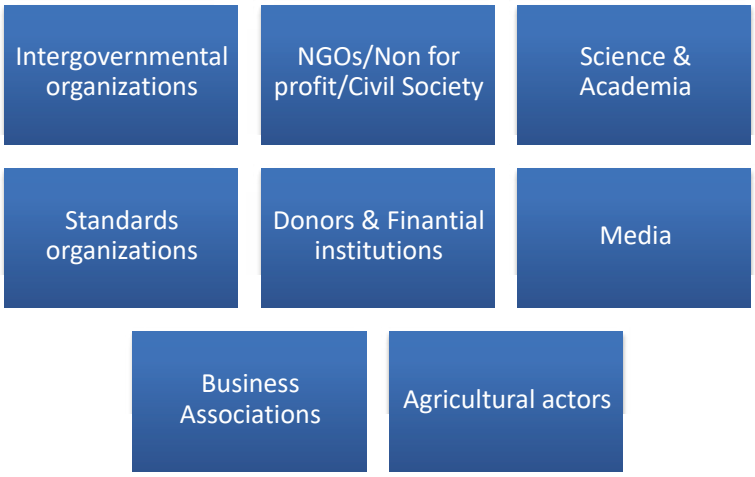

Figure A1.1. International water stewardship stakeholder groups.

Table A1.1. International stakeholder table

Acronym	Full name	Type	Description	Website
ACI Europe	Airports Council International Europe	Business associations	European Association of Airports.	www.aci-europe.org
APE	Aqua Publica Europea	Business associations	European Association of Public Water Operators. It unites publicly owned water and sanitation services, and a wide range of stakeholders are working to promote public water management at both European and international levels. APE is an operator-led association, which looks for efficient solutions that serve the public rather than corporate interests. To date, its members cover nine European countries, directly serving over 70 million people.	www.aquapublica.eu
AWS	Alliance for Water Stewardship	NGOs/not for profit	Global network that promotes responsible use of freshwater that is socially and economically beneficial and environmentally sustainable via the AWS standard.	www.allianceforwaterstewardship.org
BIER	Beverage Industry Environmental Roundtable	Business associations	Technical coalition of leading global beverage companies working together to advance environmental sustainability within the beverage sector.	www.bieroundtable.com
Bonsucro	Bonsucro	Agricultural actors	Global network that provides tools, connections and support across the entire industry to help develop professionalism and resilience in the businesses who work with sugarcane and its many products.	www.bonsucro.com
Carbon Trust	Carbon Trust	NGOs/not for profit	Organisation that leads organisations around the world and helps them contribute to and benefit from a more sustainable future through carbon reduction and resource efficiency strategies and commercialise low carbon technologies. The Carbon Trust Standard for Water recognises organisations that take a best practice approach to measuring and managing their water use, achieving real reductions in this year-on-year.	www.carbontrust.com
CDP	Carbon Disclosure Project	NGOs/not for profit	Organisation that runs the global disclosure system that enables companies, cities, states and regions to measure and manage their environmental impacts via a comprehensive collection of self-reported environmental data in the world (including water reporting).	www.cdp.net
Cefic	European Chemical Industry Council	Business associations	European trade association for the chemical industry.	www.cefic.org
CEFS	Comité Européen des Fabricants de Sucre	Agricultural actors	Committee that represents all European sugar manufacturers and refiners in the EU and Switzerland.	www.comitesucre.org
CEO Water Mandate	The CEO Water Mandate	NGOs/not for profit	Organisation that mobilises business leaders to advance water stewardship, sanitation and the SDGs – in partnership with the UN, governments, peers, civil society and others.	ceowatermandate.org
Ceres	Ceres	NGOs/not for profit	Organisation that works with influential investors and companies to build leadership and drive solutions throughout the economy to tackle sustainability challenges, including climate change, water scarcity and pollution, and human rights abuses.	www.ceres.org

Table A1.1. Continued

Acronym	Full name	Type	Description	Website
Circle of Blue	Circle of Blue	Media	Organisation that provides relevant, reliable and actionable on-the-ground information about the world's resource crises.	www.circleofblue.org
CISL	Cambridge Institute for Sustainability Leadership	Science and academia	Institution within the University of Cambridge that helps influential individuals, major organisations and whole sectors develop strategies that reconcile profitability and sustainability and work collaboratively with their peers not only to develop solutions to shared challenges but also to catalyse real systems change. Within the CISL there is the Natural Capital Impact Group, which in its water workstream aims at exploring appropriate approaches for green infrastructure and natural flood management. They are assessing the potential of innovative business models connecting flood risk management mechanisms with securing natural capital.	www.cisl.cam.ac.uk
DFID (UK)	Department for International Development	Donors and financial institutions	DFID leads the UK's work to end extreme poverty. They tackle the global challenges of our time, including poverty and disease, mass migration, insecurity and conflict. Their work is building a safer, healthier, more prosperous world for people in developing countries as well as in the UK.	www.gov.uk/government/organisations/department-for-international-development
ECPA	European Crop Protection Association	Business associations	They represent the crop protection industry in Europe. Their members develop innovative and science-based solutions that keep crops healthy and contribute to providing Europeans with a safe, affordable, healthy and sustainable food supply.	www.ecpa.eu
EDA	European Dairy Association	Business associations	European milk processor's platform for exchange throughout all parts of Europe and across all types of dairy companies, co-operatives and privately owned dairies, world dairy leaders and SMEs.	eda.euromilk.org
EEA	European Environment Agency	Science and academia	Agency that provides sound, independent information on the environment for those involved in developing, adopting, implementing and evaluating environmental policy as well as the general public. In close collaboration with the European Environmental Information and Observation Network and its 33 member countries, the EEA gathers data and produces assessments on a wide range of topics related to the environment.	www.eea.europa.eu
EIP Water	European Innovation Partnership on Water	Donors and financial institutions	Organisation that aims to speed up innovations that contribute to solving societal challenges, enhance Europe's competitiveness and contribute to job creation and economic growth. EIPs help to pool expertise and resources by bringing together public and private actors at EU, national and regional levels, combining supply- and demand-side measures.	www.eip-water.eu
ELO	European Landowners Organization	Agricultural actors	European multidisciplinary office for landowners and land managers.	www.europeanlandowners.org
EU Commission	EU Commission	Regulators	Institution of the EU, responsible for proposing legislation, implementing decisions, upholding the EU treaties and managing the day-to-day business of the EU.	ec.europa.eu
Euractiv	Euractiv	Media	European media platform that specialises in the online publication of articles focusing on European policymaking.	www.euractiv.com
EWP	European Water Partnership	NGOs/not for profit	Unites and mobilises people and stakeholders around a common water vision for Europe since 2006, developing policies, standards and sharing best practice to effectively address Europe's water challenges by 2030.	www.ewp.eu

Table A1.1. Continued

Acronym	Full name	Type	Description	Website
FDF	UK Food & Drink Federation	Business associations	Voice of the UK food and drink industry, which is the largest manufacturing sector in the country.	www.fdf.org.uk
FoodDrinkEurope	Food Drink Europe	Business associations	Organisation that facilitates the development of an environment in which all European food and drink companies, whatever their size, can meet the needs of consumers and society, while competing effectively for sustainable growth.	www.fooddrinkeurope.eu
GEMI	Global Environmental Management Initiative	Business associations	Organisation of leading companies dedicated to fostering global EHS and sustainability excellence through the sharing of tools and information to help business achieve environmental sustainability excellence. Through the collaborative efforts of its members, GEMI also promotes a worldwide business ethic for EHS management and sustainable development through example and leadership.	gemi.org
GIZ (Germany)	Deutsche Gesellschaft für Internationale Zusammenarbeit	Donors and financial institutions	GIZ staff work in thematically diverse projects and programmes in widely different countries throughout the world. A shared goal is to develop sustainable and effective solutions. They have an International Water Stewardship Programme (IWaSP), which is a transnational, multidonor, German development co-operation programme with funding through 2018.	www.giz.de/en
GlobalGAP	Global Good Agricultural Practice	Standards organisation	Farm assurance programme, translating consumer requirements into good agricultural practice. It is now the world's most widely implemented farm certification scheme.	www.globalgap.org
GRI	Global Reporting Initiative	Standards organisation	International independent standards organisation that helps businesses, governments and other organisations understand and communicate their impacts on issues such as climate change, human rights and corruption.	www.globalreporting.org
GWP	Global Water Partnership	NGOs/not for profit	Organisation that provides knowledge and builds capacity to improve water management at all levels: global, regional, national and local. GWP does not operate alone. Its networking approach provides a mechanism for co-ordinated action and adds value to the work of many other key development partners.	www.gwp.org
IBWA	International Bottled Water Association	Business associations	IBWA represents the bottled water industry with members including US and international bottlers, distributors and suppliers.	www.bottledwater.org
ICMM	International Council of Mining Metals	Business associations	International organisation dedicated to a safe, fair and sustainable mining industry.	www.icmm.com
IFC	International Finance Corporation	Donors and financial institutions	IFC, a member of the World Bank Group, is the largest global development institution focused exclusively on the private sector in developing countries. The 2030 Water Resources Group is a unique public–private–civil society collaboration. It facilitates open, trust-based dialogue processes to drive action on water resources reform in water-stressed countries in developing economies. The ultimate aim of such reforms and actions is to close the gap between water demand and supply by the year 2030.	www.ifc.org
IPIECA	(Global oil and gas industry association)	Business associations	Global oil and gas industry association for environmental and social issues.	www.ipieca.org

Table A1.1. Continued

Acronym	Full name	Type	Description	Website
ISEAL	ISEAL Alliance	Standards organisation	Global leader in defining and communicating what good practice looks like for sustainability standards. Through this work, ISEAL helps drive standards towards delivering a more positive impact. At the heart of this is ISEAL's set of core principles that define credibility in standards. ISEAL strengthens sustainability standards for the benefit of people and the environment.	www.isealalliance.org
ISO	International Organization for Standardisation	Standards organisation	Through its members, it brings together experts to share knowledge and develop voluntary, consensus-based, market-relevant international standards that support innovation and provide solutions to global challenges.	www.iso.org
IUCN	International Union for the Conservation of Nature	NGOs/not for profit	International organisation working in the field of nature conservation and sustainable use of natural resources. IUCN's water programme brings together its extensive network of IUCN members, experts, government and private sector partners to develop sustainable solutions to preserve our water resources.	www.iucn.org
IWA	International Water Association	NGOs/not for profit	"Reduce, reuse and replenish for a water wise world" is IWA's catchphrase. IWA programmes establish change agendas on key themes for a water-wise world that contribute to sustainable development; these programmes are Basins of the Future, Cities of the Future and Water and Sanitation Services.	www.iwa-network.org
IWMI	International Water Management Institute	Science and academia	Scientific research organisation focusing on the sustainable use of water and land resources in developing countries. IWMI works in partnership with governments, civil society and the private sector to develop scalable agricultural water management solutions that have a real impact on poverty reduction, food security and ecosystem health. Its mission is to provide evidence-based solutions to sustainably manage water and land resources for food security, people's livelihoods and the environment.	www.iwmi.cgiar.org
JRC	Joint Research Centre	Science and academia	The EC's science and knowledge service, which employs scientists to carry out research in order to provide independent scientific advice and support to EU policy. The JRC provides scientific assessments to address societal and economic challenges deriving from the evolving vulnerability of the European and global water environment. In particular, it develops modelling tools to predict climate change impacts on water, assesses water governance in developing countries and carries out studies on the preservation of ecosystems.	ec.europa.eu/jrc/en
ODI	Overseas Development Institute	NGOs/not for profit	Leading independent think tank on international development and humanitarian issues. The mission is to inspire and inform policy and practice which leads to the reduction of poverty, the alleviation of suffering and the achievement of sustainable livelihoods in developing countries. In terms of water, it links high-quality research with practical policy advice on water issues with a bearing on poverty, aiming to provoke, contribute to and influence debates on water and sanitation.	www.odi.org
OECD	Organisation for Economic Co-operation and Development	Intergovernmental organisations	Promotes policies that will improve the economic and social well-being of people around the world. Works with governments to understand what drives economic, social and environmental change.	www.oecd.org

Table A1.1. Continued

Acronym	Full name	Type	Description	Website
RISE	Rural Investment Support for Europe	Agricultural actors	Independent foundation which strives to support a sustainable and internationally competitive rural economy across Europe, looking for ways to preserve the European countryside, its environment and biodiversity, and its cultural heritage and traditions. It works as a think tank, bringing together experts to address key environmental/agricultural challenges in Europe and develops high-quality, accessible research reports with clear recommendations for policymakers. It draws on its extensive network of rural stakeholders to highlight innovative practices developed at the farm level and provides a platform for debate on issues that affect rural communities.	www.risefoundation.eu
SAI	Sustainable Agriculture Initiative Platform	Agricultural actors	SAI Platform is an organisation created by the food industry to communicate and to actively support the development of sustainable agriculture.	www.saiplatform.org
SDC (Switzerland)	Swiss Agency for Development and Cooperation	Donors and financial institutions	Office-level agency in the federal administration of Switzerland and which is a part of the Federal Department of Foreign Affairs. Together with other federal offices, SDC is responsible for the overall co-ordination of Swiss international development activities and co-operation with Eastern Europe, as well as humanitarian aid.	www.eda.admin.ch/sdc
Sida	Swedish International Development Cooperation	Donors and financial institutions	Government agency working on behalf of the Swedish parliament and government, with the mission to reduce poverty in the world. Through its work and in co-operation with others, Sida contributed to the implementation of Sweden's policy for global development.	www.sida.se
SIWI	Stockholm International Water Institute	NGOs/not for profit	Through applied research, policy consultation, capacity-building and connecting key actors across sectors, SIWI stimulates the development of innovative policies and scientifically based solutions to water-related challenges. It brings together experts, practitioners and decision-makers from a range of sectors and countries during its annual World Water Week in Stockholm to network, exchange ideas and foster new thinking around the most pressing water-related challenges of today.	www.siwi.org
TNC	The Nature Conservancy	NGOs/not for profit	Charitable environmental organisation with the mission to "conserve the lands and waters on which all life depends".	www.nature.org
UN	United Nations	Intergovernmental organisations	Intergovernmental organisation that promotes international co-operation and creates and maintains international order.	www.un.org
Water JPI	Joint Programming Initiative Water	Science and academia	The Water JPI challenges for a changing world and tackles the ambitious challenge of achieving sustainable water systems for a sustainable economy in Europe and abroad. Water JPI works to get participating countries to co-ordinate their individual water research agendas with a European-wide strategic research agenda on common research questions to be solved. It will increase co-operation between European water professionals through sharing resources, building networks and involving all stakeholders in the development of its activities.	www.waterjpi.eu
Water Witness	Water Witness International	NGOs/not for profit	Charity that works to improve the way that rivers, streams lakes and aquifers in developing countries are managed.	waterwitness.org

Table A1.1. Continued

Acronym	Full name	Type	Description	Website
WB	World Bank	Donors and financial institutions	International financial institution that provides loans to countries of the world for capital programmes. The World Bank Group is one of the world's largest sources of funding and knowledge for developing countries. Its five institutions share a commitment to reducing poverty, increasing shared prosperity and promoting sustainable development.	www.worldbank.org
WBCSD	World Business Council for Sustainable Development	NGOs/not for profit	Platform for companies to explore sustainable development, share knowledge, experiences and best practices, and advocate business positions on these issues in a variety of forums, working with governments, NGOs and intergovernmental organisations. It works on a variety of issues related to sustainable development, one of which is water.	www.wbcsd.org
WEF	World Economic Fund	Intergovernmental organisations	Organisation committed to improving the state of the world by engaging business, political, academic and other leaders of society to shape global, regional and industry agendas. The foundation also acts as a think tank, publishing a wide range of reports. In particular, strategic insight teams focus on producing reports of relevance in the fields of competitiveness, global risks and scenario thinking. It has a global water initiative, which seeks to embed water at the centre of economic growth planning, thus resulting in optimised allocative decision-making for policymakers and in turn a more equitable and water secure and stable environment for users.	https://www.weforum.org
WFN	Water Footprint Network	NGOs/not for profit	Network that provides science-based, practical solutions and strategic insights that empower companies, governments, individuals and small-scale producers to manage water via the water footprint standard.	waterfootprint.org
WfWP	Women for Water Partnership	NGOs/civil society	Partnership of women's organisations and networks, uniting female leadership in the areas of water and sanitation.	www.womenforwater.org
WIN	Water Integrity Network	NGOs/not for profit	Network of organisations and individuals promoting water integrity to reduce corruption and improve water sector performance.	www.waterintegritynetwork.net
WRI	Water Resources Institute	Science and academia	Institute that creates equity and prosperity through sustainable natural resource management. The aqueduct project uses the most up-to-date data to produce global water risk maps, allowing stakeholders to assess current and future challenges. They conduct economic and other analyses to identify the most cost-effective strategies to reduce water pollution. They also identify solutions, such as restoring ecosystem services, to alleviate stresses on the world's water supplies.	www.wri.org
WssTP	Water Supply and Sanitation Technology Platform	Science and academia	Platform that fosters collaborative, innovative and integrated European research and technologies development. Guideline for future research and development for the European water sector as it strives all together to make the European water sector a leading centre of expertise for providing safe, clean and affordable water services while protecting nature by 2030.	wsstp.eu

Table A1.1. Continued

Acronym	Full name	Type	Description	Website
WWC	World Water Council	NGOs/not for profit	International multistakeholder platform, which has as its mission to promote awareness, build political commitment and trigger action on critical water issues at all levels, including the highest decision-making level, to facilitate the efficient conservation, protection, development, planning, management and use of water in all its dimensions on an environmentally sustainable basis. By providing a platform to encourage debates and exchanges of experience, the WWC aims to reach a common strategic vision on water resources and water services management among all stakeholders in the water community. In the process, the WWC also catalyses initiatives and activities, whose results converge towards its flagship product, the World Water Forum.	www.worldwatercouncil.org
WWF	World Wide Fund for Nature	NGOs/not for profit	Organisation that works in the field of wilderness preservation and the reduction of humanity's footprint on the environment. In terms of water, WWF is working to protect freshwater ecosystems and improve water access, efficiency and allocation for people and the environment – an essential component of saving most of WWF's priority places and species and reducing the impact of humanity's water footprint.	www.worldwildlife.org

EHS, environment, health and safety; NGO, non-governmental organisation.

Appendix 2 National Stakeholders (for Industry and Agriculture)

Remaining within the industry and agriculture scope of the project, actors who could have an interest in sustainable water management were identified from the Irish context. These were categorised as (1) national regulatory, policy and support stakeholders and (2) industry and agriculture stakeholders. The industry and agriculture stakeholder grouping included industries and agribusiness, representative groups and bodies, agriculture associations and so on, with the aim of gathering a broad range of industry and stakeholder perspectives and different points of view.

National regulatory, policy and support stakeholders:

- Bord Bia;
- CRU (formerly CER);
- DAFM;
- Department of Communications, Climate Action and Environment;
- Department of Housing, Planning and Local Government;
- Department of Business, Enterprise and Innovation (DJEI);
- Enterprise Ireland;
- EPA;
- IDA;
- Irish Water;
- LAWCO;
- NSAI;
- SEAI;
- Teagasc;
- WPAC.

Industry and agriculture:

- Dairy Industry Ireland (formerly Irish Dairy Industry Association);
- farmer associations (e.g. Irish Farmer's Association, IFA; Irish Co-operative Organisation Society, ICOS);
- Irish Business and Employers Confederation (IBEC);
- large water users community of practice (CoP) group members:
  - multi-stakeholder forum;
  - for example, large industry/corporates (cross-sectorial) (e.g. Glanbia, Intel, ABP Food Group, Irish Cement, Bulmers, Vistakon, GSK).

Appendix 3 Organisations Attending the Conference, Wokshops and Interviews

Box A3.1. Organisations attending the conference and workshops

2030 WRG/IFC
Abbott Ireland
Aberdeen Standard Investments
ABP Food Group
Agroclimawater Hyetos
Amec Foster Wheeler
AMS Ltd – Little Island Cork
ATA Consultoria em Sustentabilidade
Australian Water Partnership
AWS
AZAO
BASF
Bayart Quantis
Beeodiversity
Better Cotton Initiative
BIM – Ireland's Seafood Development Agency
Bluetech Forum
BORDA
Boruah.com
Bulmers & Gleesons
CARE USA
CCSA
CDP
Central Solutions
Clean Water Wave
Council of Great Lakes Industries
Country Crest
CSR Solutions
Dairygold Co-Operative Society Limited
Danone Waters
Deloitte
Denkstatt GmbH
DePuy Synthes
Diageo
Dublin Airport Authority
Easton Water Consulting
EBBK
EBCD
Ecolab
Ecometrica
ECPA
EDEKA
ELO
Enterprise Ireland
Environmental Research Institute
EPA
ERM
ETICAE
Eureau
EWP
EWS
Exova BM TRADA
Fairy Bottling (Z) Ltd
Foundation for a Clean Earth
GIZ
Glanbia Foods

Box A3.1. Organisations attending the conference and workshops (continued)

GlaxoSmithKline
GLOBAL G.A.P.
Golf Environment Organization (GEO)
Good Fish Company
Good Stuff International
Great Northern Distillery
GSK
Guerbet
HELVETAS Swiss Intercooperation
Highlands and Islands Enterprise
HPC AG
HSE/HBS Cork
Ibersparragal
IDH Sustainable Trade
IFOAM
IIHS
Intel
Interel Group
International Tourism Partnership
IPIECA
Irish Country Meats
Irish Water
Irving Oil
ITC Ltd
Kinsale Bay Food Co
Kish Fish
KJMK
Kopinnacle
Lamb Weston
M&S
Manor Farm
Mars Inc
Merck
Mondi Group
MSZ
National Farmers' Union, England & Wales
Nestlé
Netherlands Water Network
NHS Highland
Nimbus
NSF International
Nuffield Farming Trust
OID
Oieau
Olam International Limited
Origin Green
Partnerships in Practice
Paulsson Good Stuff International
Philip Morris International
Protos
Regione Lombardia
Restore the Earth Foundation
Rosderra Irish Meats
Rural Education & Economic Development Society
RVO – the Netherlands Enterprise Agency
SAI
SBHSS
Scottish Environment Protection Agency
Scottish Government
SCS Global Services
Severn Trent Response
SGS
SOAS University
Stockholm International Water Institute

Box A3.1. Organisations attending the conference and workshops (continued)

The Change Agency
The Coca-Cola Company
The Nature Conservancy
The Pinero Group LLC
The South Pole Group
Toshiba of Europe Limited
Uisce Consulting
UK Department for International Development
UM
Unilever
University of Canberra
University of Waterloo – Water Policy and Governance Group
UPC
Valuing Nature
Vewin – Unie van Waterschappen
Virgilio
VITO
Walter Scott & Partners
WaterAid
Water-Culture Institute
Water Witness International
WET Foundation
Wetsus
World Business Council for Sustainable Development
World Resources Institute
WWF
Wyeth Nutritionals Ireland

Box A3.2. Organisations that took part in additional consultation interviews

Aalto University
BlueTech Research
Bord Bia (Origin Green)
CDP
DAA
Dairy Industry Ireland
Department of Housing, Planning and Local Government
ECPA
Enterprise Ireland
EPA
Fresh Thoughts Consulting
Geological Survey of Denmark and Greenland
Glanbia
ISEAL
IUCN
OECD
SAI
Teagasc
WBCSD
WssTP
WWF

Appendix 4 International Water Stewardship Incentivisation Examples

A4.1 Incentives for Dairy Farmers in Australia

Australian federal and local governments, together with industries, community organisations and landholders, have invested substantial resources in developing incentives to improve the quality of the nation's surface waters, with a focus on making the dairy industry more drought resilient. Cost-sharing of investments into these activities is a common principle, where state, local government and landholders share the costs of on-farm works and other costs are covered by landholders (45%) and local governments (5%). Additionally, the national government helps dairies and other farm businesses address any financial risk related to droughts with a drought concessional loans scheme, which helps farmers cover their short-term needs in times of drought. Finally, all costs of new water facilities implemented by farmers are also tax deductible.[4]

Support has been the most successful for the implementation of, in particular, more efficient irrigation systems and grazing practices, establishing irrigation scheduling and drainage recycling. The Drainage Nutrient Removal Scheme in the Shepparton Irrigation Region provides dairy farmers with incentives to cover 25% of costs of constructing water storage for irrigation purposes. Funding is also provided to farmers abstracting from groundwater sources with a high risk of seawater intrusion to locate groundwater pumping (Farm Exploratory Drilling Scheme, FEDS) and to install new pumping systems and upgrade existing ones (Capital Grants Schemes, CGS).[5]

A4.2 Water Trading in Australia

Water trading exists, to varying degrees, in countries around the world, although the most active water trading markets are in Australia and the western USA.

Water trading in Australia includes both short-term trades, known as allocation trading, and long-term trades, known as entitlement trading. Australia's Murray–Darling Basin (MDB) figures prominently in discussions about water trading as an example of a thriving incentive-based system that successfully transitioned from a non-market system.

In Australia's MDB, the federal government overcame some of the major challenges of water trading by investing more than AU$3 billion to purchase water for the environment. This has facilitated trading in the basin and reduced transaction costs by shifting them to national taxpayers. Over the last 30 years, the federal government also implemented significant institutional changes that facilitated trading and reduced transaction costs.

For more information on Australia's water market and interesting ideas on lessons learnt, refer to Annex 2 in the Synthesis Review elaborated by the Pacific Institute.[6]

A4.3 Watershed Payment Schemes in China

The largest PWS programmes are in China. China's Sloping Land Conversion Programme, piloted in 1999 and fully implemented in 2002, requires farmers to set aside erosion-prone farmland within critical areas of

4 Strengthening our approach to drought and risk management. Stronger Farmers-Stronger Economy.

5 Achieving Sustainable Irrigated Dairy Landscapes. The dairy industry's natural resource management achievements in Northern Victoria and Southern NSW. Murray Dairy.

6 Pacific Institute, 2015. *Incentive-based Instruments for Water Management – December 2015*. Available online: http://pacinst.org/wp-content/uploads/2016/02/issuelab_23697.pdf

the watershed of the Yangtze and Yellow Rivers – the two largest rivers in China. In exchange, farmers receive regular cash payments and grain rations. The programme promotes forestry and other economic endeavours on the land other than grain production, in order to prevent sediment from washing into rivers and clogging dams and shipping channels.

China also has these types of exchanges between cities. For example, the city of Fuzou, which lies downstream, pays about US$800 million each to upstream cities Sanming and Nanping for pollution control, source water protection and township waste disposal.

AN GHNÍOMHAIREACHT UM CHAOMHNÚ COMHSHAOIL
Tá an Ghníomhaireacht um Chaomhnú Comhshaoil (GCC) freagrach as an gcomhshaol a chaomhnú agus a fheabhsú mar shócmhainn luachmhar do mhuintir na hÉireann. Táimid tiomanta do dhaoine agus don chomhshaol a chosaint ó éifeachtaí díobhálacha na radaíochta agus an truaillithe.

Is féidir obair na Gníomhaireachta a roinnt ina trí phríomhréimse:

Rialú: *Déanaimid córais éifeachtacha rialaithe agus comhlíonta comhshaoil a chur i bhfeidhm chun torthaí maithe comhshaoil a sholáthar agus chun díriú orthu siúd nach gcloíonn leis na córais sin.*

Eolas: *Soláthraímid sonraí, faisnéis agus measúnú comhshaoil atá ar ardchaighdeán, spriocdhírithe agus tráthúil chun bonn eolais a chur faoin gcinnteoireacht ar gach leibhéal.*

Tacaíocht: *Bímid ag saothrú i gcomhar le grúpaí eile chun tacú le comhshaol atá glan, táirgiúil agus cosanta go maith, agus le hiompar a chuirfidh le comhshaol inbhuanaithe.*

Ár bhFreagrachtaí

Ceadúnú
Déanaimid na gníomhaíochtaí seo a leanas a rialú ionas nach ndéanann siad dochar do shláinte an phobail ná don chomhshaol:
- saoráidí dramhaíola *(m.sh. láithreáin líonta talún, loisceoirí, stáisiúin aistrithe dramhaíola)*;
- gníomhaíochtaí tionsclaíocha ar scála mór *(m.sh. déantúsaíocht cógaisíochta, déantúsaíocht stroighne, stáisiúin chumhachta)*;
- an diantalmhaíocht *(m.sh. muca, éanlaith)*;
- úsáid shrianta agus scaoileadh rialaithe Orgánach Géinmhodhnaithe *(OGM)*;
- foinsí radaíochta ianúcháin *(m.sh. trealamh x-gha agus radaiteiripe, foinsí tionsclaíocha)*;
- áiseanna móra stórála peitril;
- scardadh dramhuisce;
- gníomhaíochtaí dumpála ar farraige.

Forfheidhmiú Náisiúnta i leith Cúrsaí Comhshaoil
- Clár náisiúnta iniúchtaí agus cigireachtaí a dhéanamh gach bliain ar shaoráidí a bhfuil ceadúnas ón nGníomhaireacht acu.
- Maoirseacht a dhéanamh ar fhreagrachtaí cosanta comhshaoil na n-údarás áitiúil.
- Caighdeán an uisce óil, arna sholáthar ag soláthraithe uisce phoiblí, a mhaoirsiú.
- Obair le húdaráis áitiúla agus le gníomhaireachtaí eile chun dul i ngleic le coireanna comhshaoil trí chomhordú a dhéanamh ar líonra forfheidhmiúcháin náisiúnta, trí dhíriú ar chiontóirí, agus trí mhaoirsiú a dhéanamh ar leasúchán.
- Cur i bhfeidhm rialachán ar nós na Rialachán um Dhramhthrealamh Leictreach agus Leictreonach (DTLL), um Shrian ar Shubstaintí Guaiseacha agus na Rialachán um rialú ar shubstaintí a ídíonn an ciseal ózóin.
- An dlí a chur orthu siúd a bhriseann dlí an chomhshaoil agus a dhéanann dochar don chomhshaol.

Bainistíocht Uisce
- Monatóireacht agus tuairisciú a dhéanamh ar cháilíocht aibhneacha, lochanna, uiscí idirchriosacha agus cósta na hÉireann, agus screamhuiscí; leibhéil uisce agus sruthanna aibhneacha a thomhas.
- Comhordú náisiúnta agus maoirsiú a dhéanamh ar an gCreat-Treoir Uisce.
- Monatóireacht agus tuairisciú a dhéanamh ar Cháilíocht an Uisce Snámha.

Monatóireacht, Anailís agus Tuairisciú ar an gComhshaol
- Monatóireacht a dhéanamh ar cháilíocht an aeir agus Treoir an AE maidir le hAer Glan don Eoraip (CAFÉ) a chur chun feidhme.
- Tuairisciú neamhspleách le cabhrú le cinnteoireacht an rialtais náisiúnta agus na n-údarás áitiúil *(m.sh. tuairisciú tréimhsiúil ar staid Chomhshaol na hÉireann agus Tuarascálacha ar Tháscairí)*.

Rialú Astaíochtaí na nGás Ceaptha Teasa in Éirinn
- Fardail agus réamh-mheastacháin na hÉireann maidir le gáis cheaptha teasa a ullmhú.
- An Treoir maidir le Trádáil Astaíochtaí a chur chun feidhme i gcomhair breis agus 100 de na táirgeoirí dé-ocsaíde carbóin is mó in Éirinn.

Taighde agus Forbairt Comhshaoil
- Taighde comhshaoil a chistiú chun brúnna a shainaithint, bonn eolais a chur faoi bheartais, agus réitigh a sholáthar i réimsí na haeráide, an uisce agus na hinbhuanaitheachta.

Measúnacht Straitéiseach Timpeallachta
- Measúnacht a dhéanamh ar thionchar pleananna agus clár beartaithe ar an gcomhshaol in Éirinn *(m.sh. mórphleananna forbartha)*.

Cosaint Raideolaíoch
- Monatóireacht a dhéanamh ar leibhéil radaíochta, measúnacht a dhéanamh ar nochtadh mhuintir na hÉireann don radaíocht ianúcháin.
- Cabhrú le pleananna náisiúnta a fhorbairt le haghaidh éigeandálaí ag eascairt as taismí núicléacha.
- Monatóireacht a dhéanamh ar fhorbairtí thar lear a bhaineann le saoráidí núicléacha agus leis an tsábháilteacht raideolaíochta.
- Sainseirbhísí cosanta ar an radaíocht a sholáthar, nó maoirsiú a dhéanamh ar sholáthar na seirbhísí sin.

Treoir, Faisnéis Inrochtana agus Oideachas
- Comhairle agus treoir a chur ar fáil d'earnáil na tionsclaíochta agus don phobal maidir le hábhair a bhaineann le caomhnú an chomhshaoil agus leis an gcosaint raideolaíoch.
- Faisnéis thráthúil ar an gcomhshaol ar a bhfuil fáil éasca a chur ar fáil chun rannpháirtíocht an phobail a spreagadh sa chinnteoireacht i ndáil leis an gcomhshaol *(m.sh. Timpeall an Tí, léarscáileanna radóin)*.
- Comhairle a chur ar fáil don Rialtas maidir le hábhair a bhaineann leis an tsábháilteacht raideolaíoch agus le cúrsaí práinnfhreagartha.
- Plean Náisiúnta Bainistíochta Dramhaíola Guaisí a fhorbairt chun dramhaíl ghuaiseach a chosc agus a bhainistiú.

Múscailt Feasachta agus Athrú Iompraíochta
- Feasacht chomhshaoil níos fearr a ghiniúint agus dul i bhfeidhm ar athrú iompraíochta dearfach trí thacú le gnóthais, le pobail agus le teaghlaigh a bheith níos éifeachtúla ar acmhainní.
- Tástáil le haghaidh radóin a chur chun cinn i dtithe agus in ionaid oibre, agus gníomhartha leasúcháin a spreagadh nuair is gá.

Bainistíocht agus struchtúr na Gníomhaireachta um Chaomhnú Comhshaoil
Tá an ghníomhaíocht á bainistiú ag Bord lánaimseartha, ar a bhfuil Ard-Stiúrthóir agus cúigear Stiúrthóirí. Déantar an obair ar fud cúig cinn d'Oifigí:
- An Oifig um Inmharthanacht Comhshaoil
- An Oifig Forfheidhmithe i leith cúrsaí Comhshaoil
- An Oifig um Fianaise is Measúnú
- Oifig um Chosaint Radaíochta agus Monatóireachta Comhshaoil
- An Oifig Cumarsáide agus Seirbhísí Corparáideacha

Tá Coiste Comhairleach ag an nGníomhaireacht le cabhrú léi. Tá dáréag comhaltaí air agus tagann siad le chéile go rialta le plé a dhéanamh ar ábhair imní agus le comhairle a chur ar an mBord.

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A National Roadmap for Water Stewardship in Industry and Agriculture in Ireland

Authors: Ken Stockil, Niall Keely, Maria Valle and Shane Merritt

Introduction

Water is a critically important resource that is fundamental to both industrial and agricultural activity. However, water is a limited resource and water shortages have now become a global reality. Despite Ireland being a water-rich nation, managing this national resource will pose some major challenges from economic, environmental and societal standpoints in the years ahead. However, Ireland's water resources also offer the country some exciting opportunities to further improve its attractiveness as an investment location, a tourism destination and a leader in water stewardship practices on the international stage.

Identifying Pressures

At a national level, both the environmental and the economic pressures associated with industrial and agribusiness water use are significant and growing, representing almost 70% of the > 3 billion litres of water used nationally each day. Poor supply headroom, flooding and increased pollution risks are resulting in a wide range of ecological, social and competitiveness impacts. At a river basin level, significant challenges remain in managing these risks in the context of the Water Framework Directive(WFD) and River Basin Plans, whereas, at a production site level, water stewardship has become a key performance consideration and investment parameter.

Informing Policy

Water stewardship principles and standards provide an overarching mechanism for industrial and agricultural water users to systematically link WFD obligations, local river basin plans and commitments to the Sustainable Development Goals to on-site water management activity. The report outlines a number of key policy lessons including the need for:

- the development of a National Water Stewardship policy and associated awareness programme across key stakeholders;
- the establishment of a National Water Stewardship Standards Committee for both industry and agriculture in Ireland;
- enhanced recognition of the Environmental Protection Agency's mandate as the custodian of water in Ireland;
- an enhanced ecosystem of supports, incentives and recognition for good water stewards nationally including small and medium-sized enterprises, farms, processors and the wider industry;
- greater and more explicit linkage of current national initiatives to European and global Water Stewardship activity.

Developing Solutions

Following extensive desk research and a process of national and international consultation, this report captures key lessons for Ireland in relation to water stewardship and outlines a first of its kind, integrated national roadmap for Water Stewardship in industry and agriculture with a view towards establishing the country as a leader in the adoption of water stewardship best practice both nationally and internationally in the years ahead.

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