Report

Water Supply Project Eastern and Midlands Region (WSP EMR)

Preliminary Business Case

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Foreword

Uisce Éireann's purpose is to rise to the challenge of delivering transformative water services that enable communities to thrive. The Water Supply Project Eastern and Midlands Region is a generational project and is the first major comprehensive upgrade to our 'new source' infrastructure in the region in the last 60 years. It will deliver a safe, secure and sustainable source of water necessary to support our growing population and economy, including the demand for housing. It is a project that will enable us to adapt to the effects of climate change by diversifying our water supply sources. The successful delivery of this major national infrastructure project is critical to Ireland's social and economic growth now, and for generations to come.

Currently a single source, the River Liffey, supplies 85% of the water requirements for 1.7 million people in the Greater Dublin Area (GDA). This over dependence on one source combined with limited supply availability means quite simply, that we lack the capacity and resilience to provide the level of service we should all expect from our water supplies in a modern European economy.

There is currently a shortfall in our supplies and we are unable to meet our target level of service. We are delivering an ambitious leakage reduction programme and even with this, we forecast that by 2044 we will need 34% more water in the Eastern and Midlands region than we have today. This situation of a growing water supply deficit and lack of supply resilience is not sustainable. The consequences of inaction will be devastating for homes and businesses in the region, with the possibility of no new housing or commercial connections for new customers by the end of the decade, and with existing customers experiencing more frequent outages and restrictions over time.

The potential solutions to the water supply need in the Eastern and Midlands Region have been under review for over 25 years. Hundreds of options have been considered including the development of groundwater sources and the abstraction and desalination of water from the Irish Sea. The proposal presented in this summary Preliminary Business Case is the culmination of extensive and detailed appraisal of potential solutions and alternatives,

including technical, engineering, environmental, financial and economic assessments in addition to widespread stakeholder consultation. To date, the project team has engaged with over 1,500 stakeholders and we are committed to continuing engagement with all stakeholders including landowners and local communities as the project progresses. The project has also been examined in the context of the outcomes of Uisce Éireann's first National Water Resources Plan and associated Regional Water Resource Plans and it remains the best solution to address the majority of the water supply needs of the Eastern and Midlands region.

The Water Supply Project will address the water supply deficit and lack of capacity for growth in the GDA, by supplying water from a Hydropower Reservoir on the Shannon, the largest river in the country. It will also create a water supply 'spine' across the country with the capacity for future offtakes to supply communities along the route between the water treatment plant near Birdhill, County Tipperary and the termination point reservoir at Peamount, County Dublin.

I am confident this project will deliver significant social and economic benefits for the State. The primary benefit is of course the provision of a sustainable, long-term solution for water supply in the Eastern and Midlands region which contributes to the national response to climate change. By diversifying the supply source, Uisce Éireann will provide greater resilience in the system against loss of supply, contamination and pollution events, and risks arising from climate change. The economic Net Present Value (eNPV) and economic Benefit Cost Ratio (eBCR) for the base case delivery cost of the project are €29.854bn and 12.25 respectively, meaning that the benefits to Irish society are significantly higher than the cost. The base case cost estimate was prepared by industry experts Jacobs Tobin and has been independently reviewed by a panel of international experts including EY, Mott MacDonald, AECOM and Oxford Global Projects. This is a critical infrastructure project which will transform the resilience and security of supply for the region. As such, it is supported in the National Planning Framework and National Development Plan, along with the Regional Spatial and Economic Strategy for the Eastern and Midlands Region.

I would like to thank the members of the Uisce Éireann Infrastructure Delivery Team who have brought the Water Supply Project to this critical stage. The work to date has been extensive and has included in-depth technical and financial analysis and independent review. Significant work remains to bring the project to fruition. The completion of the Preliminary Business Case is an important project milestone and will enable Government to make an informed decision on what is a necessary and transformational project for the State.

Niall Gleeson

Chief Executive Officer Uisce Éireann

Note on Publication

The Preliminary Business Case (PBC) and PBC Addendum for the Water Supply Project Eastern and Midlands Region were completed and submitted in March and June 2023 respectively.

This summary of the Preliminary Business Case for the Water Supply Project Eastern and Midlands Region reflects the latest information relating to the PBC for the project, as of those dates.

1 Executive Summary

1.1 Water Supply Challenges in the Eastern and Midlands Region

Water is part of our everyday lives. Sustainable and reliable clean water supply is a fundamental need and is essential for human health and for all economic and industrial activity. It underpins a country's economic, social and environmental security and development. Every single person in Ireland is entitled to a safe, secure, resilient and sustainable drinking water supply. Access to clean fresh water is often taken for granted. Water is a valuable resource but it is a complex process to turn raw water from our rivers, lakes and groundwater into a safe, sustainable, secure and reliable water supply for customers, whilst safeguarding the environment.

Nationally, Ireland's existing public water supply was built gradually over the last 150 years, responding to local needs by developing nearby small water supplies (many with a low yield). As a result, we have a fragmented water supply system which often lacks resilience. Many decades of under-investment have led to a legacy of deficiencies in our water treatment plants and networks. In many areas, there are limitations on water supply capacity and some of our existing water abstractions may also be unsustainable.

Water supply in the Eastern and Midlands Region (EMR), and especially in the Greater Dublin Area (GDA), faces many of these challenges. The EMR is the largest of four regions, in terms of both land area and population size, which have been defined as part of Uisce Éireann's National Water Resources Plan (NWRP)[1]. The region includes 19 counties or part thereof, and covers approximately 20,900 square kilometres extending from the Shannon Estuary in the South West to the GDA in the North East. It is the primary economic region of Ireland containing the capital city Dublin and Limerick City which provide more than 1 million jobs. The region has a population of 2.48 million people with almost 1.7 million located within the GDA[2]. Uisce Éireann currently abstracts from 209 different water sources throughout the

[1] The NWRP is Uisce Éireann's 25-year strategy to meet Ireland's water requirements in the short, medium & long-term by ensuring a safe, secure, sustainable and reliable water supply for all of its customers.
[2] As defined by the NWRP and Regional Water Resources Plan – Eastern and Midlands.

region and there are 201 water treatment plants that feed water into 134 stand-alone water supplies known as water resources zones (WRZs)[3]. These WRZs provide water to all cities, towns, villages and rural properties in the region that are connected to public water supply.

Based on the 1 in 50 Level of Service[4] target that Uisce Éireann has adopted for our NWRP, 67% of the region's WRZs, including the GDA, have insufficient water supply available to meet demand at present and do not provide adequate reliability to customers in normal conditions. The region's water supply deficit is 59Mld[5] in normal conditions and 198Mld in a Dry Year Critical Period[6] (2019). The GDA accounts for the majority of the region's water supply deficit. In 2019, 81% of the region's water supply deficit (in normal conditions) was accounted for by the GDA (48Mld). In a Dry Year Critical Period, the GDA water supply deficit is 147Mld (2019).

The GDA is also over-reliant on a single source. 85% of water required to provide supply to the GDA is drawn from the River Liffey and this equates to more than 40% of the Liffey's mean annual flow. The remaining 15% of water required to supply the GDA is provided from other sources, namely the River Vartry, River Barrow and small stream and groundwater sources. These sources are already being utilised at, or close to, their maximum just to meet average demand and are not capable of providing for peaks in current demand or for projected growth in average demand.

In addition to the existing limitations on water supply sources in the region, our ability to continue to abstract from existing sources at current volumes into the future is not guaranteed. Implementation of a new abstraction licensing regime to comply with the requirements of the Water Framework Directive, could result in a reduction in the amount of water which can be abstracted from existing sources, in the future.

[3] A WRZ is an independent water supply system serving a region, city, town or village and is governed by topography or the extent of the water distribution network in an area.
[4] A Level of Service of 1 in 50 means that as a consumer, you would only ever expect to experience a water outage or severe limitations to your supply, on average, once every 50 years. Ref. National Water Resource Plan, Framework Plan, Appendix D. www.water.ie/projects/strategic-plans/national-water-resources/2.-NWRP-Framework-Plan_For-Final-Adoption_2021_05_25.pdf
[5] Mld = Megalitres of water per day. 1 Megalitre = 1 million litres.
[6] This occurs within the dry year, generally a few weeks during the summer where demands can be significantly above the annual average. See Section 2.4.

The Level of Service across the region is a significant issue. Level of Service is defined as the potential for an interruption to water supply due to insufficient water being available, or due to demand for water exceeding supply. Only circa 25% of the region's population receives Uisce Éireann's target Level of Service of 1 in 50 years (during normal conditions). The GDA has a 1 in 30 Level of Service in normal conditions but in a Dry Year Critical Period, this falls to 1 in 10 years[7]. This is unacceptable given the scale of population and economic activity and the serious consequences of supply disruption for communities and industry.

Population growth, economic growth and climate change will exacerbate the region's water supply challenges even further:

- Results of Census 2016 and initial results of Census 2022 show the counties recording the highest population growth are in the Eastern and Midlands region. By 2044, a 25% increase is projected in both the region's and the GDA's population[8]. Population growth generates increased demand for water, creating additional challenges for an already constrained water supply system.

- Linked to the above, there is a need for at least 225,000 new homes in the region by 2040[9]. The availability of water supply should not be an impediment to delivery of housing needs but there is a risk that this will be the case unless critical water supply deficits are addressed. The Proposed Project will deliver water supply infrastructure that is a key enabler to delivering housing in the region and for supporting the housing targets in Housing for All[10].

- A sustainable water supply is critical for supporting economic growth and Foreign Direct Investment (FDI). Approximately 50% of all FDI in Ireland is located in the EMR and 36% of FDI is in water-intensive industrial sectors[11].

[7] As a consumer, you could experience a water outage or severe limitations to your supply, on average, once every 10 years.
[8] Regional Water Resources Plan – Eastern and Midlands (sections 2 and 3).
[9] Based on estimated requirements, 2023-2040: The National Planning Framework identifies a national target of at least 25,000 new homes annually, half of which are expected in the Eastern & Midlands region, in order to satisfy the State's housing needs up to 2040 (source: Eastern & Midland Regional Assembly Regional Spatial & Economic Strategy 2019-2031, Section 9.3 Housing & Regeneration). Assumed 12,500 new homes annually in EMR by 18 years.
[10] Housing For All. Department of Housing, Local Government and Heritage. September 2021.
[11] Central Statistics Office (CSO), Foreign Direct Investment in Ireland 2018 (May 2020).

The forecast increase in industrial and commercial demand for water in the GDA WRZ alone, inclusive of 50Mld additional contracted demand, is 70% between 2020 and 2050[12], which will create further challenges for the already constrained water supply system in the region.

- While climate change will have significant effects on the availability of water at our sources in the future, the Proposed Project represents a climate adaptation response in line with the Climate Action Plan 2023. Mean annual temperatures for Ireland are expected to increase by 0.5ºC to 1.7ºC by 2050, with increases of 3ºC in the east of the country. The projected increase in temperature will affect the amount, timing and intensity of local precipitation. In Ireland, this is expected to mean wetter winters but also drier springs and summers. Climate change simulations for Ireland show the precipitation in the autumn and winter months could increase by between 5% and 35% while summer precipitation could decrease by a range of 0% to -30%[13]. Rainfall across Ireland is varied but the areas of lowest rainfall in Ireland are in the EMR. Water supply quality and reliability are impacted by adverse weather conditions and climate change will aggravate the challenges of water supply for populated centres of high water demand in particular. In addition, our national response to the climate emergency and move to sustainable resource use, could potentially drive further restrictions on water abstraction.

By 2044, the water supply deficit across the region is forecast to increase by 141% in normal conditions, from 59Mld in 2019 to 142Mld in 2044. In a Dry Year Critical Period, it is projected to increase to 312Mld in 2044. The water supply deficit in the GDA is forecast to increase from 48Mld in 2019 to 80Mld in normal conditions and to 183Mld in a Dry Year Critical Period, by 2044.

If no action is taken, many water sources in the Eastern and Midlands Region will be at capacity by the late 2020s and will be unable to cater for new connections for residential and commercial developments. Existing business and residential customers will experience more frequent water supply

[12] Non-domestic Demand Forecast. EY 2020.

[13] Regional Water Resources Plan Eastern and Midlands. Based on analysis from: Office of Publics Works (2019) Climate Change Sectorial Adaptation Plan; and, Murphy, Conor, 2020. A 305-year continuous monthly rainfall series for the island of Ireland (1711-2016). Climate of the Past. pp.413-440 (as referenced in Section 2 of RWRP-Eastern and Midlands).

restrictions over time and there will be increased risk of significant outages in the event of failure of critical water supply assets.

Reducing leakage and implementing water conservation initiatives, while providing valuable water savings, will not, on their own, address the significant deficit in the region's water supply. Notwithstanding the sustained and ambitious leakage reduction programme to reduce leakage to current target levels, and after making an allowance for water conservation and investment measures which will be delivered in the region, Uisce Éireann has forecast that by 2044, 34% more treated water will be required in the region, than we have today.

There is therefore an urgent need to deliver a major new source of water to meet the current and long-term water supply requirements of the Eastern and Midlands Region, including the GDA, in a sustainable manner.

1.2 The Proposed Project

Uisce Éireann is seeking to progress a project (the "Proposed Project") to deliver a new source of water supply with capacity to address a substantial proportion of the water supply demand deficits in the region. The Proposed Project is consistent with the regional solution identified in Uisce Éireann's Regional Water Resource Plan - Eastern and Midlands (RWRP-EM).

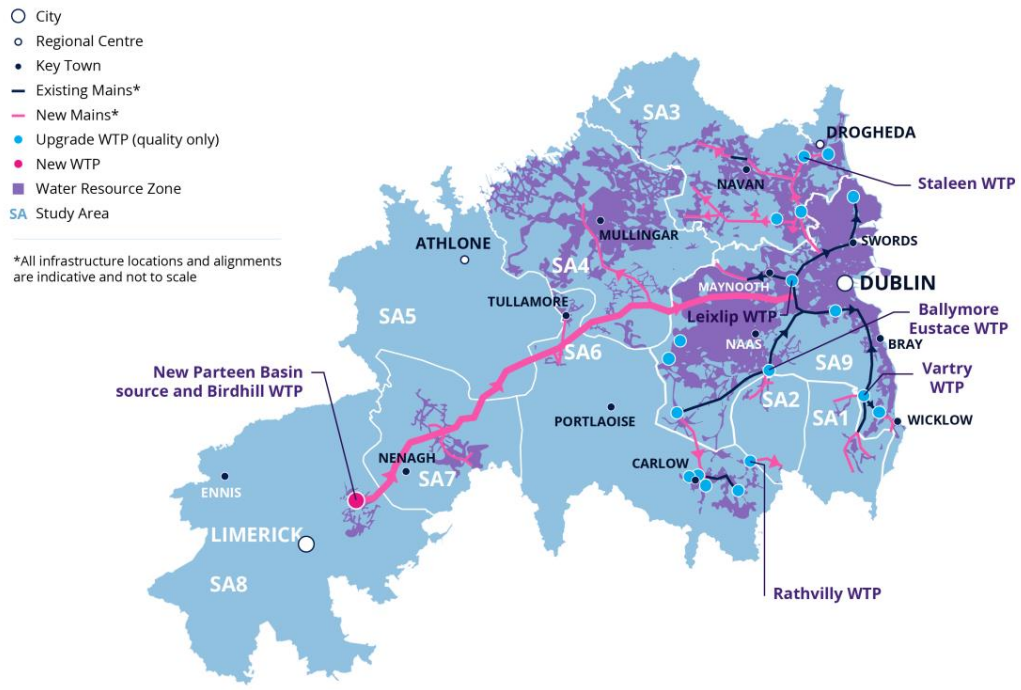
The Proposed Project comprises abstraction of water from the lower River Shannon at Parteen Basin in Co. Tipperary, downstream of Lough Derg, with water treatment nearby at Birdhill. Treated water will then be piped 170km through counties Tipperary, Offaly and Kildare to a termination point reservoir at Peamount in County Dublin, connecting into the Greater Dublin water supply network. This scope forms the basis of proposed Planning, Compulsory Purchase Order and abstraction licence applications that will be made by Uisce Éireann.

The Proposed Project has the capacity to supply communities in the Midlands, between the water treatment plant near Birdhill and the termination point reservoir at Peamount, in addition to other locations outside of the GDA in the east of the country. Offtake locations will be

provided along the supply pipeline to facilitate future connections to supply those communities. The connecting pipelines and associated infrastructure will be delivered through separate projects, yet to be commenced, and will be subject to their own separate consenting and project governance processes (including the Public Spending Code (PSC) 2019[14] governance processes).

The WRZs highlighted in Figure 1.1 (comprising 36 current WRZs), have been identified to have their water supply demand deficits addressed by the proposed new source at Parteen Basin.

Figure 1.1: 36 WRZs - Water Supply Demand Deficits that the proposed new source at Parteen Basin has the capacity to address



The Proposed Project will deliver additional treated water supply to the GDA WRZ and will have the capacity to provide for future supplies to the other 35 WRZs shown in Figure 1.1 above.

[14] Public Spending Code – A Guide to Evaluating, Planning and Managing Public Investment", December 2019.

The objectives of the Proposed Project are to:

1. Provide a sustainable water supply from a new Shannon source.

2. Address critical supply issues in the GDA with provision for future supplies to multiple Water Resource Zones in the region.

3. Increase supply resilience and Levels of Service.

4. Deliver a flexible, future-proofed solution that is responsive to change.

The key benefits which will be delivered by the Proposed Project are:

- 280Mld (Million litres/day) of additional treated water capacity in the region.

- Increased resilience and sustainability in the GDA's water supply (and in multiple WRZs in the region, in the future) through diversification of sources and a new source of supply.

- Reduction in the number of properties at risk of Interruption to Supply in the GDA WRZ (731,510 properties).

- The Level of Service in the GDA will be increased to 1 in 50 meaning, as a consumer, you would only ever expect to experience a water supply outage or severe limitations to your water supply, on average, once every 50 years.

- Reduction in the number of properties that are affected by an unacceptable level of low pressure.

- Greater resilience against the impact of climate change through climate adaptation and the provision of a new, sustainable source of water supply (enabling better management of seasonal variation in water availability and drought events).

- Provision of water supply capacity to support population and economic growth.

- Delivery of an economic Benefit to Cost Ratio (eBCR) of €12.25 of Benefits for the economy for every €1 of Costs.

It is currently anticipated that the Planning and Compulsory Purchase Order application for the Proposed Project will be made in 2024 and an abstraction licence application will be made to the Environmental Protection Agency (EPA) around the same time. The construction of the infrastructure is anticipated to take approximately four and a half to five years and subject to assumed timelines for completion of the key consenting processes, the project is anticipated to be fully completed Q3 2032.

1.3 Selection of the Preferred Option

More than 25 years of analysis and appraisal of the need and of potential solutions and alternatives has been completed in order to select the preferred option to provide a new source of water supply for the GDA and wider region. This process began with Dublin City Council in 1996 and was continued by Uisce Éireann when it assumed responsibility for managing Ireland's water and wastewater services in 2014.

Between 2014 and 2018, Uisce Éireann completed an extensive options appraisal process for the project. This comprised multi-criteria analysis (MCA) of all available options (including technical and engineering, environmental, risk, economic and cost criteria), economic appraisal through a cost benefit analysis (CBA) and financial appraisal of the shortlisted options, in addition to extensive stakeholder consultation. The outcome of Uisce Éireann's Options Appraisal process was identification of the River Shannon - Parteen Basin as the preferred option to provide a new major source of water supply for the GDA and other areas in the region.

Separately, Uisce Éireann has been developing its first National Water Resources Plan (NWRP), a 25-year strategy to meet Ireland's water requirements over the short, medium and long-term by ensuring a safe, secure, sustainable and reliable water supply for all of its customers. The NWRP comprises a Framework Plan and four Regional Water Resource Plans

(RWRPs), all of which will be subject to a Strategic Environmental Assessment (SEA) and Appropriate Assessment. The four RWRPs assess the water supply needs and identify solutions to address those needs, across 535 individual water supplies in Ireland and are at an advanced stage of development. The Framework Plan was adopted by Uisce Éireann in 2021 and the RWRP for the Eastern and Midlands Region (RWRP-EM) was adopted in Q3 2022.

The RWRP-EM identified all preferred solutions to address the water supply needs of the Eastern and Midlands region. As part of the RWRP-EM, 1,132 unconstrained options were reviewed and 594 feasible options were identified to address the needs identified in the region. These feasible options included an extensive list of option types including groundwater and surface water sources, reservoirs and water transfers. The Parteen Basin solution previously identified by Uisce Éireann was included in the RWRP-EM options appraisal process.

The outcome of the RWRP-EM is a set of solutions to address water supply quality, capacity and sustainability challenges across the whole region in a 25-year strategy to 2044. A "New Shannon Source with transfers", consisting of an abstraction from Parteen Basin on the Lower Shannon, was identified as the Preferred Approach in the RWRP-EM to address water supply needs in 36 WRZs in the region, including the GDA. It was the only option identified with the capacity and capabilities to supply multiple WRZs in the region. The New Shannon Source with transfers would address the majority of the forecast water supply demand deficit in the Region as well as delivering improved Levels of Service and water supply resilience.

To support the identification of the preferred approach, financial and economic assessments of shortlisted options were completed. These were carried out to align with the requirements of the PSC 2019 and PSC Water Services Sector Specific Guidelines[15]. All combinations of options capable of meeting the identified Need in the GDA include either a Parteen Basin option or a Desalination option and as such, the second Strategic Option chosen as an alternative to the Preferred Approach, for the purposes of the financial and economic appraisals, was based on a Desalination solution for the GDA.

[15] Water Services Sector Specific Guidelines on the Public Spending Code: Management of Public Investment in Irish Water, DHLGH, July 2022.

These financial and economic analyses further support the conclusion reached in the RWRP-EM that a New Shannon Source with transfers is the Preferred Approach on a regional basis.

Uisce Éireann has also reviewed the Parteen Basin preferred option which was previously identified in 2018 against the RWRP-EM Preferred Approach (New Shannon Source with transfers). Uisce Éireann has concluded that the Parteen Basin preferred option is consistent with the Preferred Approach identified in the RWRP-EM Plan. The Proposed Project being taken forward to the Planning process will deliver the abstraction, treatment and supply infrastructure from Parteen Basin to the GDA, with capacity and with offtake locations en route for future connections to other WRZs in the region.

There are other unquantifiable factors that further support the conclusion that a New Shannon Source with transfers is the Preferred Approach. These include: the reliance of a Desalination solution on existing freshwater sources for blending purposes, thereby reducing the level of resilience provided by a Desalination approach; the fact that a Desalination approach only addresses the need in the GDA and does not provide a regional solution for WRZs outside the GDA; and, the impact of the higher energy consumption in the Desalination process on Ireland's ability to meet energy consumption initiatives and targets.

The options appraisal and selection process has also been subject to extensive stakeholder consultation with statutory stakeholders including the Environmental Protection Agency (EPA), Department of Housing, Local Government & Heritage (DHLGH), Department of Agriculture, Food & the Marine (DAFM), Department of the Environment, Climate & Communications (DECC), the Commission for Regulation of Utilities (CRU), among others. In compliance with the principles of the Aarhus Convention, public and stakeholder engagement has been an integral part of the process. Four phases of formal non-statutory consultation have been completed for the project and the project team has engaged with over 1,500 stakeholders including landowners, community groups, public representatives and Prescribed Bodies as part of this process.

Both the NWRP Framework Plan and the RWRP-EM were also subject to statutory consultation in accordance with the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 (as amended) and the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended). Stakeholders will be provided with further opportunities to provide feedback before the submission of a Planning Application.

1.4 Project Cost & Costing Methodology

The Proposed Project is a major project in Uisce Éireann's Capital Investment Programme. A project of such importance and scale must have effective forecasting and management of project costs to ensure value-for-money. This process must be aligned with not only Uisce Éireann's governance and cost management controls but also with the Public Spending Code which requires Sponsoring Agencies to carefully monitor and forecast project cost estimates as accurately as possible throughout the project lifecycle.

The costs of the Proposed Project have been forecast using Uisce Éireann's direct experience of large-scale complex water and wastewater infrastructure in conjunction with technical advisors and other external industry experts. The process included independent review and verification of the costing approach and methodology, which is consistent with large-scale international water infrastructure projects.

The Public Spending Code particularly expects Sponsoring Agencies to adequately account for risks to the scope and delivery of projects in their cost estimates, including the impacts of inflation, in order to mitigate the risks of optimism bias and improve the accuracy of the estimated cost forecast. Uisce Éireann has used cost benchmarking and external peer review to complete reviews of the Proposed Project's cost estimates.

In practice, all large projects have numerous risk factors that can impact on their delivery. Risks and their impact on cost have been assessed by Uisce Éireann using two methodologies: (1) Quantitative Risk Assessment (QRA) which is a two-stage independent risk assessment process; and, (2) Reference Class Forecasting (RCF). Uisce Éireann worked with Oxford Global Projects

(leading international experts on megaproject management) to benchmark the project against the cost performance of a representative sample of completed projects of a similar nature.

Using this cost forecast approach, Uisce Éireann has developed and refined the project cost estimate in 2022 and 2023. This work has taken account of: the requirements of the PSC for contingency provision (in particular the use of Reference Class Forecasting to inform the contingency provision for an upper end of the estimate range); further design development of the Proposed Project; and, the high inflationary environment being experienced. As described in Section 5, this work has provided an estimate range of €4.579bn (Management Base – P95 QRA) to €5.958bn (Upper End – P80 RCF), as the basis of the project estimate in this summary Preliminary Business Case.

In line with the PSC, large infrastructure projects such as this project pass through various stages of development - the Proposed Project is currently at Decision Gate 1 Approval in Principle stage. As the design and scope are refined at each stage, costs will be updated. The cost estimate will be regularly reviewed and updated to reflect live progress made on the project until contracts are in place.

1.5 Financial & Economic Appraisals

Under the Public Spending Code, major projects are subject to financial and economic appraisal, with the latter assessing a project's desirability from a societal perspective. As outlined above, financial and economic appraisals were completed on shortlisted options as part of selecting the preferred option to deliver a new source of water on a regional basis (see Section 1.3). These supported the outcome of the RWRP-EM that a New Shannon Source with transfers is the Preferred Approach to address water supply needs in the GDA and 35 other WRZs in the EMR. The outcome of these appraisals is further supported by sensitivity / scenario tests which include variations in capital and operating expenditure assumptions, variations in the supply demand balance deficit forecast, variations in economic benefit and social discount rates. In all cases, the Preferred Regional Approach (New Shannon

Source with transfers) remains the preferred option, supporting the robustness of the outcome of the economic appraisal.

Uisce Éireann has also completed further, separate financial and economic appraisals on the Proposed Project relative to a counterfactual. These appraisals focus on the scope of the Proposed Project which is being taken forward for planning and for which approval is being sought under the Public Spending Code. The scope addresses the water supply needs in the GDA and provides off-take locations along the supply main to facilitate future connections to supply other WRZs throughout the region. However, it excludes the connecting pipelines and infrastructure to these other WRZs, as these will be delivered through separate future projects.

The financial and economic appraisals of the Proposed Project are presented in Sections 6 and 7 of this summary Preliminary Business Case. The Preliminary Business Case uses a P95 Quantitative Risk Analysis (QRA) contingency as the risk allowance for the base case financial and economic appraisals of the Proposed Project (€4.579bn). The selection of a P95 QRA contingency ensures that the results of the financial and economic appraisal may be considered to be appropriately prudent for this stage of evaluation.

The results of the Discounted Cash Flow (DCF) from the perspective of the Exchequer (ECA) show a Financial NPV of -€1.016bn. However, by including societal benefits and costs, the economic appraisal shows that the Proposed Project is clearly desirable as it will increase water supply for a significant cohort of the Irish population and deliver substantial social and economic benefits. The economic Net Present Value (eNPV) and economic Benefit Cost Ratio (eBCR) for the base case are €29.854bn and 12.25 respectively. It should be noted that conservative estimates of the economic benefits underpin the base case result, including the approaches taken for both domestic and non-domestic benefits. Further details are presented in Section 7.

Similar to the sensitivity/scenario testing carried out at strategic level to determine the Preferred Approach, an equivalent level of testing was carried out as part of the economic appraisal of the Proposed Project. This testing includes a number of variations in capital and operating expenditure assumptions, along with variations in economic benefit and social discount

rates, and in all cases concluded that the Proposed Project remains economically favorable, further supporting the robustness of the overall appraisal. At the above eBCR level, the Proposed Project is a very positive investment for Ireland and will deliver significant benefits to society during its lifetime.

1.6 Next Steps – The Way Forward

Delivery of the Preliminary Business Case is an important milestone. It presents an overview of the extensive work which has been completed for Decision Gate 1 approval of the Proposed Project. It outlines:

- The rationale for the project including the need and strategic benefits.
- Identification of the Preferred Approach to provide a new source of water supply for the GDA and ultimately, for 35 other WRZs in the region.
- The scope and preliminary design of the Proposed Project.
- The emerging procurement and contracting strategy.
- The Proposed Project's costs (which will be updated as the project progresses) including an appropriate risk allowance for unknown risks.
- Financial and economic appraisals of the Proposed Project.
- Project governance, control, accountability and risk management.

An extensive assurance and approval process is involved, including: CRU review, carried-out in accordance with the Department of Public Expenditure, NDP Delivery and Reform's external assurance process; review by the Major Water Infrastructure (MWI) Group (chaired by the DHLGH with members comprising CRU, NewERA and supported where necessary, by independent technical advisors); and, review by the Major Projects Advisory Group (MPAG).

The next major milestone for the Proposed Project is commencement of the wayleave acquisition programme, followed by the submission of the Planning Application and Compulsory Purchase Order to An Bord Pleanála, and the application for the Abstraction Licence to the EPA.

The next Public Spending Code approval stages are Decision Gates 2 and 3. A Detailed Project Brief (which includes design and quality requirements), a Project Execution Plan and a Procurement Strategy will be submitted to support decision-making and approval at Decision Gate 2. The Detailed

Project Brief will form the basis for the construction contract packages. Only with approval at Decision Gate 2, will the project proceed with issuing tenders for works. Once preferred tenders are identified, the Final Business Case can be prepared for consideration at Decision Gate 3. Decision Gate 1 Approval does not create an obligation on the part of the Approving Authorities to automatically permit the project to pass through Decision Gates 2 and 3.

1.7 Conclusion

The Proposed Project will deliver a major new source of water to contribute to meeting the long-term water supply requirements of a large proportion of the Eastern and Midlands Region, including the GDA, in a sustainable manner for the long-term. It will be the first major comprehensive upgrade to Ireland's new source water infrastructure, in over 60 years[16].

There is a clear need for this new source. Many of the existing water supplies for the region do not have the capacity or resilience to meet current or long-term water supply requirements to an acceptable Level of Service. Government strategy and policy also highlights the importance of the Proposed Project. Ireland cannot grow its economy and deliver the National Strategic Outcomes as set out in the National Planning Framework and National Development Plan, without delivering transformational projects such as this. The National Planning Framework and National Development Plan, along with the Regional Spatial and Economic Strategy for the Eastern & Midland Region (RSES-EMR) and the Dublin Metropolitan Area Strategic Plan, all support the Proposed Project as a critical water infrastructure project which will transform the resilience and security of supply for the region. For example, one of the ten National Strategic Outcomes (NSOs) of the National Planning Framework (NSO 9), states:

"a new long-term water supply source for the Eastern and Midland Region, which includes the Dublin Water Supply Area (DWSA), is needed by the mid-2020s, to provide for projected growth up to 2050 and contribute to resilience and security of supply for the region. This requires infrastructure provision to be guided and

[16] Major developments in the GDA water supply source infrastructure include the development of Vartry Reservoir in the 1860s, Poulaphuca Reservoir in the 1940s and Leixlip abstraction and Water Treatment Plant in the 1960s.

prioritised in a manner that can benefit the greatest possible number of areas within the country[17]*"*

Water projects of national significance such as the Proposed Project are identified as "key future growth enablers for Dublin":

"Ensuring that water supply and waste-water needs are met by new national projects to enhance the city's and the wider Greater Dublin Area's water supply and increase waste water treatment capacity[18]*"*

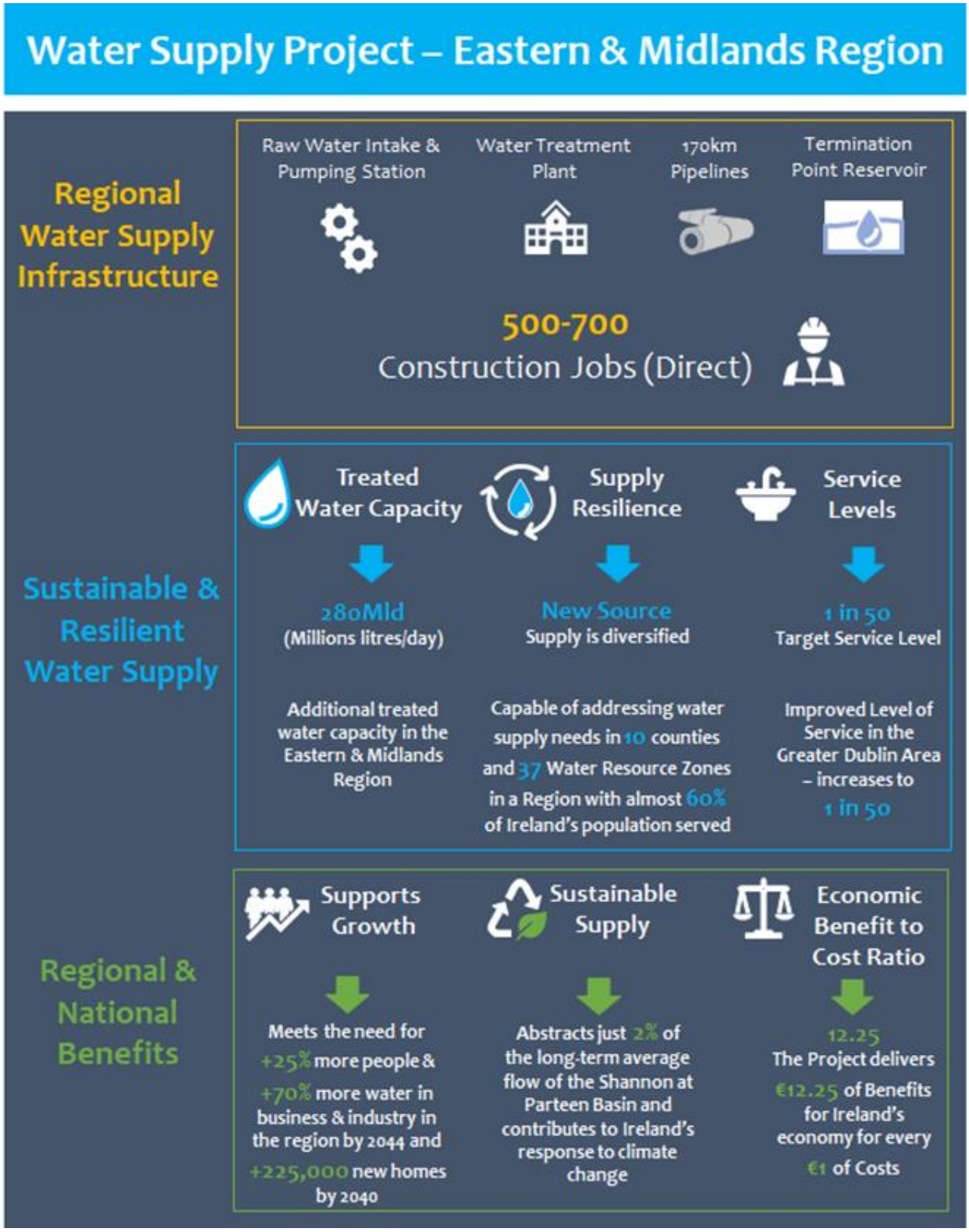
Likewise, stakeholder feedback from the public consultation on the RWRP-EM, from organisations which include IBEC, Dublin Chamber, County Kildare Chamber and County Councils including Wicklow and Meath etc., support the Proposed Project. It is seen as a critical water infrastructure project to address water supply resilience and security of supply and to support economic growth and prosperity of the region.

The case for the project is strong and following robust assessment and analysis which meets the requirements of the Public Spending Code, it is recommended that it be advanced.

A summary of the key infrastructural elements, outputs and high-level benefits of the Proposed Project is presented in Figure 1.2 overleaf.

[17] National Planning Framework 2018 – p.p. 148
[18] National Planning Framework 2018 – p.p.37

Figure 1.2: Summary of the Infrastructure, Outputs & High-level Benefits



2 Reviewing the Need for the Project

2.1 Introduction

The need for a new source of water supply for the GDA was first identified in the Greater Dublin Water Supply Strategic Study (GDWSSS) of 1996 and endorsed in a review of the GDWSSS in 2000. The studies assessed the needs of the region based on demographic projections, domestic and non-domestic water demand projections, hydrological sources, water supply infrastructure and other technical and environmental factors. A project was established by Dublin City Council to provide a new source of water to the GDA, namely, the "Water Supply Project".

In January 2014, Uisce Éireann assumed responsibility for the provision of public water services previously provided by thirty-four Local Authorities. The transfer provided an opportunity, for the first time in Ireland, to take a strategic national view of the provision of water services, and of all projects including the Water Supply Project. Uisce Éireann commissioned a review of the fundamental determinants of 'Need' for the Water Supply Project and published the 'Project Need Report' in 2015 for consultation[19]. This identified that options for a new source of water supply should be developed on the basis of a design raw water requirement from a new source, of 330Mld at 2050, for an option serving the Eastern and Midlands Region, specifically, a supply to the GDA with the potential to supply communities in the Midlands.

The publication of the Final Options Appraisal Report by Uisce Éireann in 2016 (the options appraisal process is presented in Section 3) included an update on Project Need based on updates to the supply and demand projections including interim data from Census 2016. It confirmed a raw water abstraction requirement of up to 330Mld by 2050 to address projected deficits in the GDA (243Mld) and with potential to address deficits in a number of other communities in the midlands and east (72Mld). A provision of 15Mld was also made for treatment process losses within the 330Mld abstraction requirement.

[19] https://www.water.ie/projects/national-projects/water-supply-project-east-1/publications/

The development of the National Water Resources Plan (NWRP) has provided a further examination of water supply needs across all public water supplies in the State. The NWRP is a 25-year strategy that examines water supply needs and solutions on a local, regional and national level. Four geographic regions were identified as part of the development of the NWRP. The Eastern and Midlands Region is the relevant region in the context of the Preliminary Business Case[20].

This section of the summary Preliminary Business Case presents an overview of the key water supply and demand challenges and water supply deficit in the GDA and wider Eastern and Midlands Region. Comprehensive information on all water supply needs and challenges across the entire region (including water supply quality, quantity, reliability and infrastructure issues etc.) is available separately in the NWRP Framework Plan Regional Water Resources Plan – Eastern and Midlands Region[21]. The NWRP (and its RWRP-EM) provides the most up to date information available in relation to water supply and demand. It is appropriate that the issues and challenges presented in this Section are drawn from this plan. As the NWRP is a 25-year plan, all forecasts presented in this Section are based on a 2019 (as the base year) to 2044 timeframe. It is also appropriate that the development of the Water Supply Project would utilise the information contained in the NWRP Framework Plan and RWRP-EM as the basis for developing an updated position on Project water supply Need. This updated position is presented in Section 2.7.

2.2 Overview of the Eastern and Midlands Region

The Eastern and Midlands Region is the largest of four regions, in terms of both land area and population size, which have been defined as part of Uisce Éireann's NWRP[22]. The region includes 19 counties or part thereof, and covers approximately 20,900 square kilometres extending from the Shannon Estuary in the South West to the GDA in the North East. It is the primary

[20] The definition of the Eastern and Midlands Region in the NWRP is not identical in its extents to the operational Eastern and Midlands Region but covers a similar area and incorporates the GDA.
[21] One of the four NWRP Regional Plans. https://www.water.ie/projects/strategic-plans/nation-water-resources/rwrp/eastern-midlands/
[22] The NWRP is Uisce Éireann's 25-year strategy to meet Ireland's water requirements in the short, medium & long-term by ensuring a safe, secure, sustainable and reliable water supply for all of its customers.

economic region of Ireland containing the capital city Dublin and Limerick City which provide more than 1 million jobs. The region has a population of 2.48 million people with almost 1.7 million located within the GDA[23].

In the EMR, Uisce Éireann currently abstracts from 209 different water sources. There are 201 water treatment plants that feed water into 134 stand-alone water supplies known as WRZs. These WRZs provide water to all of the cities, towns, villages and rural properties in the region that are connected to the public water supply.

As part of Uisce Éireann's NWRP, the region is divided into nine Study Areas (SAs). These are essentially smaller regional areas which are used by Uisce Éireann to manage the process of identifying water supply needs and solutions[24]. Study Area 9 (the GDA) is a key focus in this section of the report.

2.3 Water Supply & Demand Challenges in the Region

There are a number of serious water supply and demand challenges in the Eastern and Midlands Region as summarised in Figure 2.1 overleaf.

In terms of supply, many of the region's existing water supplies for the region do not have the capacity or resilience to meet current or long-term water supply requirements to an acceptable Level of Service. In addition to the existing limitations on water supply sources in the region, implementation of a new abstraction licensing regime to comply with the requirements of the Water Framework Directive, could result in a reduction in the amount of water which can be abstracted from existing sources, in the future.

In terms of demand, population and economic growth (including the need for more homes in the region) will drive increases in demand for water and along with Winter and Summer demand peaks, will exacerbate the region's water supply challenges even further.

[23] As defined by the NWRP and Regional Water Resources Plan – Eastern and Midlands. Section 2.
[24] Regional Water Resources Plan – Eastern and Midlands. Non-Technical Summary.

Figure 2.1: Summary of Key Water Supply & Demand Challenges

Water Supply Challenges

Over-reliance on Single Source of Supply

85% of water required to provide supply to the GDA is drawn from the River Liffey and this equates to more than 40% of the Liffey's mean annual flow. The remaining 15% of water required to supply the GDA is provided from other sources, namely the River Vartry, River Barrow and small stream and groundwater sources. These sources are already being utilised at, or close to, their maximum just to meet average demand and are not capable of providing for peaks in current demand or for projected growth in average demand.

Supply at Limit of Capacity

67% of the region's water resource zones, including the GDA, have insufficient water supply to meet demand and do not provide adequate reliability to customers in normal conditions. The regional water supply deficit is 59Mld in normal conditions and 198Mld in a Dry Year Critical Period. The GDA accounts for the majority of this (48Mld in normal conditions but 147Mld in a Winter Critical Period (2019)). Our ability to continue to abstract from existing sources at current volumes into the future is not guaranteed with implementation of a new abstraction licensing regime to comply with Water Framework Directive requirements.

Level of Service

The potential for an interruption to water supply due to insufficient water or due to demand for water exceeding supply, is a significant issue. Only c.25% of the region's population receives Uisce Éireann's target Level of Service of 1 in 50 years in normal conditions (meaning a customer would only expect to experience an outage or severe supply limitation on average, once every 50 years). The GDA has a 1 in 30 Level of Service in normal conditions but in a Dry Year Critical Period, this falls to <1 in 10 years. This is unacceptable given the scale of population and economic activity and the serious consequences of supply disruption for communities and industry.

Climate Change

Climate change will have significant effects on the availability of water at our sources in the future. Climate change simulations for Ireland show precipitation in autumn and winter months could increase by 5% - 35% while summer precipitation could decrease by 0% to -30%. Water supply quality and reliability are impacted by adverse weather conditions and climate change will aggravate the challenges of water supply for populated centres of high water demand in particular. In addition, our national response to the climate emergency and move to sustainable resource use, could potentially drive further restrictions on water abstraction.

Demand Challenges

Population Growth

Census 2016 and 2022 show the counties recording the highest population growth are in the Eastern and Midlands region. By 2044, a 25% increase is projected in the region's population – to 3.1m people. Population growth generates increased demand for water, creating additional challenges for an already constrained water supply system. Linked to population growth, there is a need for at least 225,000 new homes in the region by 2040. The availability of water supply should not be an impediment to delivery of housing needs but there is a risk that this will be the case unless critical water supply deficits are addressed.

Economic Growth

A sustainable water supply is critical for supporting economic growth and Foreign Direct Investment (FDI). Approximately 50% of all FDI in Ireland is located in the EMR and 36% of FDI is in water-intensive industrial sectors. The forecast increase in industrial and commercial demand for water in the GDA Water Resource Zone alone, inclusive of 50Mld additional contracted demand, is 70% between 2020 and 2050, which will create further challenges for the already constrained water supply system in the region.

Leakage

Uisce Éireann acknowledges that current leakage levels are too high. Leakage reduction is a priority and under the National Leakage Reduction Program, our ambitious aim is to reduce leakage nationally from 738Mld in 2019 to 338Mld by 2034, a 54% reduction over the timeframe. In the GDA Water Resource Zone, leakage accounts for 215Mld (2019) and we aim to reduce leakage beyond SELL to 122Mld (see Section 2.5 for further information). This ambitious target has been built into the Supply Demand Balance for the GDA Water Resource Zone. It will be challenging to deliver given the major growth in the pipe network during the period and the growth in population and new connections.

Winter & Summer Demand Peaks

There are greater demands on the water supply system in the Winter and Summer months. E.g., in Winter, particularly if there is a "Winter Critical Period", the water supply network may experience more pressure from short-term increases in demand. Conversely, in Summer, periods of warm dry weather lead to an increase in demand and this may coincide with reductions in supply due to low flows in rivers and lakes. Winter and Summer Demand Peaks increase demands on the water supply system and with Water Available for Use (WAFU) forecast to reduce due to climate change, this will create additional pressures on an already constrained water supply system.

2.4 The Water Supply Deficit in the Eastern and Midlands Region

2.4.1 The Supply Demand Balance

To explain the limitations on the capacity of the region's water supply to meet water demand, it is helpful to describe the Supply Demand Balance (SDB). This is a mechanism used for assessing the amount of water available in our supplies compared to the current and forecast demand for water. It is the difference between the water available in supplies compared to the demand for water and it is examined for four Weather Event Planning Scenarios:

1. Normal Year Annual Average (NYAA): The normal year scenario describes the demand and supply available to Uisce Éireann in a typically average weather year.
2. Dry Year Annual Average (DYAA): The dry year scenario in when there is low rainfall but no constraints on demand. Demands are based on the average daily demands experienced over the year under "dry" year weather conditions. Demands would be higher than in normal years.
3. Dry Year Critical Period (DYCP): This occurs within the dry year, generally a few weeks during the summer where demands can be significantly above the annual average
4. Winter Critical Period (WCP): The WCP generally occurs as a result of a freeze. Freeze-thaw incidents occur with high demand driven by an increase in leaks from burst pipes due to very low temperatures.

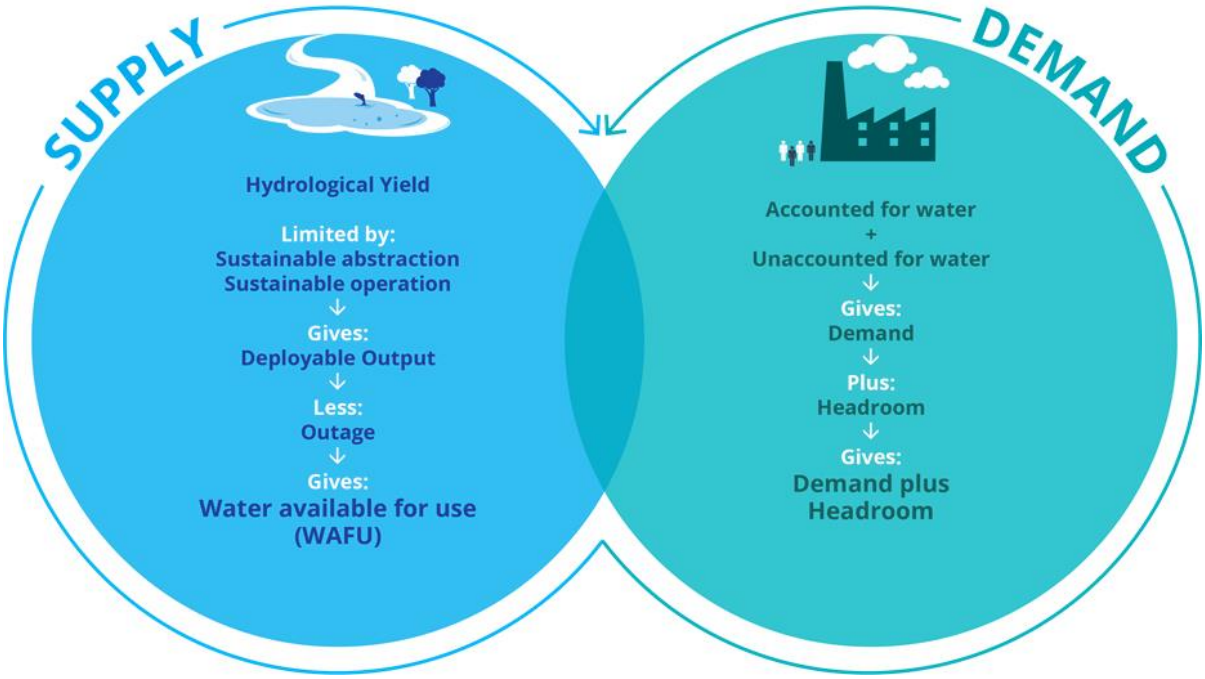
As shown in Figure 2.2 overleaf, Supply considers: water availability in the natural environment; current abstractions (hydrological yield); water treatment capacity; process losses; required allowances to ensure continuity of supply during planned and unplanned events; Levels of Service; and, trunk main constraints. When these factors have been considered, the Water Available for Use (WAFU)[25] can be calculated for each WRZ. As part of supply forecasting, declines in supply due to climate change and risks such as reductions in allowable abstraction from waterbodies, must be considered.

[25] Water Available for Use: the amount of water that can be supplied from a supply system taking into account infrastructure capacity constraints, treatment losses and planned and unplanned events that can reduce supplies.

Demand considers: domestic and non-domestic (i.e., commercial and industrial) demand; operational usage (such as flushing water mains and fire hydrants); apparent losses and leakage. Demand forecasting must also consider leakage reduction, growth in demand and allow for uncertainties by providing headroom (headroom is the safety margin which is applied to demand forecasts to allow for uncertainties). The sum of these components represents the total demand during normal conditions. Peaking factors are applied to the normal year demand to calculate demand for each of the different Weather Planning Scenarios.

Supply and demand are calculated for a base year and are projected forward to develop Supply Demand Balance forecasts. A deficit in the Supply Demand Balance means that the demand for water is higher than the available supply. In the event of an identified deficit, remedial actions must be taken to reduce future demand, increase supply or a combination of both.

Figure 2.2: Supply Demand Balance



2.4.2 Supply Demand Balance in the GDA & Region

Analysis of Supply Demand Balance for the EMR, shows that across all Weather Event Planning Scenarios, the WAFU from existing supplies is not sufficient to balance the current demand for water. The net deficit across the region, and within the GDA, is forecast to increase driven by a number of pressures including growth, climate change and increased regulation, as outlined previously.

Tables 2.1 and 2.2 present the change in estimated supply demand deficit for the region and the GDA respectively, from the base year of 2019 to the end of the NWRP planning period (2044) (calculated at Uisce Éireann's target Level of Service of 1 in 50). The projections are presented for each of the four Weather Event Planning Scenarios which underpin the SDB, namely Normal Year Annual Average (NYAA), Dry Year Annual Average (DYAA), Dry Year Critical Period (DYCP) and Winter Critical Period (WCP).

The key drivers and assumptions on which these projections are based, are described in detail in the Regional Water Resources Plan for the Eastern and Midlands Region[26].

Table 2.1: Supply Demand Balance Deficit in the Eastern and Midlands Region (2019-2044)[27]

Weather Event Planning Scenario	Mld			% Change 2019-2044
	2019	2044	Change 2019-2044	
NYAA Deficit	-59	-142	83	141%
DYAA Deficit	-146	-246	100	68%
DYCP Deficit	-198	-312	114	58%
WCP Deficit	-190	-271	81	43%

[26] Regional Water Resources Plan – Eastern and Midlands, Chapter 3. Autumn 2022.
[27] Regional Water Resources Plan – Eastern and Midlands. Table 3.12, Autumn 2022.

Table 2.2: Supply Demand Balance Deficit in the GDA (2019-2044)[28]

Weather Event Planning Scenario	Mld			% Change 2019-2044
	2019	2044	Change 2019-2044	
NYAA WAFU	571	593	22	4%
NYAA Demand	618	673	55	9%
NYAA Deficit	**-48**	**-80**	**-32**	**67%**
DYAA WAFU	516	529	13	3%
DYAA Demand	630	689	59	9%
DYAA Deficit	**-114**	**-160**	**-46**	**40%**
DYCP WAFU	565	580	15	3%
DYCP Demand	697	762	65	9%
DYCP Deficit	**-132**	**-183**	**-51**	**38%**
WCP WAFU	595	629	34	6%
WCP Demand	742	807	65	9%
WCP Deficit	**-147**	**-178**	**-31**	**21%**

2.5 Key Findings from the NWRP Assessment of Water Supply Quantity Deficit

2.5.1 Key Findings for the Eastern & Midlands Region

The key findings from the NWRP assessment of water supply quantity deficit in the Region, based on projections to 2044, are as follows:

- **67%** of the region's WRZs, including the GDA, are in deficit at present and do not provide adequate reliability to customers in normal conditions, based on the target of a 1 in 50 Level of Service Uisce Éireann has adopted for our NWRP.
- Across all weather scenarios, the WAFU from existing supplies is not sufficient to balance the current Demand for water.
- The regional water supply deficit (at the base year of 2019) is ***59Mld in normal conditions and 198Mld in a Dry Year Critical Period.***

[28] Regional Water Resources Plan – Eastern and Midlands. Appendix 10: SDB Summaries for Merged WRZs in the EMR Regional Preferred Approach.

- Total Demand in the region is forecast to increase by about 10% for all Weather Planning Scenarios despite the estimated overall regional and GDA population increases of 25%. This apparently small increase in Total Demand is attributed to:
    - Ambitious leakage reduction targets which have been set by Uisce Éireann (see Section 2.5.3); and
    - that significant high water demand growth is confined in a small number of WRZs, which is masked when using regional averages.
- By 2044, ***the net deficit across the region is forecast to increase by 141% in a normal year, to 142Mld in 2044. In a Dry Year Critical Period, it is projected to increase 58% to 312Mld in 2044.*** The increase in deficit is driven by a number of pressures including growth, climate change and the expected decommissioning of a water supply source in the region.

2.5.2 Key Findings for the GDA

- The WAFU from existing supplies is not sufficient to balance the current demand for water in the GDA. At the base year of 2019, water supply deficit in a normal year is 48Mld and in the Winter Critical Period, it is 147Mld.
- The GDA accounts for the majority of the region's water supply deficit. In 2019, **81%** of the region's net water supply deficit was accounted for by the GDA (NYAA).
- ***By 2044, the water supply deficit in the GDA is forecast to increase to 80Mld in normal conditions and 183Mld in a Dry Year Critical Period.***

Abstraction legislation and regulations may reduce allowable abstractions to meet environmental standards outlined in the Water Framework Directive. The legislative changes could increase the SDB Deficit. It should be noted that Uisce Éireann has completed a Sensitivity Analysis of the preferred approaches for addressing water supplies in the region against the potential abstraction reductions to ensure they are robust and adaptable[29].

[29] Regional Water Resources Plan (RWRP) – Eastern and Midlands (Section 3).

2.5.3 Leakage Reduction

In calculating water need for the region, ambitious targets for leakage reduction have been included:

- In the GDA WRZ, leakage accounts for 215Mld (at the base year of 2019). The target sustainable economic level of leakage (SELL)[30] for the GDA WRZ is 130Mld[31]. Uisce Éireann is however, targeting to *go beyond SELL* to reduce leakage in the GDA WRZ to 122Mld. This ambitious target has been built into the SDB for the GDA WRZ. It will be challenging to deliver given the major growth in the pipe network during the period and the growth in population and new connections.
- Ambitious targets for leakage reduction in the non-GDA WRZs in the Eastern and Midlands Region equate to a 64.5Mld reduction by 2034. This reflects a reduction of 22.5Mld to reach SELL and an additional 42Mld reduction by 2034 to go beyond the SELL target[32].

As leakage targets are being approached, Uisce Éireann will review data from the relevant WRZs and will set new leakage reduction targets based on an Appropriate Level of Leakage for each supply.

It should be noted that the baseline data used within the RWRP-EM (including on SELL and the Supply Demand Balance for each WRZ) is based on the best available information. Further data improvement will be progressed by Uisce Éireann and will be reflected in future reporting. E.g., at Final Business Case stage.

[30] The SELL concept is built on the principle that when the total costs of producing water (including environmental and social) are greater than the cost of reducing leakage, there is a natural driver to further reduce leakage to achieve equilibrium. Details of the SELL assessment process are in Appendix H of the NWRP Framework Plan.
[31] RWRP – Eastern and Midlands (Section 5 Solutions – Our Approach) – Tables 5.1 and 5.2. 2022.
[32] Tables 5.1 and 5.2 in RWRP – Eastern and Midlands (Section 5).

2.6 The Need for a New Source of Water Supply

It is clear that Uisce Éireann faces significant challenges in terms of having a secure, reliable and sustainable water supply in the GDA and throughout the region, and that these challenges will be exacerbated further by population growth, economic growth, increased regulation and climate change.

These challenges require action to be taken to ensure the region's water supply can meet current and future demand. Meeting a water supply deficit is however, only one element of the requirement. Separately, there is a need to bring resilience and sustainability to the supply system, through diversification of sources. This will also provide increased resilience in the system against loss of supply, contamination/pollution events or risks arising from climate change.

The need to develop a major new source of water to address deficits in the GDA and in the EMR has been identified through a number of studies undertaken since the mid-1990s. The need for a new source was first identified back in 1996 with the publication of the GDWSSS as outlined in Section 2.1. The need for a new source of water supply was confirmed again by Uisce Éireann following an extensive options evaluation process over the period 2014-2018. More latterly, the NWRP and its RWRP-EM have also identified the need for a new source of water supply for a number of WRZs in the region including the GDA. There is no doubt that the region needs a resilient supply which can support population, housing and economic growth. That supply must be sustainable to ensure we can meet our statutory environmental obligations and secure future supply under uncertain climate conditions. The current and forecast increase in WAFU, in both the GDA and the region, do not meet water demand, either now or in the future. Reducing leakage and implementing water conservation initiatives, while providing valuable water savings, do not address the deficit and do not provide a long-term solution for a resilient and sustainable water supply.

There is therefore an urgent need to deliver a major new source of water to meet the current and long-term water supply requirements of the Eastern and Midlands Region, including the GDA, in a sustainable manner.

If no additional supply is provided, the consequences of a deficit in the region's water supply would be severe (as summarised in Figure 2.3 overleaf). Water sources in the region will be at the limit of their capacity by the late-2020s with significant negative impacts on the region's economy and society.

Government strategy and policy also highlights the clear need for a new source of water supply. The National Planning Framework and National Development Plan, along with the Regional Spatial and Economic Strategy for the Eastern & Midland Region (RSES-EMR) and the Dublin Metropolitan Area Strategic Plan, all support a new source of water supply to transform the resilience and security of supply for the region. Likewise, stakeholder feedback from the public consultation on the RWRP-EM, from organisations which include IBEC, Dublin Chamber, County Kildare Chamber and County Councils including Wicklow and Meath etc., support it as a way to address water supply resilience and security of supply and to support economic growth and prosperity of the region. A summary of some stakeholder feedback is presented in Figure 2.4.

Figure 2.3: Consequences of Not Addressing the Need

- More frequent water supply restrictions and outages would occur over time - low water pressure; water conservation orders; water shut-offs; "Do Not Consume" Notices; and, Boil Water Notices. Potential large-scale interruptions to supply in the region in the event of failure of critical water supply assets.
- Increased risk of significant water supply outages in the event of a failure of critical water assets. E.g., without additional supply, any failures along the trunk main pipeline from Ballymore Eustace water treatment plant would result in a large-scale impact to c.450,000 water users with serious consequences of supply disruption for communities and industry.

- The GDA is at the forefront of international competition for investment. It is the main global gateway to Ireland and a global hub for high-value jobs. It faces significant challenges in critical infrastructure including water supply, transport and housing. These are vital for sustainability and live ability, and impact competitiveness. If no action is taken to secure a new source of water supply for the region, growth cannot be supported. It will not be possible to meet water demand from new commercial and industrial production capacity. It is estimated that in the absence of a new source of treated water supply, the GDA Water Resource Zone will have insufficient capacity from the late 2020s on, to cater for new water connections for residential and commercial development.

- The contribution of FDI to the Irish economy is far reaching - estimated that >20% of all private sector employment in the State is directly or indirectly attributable to FDI. It also contributes significant taxation revenue to the Exchequer, generates other commercial activity across the economy and helps drive investment in research and innovation. At present, Ireland is home to over 1,600 overseas company operations in sectors such as ICT, life sciences, financial services, engineering and business services. Many of these companies undertake strategic activities here such as advanced manufacturing and R&D. IDA Ireland's strategy[1] is to grow FDI. Inadequate water supply in the region to cater for any additional water-intensive industry presents a major risk for global investment in the Eastern and Midlands Region and Irish economy. Water-intensive industries may not choose to locate in Ireland or to expand their existing operations if essential water supplies are at risk.

- With an estimated need for at least 225,000 new homes in the region over 2023 to 2040[2], even more pressure will be put on water supply and service levels. Uisce Éireann's Demand projections take account of the region's population growth, with housing requirements feeding into these. The availability of water supply should not be an impediment to delivery of housing needs. The Proposed Project will deliver water supply infrastructure that is a key enabler to delivering housing in the region and for supporting the housing targets in Housing for All.

[1] IDA Ireland: Driving Recovery and Sustainable Growth 2021-2024.
[2] National Planning Framework target of min. 25,000 homes required annually to 2040, half in EMR (Eastern & Midland Assembly Regional Spatial & Economic Strategy 2019-2031).

Figure 2.4: Examples of Stakeholder Feedback to Uisce Éireann[33]

[33] Submissions to Uisce Éireann on the Regional Water Resources Plan – Eastern and Midlands, March 2022.

2.7 Estimation of Water Supply Requirement

Section 2.4 above presented the water supply deficit for the entire Eastern and Midlands region, highlighting the GDA.

The Proposed Project will have the capacity to address the water supply deficit in 36 WRZs, including the GDA, that have been identified as having their water supply needs resolved by a new source from the Lower River Shannon at Parteen Basin ("New Shannon Source" (NSS) - how the Proposed Project was selected as the preferred option, is presented in Section 3). The area to be supplied from the new source is referred to as the "***Water Supply Area***".

Once connected to the new supply from the River Shannon, these 36 WRZs will become five rationalised WRZs as follows:

- GDA Regional WRZ.
- Tullamore/ Mountbolus WRZ.
- Mullingar Regional WRZ.
- Dunkerrin/Moneygall/ Borrisokane WRZ.
- Newport RWSS / Killaloe WRZ.

This section of the summary Preliminary Business Case presents the deficit specifically in the Water Supply Area. It should be noted that while the NWRP assesses water supply need up to 2044, the planning horizon for the Proposed Project is 2050 and as such, the deficit is presented to 2050.

There is projected to be 578Mld of water available (in a Dry Year Critical Period - DYCP) for the GDA WRZ in 2050. This results in a 197Mld water supply deficit in the GDA WRZ. There is also projected to be an 83Mld deficit (as calculated post-connection to the NSS) in the other 35 WRZs that will make up the Water Supply Area, in the same timeframe. By 2050, there will be a total DYCP deficit of 280Mld to be addressed as shown in Table 2.3.

Table 2.3: Treated Water Requirement in the GDA & 35 other WRZs by 2050[34]

Component - GDA	2020 Mld*		Component - GDA	2050 Mld*
Domestic Usage	209		Domestic Usage	257
Non-domestic Usage	142		Non-domestic Usage	241
Operational	6		Operational	6
Illegal Connections	6		Illegal Connections	6
Leakage	207		Leakage	122
Total Distribution Input	569		Total NYAA Demand	633
Headroom 8%				51
Peaking (DYCP)				91
Water Requirement for GDA (DYCP)				**774**
Water available for GDA (DYCP)				578
GDA Deficit (DYCP)				-197
Deficit in 36 other WRZs (DYCP)				-83
Total Deficit (DYCP)				-280

(*Note: Rounding may apply)

Table 2.4 presents the increasing supply requirement as connections are gradually made to the Proposed Project in the future. Years 2019, 2025 and 2030 in the table represent GDA WRZ deficit figures, with the Mullingar connection and deficits included in years 2035 and 2040 and all connections and deficits included in years 2044 and 2050.

Table 2.4: Profile of Water Supply Required from New Shannon Source

	Supply Demand Deficit Mld						
	2019	2025	2030	2035	2040	2044	2050
NYAA Deficit	-48	-47	-25	-74	-95	-142	-154
DYAA Deficit	-114	-120	-100	-152	-174	-232	-244
DYCP Deficit	-132	-139	-117	-176	-200	-266	-280
WCP Deficit	-147	-146	-115	-175	-199	-258	-271

The Proposed Project will be designed and developed on the basis of having the capacity to address the identified deficit at 2050, currently calculated as 280Mld.

[34] Supply Demand Balance based on adopted Regional Water Resources Plan – Eastern and Midlands Region projected to 2050.

3 Identifying the Best Option

3.1 Introduction

The Public Spending Code 2019 requires the appraisal of alternatives to be presented as part of the Preliminary Business Case. In accordance with the Water Services Sector Specific Guidelines on the Public Spending Code, this appraisal should comprise multi-criteria analysis (MCA) of all available options and a cost benefit analysis (CBA) and financial appraisal of the shortlisted options.

The preferred option is the culmination of more than 25 years of analysis and appraisal. As noted in Section 2.1, the process began with Dublin City Council with the GDWSSS in 1996, which endorsed the need for a new source of water supply for the GDA. The option appraisal process was continued by Uisce Éireann and since 2018, it has been developing its NWRP to identify water supply needs and solutions across the State. As described later in this chapter, this process identified the **New Shannon Source with transfers** as the Preferred Approach for a new source of water supply for a number of WRZs in the EMR including the GDA[35].

3.2 Dublin City Council Options Appraisal

Consultation on Dublin City Council's draft Water Supply Project – Dublin Region Plan[36] (The Plan) and Strategic Environmental Assessment (SEA) Report took place in 2006. The feedback from stakeholders resulted in expanding the range of options under consideration and the undertaking of further studies. The range of options subsequently increased from three to ten. Following on from formal SEA consultation, further consultation continued, primarily with the statutory Shannon International River Basin District Advisory Council (ShIRBDAC) and non-statutory Shannon Protection Alliance (SPA). Both groups represented a significant number of Shannon stakeholders.

[35] Regional Water Resources Plan – Eastern and Midlands, Autumn 2022. https://www.water.ie/projects/strategic-plans/nation-water-resources/rwrp/eastern-midlands/

[36] https://www.dublincity.ie/sites/default/files/content/WaterWasteEnvironment/WaterSupplyProjectDublinRegion/WaterSupplyProjectDublinRegion/Documents/The%20Plan.pdf

Over 2007 to 2011, Dublin City Council undertook studies and developed a Plan which technically and environmentally appraised the ten options that were subject to the statutory Strategic Environmental Assessment and Appropriate Assessment processes (see Table 3.1). Seven options were based on the River Shannon with the remaining three comprising: desalination of seawater from the Irish Sea; conjunctive use of the River Barrow and River Liffey; and, groundwater.

Feasibility Studies on the ten options were completed in 2007/2008 in conjunction with the SEA Phase 2 process, which commenced in early 2008. The studies resulted in four options emerging as potentially viable. Formal public consultation (as required by the SEA process) took place on the expanded range of potential water supply options.

Table 3.1: Ten Options (Strategic Environmental Assessment)

Option	Description
Option A	Lough Ree (Direct)
Option B	Lough Derg (Direct)
Option C	Parteen Basin (Direct)
Option D	Lough Ree and Lough Derg
Option E	Lough Ree and Storage
Option F	Lough Derg and Storage:
	• F1: Lough Derg and Storage: Rochfortbridge
	• F2: Lough Derg and Storage: Garryhinch
Option G	Lough Ree with Impoundment
Option H	Desalination (of seawater from the Irish Sea)
Option I	Groundwater
Option J	Conjunctive use of the River Barrow and River Liffey

The shortlisted four technically viable options, all remained in consideration subject to further investigative studies such as water quality modelling and subsoil surveys etc. These were:

1. Option F2: Lough Derg and Storage: Garryhinch.
2. Option B: North East Lough Derg Direct.
3. Option C: Parteen Basin Direct.
4. Option H: Desalination.

3.3 Uisce Éireann Options Appraisal 2014-2018

Following the transfer of the project to Uisce Éireann in 2014, a comprehensive options appraisal process was undertaken between 2014 and 2018 to further review and evaluate all options and identify a preferred solution. The process was completed over four phases and comprised: an analysis of the need; multi-criteria analysis of the options (using technical, financial, socio-economic, economic, environmental and regulatory criteria); and shortlisting of the options using further technical and engineering appraisals, costing and economic appraisals.

The appraisal process was informed by an extensive non-statutory public consultation process (four rounds between 2015 and 2018), with views and feedback from the public, landowners, community groups, public representatives, Prescribed Bodies and other stakeholders feeding into each phase. A Project Consultation Roadmap was designed to align with key milestones and decision-making points within the project timeline, to allow all stakeholders to influence the project in a meaningful manner. The four rounds of non-statutory public consultation were undertaken in line with this Roadmap between March 2015 and February 2017.

All stages of the process were published in reports which were subject to public consultation. These included: a Project Need Report (2015); Water Supply Options Working Paper (2015); a Preliminary Options Appraisal Report (POAR, 2015); and a Final Options Appraisal Report (FOAR, 2016). The outcome was confirmation of the Shannon Parteen Basin option as the preferred option to provide a new source of water supply for the Eastern and Midlands Region (Option C in Table 3.1). An Environmental Impact Statement Scoping Report was published and consulted on, between November 2016 and February 2017. A summary of the consultation feedback, along with responses to that feedback, was published in April 2018.

3.4 Uisce Éireann National Water Resources Plan (NWRP)

As stated in the introduction, since 2018, Uisce Éireann has been developing its first NWRP. The NWRP identifies deficiencies and need across the entire

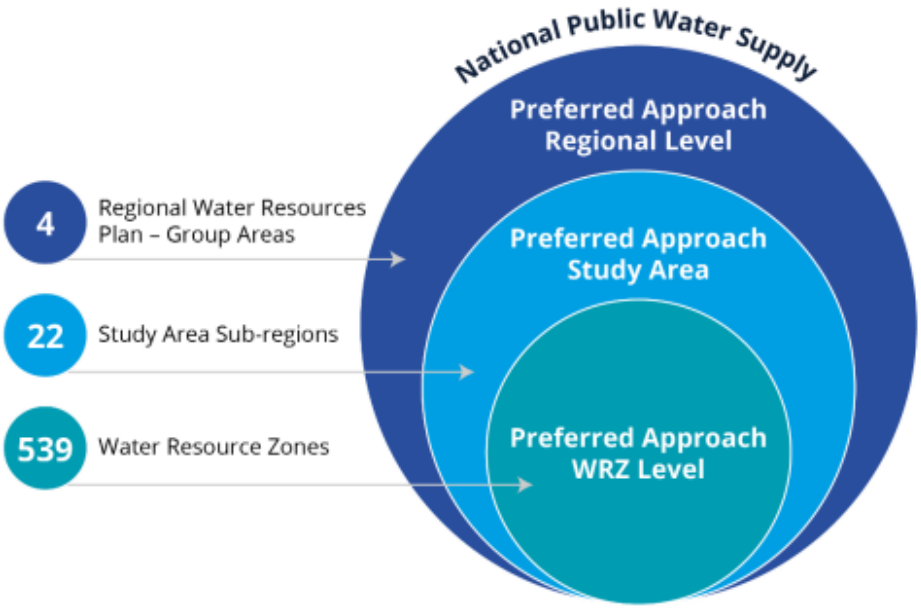
public water supply, and the capital and operational solutions to address these issues, in order to improve the Level of Service, supply resilience and quality across all 539 WRZs in Ireland. It accounts for increased demands, climate change impacts, tighter drinking water and environmental standards.

The RWRP-EM subdivides the EMR into nine Study Areas (SAs) based on factors such as: groundwater body boundaries; surface water sub-catchments; geographical features; WRZ boundaries; local authority functional areas; and, appropriate size for an efficient reporting structure. The RWRP-EM identified a Preferred Approach for a new water supply for the region as part of the range of solutions to address all Needs in the region.

3.4.1 RWRP-EM Options Assessment & Development Process

This section presents the identification of the preferred option for a new water supply in the region, as part of the RWRP-EM process. The process was in-depth and has taken into account environmental, legislative, regulatory and policy requirements. Uisce Éireann applied a defined process to develop the Preferred Approach at the three spatial levels as shown in Figure 3.1 below. The approach was undertaken sequentially for each WRZ and Study Area, before looking at approaches to address Need at a wider regional Level.

Figure 3.1: Three Spatial Levels



3.4.2 Identification of Unconstrained Options

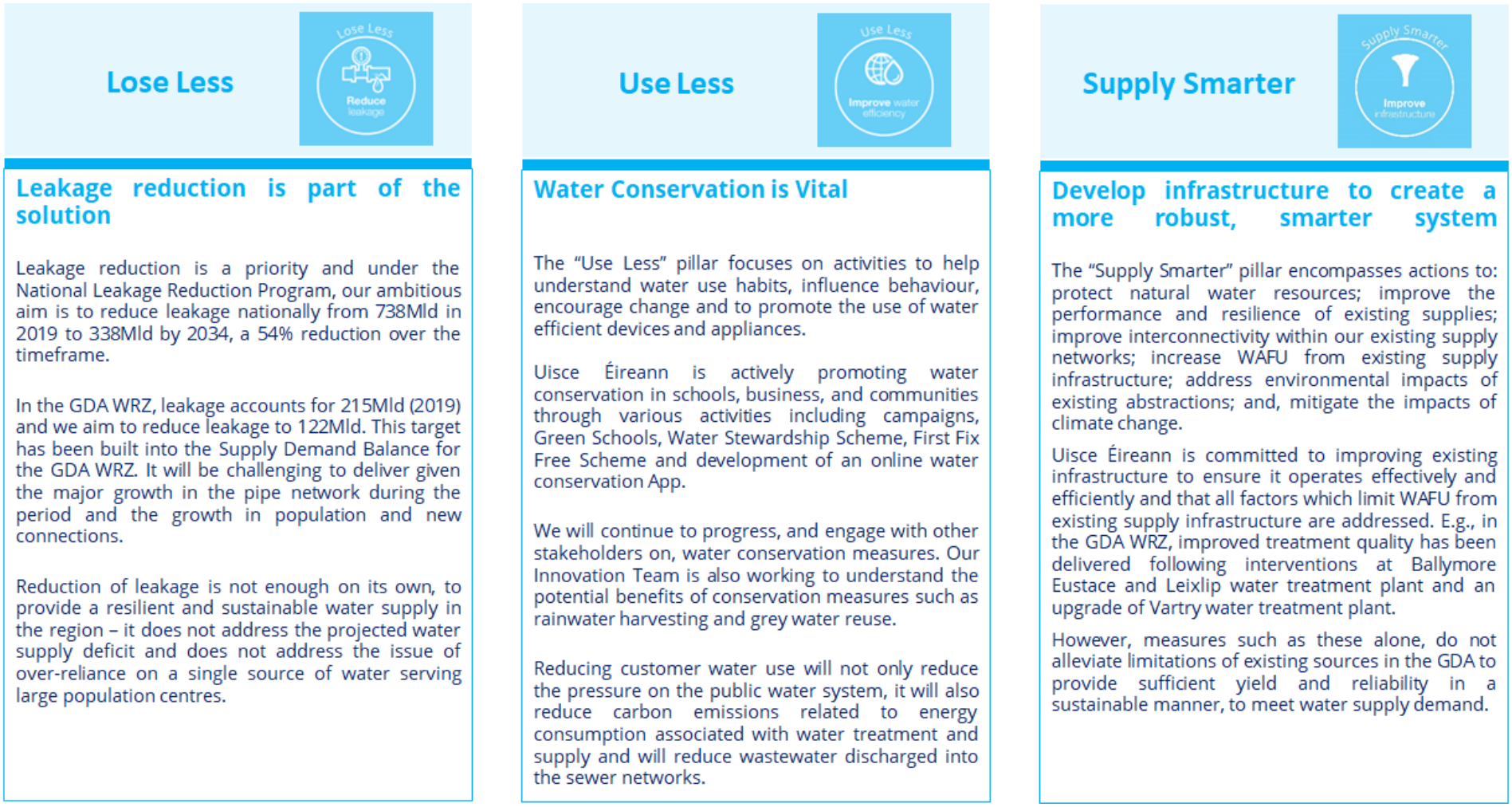
Following the identification of needs in the region, an Unconstrained List of Options to address these needs, was developed. The list comprised solutions that either fully or partly resolve a water supply deficit or need, regardless of cost, and with high-level environmental considerations.

The types of solutions that Uisce Éireann uses to address the identified needs across Ireland's water supplies can be categorised under "three pillars" as summarised in Figure 3.2 - Lose Less, Use Less and Supply Smarter. Uisce Éireann is ensuring that Ireland's water supplies become more sustainable over time. Where feasible, increased growth requirements will be catered for in the first instance, by driving an aggressive leakage reduction programme combined with strong promotion of water conservation in homes and businesses.

The first stage of option identification and assessment for the EMR identified **1,132 Unconstrained Options** to address water supply needs in the region:

- 46% were local abstractions (30% groundwater and 16% surface water) - expansions or new sites.
- 26% involved rationalisation (merging water supply systems and subsequent decommissioning of obsolete water infrastructure).
- 13% were water transfers.
- 3% involved WTP upgrades.
- 12% comprised network improvements, reuse options, desalination plants and advanced leakage reduction.

Figure 3.2: "Three Pillars" Solutions



3.4.3 Options Screening

Following the development of the Unconstrained Options List, a two-stage screening process (Coarse Screening and Fine Screening) was applied to the 1,132 Unconstrained Options to develop a 'Feasible Options List' for each of the nine SAs in the EMR.

As sustainability is at the heart of the NWRP and Regional Plans, environmental and social assessment criteria were included at the earliest stages of the screening process to ensure the protection of the environment. Uisce Éireann also considered Water Framework Directive (WFD) objectives through a sustainable abstraction risk review.

The Coarse Screening process assessed the Unconstrained Options against the following criteria:

- Resilience (i.e., does the option address the supply-demand problem).
- Deliverability & Flexibility (i.e., is the option technically feasible).
- Sustainability (i.e., Environmental and Social Impacts – can the impacts on known high-level environmental constraints including at internationally designated sites, be avoided).

Following the Coarse Screening process, 515 options were rejected. The remaining **617 options** were taken forward for Fine Screening. This process involved a more detailed desktop assessment - a Multi-Criteria Assessment (MCA) was applied using a range of key criteria, to determine the relative merits of each option across the key criteria. 33 questions were used as detailed sub-criteria against which options were assessed. The environmental MCA criteria were based on the SEA objectives from the SEA Scoping Report and were consulted on with environmental stakeholders. Habitats Directive considerations were also integrated into the assessment.

23 options were rejected after Fine Screening, with **594 options** taken forward as "Feasible Options" of which: 342 were WRZ level options (sufficient to resolve need in a single WRZ); and 252 were SA level options (can resolve need in >1 WRZ in a SA). The next step of the analysis comprised the development of an outline design and estimated cost for each Feasible Option. Costs encompassed direct and indirect costs and included monetised

values for environmental and social aspects, and embodied carbon and whole life carbon costs.

3.4.4 Test a Range of Approaches

After fine screening the remaining Feasible Options were assessed against six approaches which were selected to align the NWRP with all relevant Government Policy. This is described in Section 8.3.7 of the NWRP Framework Plan. The six approaches are Least Cost, Best Appropriate Assessment, Quickest Delivery, Best SEA Environmental, Most Resilient and Lowest Carbon.

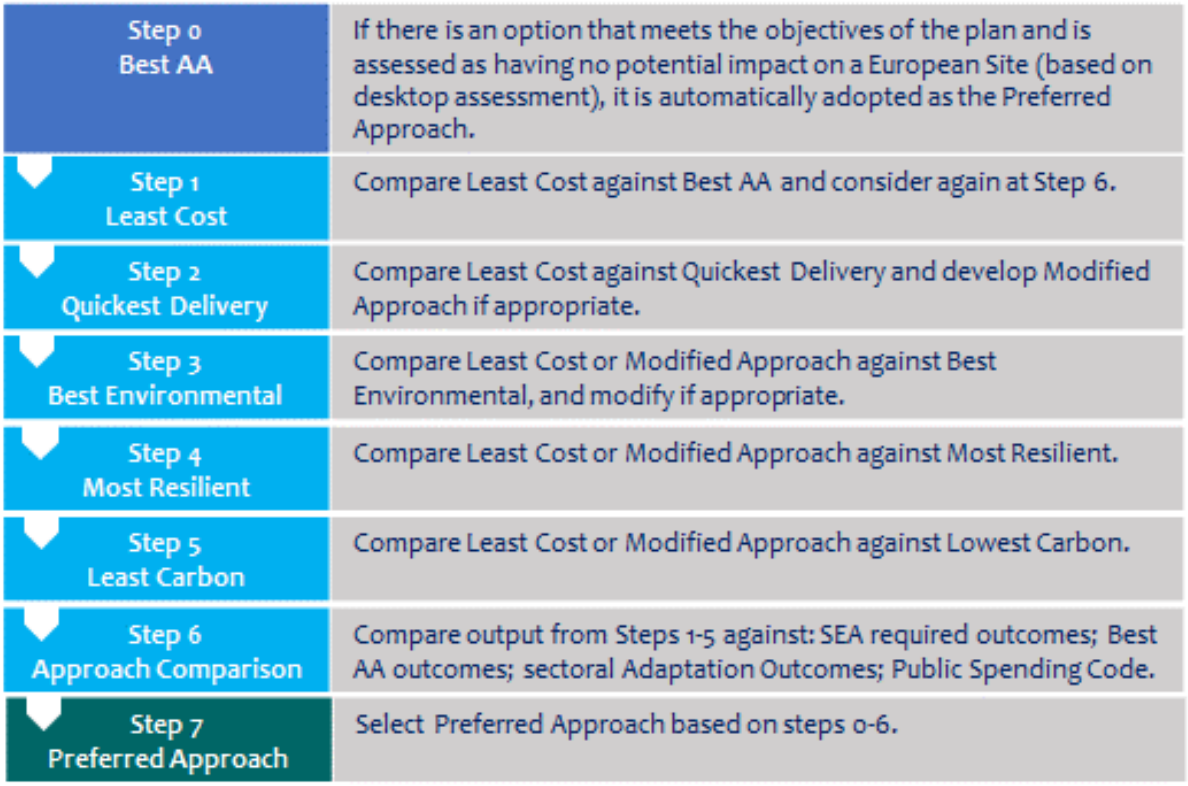
The best performing Feasible Options for each of the six approaches were determined using an EBSD model (Economics of Balancing Supply and Demand). This evaluates the range of potential approaches, comprising single or different combinations of options for a WRZ to reflect criteria used in the Fine Screening stage: resilience; deliverability and flexibility; progress-ability; sustainability (environmental and social impacts) and cost.

The model determines: which options should be selected; when the option should be implemented; and, what utilisation should be made of the option within the planning period. For each of the six Approaches (Least Cost, Best AA, Lowest Carbon etc.), the EBSD Model is used to derive an optimum combination of options to address the future need based on the MCA scores. The process is designed to determine the Best Value approach to meet the need and this is then identified as the Preferred Approach.

3.4.5 Approach Appraisal

The options identified as the best performing within each of the six approaches tested, were then compared with each other to identify the "Preferred Approach". The approach is summarised in Figure 3.3.

Figure 3.3: Approach Assessment Process



Although the Preferred Approach development process starts with the Least Cost approach, it gave the highest consideration to Environmental Legislation and Government Policy on climate change adaptation and public expenditure. The process was conducted via a combination of workshops supported by a process of ongoing engagement and dialogue between technical experts including Engineers, Hydrologists and Hydrogeologists, Ecologists and Environmental Scientists.

3.4.6 Preferred Approach

The application of the process resulted in the identification of Preferred Approaches to meet the needs in the nine Study Areas in the Eastern and Midlands Region. One of the key benefits of having a regional plan is that it enabled the consideration of options to address not just the need for each individual supply, but also to further assess whether outcomes could be improved by reviewing larger SA or regional options to resolve Need in multiple WRZs. In particular, regional options:

- Allow Uisce Éireann to look at the resilient supplies across a wider area.
- Provide opportunities to decommission unsustainable local sources.

- Enable a balancing of overall regional abstraction in an improved way across multiple catchments, with improvements in sustainability.
- Improve operational control by having fewer WTPs to manage.
- Provide more resilient WRZs that are less sensitive to peaks in demand during critical events.

The Preferred Approach identified for SA9 (the GDA) is the only regional option identified, namely, the development of a New Shannon Source (NSS - a new surface water abstraction from the Parteen Basin) and a pipeline transfer to provide supply to the GDA. The sustainable yield available from the NSS has the potential to supply a demand that is greater than the demand required in the GDA and therefore provides an opportunity to supply WRZs in other SAs in the region. The NSS was therefore also considered as an option for other WRZs in the region. As a result of this process, a number of WRZs were identified as having the NSS as their Preferred Approach to resolve identified needs. These are shown in Table 3.2.

Table 3.2: WRZs Identified as having the NSS as their Preferred Approach

Water Resource Zone	
GDA	Newport RWSS
Avoca Ballinaclash Public Supply	Killaloe
Redcross Conary Public Supply	Dunkerrin / Moneygall
Ballinteskin Public Supply	Borrisokane
Rathdrum Public Supply	Cloughjordan
Laragh Annamoe Public Supply	Tullamore
Ballinapark Public Supply	Mountbolus PWS
Hacketstown	Ballany
Dunlavin Public Supply	Ballymahon
Hollywood Donard Public Supply	Mullingar
Navan-Mid Meath	Clonard/ Abbeysfields Housing Estate
South Louth & East Meath	Longwood WS
Kells-Oldcastle	Enfield WS
Trim	Ardcarraig Clogherinkoe
Athboy	Geashill
Ballivor	Edenderry & Rhode
Kilmessan	Daingean
Carlow Town	Walsh Island

3.4.7 Evaluation of the Preferred Approach

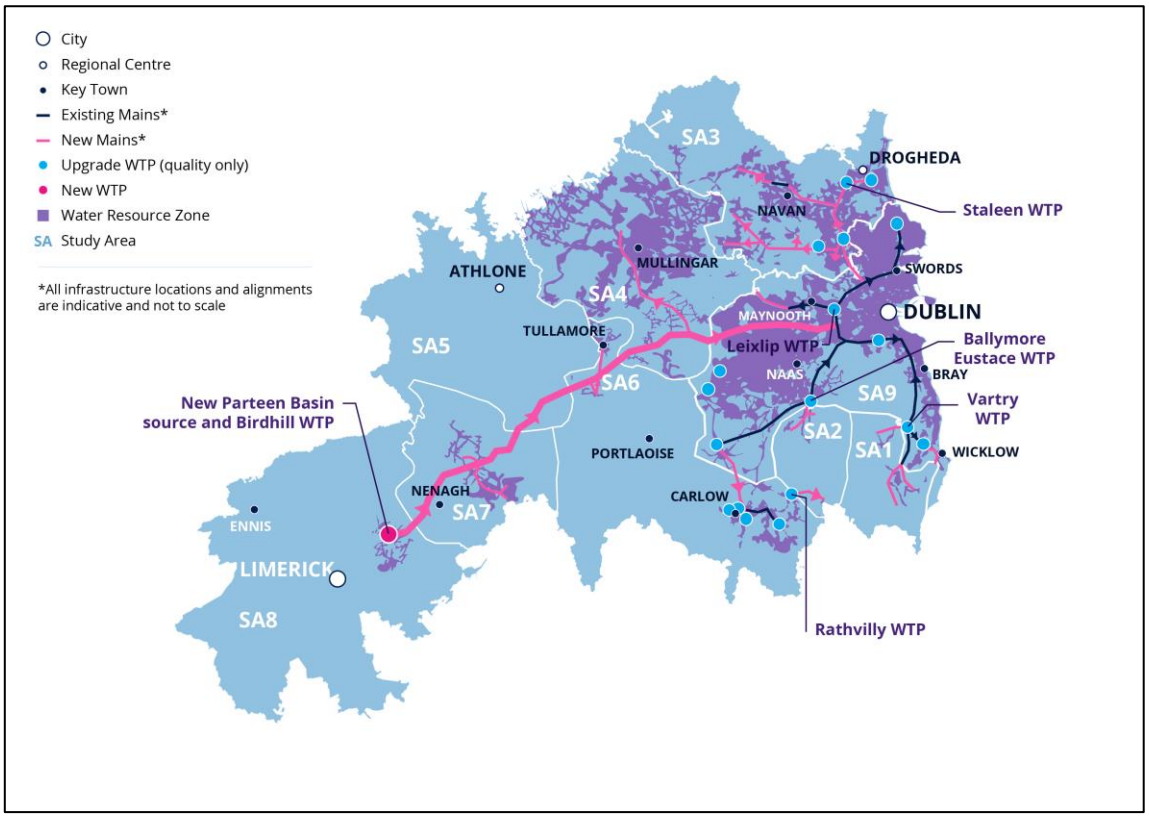
For the purposes of the RWRP-EM, Uisce Éireann compared two alternative regional approaches that did not involve cross SA transfers, with the Preferred Approach of the New Shannon Source. The three Combinations were ranked against each of the six assessment approaches (i.e., Least Cost, Best Appropriate Assessment, Quickest Delivery, Best SEA Environmental, Most Resilient and Lowest Carbon using the EBSD model outlined above).

Following the completion of the Options Assessment Process, the preferred option to address the need in SA9 (the GDA) plus 35 other WRZs in the region (36 in total), was identified as being:

- A New Shannon Source ("NSS") with transfers, comprising an abstraction from Parteen Basin and a transfer of treated water to a termination point reservoir in Dublin.
- The 36 WRZs will be supplied by:
    - Direct supply from the NSS transfer pipeline connection to the GDA WRZ at Peamount.
    - Offtakes from the NSS transfer pipeline to WRZs in the Midlands.
    - Supply from the GDA WRZ to other WRZs in the East, which is facilitated by the additional supply from the NSS to the GDA.
- The 36 WRZs are:
    - The GDA and 17 additional WRZs, which collectively would become the GDA Regional WRZ.
    - 18 other WRZs via 4 transfers from the pipeline connecting the NSS to the GDA.
    - The intention is that the 36 WRZs will ultimately form five new/consolidated WRZs: Newport, North Tipperary, Tullamore, Mullingar Regional and GDA Regional WRZ.
- This would enable Uisce Éireann to decommission 28 groundwater abstractions and 14 surface water abstractions resulting in a more efficient, interconnected and resilient supply system.

The preferred option identified in the RWRP-EM consisting of the NSS with transfers, and the WRZs it addresses, is summarised in Figure 3.4.

Figure 3.4: New Shannon Source with Transfers



The Preferred Option for water supply in the EMR, as set-out in the Final Options Appraisal Report (FOAR) in 2016 (as described in Section 3.3), was compared against the New Shannon Source Preferred Approach which was identified in the RWRP-EM. This comparison concluded that the Parteen Basin Preferred Option is consistent with the New Shannon Source Preferred Approach. The proposed catchment for the Parteen Basin Preferred Option (i.e., the GDA and Benefiting Corridor) was updated to align with the 36 WRZs identified as part of the New Shannon Source Preferred Approach in the RWRP-EM (along with the proposed offtake locations on the transfer pipeline). This alignment is reflected in the Proposed Project which is being taken forward for planning permission (as described in Section 4).

It is worth highlighting that water transfers across regions are common international practice and more recently, are a direct response to climate change adaptation. E.g., in the UK, where it is common practice to move water from where it is in plentiful supply to where it is needed most, schemes include water transfers from reservoirs, lakes and rivers in Wales and the Lake District to cities including Manchester and Liverpool. In France, the

Aqueduct de l'Avre brings water to Paris from the Avre River in Normandy over 102 kilometers away. In Italy, the Naples region receives its drinking water through the Western Campania Aqueduct from the River Gari in the Lazio region. Looking at only local solutions, which Ireland has historically done, creates lack of interconnectivity and resilience in supply, increased requirement for peaking and headroom (i.e., only one supply to manage a peak event / outage), lacks sustainability (over-abstracting from constrained sources) and is characterised by operational inefficiencies.

3.5 Financial & Economic Appraisals

Under the Public Spending Code, major projects are subject to financial and economic appraisal, with the latter assessing a project's desirability from a societal perspective. These appraisals are key aspects of the process to select a preferred option for the project. Uisce Éireann has undertaken a two-stage financial and economic appraisal in the context of the RWRP-EM outcomes and Public Spending Code requirements.

These confirm the selection of the Preferred Approach at regional level and of the Proposed Project which is being brought forward for planning. The two stages are:

1. **Stage 1 –** Financial and Economic appraisal of a shortlist of RWRP-EM Strategic Options for the purposes of the Preliminary Business Case options appraisal process.

2. **Stage 2 –** Financial and Economic appraisal of the Proposed Project which is being taken forward for Planning Approval and for which approval is being sought under the Public Spending Code. The scope of the Proposed Project addresses the water supply needs in the GDA and provides the capacity and off-take locations along the supply pipeline to facilitate future connections and enable supplies to another 35 WRZs throughout the region. However, it excludes connecting pipelines and infrastructure to these other WRZs, as these will be delivered through separate future projects.

Stage 1 is summarised in this section as it supports the decision-making in the selection of the 'New Shannon Source with transfers' as a Preferred Approach for 36 WRZs at regional level. Stage 2 is presented in Sections 6 (Financial Appraisal) & 7 (Economic Appraisal).

3.5.1 Strategic Options for Stage 1 Appraisals

Two strategic options are selected for financial and economic appraisal. A New Shannon Source is the only Regional option identified during the screening process in the RWRP-EM and it offers capability to address water supply needs in multiple WRZs in the region. A New Shannon Source with transfers is the Preferred Approach identified in the RWRP-EM to address water supply needs in all 36 WRZs including the GDA.

All combinations that are capable of meeting the identified Need in the GDA include either a Parteen Basin option or a Desalination option[37]. Therefore, the second Strategic Option chosen as an alternative to the Preferred Approach, for the purposes of this economic appraisal, is based on a Desalination solution for the GDA. The Desalination alternative was selected from the options in the RWRP–EM and comprises: 150Mld north Dublin Desalination plus 50Mld additional from Leixlip (facilitated by Ringsend Treated Sewage Effluent as River Liffey compensation flow) for the GDA WRZ.

In order to facilitate a like-for-like comparison, strategic options for this analysis are based on a common water supply area where need is being addressed. The common water supply area consists of the 36 WRZs associated with the New Shannon Source with transfers Preferred Approach. The capability of the Desalination option is limited to addressing water supply need in the GDA only. Therefore, local solutions are assumed as being the alternatives to address the Need in the 35 WRZs outside of the GDA.

The Stage 1 financial and economic appraisals of the Strategic Options therefore include:

- The Preferred Regional Approach – New Shannon Source with transfers (266Mld at year 2044). This supplies to the Greater Dublin Area and 35

[37] Of 12 Study Area Combinations identified in Table 5.6 of Study Area 9 (GDA) Technical Appendix to the RWRP-EM.

other WRZs in the Region and includes all associated infrastructure needed to deliver those supplies

- The Alternative – Desalination for the GDA combined with a number of local solutions outside of the GDA (addressing individual WRZ deficits at year 2044).

3.5.2 Counterfactual

The Counterfactual adopted in the Stage 1 economic appraisal is 'Do Minimum'[38]. "Do Minimum" equates to continuance of existing committed interventions such as the existing leakage reduction programme and system maintenance, including capital replacement costs for existing infrastructure. As however these existing committed interventions are built into the supply demand balance calculation, the associated costs and benefits are therefore not monetised in the Cost Benefit Analysis.

3.5.3 Costs and Benefits

For the purposes of the financial and economic appraisals in this summary Preliminary Business Case, capital and operational cost estimates have been developed for each of the strategic options and the counterfactual.

For the purpose of the financial appraisal (Exchequer Cashflow Analysis) and economic appraisal, all capital costs exclude inflation and VAT. Finance costs and sunk costs are also excluded.

3.5.4 Stage 1 Financial Appraisal

Under the Public Spending Code, all projects, irrespective of scale or cost, are subject to a financial appraisal. The financial appraisal must address options analysis, affordability and financial impact, and include sensitivity / scenario analysis. The costs captured by a financial appraisal typically include:

- Total investment costs.
- Total operating costs.
- Maintenance and renewal costs.
- Residual values.

[38] "Do Nothing" would equate to not proceeding with existing planned interventions such as the existing leakage reduction programme and infrastructure maintenance which is not a realistic counterfactual as it would allow leakage levels to rise and the water supply system to degrade.

- Incremental revenue as a result of the project occurring.

On behalf of Uisce Éireann, EY conducted an Exchequer Cashflow Analysis (ECA) for the Strategic options. An ECA is a discounted cash flow analysis (DCF) from the perspective of the Exchequer. The financial appraisal outcome is presented in Table 3.3. The economic appraisal cashflows have been discounted at the social discount rate of 4% in line with the Public Spending Code. The financial appraisal cashflows have been discounted at a rate of -0.21% (the NDFA (National Development Finance Agency) nominal rate of 1.79%, adjusted for long-term general inflation assumption of 2%).

Table 3.3: Financial Appraisal Outcome

Item	Benefit/Cost	Discounted – Preferred Regional Approach - NSS with transfers €m	Discounted – Desalination and Local solutions €m
Non-Domestic Revenue	Benefit	561	414
Residual Value	Benefit	1,931	2,184
Capital Expenditure	Cost	(3,236)	(3,635)
Operating Costs	Cost	(969)	(2,198)
Total Net Present Value (NPV)		**(1,714)**	**(3,236)**
Benefit Cost Ratio (BCR)		**0.59**	**0.45**

While the outcome of this appraisal is a negative NPV and BCR less than 1, the analysis confirms that from a solely financial perspective, the Preferred Regional Approach is still preferred to the Desalination and Local solutions Alternative. The incorporation of societal benefits and costs changes the appraisal outcome significantly, as demonstrated in the economic appraisal.

3.5.5 Stage 1 Economic Appraisal

3.5.5.1 Overview of the Stage 1 Economic Appraisal

The key assumptions underpinning the Stage 1 economic appraisal are:

- The appraisal is based on Supply Demand Balance deficit projections to 2044 for all of the options, using RWRP-EM projections.

- A “like-for-like” comparison is enabled by considering an alternative that has the same water supply area extents as the Preferred Approach.
- Environmental feasibility of the alternative (i.e., Desalination to supply the GDA with local solutions for the remainder of the region) is not considered beyond the Strategic Environmental Assessment undertaken for the RWRP-EM.
- The major components of the options/combinations are based on cost and benefits developed at project-level.
- The appraisal period is 30 years from commencement of operation.

3.5.5.2 Results of the Stage 1 Economic Appraisal

An economic Benefit Cost Ratio (eBCR) and an economic NPV (eNPV) have been generated for the Preferred Regional Approach and the Desalination Alternative, and compared to the Counterfactual. The incremental eNPVs and eBCRs generated, relative to the counterfactual are presented in Table 3.4.

Table 3.4: Economic Appraisal Output

Item	Benefit/Cost	Discounted – Preferred Regional Approach €m	Discounted – Desalination €m
Non-Domestic Revenue	Benefit	158	107
Residual Value	Benefit	304	345
Water Supply Outages – Domestic	Benefit	5,266	5,084
Water Supply Outages – Non Domestic	Benefit	22,967	22,366
Capital Expenditure	Cost	(2,223)	(2,127)
Operating Costs	Cost	(326)	(682)
Shadow Price of Public Funds	Cost	(626)	(707)
Carbon Footprint	Cost	(60)	(42)
Traffic Disruption	Cost	(1)	(1)
Total incremental eNPV		**25,459**	**24,343**
Benefit Cost Ratio		**8.87**	**7.84**

All cashflows have been discounted at the social discount rate of 4%, in line with the Public Spending Code. Based on the above results, the Preferred Regional Approach is confirmed as the preferred approach as its eNPV and Benefit Cost Ratio are higher. This result is driven by the following factors:

- It is expected that the Parteen Basin abstraction and supply pipeline to the GDA will be completed in 2032 while the Desalination Alternative would be completed by 2037. This gives rise to five years of additional societal and economic benefits under the Preferred Regional Approach.
- Desalination is an energy intensive process and this is reflected in the operational costs for that option.

In addition to these quantifiable factors, other non-quantifiable advantages of the Preferred Regional Approach are:

- Introducing a New Shannon Source by 2032, versus the Desalination alternative of 2037, increases network resilience for that additional period, improving the network's ability to withstand any adverse climate related events that may occur.
- A Desalination option does not provide a Regional solution and therefore does not offer the potential to alleviate need in other parts of the Region. The New Shannon Source option is the only regional option identified.
- Desalination does not provide the same level of resilience as the New Shannon Source because desalinated water requires blending and therefore continues the current level of reliance on existing freshwater sources to achieve the blending ratio requirement.
- The more energy intensive nature of the desalination process makes it less attractive in terms of meeting Ireland's energy consumption initiatives and targets.

It is important to recognise that the above economic appraisal reflects base case results, which are based on a point estimate for each assumption. Given the inherent uncertainty in any estimate and to guard against optimism bias, the Public Spending Code requires extensive scenario and sensitivity analysis. The sensitivities/scenarios used to assess the Stage 1 options include the testing of:

- Capital expenditure assumptions.
- Operating expenditure assumptions.
- Variations in economic benefits.
- Variations in the social discount rate.
- Scenario where both capital costs and operating expenditure are higher than expected.

- Scenario where capital costs are higher than expected and economic benefits are lower than expected.

The Stage 1 CBA results include 13 sensitivities/scenarios (a number of which had 2-4 variations). Key scenarios and sensitivities are presented in Table 3.5, along with the revised eNPV and eBCR relative to the counterfactual. In all cases, the Preferred Regional Approach remains the preferred option, supporting the robustness of the overall economic appraisal.

Table 3.5: CBA Outcome - Sensitivity

Scenario	eNPV €m Preferred Approach	eNPV €m Desalination	eBCR Preferred Approach	eBCR Desalination
Capital Costs as per P80 RCF (30% higher than base case P95 QRA)	24,710	23,648	7.06	6.43
Capital Costs as per P95 RCF (127% higher than base case P95 QRA)	22,290	21,401	4.28	4.08
Opex Cost 10% higher than expected	25,416	24,255	8.75	7.65
Opex Cost 50% higher than expected	25,247	23,900	8.32	6.97
Opex Cost 50% lower than expected	25,671	24,787	9.49	8.96
Benefits (Non Dom Revenue, Domestic and Non Domestic Outages) 50% lower than expected	11,239	10,549	4.45	3.95
Social discount rate of 6%	14,100	13,474	6.12	5.94
Capital costs and operating costs both 50% higher than expected	23,999	22,742	5.95	5.26
Benefits (Non Dom Revenue, Domestic and Non Domestic Outages) 50% lower than expected, and Capex 127% higher than expected (P95 RCF)	8,071	7,606	2.18	2.09

In addition to these scenarios, delay scenarios have also been tested, where the construction period of the Preferred Solution and the Desalination Alternative, is delayed beyond 2032 and 2037 respectively. In all delay

scenarios tested, the Preferred Regional Approach remains the preferred option.

3.5.5.3 Additional Sensitivity Analysis – SDB Deficit Variations

As the sensitivity analysis presented above was based on a baseline forecast of the water supply demand balance (SDB) deficit, additional sensitivity analysis was completed which focused on examining variations of the SDB deficit forecast, as alternative scenarios to the baseline deficit forecast. It examined how the alternative deficit forecasts would influence the results of the financial and economic appraisal of the strategic options.

The methodology adopted for this additional sensitivity analysis was:

- Establish 'benign' (low) and 'adverse' (high) SDB deficit scenarios based on output from Monte Carlo simulation of the SDB deficit calculation.
- Apply these scenarios to the 'strategic options' financial and economic appraisal (Cost Benefit Appraisal (CBA)) model.
- Conclude whether the New Shannon Source option remains the best performing option, in economic appraisal terms, in each scenario.

The Monte Carlo simulation of the SDB for the GDA was developed by EY. Uisce Éireann commissioned Jacobs Engineering Ireland to develop an Opex profile, operational carbon profile and an 'Outages' profile for each of the two scenarios. EY then applied the 'benign' and 'adverse' scenarios in the Strategic Options CBA.

It should be noted that 'Benign' (Low') deficit and 'Adverse' (high) deficit figures are based on P5 (5th percentile deficit: 95% of the range of likely deficit outcomes exceed this value) and P95 (95th percentile deficit: 95% of the range of likely deficit outcomes are lower than this value) deficit values, respectively, from the Monte Carlo simulation of the 2044 Dry Year Critical Period deficit for the GDA.

Following the development of the benign and adverse deficit scenarios, updated financial and economic appraisals were completed, reflecting updated operational expenditure and demand profiles for each scenario. The financial appraisal and financial NPV (fNPV) for all scenarios are shown in

Table 3.6. This demonstrates that the Preferred Regional Approach (New Shannon Source with transfers) remains the preferred option in all scenarios.

Table 3.6: Financial Appraisal Outcome – Additional Sensitivity Analysis

Scenario	Financial NPV - fNPV (€m) – Preferred Regional Approach	Financial NPV - fNPV (€m) - Desalination
Benign	(1,758)	(2,954)
Base	(1,714)	(3,236)
Adverse	(1,625)	(3,647)

The results of the economic appraisal based on the benign, base and adverse SDB deficit scenarios, incremental to the Do Minimum, are presented below in Table 3.7. The results show that in all scenarios, the Preferred Regional Approach is preferrable to a Desalination option. The eBCR range associated with this option of 2.15x – 93.71x also demonstrates the significant benefit of the option from an overall societal perspective for the identified range of SDB scenarios.

Table 3.7: Economic Appraisal Outcome – Additional Sensitivity Analysis

Scenario	Discounted – Preferred Regional Approach eBCR, incremental to Do Min	Discounted – Desalination eBCR, incremental to Do Min
Benign	2.15	1.82
Base	8.87	7.84
Adverse	93.71	71.62

3.5.6 Conclusions of the Options Appraisal Process

The economic appraisal and financial appraisal of strategic options undertaken for the purposes of the Preliminary Business Case supports the conclusion reached in the RWRP-EM that a New Shannon Source with transfers is the Preferred Approach on a Regional basis.

Uisce Éireann is seeking to progress a Project (the "Proposed Project") that will deliver the abstraction, treatment and supply infrastructure from Parteen Basin to the GDA with offtake locations en route for future connections to

other WRZs in the Region. Section 4 of this summary Preliminary Business Case describes the main elements of this Proposed Project.

3.6 Interim Measures

Uisce Éireann has over 50 projects ongoing in the region to help address water supply need issues in the short to medium-term including:

- Upgrading Water Treatment Plants;
- Additional network connectivity;
- Leakage Reduction Programme;
- Additional Reservoir Storage; and,
- Active promotion of efficiency and reduction in water use, including conservation campaigns.

While these measures will address short-term water supply issues in the region, until a major new source of water is delivered, Uisce Éireann will not be able to achieve the desired level of service and reliance and will continue to run the risk of outages, impacting homes and businesses.

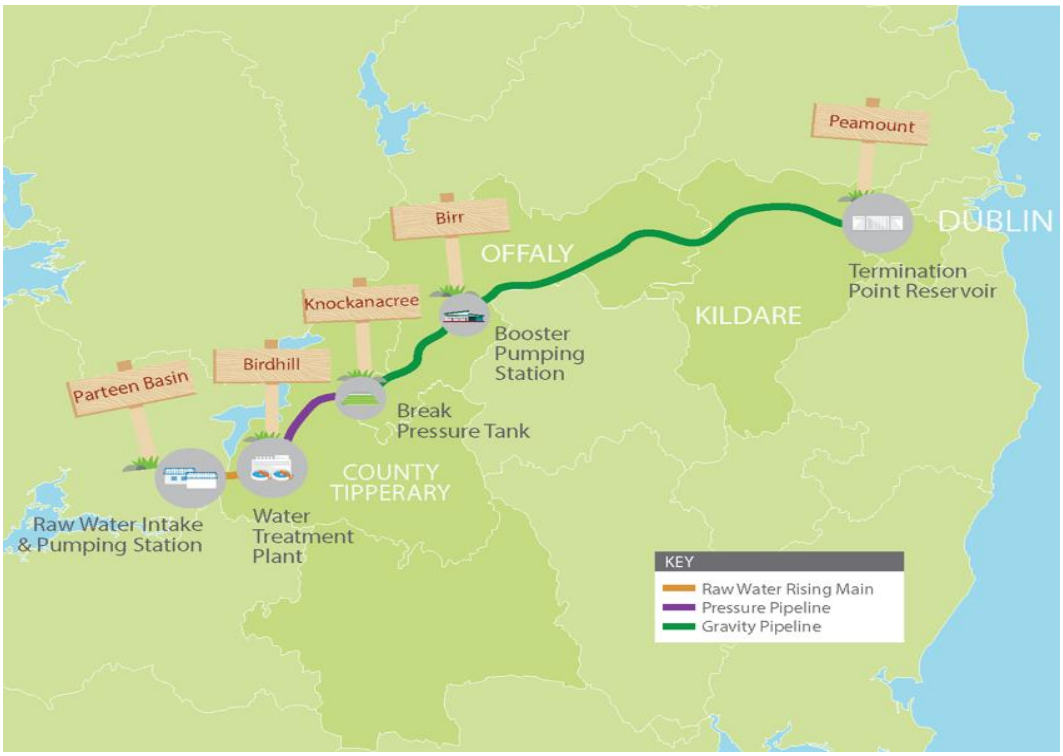
4 Overview of the Proposed Project

4.1 Introduction

The Proposed Project comprises abstraction of water from the lower River Shannon at Parteen Basin in Co. Tipperary, downstream of Lough Derg, with water treatment nearby at Birdhill. Treated water will then be piped 170km passing through Tipperary, Offaly and Kildare to a termination point reservoir at Peamount in County Dublin, connecting into the Greater Dublin network. This will form the basis for the Strategic Infrastructure Development (SID) application for planning permission.

The Proposed Project will have the capacity to supply communities in the Midlands, between the water treatment plant near Birdhill and the termination point reservoir at Peamount, in addition to other locations outside of the GDA in the East of the country. Offtake locations will be provided along the supply main to facilitate future connections to supply those communities. The connecting pipelines and associated infrastructure will be delivered through separate projects, yet to be commenced.

Figure 4.1: Summary of the Preferred Option



4.2 Basis for Infrastructure Design

Investment in long-term strategic infrastructure, especially infrastructure which is delivered over an extended timeframe, can be particularly subject to risk and uncertainty. For example, it has to anticipate demographic, social, legislative changes amongst others. Uncertainties around the future mean that investment plans must contain flexibility, while at the same time, still retain clarity in their strategic aims. The Proposed Project is no different and addressing potential uncertainties is therefore of critical importance in shaping and future-proofing the proposed water supply infrastructure.

The physical infrastructure for the Proposed Project is designed to address the identified supply demand deficit of 280Mld. The infrastructure design has the inherent adaptability to address a deficit of up to 315Mld without affecting the sizing and scope of the principal elements of the infrastructure and for which development consent will be sought. An abstraction licence will be sought for the raw water abstraction volume required to address the supply demand deficit current at the time of making the licence application (at present that deficit is calculated as 280Mld but may be subject to amendment as new data becomes available).

4.3 Objectives & Scope of the Proposed Project

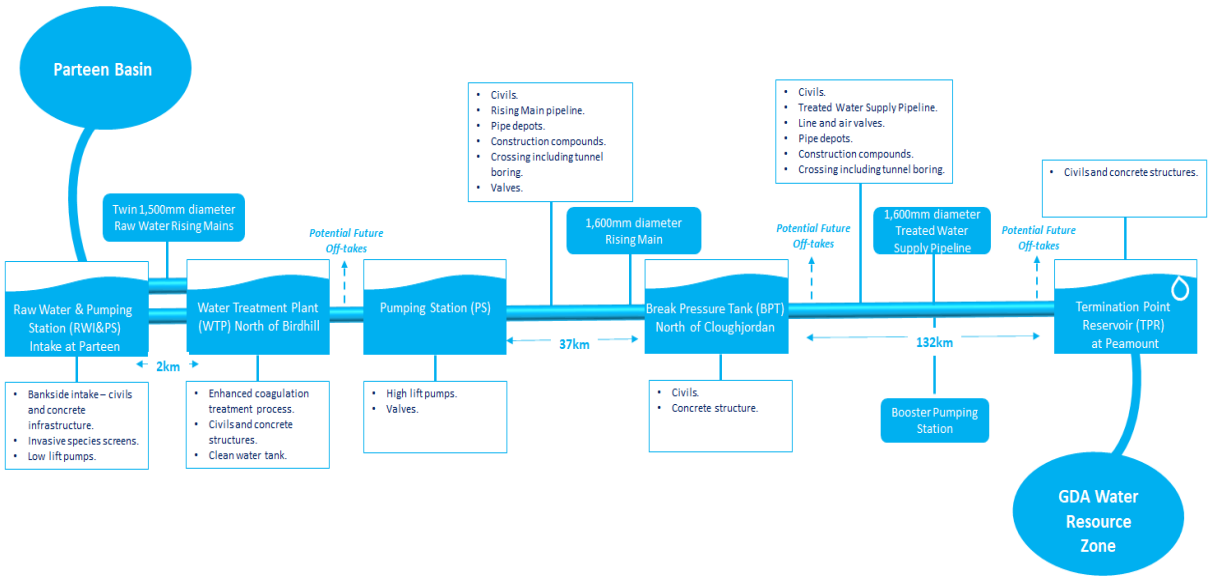
The objectives of the Proposed Project are to:

1. **Provide a sustainable water supply from a new Shannon source.**
2. **Address critical supply issues in the Greater Dublin Area with provision for future supplies to multiple Water Resource Zones in the Region.**
3. **Increase supply resilience and Levels of Service.**
4. **Deliver a flexible, future-proofed solution that is responsive to change.**

The project's scope comprises delivery of the following assets and infrastructure based on the preliminary infrastructure design, as summarised in Figure 4.2.

- Abstraction of water from the lower River Shannon at Parteen Basin: Raw Water Intake & Pumping Station, and 2km twin 1500mm Raw Water Rising Mains;
- Water Treatment Plant at Birdhill, Co. Tipperary;
- Break Pressure Tank at Cloughjordan, Co. Tipperary;
- Booster Pumping Station at Coagh Upper, Co Offaly;
- Termination Point Reservoir at Peamount, Dublin; and,
- 170km steel treated water supply pipeline of 1.6m diameter. Provision of offtake locations along the pipeline to enable treated water supplies to be made available to communities along the route through future connecting pipelines and infrastructure. As described earlier, the connecting pipelines and associated infrastructure will be delivered through separate projects and separate consenting and governance processes, yet to be commenced.

Figure 4.2: Summary of the Preliminary Infrastructure Design



4.3.1 Pipeline Route Selection

During the early stages of the project, several 2km wide potential pipeline "corridors" were originally identified and considered. One of these corridors was identified as likely to have the least impact on communities and the environment, and was termed the 'least constrained route corridor (2km)'. This was offered for public consultation in the Preliminary Options Appraisal Report (POAR) in 2015/2016 and following updates based on consultation feedback, this became

the Preferred Route Corridor (2km). Areas of least constraint from within the "Preferred Route Corridor" (2km) were identified in order to reduce the study width from 2km to 200m. Within this preferred 200m pipeline corridor, an indicative 50m pipeline corridor within which it would be feasible to locate the pipeline in a way which accommodates environmental, technical and geographical constraints was identified. The Preferred 200m pipeline corridor and indicative 50m pipeline corridor were communicated to landowners and other stakeholders in the Final Options Appraisal Report (FOAR) which was published for consultation in late 2016. Based on feedback from the FOAR consultation, and from on-going engagement with landowners, the 50m pipeline corridor has been the subject of amendments (where technically and environmentally feasible, and acceptable to any impacted landowners). The 50m pipeline corridor route, will form the basis for wayleave acquisition and for the Planning and CPO applications for the project.

4.3.2 Phasing Considerations

At various stages of project development, opportunities for phased delivery of the project were considered. This is also important in considering affordability. The phased / modular approach was considered as follows:

- **Raw Water Intake & Pumping Station:** phasing potential is limited to M&E (mechanical and electrical) fit-out only, due to the need to build the entirety of the civil and building works in a single phase thus mitigating geotechnical risks associated with construction in proximity to an existing Category A dam.
- **Raw Water Rising Mains:** twin pipelines are necessary from the outset to facilitate taking one out-of-service and maintaining the other live during maintenance activity.
- **Water Treatment Plant:** it is already designed in a modular layout. There is the potential to build two modules initially or build the proposed three modules and fit-out two initially. There is also the potential to incrementally fit-out the Main Lift Pumping Station. However, following a TOTEX assessment of the various configurations, it was decided that the benefits of having the resilience and operational flexibility provided by the full capacity from the outset, outweighed the relatively small TOTEX benefit of a phased approach (all 3 modules built and fitted-out initially has a marginally higher TOTEX than the phased approach).

- **Treated Water Pipeline:** a comparative assessment of TOTEX costs for various pipe configurations (one, two and three parallel pipes) for various diameters, with and without a booster pumping station, was undertaken. It was observed that the cost of laying two pipes rather than one is significantly higher than a single pipe for the same carrying capacity. In addition, it would not be acceptable from an environmental or landowner perspective, to construct twin pipelines in a phased manner. As the Proposed Project will augment water supplies in an interconnected system generally comprising multiple sources and WTPs that will provide the necessary resilience independent of the pipeline configuration, twinned pipelines are not necessary for provision of resilience. A single pipeline configuration and booster pumping station was therefore chosen from a TOTEX perspective.
- **Break Pressure Tank:** this is required to manage the pipeline hydraulics and maintain the pipe in full condition. There is no potential for phasing.
- **Booster Pumping Station:** the design of the Proposed Project has been optimised to cater for expected normal average flows in a pipeline sized at 1.6m diameter, while providing adaptability and flexibility to cater for higher flow rates by incorporating a Booster Pumping Station (BPS) between the Break Pressure Tank (BPT) and Termination Point Reservoir (TPR). The proposed BPS is required to operate only when demand is in excess of approximately 170Mld with these higher flow requirements not expected to occur from a peak supply demand deficit perspective (DYCP) until approximately 2040. While there is the potential to defer the BPS construction or complete the works and undertake M&E fit-out incrementally, it is proposed that the BPS is included in the project scope from the outset. This is to provide the operational flexibility and resilience in the GDA that would facilitate maintenance of critical infrastructure that would otherwise be difficult or impossible in the absence of an alternative source of supply.

The total cost of the elements of the proposed scope which could be progressed in a modular approach represent less than 5% of the construction cost estimate. However, it is important to highlight that the costs of progressing the deferred / modularized elements of work at a later stage would likely be increased due to the additional costs associated with remobilisation and operations disruption which would occur when they are carried out at some stage in the future on an operational site.

There are a number of other important considerations for a phased approach:

- A fully developed scheme will have to be environmentally assessed even in the first planning application in a phased development approach.
- The full extent of permanent infrastructure sites will have to be acquired at the outset to ensure that the appropriate lands are secured.
- Consents for the first phase in a phased approach, would not deliver the project outcomes and objectives as currently defined for the Proposed Project.
- The limited financial benefits of phasing the infrastructure are offset by:
    - Risk of insufficient capacity of the first phase on day of opening.
    - A reduction in scheme flexibility and responsiveness to events.
    - Risk and uncertainty introduced by additional consenting requirements for future phases.
    - Increased cost and risk due to phased delivery, multiple consents and associated technical and environmental consultancy services and risk of Judicial Review etc.

Therefore, consent for development of the full scope of the scheme is the preferred approach, while retaining the option to phase M&E elements only (which can be decided at later stages at both Decision Gate 2 (Pre-Tender Approval) and Decision Gate 3 (Approval to Proceed) stages).

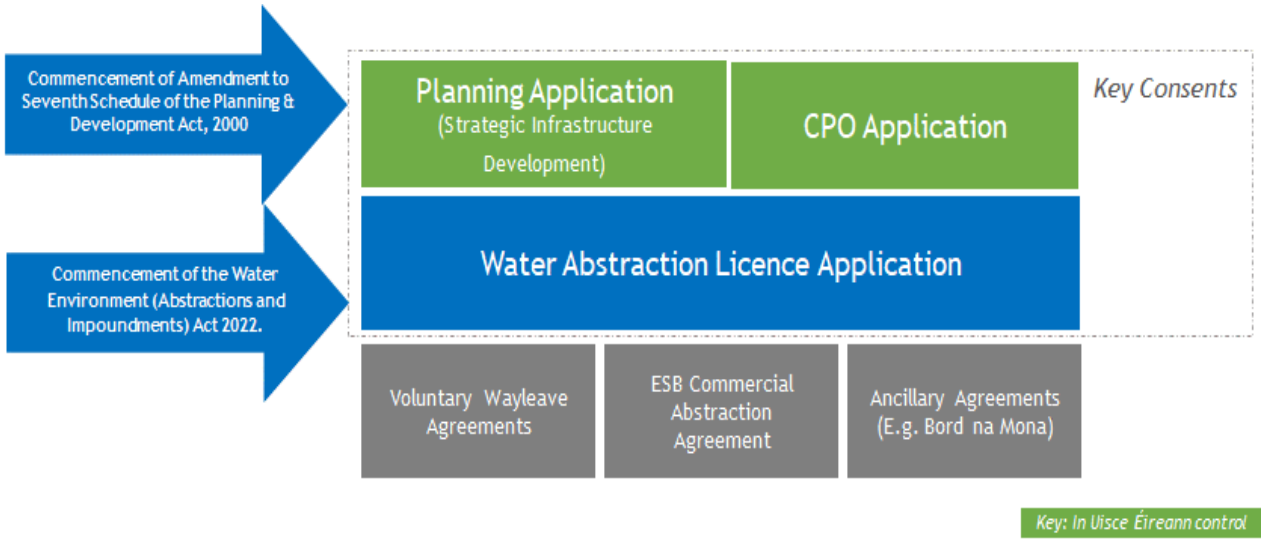
4.3.3 Out of Scope

- While take-off locations are included in the scope of the Proposed Project to ensure that supplies of treated water can be made available to Midlands communities along the route, the project scope excludes construction of the connections from the supply pipeline to these communities. These will be delivered under separate future projects and consenting processes.
- In addition, physical connections from the GDA to locations in the East, outside the GDA but facilitated by introduction of the Shannon supply to the GDA, will be the subject of their own separate projects and consenting processes.
- This design is based on Uisce Éireann's forecast of project need from the Supply Demand Balance (SDB) calculations up to year 2050. The proposed new source and associated infrastructure would continue to be operated and maintained, in conjunction with other sources, well beyond 2050.

4.4 Key Consent Applications

The consent applications required to progress delivery of the Proposed Project, in addition to the legislation upon which they are critically dependent, are summarised in Figure 4.3. The schedule and costs associated with the consenting process will be dependent on the finalisation of details of the consenting roadmap (subject to introduction of regulations and guidance associated with the new abstraction licensing regime as well any other relevant legislative changes) and key stakeholder engagement.

Figure 4.3: Summary of Principle Consents & Agreements



Planning Application (Strategic Infrastructure Development Application)

The Strategic Infrastructure Development (SID) planning regime was introduced in 2006 to provide for expeditious determination of planning applications in respect of developments of strategic importance to the State. For the Proposed Project to be considered SID, it must be a type listed in the Seventh Schedule and also meet one or more of the tests set out by Section 37A(2), namely that:

- The project is of strategic economic / social importance to State/region.
- The project would contribute substantially to objectives of National Planning Framework or Regional Spatial and Economic Strategy.
- The project would have a significant effect on the area of more than one planning authority.

Section 116 of the Water Environment (Abstractions and Associated Impoundments) Act 2022 provides for an amendment to the Seventh Schedule of the Planning & Development Act to include surface water abstractions which supply above [2,000 cubic meters per annum]. This amendment must be commenced for the Proposed Project to constitute SID infrastructure per the provisions of the 2000 Planning and Development Act. The draft Planning and Development Bill 2022 was published in January 2023 and when enacted, will replace the 2000 Act.

The SID application for the Proposed Project will be made to An Bord Pleanála and must be accompanied by extensive technical reports. The Proposed Project is currently at pre-application stage. Any SID planning application is submitted concurrently with any land acquisition element (Compulsory Purchase Order) and both are assessed and determined together. Oral Hearings are generally held for SID cases, and it can be expected that one will take place for the Proposed Project.

Land and Wayleave Acquisition and Associated Compulsory Purchase Order (CPO) Application

The Project involves the acquisition of:

(a) an approximately 172km long, 20m wide permanent wayleave (right to construct and operate a pipeline through the lands of a third party) within a 50m wide temporary working width for construction purposes, affecting approximately 500 landowners; and,

(b) the acquisition of approximately 50 hectares of land on a permanent basis for the abstraction, treatment and storage infrastructure. It is Uisce Éireann's preferred approach to acquire land and wayleaves by voluntary agreement.

A Wayleave Package will be structured to reflect the unique nature of the project and will be offered to landowners affected by the project pipeline for acceptance on a voluntary basis. The wayleave acquisition programme will allow sufficient time for landowners to consider the package and for legal arrangements to be completed. Acquisition of the circa 50 hectares of land required for the Raw Water Intake, Water Treatment Plant, Break Pressure Tank, Booster Pumping Station and

Termination Point Reservoir will be negotiated on a case-by-case basis. Where voluntary agreement is not possible, or where there may be title issues, Uisce Éireann has the statutory power to acquire land and wayleaves by Compulsory Purchase Order under Section 93 of the Water Services Act, 2007. The Compulsory Purchase Order will be submitted in parallel with the SID planning application as noted. It is normal practice for any objections to the making of the Compulsory Purchase Order to be heard as part of the planning application Oral Hearing. The Compulsory Purchase Order process is also potentially subject to Judicial Review.

Water Abstraction Licence Application

In September 2022, the Water Environment (Abstractions and Associated Impoundments) Act 2022 was signed into law in December 2022 (the "Abstraction Act"). It has yet to commence and we are awaiting the regulations associated with the Abstractions Act prior to commencement and operation of the regime.

The Abstraction Act applies to the removal or diversion of water from the water environment (referred to as an 'abstraction'), and their associated impoundments. The Abstraction Act requires the mandatory submission of a licence application for, inter alia, abstractions above 2,000 cubic metres per 24 hour and significant abstractions, in addition to certain sub-threshold abstractions. The requirement to obtain a licence will apply to both existing and new abstractions. The Abstraction Act will also, in respect of public abstractions, provide for temporary and emergency abstractions, provide compensation for certain abstractions carried out by Uisce Éireann and provide for abstractions by Uisce Éireann from reservoirs of the ESB. This would mean that the Proposed Project will need to obtain an abstraction licence from the EPA. The regulations, once published, will provide further clarity on requirements for the licence application and (we anticipate) how sustainability levels of abstraction will be assessed. This legislation and guidance is a critical dependency for the project.

The proposed abstraction from Parteen Basin will be dependent on the ESB's impoundment infrastructure. Therefore, it is envisaged that it will be necessary for Uisce Éireann to engage closely with the ESB in relation to the abstraction and impoundment licence application for the Proposed Project.

Subsection 83(4) of the Abstraction Act provides that the EPA will only consider an application from Uisce Éireann for an abstraction from a ESB reservoir if Uisce Éireann provides a copy of a water abstraction agreement between Uisce Éireann and the ESB.

4.4.1 Summary of Implementation Dependencies

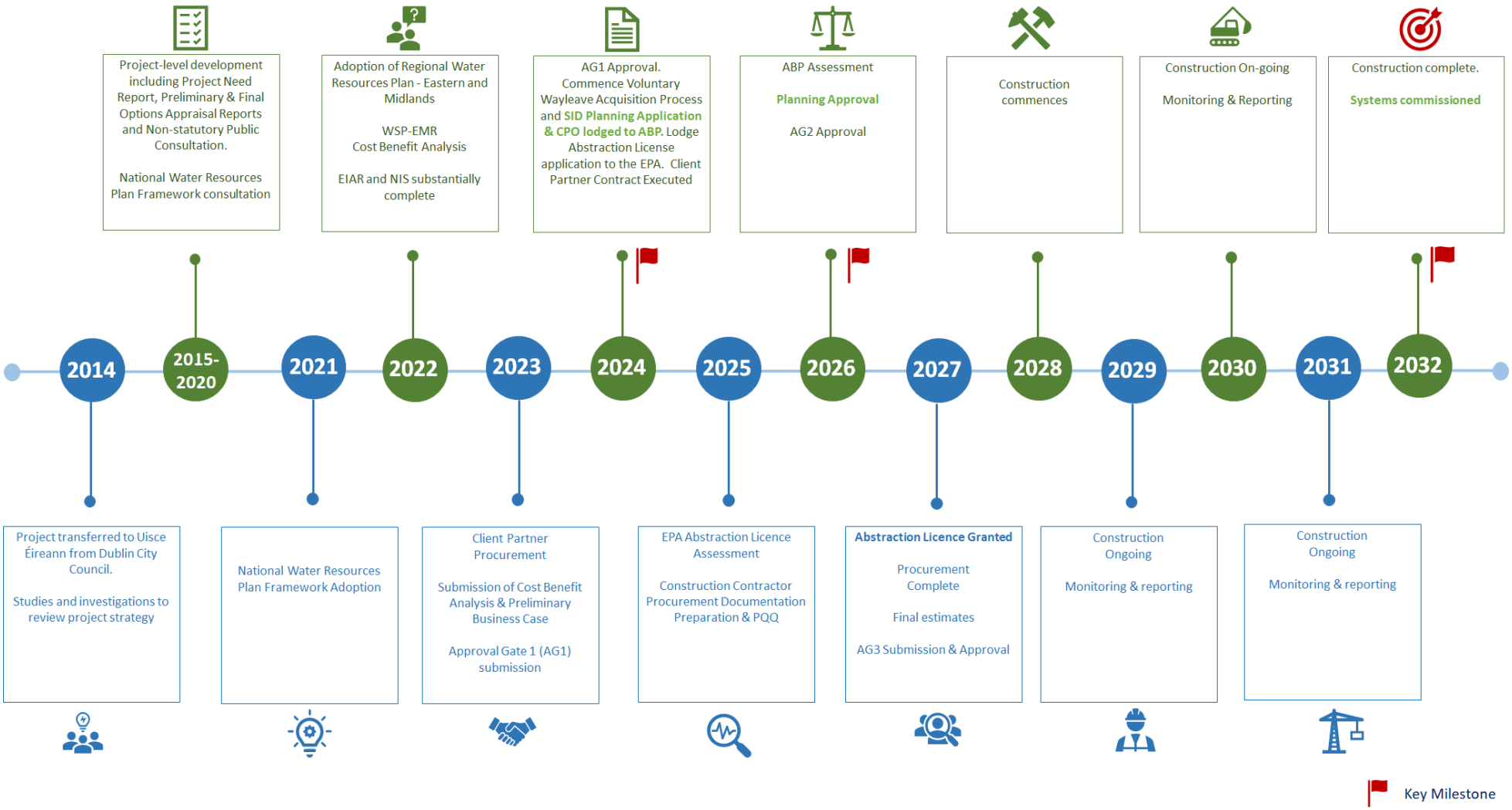
In summary, there are a number of areas on which successful delivery of the project is dependent. These could have a significant impact on the schedule timeline. They require careful management, monitoring and extensive stakeholder engagement.

- Engagement with the ESB on the Commercial Abstraction Agreement.
- Commencement of the Abstraction Legislation (primary and secondary).
- Amendment to Seventh Schedule to the Planning & Development Act, 2000 (or amended legislation) to ensure the project is covered by the SID application process.
- Outcome of negotiations with the farming bodies, primarily the Irish Farmers Association and the Irish Creamery Milk Suppliers Association, in relation to the voluntary wayleave consent package.
- Approvals under the Public Spending Code and Sector Specific Guidelines, including the external assurance process.
- Engagement with: ESB; Bord na Mona; Inland Fisheries Ireland; National Parks and Wildlife Service; Irish Rail; Transport Infrastructure Ireland; Waterways Ireland; the Environmental Protection Agency and the relevant Local Authorities.

4.5 Implementation Timeframe & Key Milestones

Enactment of the new Abstraction Legislation (primary legislation enacted in December 2022, but not yet commenced) is necessary to provide a clear consenting roadmap for the Project. The current expected planning submission milestone is December 2024, with an associated anticipated overall delivery date of 2032. However, it should be noted that this delivery timeline excludes any potential delays which could be caused by any legal challenges to the Proposed Project. This is treated as a risk and is not included in the project baseline schedule. A summary of the project timeframe and key milestones to 2032 is presented in Figure 4.4.

Figure 4.4: Summary of High-level Project Timeframe & Key Milestones



4.6 Proposed Approach to Operation

The Proposed Project is designed to operate in conjunction with other supplies in the EMR, the largest of those being the supplies currently serving the GDA. The operational strategy is at an early stage of development and will require further consideration at the detailed design and procurement stages of the project. This is to ensure that the new source of water supply will be effectively and efficiently integrated with the operation of existing sources and infrastructure in the GDA WRZ and to ensure its capability to integrate with schemes in the Midlands. The Proposed Project will enhance the resilience of the water supply system in the region with a new source and storage that enable Uisce Éireann to manage seasonal variation in water availability, and improved operational control across our water supplies.

It is envisaged that the project will be divided into a number of works contracts for construction delivery and that there will be an operation period associated with some of those contracts. However, the extent and duration of the Operate elements of those works contracts have yet to be confirmed. These would consist of activities such as testing, commissioning and operating of the Intake Works and Water Treatment Plant etc. It is intended that the procurement strategy for the Proposed Project will address these requirements.

4.7 The Proposed Project is Aligned with International, European and National Policy

The Proposed Project is strongly aligned with international, European and National Policy, in particular the National Strategic Outcomes (NSOs) of Project Ireland 2040, the Government strategy for Ireland's growth and development.

This alignment with policy is summarised in Table 4.1 overleaf.

Table 4.1: Summary of Alignment of the Proposed Project with Key Strategy and Policies	
INTERNATIONAL POLICY CONTEXT	
2030 Agenda (United Nations, 2015)	• "Transforming Our World: the 2030 Agenda for Sustainable Development" was adopted in 2015 by the United Nations (UN). The *'2030 Agenda'* aims to deliver a more sustainable, prosperous, and peaceful future for the entire world, and sets out a framework for how to achieve this by 2030. This framework is made up of 17 Sustainable Development Goals (SDGs) which cover the social, economic, and environmental requirements for a sustainable future. • The Proposed Project has been informed by these SDGs, in particular SDG 6 on Clean Water and Sanitation, SDG 9 on Industry, Innovation and Infrastructure and SDG 13 on Climate Action. It will deliver infrastructure to ensure sustainable abstraction of water and will facilitate implementation of an integrated system of water resources management.
2016 Paris Agreement (United Nations 2016)	• Ireland has signed up to the United Nations Framework Convention on Climate Change through the 2016 Paris Agreement. The Paris Agreement is a legally binding treaty; the goal of which is to limit global warming to well below 2 degrees Celsius. Subsequent climate conferences in Glasgow, UK (2020) and in Sharm el Sheikh, Egypt (2022) have restated commitments to limit global warming to below 1.5 degrees Celsius. • The Proposed Project will strengthen the resilience and adaptive capacity of the region to better equip it to deal with the challenges of climate change. It will enable us to better manage seasonal variation in water availability and drought events. The new source of water supply will be environmentally sustainable. This will ensure that the Proposed Project aligns with broader climate related polices and strategies at a national level.
EU POLICY CONTEXT	
EU Water Framework Directive	• The Water Framework Directive (WFD) adopted in 2000 aims to *"establish a framework for the protection of inland surface waters, transitional waters, coastal waters and ground waters"* (Article 1). Its primary aim is to preserve and enhance the status of aquatic ecosystems. • The Proposed Project will help to ensure that a more sustainable system of water abstraction from surface water bodies is achieved and in particular, it will end the GDA's current unsustainable over-reliance on the River Liffey as a water source.

Table 4.1: Summary of Alignment of the Proposed Project with Key Strategy and Policies (continued)	
EU POLICY CONTEXT	
EU Drinking Water Directive	• The Drinking Water Directive (Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption) concerns the quality of water intended for human consumption. Its objective is to protect human health from adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean. Revisions to the Directive (2021) reflect the union's obligations to meet targets outlined in the UN SDGs. • The Proposed Project will secure a sustainable and resilient water supply source for the GDA and 35 other WRZs in the region and thereby reduce existing unsustainable over-dependence on single water sources. This will ensure that a more resilient water supply system is established to provide high quality water to significant population centres.
EU Green Deal (EGD) 2019	• The EGD sets-out key policies aimed at cutting emissions and preserving the natural environment. It commits Europe to becoming a climate-neutral continent by 2050 while increasing the resource-efficiency and improving the resilience of the region to deal with the challenges presented by climate change. • The Proposed Project will contribute to the establishment of an integrated water supply management system for the state and ensure more sustainable use of water resources. It will also increase the resilience of the state's water infrastructure system in the face of climate change challenges.

Table 4.1: Summary of Alignment of the Proposed Project with Key Strategy and Policies (continued)	
NATIONAL POLICY CONTEXT	
National Planning Framework (NPF)[39] 2018	• The NPF is the Government's strategic framework to guide development and investment to enhance the wellbeing and quality of life of Irish people. The NPF's ambition is to shape the growth and development of Ireland by providing a framework up to the year 2040. Its 10 goals are expressed as National Strategic Outcomes (NSO). NSO 9 is of particular relevance in the context of the Proposed Project: o *"a new long-term water supply source for the Eastern and Midland Region, which includes the Dublin Water Supply Area (DWSA), is needed by the mid-2020s, to provide for projected growth up to 2050 and contribute to resilience and security of supply for the region. This requires infrastructure provision to be guided and prioritised in a manner that can benefit the greatest possible number of areas within the country[40]"* • Water projects of national significance such as the Proposed Project are identified as "Key future growth enablers for Dublin": *"Ensuring that water supply and waste-water needs are met by new national projects to enhance the city's and the wider Greater Dublin Area's water supply and increase waste water treatment capacity[41]"*
National Development Plan (NDP)	• The updated NDP was published in 2021 and relates to 2021-2030. It is the national capital investment strategy plan and is a companion document to the NPF (together they form Project Ireland 2040). It sets out the framework of expenditure commitments to secure the Strategic Investment Priorities to the year 2030. Water infrastructure is a strategic investment priority of the NDP 2021-2030 and is aligned to implement the NPF over 10 years to provide for the anticipated population growth of the State. • The NDP supports the delivery of the 10 National Strategic Outcomes identified in the NPF including NSO 9 which relates directly to the proposed WSP. The '*Water Supply Project – Eastern and Midlands Region*' is identified as a major infrastructural project and one of the key Strategic Investment Priorities of the NDP[42].

[39] The NPF will be updated in 2024 including Census 2022 data and other updates.
[40] NPF, 2018 - p.p. 148
[41] NPF, 2018 - p.p.37
[42] Chapter 14 – p.p. 134

Table 4.1: Summary of Alignment of the Proposed Project with Key Strategy and Policies (continued)	
Climate Action Plan (CAP) 2021 and Climate Action Plan 2023	• Refer to Section 4.8 for further information. The Climate Action and Low Carbon Development Act (as amended "CALCD"), was published in 2021. • Following on from this, the Climate Action Plan (CAP) was published in 2021 and details the range of climate policies and measures required in every sector to urgently and significantly reduce national greenhouse gas (GHG) emissions. At the end of 2022, CAP 2023 was published. It reemphasises the continued risks posed by climate change and sets-out current and future actions, namely, outlining the EGD commitments of net zero GHG emissions by 2050 and Ireland's commitment to 51% reduction in GHG emissions from 2021 to 2030, aiming to achieve net zero emissions no later than 2050. CAP 2023 sets-out legally binding requirements to achieve the objectives set-out in legislation and a roadmap to meet emission targets. • The 2021 and 2023 CAP highlight pressures that climate change will put on our water resources and the economic impact that water shortages can have. Both CAP 2021 and 2023 outline a series of actions and in the 2021 plan, Uisce Éireann is assigned the preparation of Regional Water Resources Plans. Uisce Éireann is also called out in CAP 2023 under Action (AD/23/14) to improve the resilience of Ireland's water infrastructure to the impacts of climate change. • The Proposed Project is in line with climate adaptation and follows directly from Uisce Éireann's RWRP-EM. It will provide the best outcome for the region in relation to environmental, ecology and resilience outcomes. It will result in the transformation of water services in the GDA and 35 other WRZs in the EMR. There will be improved resilience and a more sustainable water supply which will enable us to better manage seasonal variation in water availability and drought events. The new source of water supply will be environmentally sustainable and allow us to adapt to climate change.
Water Quality & Water Services Infrastructure – Climate Change Sector Adaptation Plan	The National Adaptation Framework (NAF) was published by the Department of Communications, Climate Action and Environment in 2018 and outlines the national strategy for the rolling out of adaptation measures by local authorities to address climate change. Following on from the NAF, a Sectoral Adaptation Plan in respect of Water Quality and Water Services Infrastructure was published in October 2019. This "*presents an assessment of key future climate risks to the sectors and describes a range of key potential adaptive measures*". Key adaptive measures include the establishment of an integrated water management system which will deliver a long-term strategy for water supply in the state. The Proposed Project aligns fully with this plan and has been identified in the NWRP and RWRP-EM as the Preferred Approach for the region.

Table 4.1: Summary of Alignment of the Proposed Project with Key Strategy and Policies (continued)	
Water Services Strategic Plan (WSSP)	• The WSSP was published by Uisce Éireann and approved by the Minister for the Environment, Community and Local Government in 2015. It presents strategic objectives for the delivery of water services over 25 years to 2040. It sets out objectives to support social and economic growth in a manner consistent with national and regional spatial planning policy. Arising from the WSSP, Uisce Éireann published the *Capital Investment Plan 2020-2024*. This highlights significant projects to address capacity constraints in the EMR, such as the Proposed Project as a key strategic priority for the State's water infrastructure network.
NWRP and RWRP-EM	• The NWRP is Uisce Éireann's 25-year strategy to meet Ireland's water requirements in the short, medium and long-term by ensuring a safe, secure, sustainable and reliable water supply for all of its customers. The Proposed Project aligns with, and supports, the delivery of the regional solution identified in Uisce Éireann's RWRP-EM, as outlined in Section 3.
Housing for All[43]	• Housing for All is the government's housing plan to 2030 and was launched in September 2021. The plan estimates that an average of some 33,000 new homes will need to be delivered per year to increase supply and affordability and to eradicate homelessness to 2030. It recognises that investment in water infrastructure is vital to delivering this target, and identifies some €4.5 bn to be spent on such infrastructure projects to 2025. Section 5.6.4 of the Plan acknowledges that investment in water services will support delivery of Housing for All. The Proposed Project will deliver water supply infrastructure that is a key prerequisite to delivering housing in the region and for supporting the housing targets in Housing for All (it is now recognised that the new homes estimate in Housing for All understates the requirement).
Regional Spatial and Economic Strategies (RSES) for the Eastern and Midland and Southern Regions	• The RSES for the EMR (RSES-EM) is a strategic plan which outlines regional policy objectives and provides a framework for investment to ensure the sustainable growth of the region. The EMR includes the Local Authority areas of Offaly, Kildare and South Dublin, through which the route of the Proposed Project passes. The Southern Region RSES includes the Local Authority areas of Tipperary, Limerick and Clare within which elements of the Proposed Project are located. RSES-EM states the Proposed Project "*is required to ensure sufficient treated water is available to meet the long-term water supply needs of the Region to provide for projected growth up to 2050 and contribute to resilience and security of supply for the Region".* It is cited as one of 4 Strategic Water Service Projects. RSES – Southern notes the importance of supporting projects such as that proposed, to improve water services. Additional objectives within this RSES commit to supporting Uisce Éireann Investment Plans and strategic water supply projects.

[43] Housing For All. Department of Housing, Local Government and Heritage. September 2021.

Table 4.1: Summary of Alignment of the Proposed Project with Key Strategy and Policies (continued)	
REGIONAL & LOCAL POLICY CONTEXT	
Relevant Statutory County Development Plans	• The Proposed Project's route and associated ancillary infrastructure is located within six Local Authority areas. A review of the Local Authority Development Plans within each of these areas has been undertaken to ascertain the level of support for the Proposed Project. This clearly demonstrates support for the Proposed Project: • **South Dublin County Council Development Plan 2022-2028:** *support Irish Water in delivering key water service projects in the County including: The Water Supply Project Eastern and Midlands Region….* • ***Kildare County Council Development Plan 2023 – 2029:*** *The Water Supply Project remains the project identified to deliver a 'new source' of water supply for the Eastern and Midlands area to meet the longer-term growth of the Region up to 2050 and to ensure resilience and security of supply. The Parteen Basin option has been identified by Irish Water as the preferred water supply scheme to deliver the widest benefit to the greatest number of people, with the least environmental impact and in the most cost-effective manner; Support Irish Water in delivering key water service projects in the county as set out in the Water Services Strategic Plan (2015) including: The Eastern and Midlands Regions Water Supply Project and to preserve the corridor for this scheme free of development.* • ***Offaly County Development Plan 2021-2027:*** *It is an objective of the Council to co-operate with Irish Water in the delivery of the Eastern and Midlands Water Supply Project and to ensure the maximum benefit from this project to County Offaly, in particular with respect to economic development potential and security of supply.* • ***Tipperary County Council Development Plan 2022-2028:*** Co-operate with Irish Water in the delivery of the Eastern and Midlands Water Supply Project and to ensure the maximum benefit from this project to County Tipperary, in particular with respect to economic development potential and security of supply. • ***Limerick City and County Council Development Plan 2022-2028:*** Recognition of the importance of the implementation of Irish Water's Investment Plan and the alignment of the supply of water services with the settlement strategy of the Plan, is clearly set out and supported. • ***Clare County Development Plan 2023-2029:*** *It is an objective of Clare County Council: to support investment and the sustainable development of strategic water supply projects of Irish Water and leakage reduction programmes and initiatives through the National Water Resources Plan subject to appropriate environmental assessment and the planning process.*

4.8 Sustainability

Uisce Éireann is committed to sustainable development, to protecting and enhancing the environment and ensuring the sustainable management of water resources, contributing to the ambitions of the United Nations (UN) Sustainable Development Goals (SDGs). The 17 SDGs which provide a consistent, integrated framework for defining and considering sustainability and for targeting and measuring positive action across policies and plans. The UN SDGs are reflected in Project Ireland 2040's National Planning Framework and National Strategic Outcomes (NSOs). The Proposed Project has been informed by these SDGs. It will deliver water infrastructure to ensure the sustainable abstraction, treatment and supply of water. It will facilitate the implementation of an integrated system of water resources management. It will strengthen the resilience and adaptive capacity of the areas it serves in order to better equip them to deal with the challenges that climate change presents, thus ensuring that the project aligns with broader climate related polices and strategies at a national level. A summary of the sustainability benefits of the Proposed Project is presented in Table 4.2.

Table 4.2: Summary of the Sustainability Benefits of the Proposed Project

Environment	Social	Economic
• A sustainable, long-term solution for water supply in the EMR which can contribute to the national response to climate change. • Diversify the supply source, providing greater resilience in the system against loss of supply, contamination / pollution events and risks arising from climate change. • Design, build and operate assets to ensure energy efficiency, reducing total lifecycle costs and emission of carbon dioxide. • Managed, resilient supply which minimises impact on catchments, water courses and associated habitats. • Potential opportunities to improve biodiversity along the route, where feasible.	• A resilient, safe and more secure water supply for the population of the EMR. • Greatly reduced risk of water restrictions including: low water pressure; water conservation orders; water shut-offs; "Do Not Consume" Notices; and, Boil Water Notices, which impact supply to homes and businesses. • A future-proofed water supply which supports population, economic and housing growth to 2050 and beyond. • Potential opportunity for partnerships to maximise environmental benefit and positive community impact along the route.	• Support economic and population growth through the provision of reliable industrial and domestic water supply. • A secure, sustainable new water supply will act as a supply "backbone" for the region, contributing to balanced regional development. • Construction will support jobs and business opportunities in communities along the route, with benefits for regional services.

The Climate Action and Low Carbon Development Act (as amended "CALCD"), published in 2021, contains the following **National Climate Objective**: "…*to pursue and achieve the transition to a climate resilient biodiversity rich, environmentally sustainable and climate neutral economy by the end of 2050*"[44].

Following on from the legal underpinning which the amended CALCD Act provides, a Climate Action Plan (CAP) was published in 2021 and subsequently revised and updated in 2022 with the publication of CAP 2023 'Changing Ireland for the Better'. CAP 2023 details the range of climate policies and measures required in every sector to urgently and significantly reduce national greenhouse gas emissions. It specifically identifies six vital high impact sectors, including; power renewables, building better, transforming how we travel, making family farms more sustainable, greening business and enterprise and changing our land use, and sets percentage reduction targets. In respect of the public sector, the 2023 CAP notes that it should lead by example by reducing emissions by 51% and deliver a 50% improvement in public sector energy efficiency by 2030. It highlights pressures that climate change will put on our water resources and notes that climate change also has the potential to lead to poorer water quality. As outlined in section 15 of CALCD 2021, there is a requirement on relevant bodies under each Minister to provide an account of progress under the most recently approved CAP, in respect of compliance with policies for climate mitigation and adaptation.

CAP 2023 recognises that greater action is needed on Climate Adaptation and nationally we must respond to climate change which has diverse and wide ranging impacts on Ireland's society, economic development and environment. It identifies numerous actions such as developing a new National Adaptation Framework and specifically requires in Action (AD23/14) the following – "*Improve the resilience of Ireland's water infrastructure to the impacts of climate change*". The Proposed Project, as strategic infrastructure to provide water to the region and improve resilience in the water network, will deliver upon this action.

As described in Chapter 3, throughout the options appraisal process, sustainability has been a core factor in the decision-making process. The SEA process provides strategic protection of the environment and contributes to integrating environmental considerations into the preparation and adoption of

[44] Climate Action and Low Carbon Development Act (as amended) 2021 – Section 5

plans to promote sustainable development. As such, at every step of the development of the Proposed Project, disciplines such as climate change and biodiversity have been key considerations. This has continued through site and route selection studies on the Parteen Basin option. It will continue through the development of the preliminary design which will be impact assessed through the development of an Environmental Impact Assessment Report (EIAR), thereby ensuring sustainable design to mitigate impacts and protect the natural environment and local populations.

As part of the continued integration of sustainability within the Proposed Project, the Energy Efficient Design (EED) process has been employed since 2018. This is a framework to embed energy efficient practices and ensure that plant, equipment, buildings, systems and directly associated activities are planned, designed, equipped, maintained and operated to deliver a high level of energy performance. The process will also ensure that energy is used efficiently, with consideration given to alternative design options, to achieve this. Examples of how this will be delivered on the project include:

- Energy from renewable sources will be used where feasible and maximum use of solar panels will be made at the WTP.
- Use of gravity for transporting treated water will be maximised.
- Passive methods for lighting and ventilation will be used.

Alongside the design development and consideration of renewables and energy efficiency, other sustainability aspects such rainwater harvesting systems and green roofs will be incorporated where feasible across the infrastructure sites. The incorporation of rainwater harvesting will contribute to a reduction in the raw water abstraction requirement and the green roofs will both allow the infrastructure to blend with the natural landscape in addition to meeting biodiversity objectives.

The design and delivery process will seek to mitigate significant negative impacts over the whole project life cycle and contribute environmental and social benefits which align with Ireland's ambition to transition to a climate resilient, biodiversity-rich, environmentally sustainable and net zero economy. It will also facilitate continued consideration of emerging best practice.

4.9 Community Gain

Uisce Éireann acknowledges that the Water Supply Project will bring significant benefits for the EMR, and recognises the unprecedented scale of the project as a major inter-generational investment for the State. Similarly, we recognise the opportunity presented by the Proposed Project to bring significant value via Community Gain, during the project's delivery phase. Community Gain is defined as a *"good will contribution for the benefit of the communities affected by the project in the short, medium and long-term to alleviate the effect from the construction and siting of a major piece of infrastructure*[45]"

The Planning and Development Act, 2000, provides that An Bord Pleanála may attach a condition in respect of Community Gain for a SID development[46].

It is Uisce Éireann's intention to submit a Community Gain proposal as part of the SID application, and an approach has been developed by the project team (in conjunction with the Community Gain Steering Group), and approved by the Uisce Éireann Executive. This proposal will be progressed through the required governance and stakeholder engagement processes in due course. Key to the approach is the allocation of a Community Gain Fund. The project's draft preliminary estimate includes an estimated amount for a Community Gain Fund, with a preliminary proposal for apportionment between the relevant Local Authorities.

[45] Ervia Community Gain for Strategic Infrastructure Projects Guidelines.
[46] S.37(G)(7)(d) of Planning and Development Act, 2000, as amended (and note this is provided for in new draft Planning and Development Bill 2022 also (Section 83 (4)).

5 Project Cost

The Proposed Project must have effective forecasting and management of project costs to ensure value-for-money. This process must be aligned with Uisce Éireann's governance and cost management controls and the Public Spending Code, which requires Sponsoring Agencies to forecast project cost estimates as accurately as possible throughout the project lifecycle.

In line with the Public Spending Code, large infrastructure projects such as the Proposed Project pass through various stages of development. As the design and scope are refined at each stage, indicative costs are updated. The project cost estimate will be monitored throughout the project lifecycle and updated at the Approval Gates, ensuring the most up-to-date information at key decision points.

The Proposed Project has three major cost components: delivery costs; operating & maintenance costs; and, renewal/replacement costs. The process to estimate these components along with the resulting cost ranges are outlined in this chapter. The chapter also describes the external independent validation of cost forecasts and Uisce Éireann's cost management approaches through both external sources and the Expert Review Panel (ERP).

5.1 Forecast Methodology for Estimated Total Cost of the Project – Delivery Cost

5.1.1 Design Development and Bottom-up Estimate

The delivery cost forecast (i.e., costs of constructing the infrastructure) has been developed by the project team in conjunction with Uisce Éireann's technical advisors for the project, based on the pre-planning preliminary design. Selection of the principal infrastructure sites has been completed and the preferred pipeline corridor from Parteen Basin to the proposed Termination Point Reservoir at Peamount identified. These form the basis of the project scope for the purposes of the cost estimate. The Estimated Total Cost encompasses the full capital cost estimate of the project from identification to completion of construction/implementation including land costs, VAT, professional fees, materials, labour, and uncertainty/contingencies for risk and inflation. As the Project's technical advisors, Jacobs Engineering Ire. Ltd. with Tobin Consulting

Engineers acting as sub-consultants (referred to hereafter as Jacobs Tobin) provided construction costs estimates based on a combination of actual contract rates and their industry experience on works of a similar nature both in Ireland and internationally. The estimate was reviewed by Uisce Éireann to test the robustness of the estimate and ensure that related interface and logistical issues had been identified and costed appropriately.

Non-construction costs were forecast by the Project Team supported by expert input where necessary for some cost components such as land acquisition and wayleaves. The principal components of non-construction costs relate to resourcing costs (internal and external project management), design services, procurement, site compounds, fieldworks, insurance and land & wayleaves.

In summary, the forecasting process involved Uisce Éireann's direct experience of large-scale complex water and wastewater infrastructure, the project's technical advisors, an independent Construction Cost Consultancy, an independent commercial real estate advisor and independent review and verification of the approach and methodology deployed, which is consistent with large-scale international water infrastructure projects.

5.1.2 Benchmarking

The Public Spending Code requires Sponsoring Agencies to adequately account for risks to project scope and delivery in cost estimates, including the impact of inflation, in order to mitigate the risks of optimism bias and to improve the accuracy of the estimated cost forecast. The Public Spending Code lists a number of tools for this purpose, including cost benchmarking and external peer review. Uisce Éireann applied both tools to review project cost estimates.

Energy and infrastructure consultants AECOM, were appointed to provide an independent benchmarking review of the project cost – the Capital Cost Estimate Review (CCER). The CCER analysis comprised an assessment of the current design and Cost Estimate developed by Jacobs Tobin. The costing analysis was completed using information available where AECOM applied benchmarking data from their current and previous applicable projects. In addition, AECOM took account of known outturn costs for steel pipelines from a number of UK and international projects. AECOM also provided a range of percentages for non-construction costs

based on comparable projects. The bottom up forecast of non-construction costs completed by Uisce Éireann is consistent with the median of AECOM's proposed range. Further benchmarking will be ongoing through the next stage of the project lifecycle, and results will be updated for any subsequent Decision Gates.

5.1.3 Quantitative Risk Analysis

International experience demonstrates that in practice, all large projects have numerous risk factors that can impact delivery. For this reason, a risk allowance is added to the base cost of the project to address the cost implications of such risks potentially materialising. Risks and their impact on project cost have been assessed by Uisce Éireann using two methodologies: Quantitative Risk Analysis (QRA); and Reference Class Forecasting.

QRA is a key pillar of Uisce Éireann's risk management processes. The project has completed a two-stage independent risk analysis process (prepared by Turner & Townsend, independent advisors for real estate, infrastructure and natural resources investment programmes). QRA evaluates the aggregate exposure of risks on project cost ("Quantitative Cost Risk Analysis - QCRA") and schedule ("Quantitative Schedule Risk Analysis - QSRA"). QCRA supports investment decisions utilising a three-point estimate of cost impact (minimum, most likely and maximum impact value) for a probable risk event. Monte Carlo simulation is then used to generate a risk cost distribution at various different probability levels. The QRA process was independently reviewed and validated by AECOM.

5.1.4 Reference Class Forecasting

Working with Oxford Global Projects, Reference Class Forecasting (RCF) analysis was also completed for the project. This is where the historic cost performance of completed projects of a similar nature are examined. It uses a database of schemes of a similar class to ascertain risk allowances to apply to projects. RCF provides an objective view of project risk and encapsulates the potential outcome from macro risks and unknown unknowns – a limitation of the more internally focused QRA approach. RCF is reliant on the projects within the dataset being comparable to the project which is being appraised.

The Proposed Project's cost estimate (base cost plus risk and contingency allowance) was benchmarked against RCF curves. The cost curves utilised were

derived from the cost performance history of 607 reservoir projects, 67 pipeline projects and 50 water treatment plants. RCF considers the original base costs for these projects against their final cost, to generate an assessment of uplift percentages which should be applied to base cost estimates. This results in an appropriate contingency for a probability level chosen by the Sponsoring Agency.

5.1.5 Inflation

For all multi-year projects, the cost estimate must include the estimated cost of inflation over the delivery timeframe. Estimates of inflation are based on:

- The base year for the cost estimate is 2022.
- Harmonised Index of Consumer Prices (HICP) and Wholesale Price Index forecasts for Building and Construction Materials (Central Statistics Office) to 2025 using external estimates and regression forecasting, and assumed long-term average rates for HICP and construction inflation from 2026 to construction completion; and,
- The year of expenditure which is based on the preliminary design and estimated project delivery schedule.

Inflation assumptions are based on current trends where both construction tender prices and general costs in the economy have seen notable increases since late 2021/early 2022, further amplified by the ongoing conflict in Ukraine. A long-term inflation assumption of 2% for HICP and 3% for construction inflation has been used for 2026 and beyond.

5.1.6 Expert Review Panel

Key assumptions and outputs relating to the project have been presented to an Expert Review Panel (ERP). The ERP comprises experts in major infrastructure delivery from Mott MacDonald, EY and Oxford Global Projects. The Panel was presented with the Construction Cost Estimates, an Independent Estimate Report, and the QRA methodology plus RCF outputs. The ERP queries and guidance were noted, over several meetings as Uisce Éireann developed the project cost range.

5.1.7 Risk Allowance Probabilities & Range

The degree of uncertainty related to large projects makes the use of a cost forecast range more appropriate. A range of forecasts associated with the Risk

Allowance Probabilities from P50 to P95 is often deemed to provide an appropriate range for cost forecasting and budgeting purposes.

- A P50 Risk Allowance is the risk adjusted cost that provides a 50% probability that the outturn cost will be at or lower than that figure (and a 50% probability that it will be greater).
- A P80 Risk Allowance is the risk adjusted cost that provides an 80% probability that the outturn cost will be at or lower than that figure (and a 20% probability that it will be greater).
- A P95 Risk Allowance is the risk adjusted cost that provides a 95% probability that the outturn cost will be at or lower than that figure (and a 5% probability that it will be greater).

The risk allowance can be generated using the QRA or RCF methodologies. The outcome from these methodologies was presented to the ERP. An appropriate range of estimate, given the strengths and weaknesses of each methodology, has been outlined below:

- Management Base – a lower end estimate based on a P95 QRA.
- Upper End – in order to encapsulate macro risks and unknown unknowns, an upper limit of P80 RCF is included. This ensures that a conservative approach has been taken with respect to the estimate and guards against optimism bias, as required under the Public Spending Code.

Table 5.1: Contingency Range for the Project

	Risk Allowance/Contingency (Nominal €m, incl. VAT)
Management Base – P95 QRA	1,555
Upper Limit – P80 RCF	2,934

While a P95 QRA estimate has been used to derive the Management Base estimate for the Project, it was decided that the use of P95 RCF would be unreasonably conservative for this project. On the basis of the reports provided to the ERP and interaction with that panel and with the Uisce Éireann Board, Uisce Éireann believes that the following recommendations are robust and aligned with what would be expected at Preliminary Business Case stage: that a P80 RCF Risk Allowance represents a best practice number to use in the financial and economic appraisal of the project for the upper limit and that the most appropriate Risk Allowance to be used for the target project budget is P95 QRA.

5.2 Project Delivery Cost – Forecast Cost Range

The base estimate, excluding contingency allowances, is €3,025m. A breakdown of this is provided in Table 5.2 with the estimate range presented in Table 5.3.

Table 5.2: Delivery Cost for the Project – Base Cost

	€m incl VAT
Construction Cost (real)	1,508
Non Construction Cost (real)	395
Finance Charges (real)	50
Inflation	1,070
Total Nominal Costs, excl contingency	**3,025**

Table 5.3: Delivery Cost Forecast Range for the Project

Nominal €m incl. VAT	Risk Allowance / Contingency	Total Estimate
Management Base – P95 QRA and special contingencies	1,555	4,579
Upper End – P80 RCF	2,934	5,958

The above costs have been subjected to a detailed sensitivity analysis conducted by EY, along with sensitivities relating to benefits, operational expenditure and other key assumptions/variables. These sensitivities were conducted as part of the financial appraisal and Cost Benefit Analysis as outlined in Sections 6 and 7.

The estimated cost of the project has evolved over many years. In the initial stages of project development, preliminary indicative cost estimates for the project ranged from €800m to €1.4bn. Following the adoption of a more mature approach to risk identification, additional project design and development, and provision for inflation at the time, a revised preliminary indicative estimate range of between €1.9bn and €2.4b was adopted in 2020. The estimate was revised further through 2021/2022 and into 2023 taking into account: the requirements of the Public Spending Code for contingency provision (in particular the use of RCF to inform the contingency provision for an upper end of the estimate range); further design development; and, the high inflationary environment being experienced. This provided a revised preliminary estimate range of €4.579bn to

€5.958bn, which is the basis of the project estimate in the Preliminary Business Case.

5.3 Operating & Maintenance Costs

Estimates of operating costs for the Proposed Project were developed by Jacobs Tobin and reviewed by Uisce Éireann. The principal operational costs relate to:

- Payroll/direct labour for the operation of the infrastructure.
- Power costs to treat and pump water.
- Chlorination and chemicals relating to the treatment of water.
- Sludge disposal.
- Maintenance of mechanical and electrical infrastructure.
- Other costs including general consumables and insurance.

Variable operational costs are driven by the water supply profile for the Proposed Project. The Proposed Project will supply water to the GDA WRZ only (but will have capacity to cater for future connections to 35 other WRZs) therefore the opex costs for the Proposed Project are based on the forecast NYAA supply demand deficit profile for the GDA WRZ. The operational costs have been included in both the financial and economic appraisals and are subject to sensitivities conducted by EY to ensure the overall robustness of the business case. Operational costs have been inflated in line with forecasts of the HICP index.

5.4 Renewal Cost Estimates

The proposed project will have a significant useful economic life – nearly 80 years on a weighted average basis. The chosen appraisal period and the asset life of the project dictates the extent to which replacement capital expenditure is required within that period. Uisce Éireann's Guide on Investment Appraisal: Approach and Assumptions states:

"The appraisal period is the time over which the impact of a project is assessed. This is typically the life of the overall asset constructed as part of the project. However, some assets are particularly long-lived, such that a very long appraisal period may be impractical, or a project may have components with very different asset lives. As a result, a standard assumption has been developed for the purposes of appraising any standard water or wastewater project, which is 30

years from the expected completion of the project, based on the option with the longest construction and lead time".

Following from the above, a 30-year appraisal period has been adopted for the Water Supply Project. The use of a 30-year appraisal period is also recommended by the European Commission's guidelines for water supply/sanitation reference periods – these guidelines are included in the Public Spending Code.

Replacement capital expenditure during this 30-year period primarily relates to fibre optic cables, ducting for electrical connections and general mechanical/electrical infrastructure. Operational costs also provide for the inspection and maintenance of certain infrastructure on an annual basis.

Replacement capital expenditure and residual values have been inflated in line with the construction inflation index described above. Sensitivity checks of this expenditure, along with overall capital expenditure, has been completed in the Cost Benefit Analysis. The residual value relating to the project after the 30-year appraisal period has been included in both the financial and economic appraisals.

6 Financial Appraisal of the Proposed Project

Financial and economic appraisals of a shortlist of RWRP-EM Strategic Options for the purposes of identifying the Preferred Approach in the Preliminary Business Case options appraisal process, were presented in Section 3. This section presents the Financial Appraisal of the **Proposed Project** relative to a Do Minimum counterfactual. Affordability considerations are also included in this section.

The costs captured by a financial appraisal typically include:

- Total investment costs.
- Total operating costs.
- Maintenance and renewal costs.
- Residual values.
- Incremental revenue as a result of the project occurring.

The absolute value of costs relating to the Proposed Project were presented in Section 5. A financial appraisal also requires discounting of cashflows to reflect time value of money and opportunity cost of capital (Discounted Cashflow Analysis (DCF)). Uisce Éireann performed two versions of this analysis (both approaches are outlined under the Public Spending Code):

- DCF from the Exchequer's perspective (Exchequer Cashflow Analysis - ECA)
- DCF from the Sponsoring Agency's perspective, representative of a more traditional approach to a financial appraisal.

6.1 Discounted Cash Flow – Methods

For comparison purposes, an overview of the different appraisals performed in Sections 6 and 7, is outlined below in Table 6.1. All appraisals have been conducted over a 30-year period. The appraisal compares:

- The Proposed Project (Parteen Basin 280Mld) - delivery of a major new supply from Parteen Basin on the River Shannon to the GDA.
- Do minimum – counterfactual (see Section 3.5 for further information).

Table 6.1: Overview of Appraisal Methods

	DCF Exchequer (ECA)	DCF Sponsoring Agency	Economic Appraisal
Section of this document	7	7	8
Financial Benefits and Costs Included	Yes	Yes	Yes
Societal Benefits and Costs Included	No	No	Yes
Discount Rate	Real	Nominal	Real
Cashflows (Inflation Basis)	Real – 2022 monies	Nominal	Real – 2022 monies
VAT included	No	Yes	No

It should be noted that the costs included in the above differ from those in Section 5 due to the exclusion of sunk costs and finance charges, and the differences in the treatment of VAT and inflation. Finance charges have been excluded as the cost of finance is captured within the discount rate assumptions used.

6.2 Expenditure Profile

The output of any DCF analysis is contingent on the timeline associated with the expenditure, due to the discounting of cashflows in the future to a singular point in time. The DCF in Section 6.3 discounts all cashflows back to 1st January 2023.

A summary of the undiscounted capital expenditure is shown in Table 6.2. All costs are based on a P95 QRA assumption and are then profiled out to the project completion date of 2032, with the majority of the expenditure taking place in the construction phase (2028-2032).

Table 6.2: Capital Expenditure Summary – Nominal/Undiscounted €m

Cost Category	Total
Construction Costs	2,465
Non Construction Costs	486
Contingency	1,555
Finance Charges	74
Total Costs	4,579

6.3 Discounted Cash Flow – Output

Following the discounting of the project cash flows outlined above, the results of the DCF Exchequer (ECA) are shown in Table 6.3. These costs reflect both the gross cost of the Proposed Project and the incremental costs to the Do Minimum scenario (i.e., both options assume all committed investments in the network and a target leakage reduction programme in the GDA as described earlier).

Table 6.3: DCF Exchequer (ECA) – Discounted Values €m

	€m
A Capital Costs	(2,562)
B Residual Values	1,703
C Operating Costs	(575)
D Operating Revenue	418
Total NPV	(1,016)
Benefit Cost Ratio - BCR = (B+D)/(A+C)	0.68
Discount Rate – NDFA (1.79% nominal, converted to real)	-0.21%

The sum of the capital costs, residual value and operating costs reflects the cost of the asset over a 30-year period, while the operating revenue results from increased non-domestic revenue due to increased water supply.

The Net Present Value (NPV) is less than 0 and the BCR is less than 1. However, by including societal benefits and costs, the economic appraisal shows the Proposed Project to be desirable as it will increase water supply for a significant cohort of the population and deliver significant social and economic benefits.

The results of the DCF from the perspective of the Sponsoring Agency are presented in Table 6.4 (see Table 6.1 for differences between the DCF ECA and the DCF from the perspective of the Sponsoring Agency). The results are consistent with the DCF Exchequer ECA output, as the Net Present Value (NPV) is less than 0 and the BCR is less than 1.

Table 6.4: DCF Sponsoring Agency – Discounted Values €m

	€m
A Capital Costs	(3,761)
B Residual Values	1,729
C Operating Costs	(557)
D Operating Revenue	353
Total NPV	(2,236)
Benefit Cost Ratio - BCR = (B+D)/(A+C)	0.48
Discount Rate – 3 month moving average of Ireland 2050 bond yield	2.86%

All figures in Table 6.4 are discounted values. The bridge to the capital expenditure outlined in Section 5 (P95 QRA basis - €4,579m) and Section 6.2 is shown in Table 6.5. Finance costs and sunk costs are excluded as per PSC guidance.

Table 6.5: Bridge to Nominal Capex per Section 5

	€m
Discounted capital Costs (Table 6.4)	3,761
Undiscounted capital costs excl capital replacement	4,447
+ Finance Charges	74
+ Sunk Costs	59
Capital Costs per Section 6.2 (P95 QRA basis)	4,579

6.4 Affordability Considerations

The Proposed Project has been identified as the best option to meet the water supply needs of the GDA and wider region from a technical, engineering and environmental perspective. The financial and economic appraisals further support the conclusion reached in the RWRP-EM that a New Shannon Source with transfers is the Preferred Approach on a regional basis. It will deliver the objectives and target outcomes and maximise the benefits for society.

In developing the design for the Proposed Project, as well as through public consultation and stakeholder engagement, various configuration and phasing decisions have been considered. These decisions have sought to ensure the Proposed Project benefits will delivered while identifying any potential to offer cost reductions or deferrals. This has been discussed in Section 4.3.2.

For the project to proceed, it will require Ministerial approval. Indicative project costs are outlined in this document and will be updated over time within a number of other documents/submissions, including Uisce Éireann's: Business and Financial Plan (BFP); Strategic Financial Plan (SFP); Annual budgetary submission; Capital Investment Plans (CIP); Revenue Control (RC) Submissions, specifically the forthcoming RC4 process; and, further business case updates as the project moves through approval gates. A multi-year commitment will be required to ensure the project is delivered, in line with the envelope of the wider Uisce Éireann capital investment programme. If approval is granted, it is expected that the project will be funded through the existing Exchequer mechanisms outlined in the Memorandum of Funding Agreement between the Department of Housing, Local Government & Heritage and Uisce Éireann. Annual expenditure for the project will be approved in accordance with the annual Exchequer budget. As shown in Section 6.2, the majority of funding will be required over the 2028-2032 period (€4,275m over the 5 years) in line with the construction phase of the project. The residual funding will be required over the preceding years.

6.5 Sensitivity and Scenario Testing

Detailed scenario testing of the economic appraisal, which includes both financial and non-financial parameters, has been undertaken as part of the CBA process. Section 7 provides an overview of this analysis and its link to the sensitivity analysis requirements under the Public Spending Code.

7 Economic Appraisal of the Proposed Project

7.1 Overview

The Proposed Project will deliver significant benefits to society during its lifetime. Under the Public Spending Code, major projects are subject to economic appraisal which assesses a project's desirability from a societal perspective. The appraisal incorporates societal benefits and costs, in addition to the traditional financial benefits and costs from the financial appraisal. Economic appraisals allow for a Cost Benefit Analysis (CBA) or Cost Effectiveness Analysis (CEA) or Multi-criteria Analysis (MCA). For projects with an estimated capital cost in excess of €100m, a CBA should be undertaken.

This chapter presents the Economic Appraisal of the Proposed Project relative to the Counterfactual (in accordance with the PSC). The basis for this CBA is:

- The scope and preliminary design of the Proposed Project.
- The costing of the Proposed Project, as outlined in Section 5. The costs in Section 5 are provided in nominal terms. For the purpose of the economic appraisal and in accordance with the Public Spending Code, costs and benefits have been expressed in real terms (2022 monies).
- A P95 QRA has been used as the Risk Allowance for the base case CBA.

EY was commissioned to undertake this CBA and the appraisal comprised an analysis of the financial, economic and social impacts of the Proposed Project from the perspective of Irish society. Where possible, the Proposed Project's costs and benefits have been monetised in line with Cost Benefit Analysis methodologies.

7.2 Economic Analysis Options and Components of the CBA

The appraisal compares:

- The Proposed Project (Parteen Basin 280Mld) - delivery of a major new supply from Parteen Basin on the River Shannon to the GDA, with related works in the GDA, including a Termination Point Reservoir (TPR) at Peamount, Co. Dublin
- Do minimum – counterfactual (see Section 3.5 for further information).

Both options assume all committed investments in the network and a target leakage reduction programme as described earlier. The CBA was conducted on an incremental basis – i.e., what are the incremental benefits and costs of the Proposed Project relative to the Counterfactual.

The first step of the economic analysis is to take the components of the ECA analysis as presented in Section 6, and include any quantifiable societal benefits/costs. While the methodology used to quantify these elements differs to the methods used to quantify financial cashflows, significant sensitivity testing has been carried out to the test the robustness of the assumptions. The benefits and costs quantified as part of the economic analysis are:

Table 7.1: Components of the CBA

Item	Benefit/Cost	Included in DCF ECA (Section 6)
Non-Domestic Revenue	Benefit	Yes
Residual Value	Benefit	Yes
Water Supply Outages avoided – Domestic	Benefit	No
Water Supply Outages avoided – Non Domestic	Benefit	No
Capital Expenditure	Cost	Yes
Operating Costs	Cost	Yes
Shadow Price of Public Funds	Cost	No
Carbon Footprint	Cost	No
Traffic Disruption	Cost	No

As the financial elements of the ECA have already been discussed in Section 6, Table 7.2 overleaf addresses the non-financial elements, or societal benefits/costs, providing a description and brief overview of the methodology used to monetise the respective benefit/cost.

Table 7.2: Societal Benefits and Costs

External Costs & Benefits Parteen Basin	Description
Water Supply Outages – Domestic and Non-Domestic	• Project reduces potential water outages significantly, avoiding supply disruption to the GDA. • The value of reducing domestic outages has been calculated through the use of studies, both US and European, on price elasticity of demand with respect to domestic water usage and applying this value to forecasted outages beyond 2032 under a Do Minimum Scenario. • The value of reducing non-domestic outages has been calculated by applying a forecast Do Minimum outage percentage to forecast Gross Value Added (GVA) for the GDA beyond 2032, adjusting for water resilience and water intensity ratios across various sectors. • All potential outages under the Do Minimum scenario have been calculated using the outage methodology developed in line with NWRP. • A conservative approach has been taken to benefit calculations by: (a) using the lower end of cost ranges related to domestic customer impact; (b) using outages based on demand which is capped at 2050 for the purpose of calculating supply outages to both domestic and non-domestic sectors; and, (c) excluding potential direct impacts on FDI as a result of water outages.
Traffic Disruption	• Construction phase will lead to traffic disruption in/around the construction area. The impact is monetised by estimating the value of time through the use of CAF and PAG[47] methodologies.
Carbon Footprint	• The energy resources required to both construct and operate the chosen solution will lead to carbon emissions. The monetisation of this is done by applying spot and forward prices for carbon credits under the emission trading system.
Shadow Price of Public Funds	• For publicly-funded projects, the Exchequer must withdraw money from other sectors of the economy to pay for them, through taxes. In order to take account of the distortionary impact of these taxes, a shadow price must be applied (a credit would be applied where the Exchequer cashflow is positive). The Public Spending Code sets the value of the shadow price of public funds at 130% of the annual net Exchequer cashflow.

In addition to the monetised impacts outlined, there are other potential external impacts which have not been monetised including:

[47] Common Appraisal Framework (CAF) and Project Appraisal Guidelines (PAG).

- House construction.
- Indigenous industry impacts.
- Impacts on ecology/biodiversity.
- Wider carbon impacts – the additional infrastructure necessary nationally to support energy consumption, including renewable energy infrastructure in the context of Ireland's climate change commitment and targets.

7.3 Economic Appraisal - Results of the CBA

Following the monetisation of the factors outlined in Section 7.2, an economic Net Present Value (eNPV) and an economic Benefit Cost Ratio (eBCR) are generated. An eNPV > 0 and an eBCR>1 suggest that based on the inputs of the CBA (P95 QRA), the project is desirable from a societal perspective.

The eBCR and eNPV for the base case set of inputs are 12.25 and €29.854bn respectively. The components of these results are outlined in Table 7.3. All results have been generated by discounting cashflows back to 2023, using a social discount rate of 4%, as required under the Public Spending Code.

Table 7.3: Economic Appraisal Output

Item	Benefit/Cost	Discounted €m
Non-Domestic Revenue	Benefit	133
Residual Value	Benefit	340
Water Supply Outages avoided – Domestic	Benefit	5,949
Water Supply Outages avoided – Non Domestic	Benefit	26,086
Capital Expenditure	Cost	(1,906)
Operating Costs	Cost	(213)
Shadow Price of Public Funds	Cost	(494)
Carbon Footprint	Cost	(41)
Traffic Disruption	Cost	(1)
Total NPV		**29,854**
Benefit Cost Ratio		**12.25**

The eNPV and eBCR metrics show that the Proposed Project, Parteen Basin 280Mld, is desirable from an overall socio-economic perspective.

The result is primarily driven by the avoidance of water supply outages relating to the domestic and non-domestic sectors, and the associated social/economic benefits.

Based on the above result, the Proposed Project is a good investment. However, it is important to recognise that the above economic appraisal reflects base case results, which are based on a point estimate for each assumption. Given the inherent uncertainty in any estimate and to guard against optimism bias, the Public Spending Code requires extensive scenario and sensitivity analysis, which is outlined in Section 7.4 below.

7.4 Sensitivity and Scenario Analysis

Uncertainty and the requirement to use long-term forecasts in many cases necessitate making a number of assumptions. Realistic assumptions reduce the level of uncertainty but do not eliminate it. As such, the results of the analysis are potentially associated with a wide margin of error. The sensitivity/scenario analysis tests assist in identifying the impact to the CBA outcome as a result of changing key assumptions, either individually or in-combination.

Sensitivity analysis shows the variability of potential eNPV/eBCR as individual key assumptions are changed. The Proposed Project is economically robust as an investment if the sensitivity analysis shows that it remains economically favourable even as key variables and assumptions change.

Scenario analysis tests the robustness of a Preferred Option as a combination of key variables change – the Public Spending Code in particular references this in relation to CBAs: *"Appraisals should systematically test low benefit outturns against highest cost outturns for the critical variables as part of the sensitivity analysis."* Similar to the sensitivity analysis, a robust Preferred Option will remain so in a range of scenarios. The sensitivities/scenarios used include the testing of:

- Capital expenditure assumptions.
- Operating expenditure assumptions.
- Variations in economic benefits.
- Variations in the social discount rate.
- Scenario where both capital costs and operating expenditure are higher than expected.

- Scenario where capital costs are higher than expected and economic benefits are lower than expected.

The Stage 2 CBA results include 13 sensitivities/scenarios. The key sensitivities are presented in Table 7.4, along with the revised eNPV and eBCR. In all cases, the Parteen Basin remains economically favourable, supporting the robustness of the overall appraisal.

Table 7.4: Sensitivity Analysis

Scenario	eNPV €m	eBCR
Capital Costs as per P80 RCF (30% higher than base case P95 QRA)	29,244	9.69
Capital Costs as per P95 RCF (127% higher than base case P95 QRA)	27,270	5.81
Opex Cost 10% higher than expected	29,827	12.12
Opex Cost 50% higher than expected	29,716	11.64
Benefits (Non Dom Revenue, Domestic and Non Domestic Outages) 50% lower than expected	13,741	6.12
Social discount rate of 6%	16,956	8.29
Capital costs and operating costs both 50% higher than expected	28,699	8.21
Benefits (Non Dom Revenue, Domestic and Non Domestic Outages) 50% lower than expected, and Capex 127% higher than expected (P95 RCF)	11,156	2.96

8 Delivering the Proposed Project

8.1 Introduction

Delivering the benefits of this strategic infrastructure project for the Eastern and Midlands Region, will require effective project management and execution at all stages of the project's lifecycle from design, procurement and contracting to construction, commissioning, operation and maintenance. This section presents an overview of key elements of the delivery of the Proposed Project as follows:

- Proposed approach to implementation.
- Preliminary contracting and procurement strategy.
- Governance and risk management.
- Stakeholder engagement.
- Benefits realisation.

8.2 Proposed Approach to Implementation

The Proposed Project is a major infrastructure project of national strategic importance. The proposed pipeline would be the longest water pipeline ever delivered in Ireland to date. The ground conditions along the pipeline corridor are expected to be variable and there will be numerous crossings of watercourses and infrastructure such as roads, railways, utilities and canals. Extensive consents and applications are required to deliver the infrastructure as outlined earlier.

Uisce Éireann has a strong track record of delivering major water, wastewater and pipeline infrastructure. While the scale and complexity of the Proposed Project is greater than projects which have been delivered previously, the technologies involved are not new and are commonly adopted in the delivery of Uisce Éireann's capital programme. Uisce Éireann has identified the capabilities and structures which are required to deliver the project successfully and have established a governance and delivery structure to ensure this is achieved. These include a Project Director and Project Team to lead its delivery, along with robust oversight and review structures.

The Proposed Project will be delivered by Uisce Éireann in conjunction with a "Client Partner" and multiple "Construction Delivery Partners" which will be overseen by the Client Partner, as described in Section 8.3.

- The Client Partner will develop the detailed project design and associated tender documentation, evaluate contractors and act as the Employers Representative and oversee the Construction Delivery Partners during the construction of the major civil infrastructure to commissioning and operational stages.
- The Construction Delivery Partners will deliver the construction phase of the pipeline and infrastructure packages. The procurement strategy for the Construction Delivery Partners will be developed in conjunction with the Client Partner, once appointed.

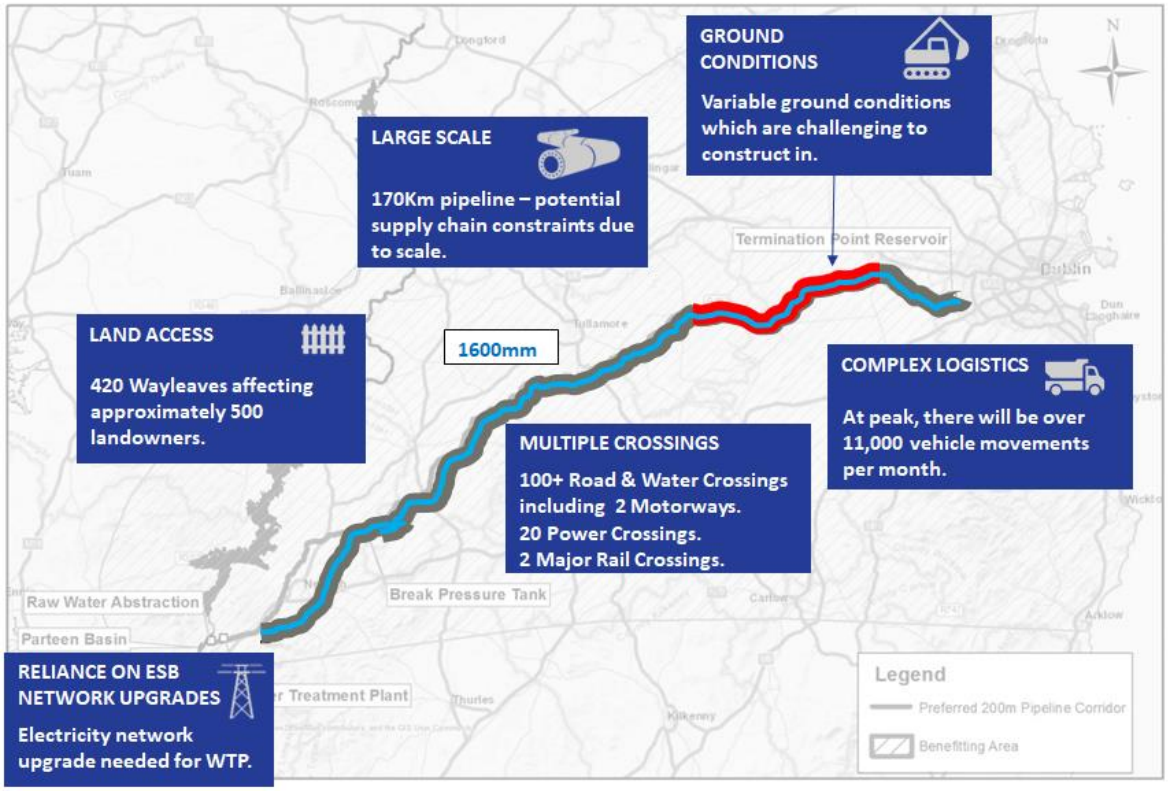
8.2.1 Construction Approach Peer Review

In 2020, Uisce Éireann engaged Ryan Hanley Stantec (RHS) to undertake a peer review of a draft version of the Construction & Commissioning chapter of the Environmental Impact Assessment Report (EIAR) for the Proposed Project. As part of that review, RHS examined the principles underpinning the proposed approach to construction of the infrastructure. The proposed approach at the time, was to deliver the works in four main construction contracts, over circa, a four-year period. While some queries were raised by RHS regarding the deliverability of some elements of the works within individual timelines, the overall approach and timescales were considered generally reasonable. In the intervening period, the approach to construction and commissioning has been further developed and refined, and the overall delivery programme is now estimated at between 4.5 to 5 years. The proposed procurement approach is broadly in line with the approach which was reviewed and generally endorsed by RHS, while also taking into account the comments and recommendations made by RHS at the time.

8.3 Preliminary Contracting & Procurement Strategy

A preliminary contracting and robust procurement strategy is emerging as a feasible delivery mechanism for the Proposed Project which takes account of the project's technical, engineering, financial, procurement/market capacity and other challenges and risks, as summarised in Figure 8.1.

Figure 8.1: Summary of Challenges



Broadly, the emerging procurement and contracting strategy anticipates the procurement of a series of Design-Build (DB) contracts for the main construction phase and a Client Partner, as noted above. The DB contracts will comprise both pipeline and infrastructure packages and will be constructed by several construction Delivery Partners. Oversight and integration shall be provided by the Client Partner.

The Client Partner will develop a detailed design from the current concept design, for all the construction elements of the project. The Client Partner will also develop the associated tender documentation for works packages and evaluate contractors' technical responses during the procurement competition. The Client Partner will be appointed to a key statutory role as Project Supervisor Design Phase (PSDP) for both the design and construction phases to ensure an integrated safety approach. Another critical role will be acting as Employers Representative (ER) during the construction phase until all infrastructure and pipeline sections are commissioned and operational.

Due to the high complexity and importance of the project, the Client Partner is expected to work collaboratively with all stakeholders to maximise innovation and ensure successful delivery of the project, while maximising value-for-money.

The key procurement and contracting strategy principles comprise:

- Support the safe completion of the project by the current target date of 2032.
- Deliver value-for-money in terms of whole-life costs.
- Apply a robust approach to governance and control including contract approval and management, complying with all internal controls and with all relevant EU and national procurement rules.
- Foster a culture of collaboration between the Client and all Contractors/Suppliers to ensure the best opportunity for success.
- Contract with technically competent and financially robust suppliers and award contracts based on technical expertise, experience and the most economically advantageous offers.
- Risks related to procurement and delivery are identified, evaluated and allocated appropriately to achieve value-for-money.
- Green procurement is a key objective. Sustainability underpins the project, requiring construction and operation of the water supply infrastructure in an efficient, low carbon and climate-resilient manner.
- Funding - the procurement strategy is being developed on the basis that funding will be derived from the Exchequer rather than private sources.

The emerging contracting structure is summarised as follows:

1. A Client Partner will be retained to draft the tender documentation and drawings to a performance specification, as well as evaluating the procurement competitions and providing technical assurance oversight as Employers Representative;
2. A series of advance works packages leveraging existing Uisce Éireann frameworks, that if undertaken early, would allow for faster mobilisation of the larger construction contracts;
3. Two or more geographically-based DB contract packages for construction of the pipeline across the entire proposed route; and
4. Several contracts for the construction and commissioning of the required infrastructure on five discrete sites consisting primarily of abstraction, treatment, pumping and reservoir.

The following key considerations were taken into account when developing the outline package structure:

- **Whole Life Performance & Operation** – Design Build Operate (DBO) packaging. Suitability of delivering particular assets within a single procurement package.
- **Scope & Scale** – balancing economies of scale with market capacity and delivery risk.
- **Complexity & Type of Works** – group similar types of works where possible - some works will suit contractors with specific skills sets and experience.
- **Contractor capability & capacity** – the packaging strategy must:
    - be aligned to supply chain capacity and capability;
    - maximise opportunities for small medium enterprises (SMEs) and the supply chain in general; and,
    - ensure sufficient capacity to supply them.
- **Interfaces** – minimise inter-package interfaces where possible (geographical, design, schedule and contractual) to prevent complexity/potential points of failure.
- **Location/geography of works** – includes requirements for multi-location working (i.e., parallel work fronts in different geographies).
- **Seasonal Restrictions** – main pipeline activities generally have a restricted window outside of the winter period potentially creating significant periods of reduced activity and additional mobilisation / demobilisation costs (crossings works could be conducted in the remaining period to provide continuity of work for example).

The emerging Procurement & Contracting Strategy supports Approval Gate 1 as part of the Preliminary Business Case. Further work will be done in support of Approval Gate 2 which requires a Detailed Procurement Strategy.

8.4 Governance & Risk Management

A project of such importance and scale must be controlled through a rigorous governance framework to ensure effective management of project scope, cost and delivery in addition to clear and direct accountability. This is critical for delivering value-for-money and for managing project risks effectively. It is also critical for ensuring timely and effective decision-making and reporting and a systematic application of project controls.

Uisce Éireann has established a rigorous governance approach for all capital projects which is fully aligned with the Public Spending Code and integrates the corporate governance requirements of the Uisce Éireann Board (as the Approving Authority) and Uisce Éireann executive (as Sponsoring Agency). Reflecting the scale and importance of the project, together with its extended project lifecycle, additional controls have been put in place to ensure the project's governance framework is fit-for-purpose and drives value-for-money.

The project is also subject to extensive external governance, to take account of the unique nature of the statutory structure, responsibilities and funding of Uisce Éireann.

A summary of the key aspects of the Proposed Project's oversight and governance is presented in Figure 8.2.

Figure 8.2: Summary of the Project Governance Framework

1. Project Governance Structure

- A robust governance structure is in place comprising Government stakeholders (DPER, DHLGH, NewERA), the Commission for the Regulation of Utilities (CRU), the Uisce Éireann Board, Expenditure Approval Committee (EAC) and Project Advisory Board (PAB), a Project Director and team. The Uisce Éireann Board is the day-to-day Approving Authority and Uisce Éireann Executive is the Sponsoring Agency.
- These structures form the project's delivery, oversight, escalation and approval structure. It is based on principles of "check, review and challenge" in conjunction with independent audit and assurance. It reflects the requirements of the Water Services Sector Specific Guidelines of the Public Spending Code.

2. External Governance & Oversight

- Uisce Éireann's Government Departments and the CRU provide governance and oversight through specific structures, review and approval processes.
- Government approval is required at three major Decision Gates including the Preliminary Business Case. It is facilitated by DHLGH and its Major Water Infrastructure Group which has a governance role for projects >€500m. The Preliminary Business Case is subject to a review by the CRU and a technical review by DPER which is supported by the Major Projects Advisory Group (MPAG), prior to consideration by Government. NewERA also carries out a review of any project >€50m, including the Proposed Project.

3. Project Expert Review Panel

- An independent Expert Review Panel has been established by Uisce Éireann for the project. It comprises an expert in major infrastructure delivery from each of the following three organisations: EY; Oxford Global Projects and Mott MacDonald.
- The role of the Expert Review Panel is to provide expert advice and challenge to the Project Team and Project Advisory Board about strategic decisions, cost forecasting, assumptions and best practice throughout the lifecycle of the project.

4. Uisce Éireann Project Advisory Board (PAB)

- The PAB is an internal Board comprising senior Uisce Éireann executives including the CEO. Its role is to provide direction and guidance to the Project Director in overseeing the implementation of the project and ensuring that the overall interests of stakeholders are preserved during project planning and implementation. This includes, but is not limited to, monitoring realisation of the strategic objectives, benefits, and adherence to timelines and budgetary provisions.
- The PAB is primarily focused on budget and schedule performance, scope control, risk management and any wider issues outside the visibility of the Project Director. It does not have budget approval authority and is not involved in the day-to-day management of the project.

5. Project Director & Project Team

- Day-to-day leadership is the responsibility of the Project Director who: directs and manages the project to deliver the objectives; advances the project investment case and is accountable for project outcomes and benefits; reports on the project, escalating issues as necessary; and, secures approvals through the appropriate governance structures.
- A Project Team reports directly into the Project Director. The team has been configured based on the key disciplines and capabilities required to deliver the project safely and efficiently.
- The Client Partner and construction Delivery Partners are an integral part of the project team and will work closely and collaboratively with Uisce Éireann in the delivery of the project.

6. Project Management & Controls (inc. Risk Mgt.)

- Best practice project management and controls are in place including: project planning & scheduling; cost estimating and management; change management; and risk management. These ensure there are clear planning and control procedures and that costs are constantly monitored and controlled.
- A mature "Stages & Gates" process for management and governance of projects through the capital investment life cycle is also in place, which aligns with the requirements of the Public Spending Code. It has six mandatory review points / Approval Gates in the project investment appraisal and approval process.
- A Project Management Office (PMO) provides project controls and governance to manage project information flows. It also coordinates project risk reviews and oversees change control.

7. Project Reporting & Escalation

- An extensive reporting structure and protocols are in place. Update reports are provided on a monthly and quarterly basis to senior management and the Infrastructure & Investment Committee of the Board.
- External updates are presented to the DHLGH, NewERA, the EPA, CRU, and the Delivery Monitoring Group on progress and status, outcomes, emerging issues, risks and compliance with the Public Spending Code etc.
- Uisce Éireann's Capital Investment Governance Framework ensures all capital investment is aligned to objectives and strategies. Six performance metrics are used, known as the "Six Dials", to enable performance to be tracked over time.

The project's Governance Framework ensures:

- **Robust oversight:** the governance structure clearly defines the management and reporting structure and responsibilities for the project. It sets-out the decision-making and information flows between stakeholders at each level including the Uisce Éireann Board and executive. The reporting framework, in particular the external oversight and approval processes, ensure that the Uisce Éireann Board, DHLGH and the Government are fully appraised of project status and developments in a timely manner, allowing for early intercession and action as required;
- **Good decision-making:** the reporting structures and procedures allow for timely dissemination of robust information and analysis to inform decision-making;
- **Challenge:** Uisce Éireann's Board, the Expenditure Approval Committee, the Project Advisory Board and the Expert Review Panel all challenge and examine the project team's strategic decisions. Challenge also comes at Government level through the various external governance, oversight and approval structures.
- **Accountability:** a project governance framework and structure are in place which clearly identify the roles and responsibilities of each stakeholder. The governance framework and structure also ensure risk is managed well and that appropriate levels of authority and accountability are assigned to enable key decisions to be made throughout the project's lifecycle. A strong leadership team is in place with clear project accountabilities.

8.4.1 Risk Management

Risk management is a vital part of the project's governance framework as managing risk and uncertainty is fundamental to the successful delivery of the project.

Project risk is identified and managed within a hierarchical framework by Uisce Éireann. The hierarchy includes: strategic organisation-wide risks; portfolio risks; programme and sub-programme- risks; project risks; and, contract risks. All risks at all levels of the hierarchy are subject to robust risk management appraisals.
The risk management process provides a structured and systematic approach to the identification, assessment and treatment / mitigation of risks to ensure project

success by minimising any project threats and potential impacts. It encompasses the management of all categories of risk throughout all stages of the project lifecycle, from planning, design and construction through to commissioning and handover to client operations. Risk management is not a one-off project activity – it is iterative and continuous and will continue to be refined, enhanced and updated as the project progresses.

Clear lines of responsibility for the management of risk is a key element of effective risk management for the project. There is formal reporting and escalation of the project's risks on a regular and defined basis. The Project Director, Project Managers and project team maintain up-to-date / project risk registers and review and refresh risk controls and actions on an ongoing basis. Risks are regularly reported to the Uisce Éireann Assets & Services Risk Sub-Committee, Risk Management Committee and Board.

The project conducts regular QRA supported by Turner and Townsend, to evaluate the aggregate exposure of the identified risks on the cost (QCRA) and schedule (QSRA) and to prioritise risks and inform the risk management process. This process gives a robust assessment of the project's risk exposure using representative models that accurately reflect the nature of the risk. Both cost and schedule QRA are undertaken on a project basis to support investment decisions, Project change and options appraisals where risk may be a factor and to understand changes in risk exposure during the Project lifecycle.

The QSRA and QCRA utilise a three-point estimate of schedule/cost impact (minimum, most likely and maximum impact value) for a probable risk event. Monte Carlo simulation is then utilised to generate a risk schedule distribution (for the QSRA) and risk cost distribution (for the QCRA). Where mitigation strategies which have been implemented to reduce the cost/delay impact and/or probability of the risk occurring, this is also considered.

8.5 Stakeholder Engagement

Proactive Stakeholder Engagement and the support of key stakeholders is essential to delivery of the Proposed Project. Our Stakeholder Engagement Plan is designed to achieve three key objectives:

- Ensure stakeholder communications is timely, transparent and accessible.

- Build and maintain relationships with key stakeholders.
- Ensure that project's communications strategy aligns with Uisce Éireann's Corporate Strategy and stakeholder approach.

Uisce Éireann has a stakeholder management and communications plan in place since 2014. A stakeholder engagement platform is also used to create stakeholder profiles, upload ongoing communications and file documents such as emails, meeting minutes and presentations. It is fully compliant under the EU General Data Protection Regulation 2018. This tool is vital for managing stakeholder information easily and ensures that key information is recorded at all times.

Each round of public consultation is accompanied by a Stakeholder Action Plan that sets out how, when and what we communicate. As part of this plan, key stakeholders have been mapped and engaged with, both through the consultation process and through regular updates as the project has progressed. Project information and updates are tailored to meet the requirements of all audiences and these take place across all channels to ensure accessibility. There is a dedicated project phoneline and email address and individual feedback from the public is welcome at all stages. Uisce Éireann also engages with statutory stakeholders and oversight bodies such as An Foram Uisce, the Water Advisory Body and Uisce Éireann's own National Stakeholder Forum. We also host regular drop-in councillor clinics in each Local Authority and there is a dedicated local representative support service for information on the project. Project updates and communications are also a priority for the out-reach programme through Uisce Éireann's Public Affairs team.

Construction of the Proposed Project will take approximately four and a half to five years and will bring economic benefits to local communities during this time but it will also lead to some disruption. To this end, Uisce Éireann is engaging with the relevant Local Authorities and will provide further information to local communities with details of infrastructure sites along the route. Furthermore, a dedicated Community Liaison Officer (CLO) will be appointed for the duration of the construction works.

Landowner Engagement

There are almost 500 landowners along the route of the proposed pipeline corridor and a vital element of project stakeholder engagement is landowner engagement. Regular consultation is also taking place with the main farming organisations. Landowner engagement has been ongoing since 2016. It has primarily been undertaken via four Landowner Liaison Officers who have been advising landowners on the progress of route development and technical design and also arranging access for environmental surveys and ground investigation surveys. This ongoing engagement has assisted Uisce Éireann with route design and construction planning, with feedback received from affected landowners considered and assessed, and where possible, resulting in accommodating or partially accommodating local re-route requests.

Public Consultation

In compliance with the principles of the Aarhus Convention, public consultation is an integral part of the project. It is designed to provide early participation opportunities for the public and other stakeholders, to inform project development and decision-making. Since 2015, the Project Team has completed four phases of formal non-statutory consultation. It has engaged with over 1,500 stakeholders including landowners, community groups, public representatives and Prescribed Bodies as part of this process. There was extensive stakeholder engagement including information evenings in locations along the route, specific landowner information evenings, Oireachtas open days for elected representatives and 124 separate project briefings for statutory and non-statutory stakeholders. Both the consultation and information evenings were widely advertised both nationally and locally and a project newsletter provided an update to over 500 registered subscribers. The Uisce Éireann Executive and Project Team have also provided updates to the Joint Oireachtas Committee on Housing, Planning and Local Government.

The NWRP Framework Plan and the RWRP-EM were also subject to non-statutory consultation. 84 submissions were received on the Framework Plan and 64 on the RWRP-EM, several of which made specific reference to the proposed project. Copies of public consultation materials were available for public display in 29 Local Authority offices and two county libraries and Uisce Éireann also facilitated

webinars for the public and briefings for elected representatives and other stakeholders. Stakeholders will be provided with another opportunity to give feedback before the submission of a planning application.

8.6 Benefits Realisation

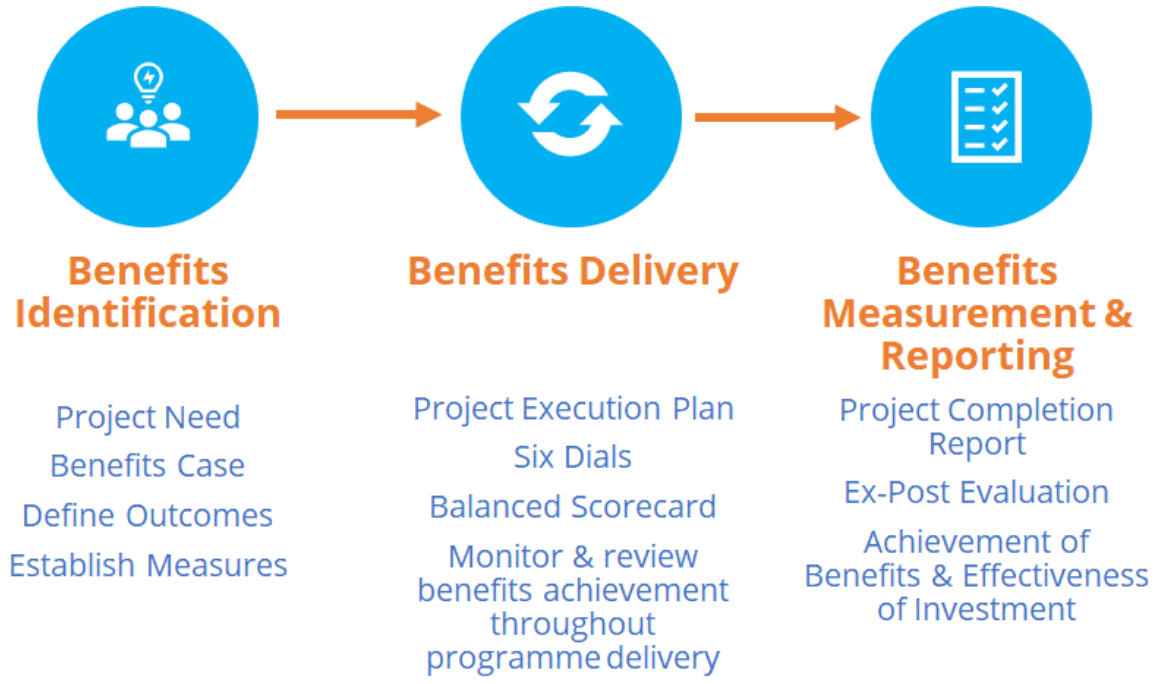
Benefits Realisation is a key element of Uisce Éireann's governance procedures. It is critical for ensuring that the project delivers value-for-money for the State. Uisce Éireann uses "Six Dials" for monitoring capital projects over the project lifecycle. Monitoring and evaluation of the project will be undertaken in line with the Public Spending Code 2019 and the Six Dials approach.

A Benefits Realisation Plan will be finalised for the project which will comprise the objectives and expected benefits and the management of their achievement, both during and following completion of the project. The benefits are typically strategic in nature and will comprise the project's target outputs and outcomes. Measures for these outputs and outcomes will also be identified, namely key performance indicators (KPIs). The project's Benefits Realisation Plan will align with the project's Six Dials which are used for monitoring the project internally. Operational KPIs, including contractor KPIs, will also be used to monitor the project's delivery and operational performance. These are subject to further development at Final Business Case (FBC) stage.

Annually, a Balanced Scorecard will be developed for the project which includes targets and associated metrics to be delivered in the year ahead. The Six Dials and operational KPIs will be reported on regularly at the appropriate governance fora to monitor the project's progress. A Project Completion report and Ex-post Evaluation of the project will be completed and submitted to the Approving Authority for approval at Gate 5. These reports will include an assessment of the achievement of the expected benefits of the project (objectives and related outputs and outcomes) and the effectiveness of the investment.

A summary overview of Uisce Éireann's Benefits Realisation & Evaluation process is presented in Figure 8.3.

Figure 8.3: Summary of the Benefits Realisation & Evaluation Process-



9 Conclusions & Way Forward

Uisce Éireann is seeking to progress a project to deliver a major new source of water to the EMR, including the GDA. It will contribute to meeting the long-term water supply requirements of a large proportion of the region in a sustainable manner, to 2050 and beyond. It will be the first major comprehensive upgrade to Ireland's new source water infrastructure in the region, in over 60 years.

The Proposed Project comprises abstraction of water from the lower River Shannon at Parteen Basin in Co. Tipperary, downstream of Lough Derg, with water treatment nearby at Birdhill. Treated water will then be piped 170km through counties Tipperary, Offaly and Kildare to a termination point reservoir at Peamount in County Dublin, connecting into the Greater Dublin network. This will form the basis for the planning application.

The Proposed Project has the capacity to supply communities in the Midlands, between the WTP near Birdhill and the termination point reservoir at Peamount, in addition to other locations outside of the GDA in the East of the country. Offtake locations will be provided along the supply main to facilitate future connections to supply those communities. The connecting pipelines and associated infrastructure will be delivered through separate projects, yet to be commenced.

There is a clear need for this new source of water supply. Based on the target 1 in 50 Level of Service that Uisce Éireann has adopted for our NWRP, 67% of the region's WRZs, including the GDA, have insufficient water supply available to meet demand at present and do not provide adequate reliability to customers in normal conditions. The current regional water supply deficit is 59Mld in normal conditions and 198Mld in a Dry Year Critical Period (2019).

The GDA accounts for the majority of the region's water supply deficit. In 2019, 81% of the region's water supply deficit (in normal conditions) was accounted for by the GDA (48Mld). In a Dry Year Critical Period, the GDA water supply deficit is 147Mld (2019).

The GDA is also over-reliant on a single source. 85% of water required to provide supply to the GDA is drawn from the River Liffey and this equates to more than 40% of the Liffey's mean annual flow. The remaining 15% of water required to

supply the GDA is provided from other sources, namely the River Vartry, River Barrow, small stream and groundwater sources. These sources are already being utilised at, or close to, their maximum just to meet average demand and are not capable of providing for peaks in current demand or for projected growth in average demand.

Our ability to continue to abstract from existing sources at current volumes into the future is not guaranteed. Implementation of a new abstraction licensing regime to comply with the requirements of the Water Framework Directive, could result in a reduction in the amount of water which can be abstracted from existing sources, in the future.

The Level of Service across the region is a significant issue. Level of Service is defined as the potential for an interruption to water supply due to insufficient water being available, or due to demand for water exceeding supply. Only circa 25% of the region's population receives Uisce Éireann's target Level of Service of 1 in 50 years (during normal conditions). The GDA has a 1 in 30 Level of Service in normal conditions but in a Dry Year Critical Period, this falls to 1 in 10 years. This is unacceptable given the scale of population and economic activity and the serious consequences of supply disruption for communities and industry.

Population growth, economic growth and climate change will exacerbate the region's water supply challenges even further. By 2044, the water supply deficit across the region is forecast to increase by 141% in normal conditions, from 59Mld in 2019 to 142Mld in 2044. It is projected to increase by 58% from 198Mld in a Dry Year Critical Period (base year of 2019), to 312Mld in 2044.

The water supply deficit in the GDA is forecast to increase from 48Mld in 2019 to 80Mld in 2044 in normal conditions and to 183Mld in a Dry Year Critical Period, in 2044.

If no action is taken, many water sources in the region will be at capacity by the late 2020s and will be unable to cater for new connections for residential and commercial developments. Existing business and residential customers will experience more frequent water supply restrictions over time and there will be increased risk of significant outages in the event of failure of critical water supply assets.

Reducing leakage and implementing water conservation initiatives, while providing valuable water savings, will not, on their own, address the significant deficit in the region's water supply. Notwithstanding the sustained and ambitious leakage reduction programme to reduce leakage to current target levels, and after making an allowance for water conservation and investment measures which will be delivered in the region, Uisce Éireann has forecast that by 2044, 34% more treated water will be required in the region, than we have today.

Government strategy and policy highlight the importance of the project. Ireland cannot grow its economy and deliver the National Strategic Outcomes as set out in the NPF and NDP without delivering transformational projects such as this. The NPF and NDP along with the Eastern & Midland Regional Spatial & Economic Strategy and the Dublin Metropolitan Area Strategic Plan all support the Proposed Project as a critical water infrastructure project which will transform the resilience and security of supply for the region. Likewise, stakeholder feedback from the public consultation on the RWRP-EM, from organisations which include IBEC, Dublin Chamber, County Kildare Chamber and County Councils including Wicklow and Meath etc., supports the project. It is seen as a critical water infrastructure project to address water supply resilience and security of supply and to support economic growth and prosperity of the region. The project also directly supports Ireland's National Climate Objective: "…*to pursue and achieve the transition to a climate resilient biodiversity rich, environmentally sustainable and climate neutral economy by the end of 2050*"[48]. It represents a climate adaptation response in line with the Climate Action Plan 2023.

The project is anticipated to generate significant benefits for the economy. With an economic Benefit to Cost Ratio (eBCR) of 12.25, the monetised benefits more than outweigh the costs. The non-monetised benefits are also extensive and reflect the valuable impact this long-term project will have today and for future generations.

In the period since the project transferred to Uisce Éireann, extensive technical, environmental and economic appraisal of the need, options and preferred solution has been completed. The cost forecasting methodologies and process

[48] Climate Action and Low Carbon Development Act (as amended) 2021 – Section 5.

(including independent review and validation) which have been applied to the project also provide a high level of confidence in its cost forecast. The project's CBA focuses on its value for the region and for wider society. The case for the project is strong and following robust assessment and analysis which meets the requirements of the Public Spending Code, it is recommended that it be advanced.

Next Steps – The Way Forward

The delivery of the Preliminary Business Case is an important milestone. It presents an overview of the extensive work completed for Decision Gate 1 approval of the Proposed Project. It outlines:

- The rationale for the project including the need and strategic benefits.
- Identification of the preferred option to provide a new source of water supply for the GDA and ultimately, for 35 other WRZs in the region.
- The scope and preliminary design of the Proposed Project.
- The emerging procurement and contracting strategy.
- The Proposed Project's costs (which will be updated as the project progresses).
- Financial and economic appraisals including project benefits.
- Project governance, control, accountability and risk management.

An extensive assurance and approval process is involved including: CRU review which is carried-out in accordance with the Department of Public Expenditure, NDP Delivery and Reform's external assurance process; review by the Major Water Infrastructure (MWI) Group (chaired by the DHLGH); and, review by the Major Projects Advisory Group (MPAG, which assists DPER's assurance process).

The next major milestone for the project is commencement of the wayleave acquisition programme, followed by submission of the Planning Application and Compulsory Purchase Order and the application for the Abstraction Licence to the EPA. Project workstreams which support the substantial work involved in completion of the Environmental Impact Assessment Report and Natura Impact Statement, procurement strategy, project brief development etc. are also being progressed.

Decision Gate 2 & Decision Gate 3

The project will submit its Detailed Project Brief, Project Execution Plan and Procurement Strategy to support decision-making and approval at Decision Gate 2. The Detailed Project Brief will form the basis for the construction contract packages and a refined budget will also be prepared. The Procurement Strategy will focus on finalising the emerging procurement and contracting strategy. The Project Execution Plan will present updated construction and delivery timeframe and milestones and longer-term maintenance and replacement requirements. Approval at Decision Gate 2 will allow the project to proceed with issuing tenders for works. Once preferred tenders are identified and tender prices received, the Final Business Case can be prepared for consideration at Decision Gate 3. No works tender can be awarded until planning approval has been secured. The Final Business Case will present: the detailed project brief; procurement strategy; project execution plan; economic and financial appraisal including sensitivity and scenario analysis; cost and assessment of affordability; risk management etc.

The importance of proceeding to the next stage of the project cannot be emphasised enough. Delaying the project will incur a significant cost both through the impacts of inflation on the forecast cost (estimated to be €4,579m) but also in the delay of realising the benefits of the project.

Approvals

It is noted that Decision Gate 1 Approval does not create an obligation on the part of the Approving Authorities to automatically permit the project to pass through Decision Gates 2 and 3. These approvals will be based on the merits of the documentation submitted to support them (Detailed Project Brief, Project Execution Plan and Procurement Strategy for Decision Gate 2 and a Final Business Case for Decision Gate 3).

10 Glossary & Abbreviations

Glossary & Abbreviations	
AG	Approval Gate
BCR	Benefit to Cost Ratio
CAF	Common Appraisal Framework
CBA	Cost Benefit Analysis
CCER	Capital Cost Estimate Review
CIP	Capital Investment Programme / Capital Investment Plan
CLO	Community Liaison Officer
CPO	Compulsory Purchase Order
CRU	Commission for Regulation of Utilities
CSO	Central Statistics Office
DAFM	Department of Agriculture, Food and the Marine
DBO	Design, Build, Operate
DCC	Dublin City Council
DECC	Department of the Environment, Climate and Communications
DG	Decision Gate
DHLGH	Department of Housing, Local Government and Heritage
DMA	Dublin Metropolitan Area
DMASP	Dublin Metropolitan Area Strategic Plan
DPER	Department of Public Expenditure & Reform
DYAA	Dry Year Annual Average
DYCP	Dry Year Critical Period
eBCR	Economic Benefit Cost Ratio
EED	Energy Efficient Design
EGD	European Green Deal
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMR	Eastern & Midlands Region
eNPV	Economic Net Present Value
EPA	Environmental Protection Agency
ER	Employers Representative
ERP	Expert Review Panel
ESB	Electricity Supply Board
FDI	Foreign Direct Investment
GDA	Greater Dublin Area
GDA WRZ	Greater Dublin Area Water Resource Zone
GDWSSS	Greater Dublin Water Supply Strategic Study
GVA	Gross Value Added
HICP	Harmonised Index of Consumer Prices
HSQ	Health, Safety & Quality
ICT	Information Communication Technology
IRR	Internal Rate of Return
Km	Kilometre
LMS	Leakage Management System

LoS	Level of Service
MCA	Multi-criteria Analysis / Appraisal
Mld	Megalitres of Water per Day
MPAG	Major Projects Advisory Group
MWI	Major Projects Water Infrastructure Group
NSO	National Strategic Outcome
NDFA	National Development Finance Agency
NDP	National Development Plan
NIS	Natura Impact Statement
NPF	National Planning Framework
NPV	Net Present Value
NSS	New Shannon Source
NWRP	National Water Resources Plan
NYAA	Normal Year Annual Average
PAB	Project Advisory Board
PAG	Project Appraisal Guidelines
PSC	Public Spending Code
PSDP	Project Supervisor Design Phase
QA	Quality Assurance
QRA	Quantitative Risk Analysis
QCRA	Quantitative Cost Risk Analysis
QSRA	Quantitative Schedule Risk Analysis
RSESEM	Regional Spatial & Economic Strategy Eastern & Midlands
RSO	Regional Strategic Outcome
RWRP	Regional Water Resources Plan
RWRP-EM	Regional Water Resources Plan – Eastern and Midlands
SA	Study Area
SDB	Supply Demand Balance
SEA	Strategic Environmental Assessment
SELL	Sustainable Economic Levels of Leakage
SID	Strategic Infrastructure Development
WAB	Water Advisory Body
WAFU	Water Available for Use
WCP	Winter Critical Period
WFD	Water Framework Directive
WRZ	Water Resource Zone
WSP	Water Supply Project
WSP-EMR	Water Supply Project Eastern and Midlands Region
WSSP	Water Services Strategic Plan
WSZ	Water Supply Zone
WTP	Water Treatment Plant