1. Executive Summary

1.1 Background

The Water Supply Project, Eastern and Midlands Region, is a key element of Irish Water's overall nationwide remit as it will meet the domestic, commercial and industrial needs of over 40% of Ireland's population into the medium to long-term future (to 2050).The Final Options Appraisal Report (FOAR) is the fourth in a series of reports published since March 2015 in a process to identify a new major source of water for the Region, and a Preferred Scheme for its development.

The first of these reports was the Project Need Report (PNR) (Feb 2015), published in March 2015, which examined the capacity of existing sources, and the need for the new source. It included a fundamental review of the demographic, economic and sectoral water consumption drivers in overall water demand, as well as a critical appraisal of the resilience of the existing water supplies serving the region. It emphasised the importance of both aspects in considering the question of 'need' and concluded that the existing supply sources and infrastructure for the region do not have the capacity or resilience to meet future requirements. It projected that population and industrial growth will generate a demand for an additional 330 million litres of raw water per day by 2050. The present infrastructure is struggling to meet current need as evidenced by a number of significant and costly outages in Dublin over the past 5 years. Projected water requirements already assume that ambitious leakage control targets will be met and that water conservation initiatives will be successful. These will provide valuable water savings, but they will not provide a long term solution for our water supply requirements. The Project Road Map was published for consultation alongside the Project Need Report. The Project Road Map outlined how a preferred new supply option would be selected and the public consultation milestones involved in that process.

The second report was the Options Working Paper (OWP) (June 2015). It examined the work previously carried out in the Strategic Environmental Assessment of ten options considered in 2010, and it validated four options, identified at that time, as technically viable for consideration in the next stage of options appraisal. It also published, for consultation, the assessment criteria in options appraisal, and the proposed approach to positioning infrastructure to achieve least environmental impact, through the use of constraint mapping.

The third report was the Preliminary Options Appraisal Report (POAR) (November 2015), it considered and evaluated these four options, taking into account preliminary results of investigative surveys and modelling at the time, which have been continuing over the interim period.

The POAR set aside options which abstract from Lough Derg, either directly or with raw water storage in the Midlands, because they would have significant impact on water residence times in Lough Derg in prolonged dry summer conditions. It also did not favour pumping to raw water storage in the Midlands, because of risks of transfer of alien aquatic species, because of construction and environmental risks at the Midlands storage site, and because transferring raw water does not meet Irish Water's broader objectives related to improving treated water supplies to communities in the Midlands Region. It highlighted that abstraction from Parteen Basin (also known as 'Lower Lake'), being sited downstream of Lough Derg, would avoid impacts on lake residence time. It identified abstraction from the River Shannon at the Parteen Basin area, downstream of Lough Derg, as an 'Emerging Preferred Option', subject to continuing surveys and it identified a 2km corridor from Parteen to a termination point in South Dublin where a pipeline route of least environmental impact could be positioned. While Desalination remained as the second ranked viable option, it was noted that it was 'Dublin-centric', and did not address the problems of small isolated water supplies in the Midlands. Desalination also posed a potentially greater environmental impact through its use of chemicals and high energy consumption.

This Final Options Appraisal Report (FOAR), having further examined the options of abstraction from the River Shannon at the Parteen Basin, and desalination of seawater at the coast in Fingal, including a cost benefit analysis of both options, confirms the Preferred Scheme is abstraction from the Shannon in the Parteen Basin area, downstream of Lough Derg, with water treatment nearby at Birdhill and delivery of treated water by pipeline through the Midlands to a termination point reservoir at Peamount in south Dublin. The Final Options Appraisal Report is offered for public consultation along with an EIS Scoping

Report, where comments are invited on the scope and methodologies proposed for Environmental Impact Assessment on the preferred scheme.

1.2 Remaining Sustainable Options

Section 2 of this Report first establishes the chronology and roadmap of work carried out to date. Section 3 recaps on the two technically viable and sustainable options carried forward to this Final Options Appraisal Report:

1) **PARTEEN BASIN DIRECT (OPTION C)**

This would be a constant, all year-round abstraction from Parteen Basin (also known as the Lower Lake) and water treatment nearby at Birdhill, followed by approximately 170km of treated water transfer pipeline, in a configuration which could supply treated water to other communities in a 'benefiting corridor' along the route from the Parteen Basin to Dublin.

2) **DESALINATION (OPTION H)**

This option involves the abstraction of sea water from the Irish Sea in North Fingal and desalination of this water through a Reverse Osmosis (RO) desalination plant, together with the discharge of brine (from the treatment process) back into the Irish Sea. The process includes the pumping of treated water through approximately 35km of pipelines to existing and proposed reservoirs located in northern and western parts of Dublin.

1.3 Consultation

Section 4 of the Report defines how public consultations, on the Project Need Report, on the Options Working Paper and on the Preliminary Options Appraisal Report have been taken into account in the current work. This is accompanied by Appendix J, the Consultation Submissions Report on the Preliminary Options Appraisal Report, which details the submissions received, by theme, and which responds to those submissions.

It also summarises, across all three phases of previous consultation, how the submissions and views expressed have influenced the process of design.

1.4 Interim Demand Review

Section 5 provides an interim review of water demand, in the light of results from conservation initiatives and information which has become available from the domestic metering programme. Water demand will continue to be reviewed, as detail from the CSO Census of 2016 becomes available.

1.5 Abstraction Regime

Section 6 describes how abstraction at Parteen, which lies just upstream of the headrace canal to Ardnacrusha power station, would be supported by an agreement, whereby ESB would reduce water used in hydropower, measure-for-measure with water abstracted for water supply.

1.6 Source Impact

Section 7 provides an update on modelling work to define the potential for impact of abstraction from the Lough Derg and Parteen Basin waterbody, confirming that abstraction from Parteen Basin avoids impacts on lake residence time, ensuring no impact on water quality status or shallow water floral and faunal communities in Lough Derg.

1.7 Economic Appraisal

Section 8 presents the findings of a cost-benefit appraisal, by independent economists, into the investment options to guarantee a continued water supply to the Eastern and Midlands Region and the defined Benefitting Corridor. This appraisal considered both the abstraction from the Shannon at Parteen Basin and the Desalination Option with reference to the "Do Minimum" base scenario; the latter being the mostly likely scenario to prevail should the proposed investment(s) not be undertaken.

The cost – benefit analysis considered the following key costs and benefits:

- Capital costs;
- Operational expenditure;
- Environmental costs;
- Disruption costs of construction works where applicable; and
- Benefitting Corridor costs.

The cost-benefit appraisal concluded that abstraction from the Shannon's Parteen Basin is the most cost effective scheme.

1.8 Preferred Scheme

Section 9 draws the appraisal work into a confirmation of the Preferred Scheme, which is abstraction from the lower Shannon in the Parteen Basin area downstream of Lough Derg; abstraction from here is the most suitable source and option for a new water supply for a number of key reasons:

- It provides treated water, delivered in a way which brings the greatest availability and economic advantages to the widest group of communities in Irish Water's Eastern and Midlands Region. Towns and communities along the proposed pipeline route through the Eastern and Midlands Region will gain a secure water supply to meet future domestic, commercial and industrial water requirements and therefore the opportunity to develop and grow their economies. All consumers will have a reliable and sustainable water supply to international standard of service.

- It enables the delivery of more efficient and up to date supply infrastructure by facilitating the development of fewer and more modern water treatment plants to replace the numerous small, inefficient and outdated plants currently operating across the region. It provides the strategic basis for rationalisation of a number of small public supplies to fewer schemes over time.

- The results of the cost-benefit appraisal of the various investment options suggest that Option C, abstraction of water from Parteen Basin on the Shannon, is the preferable investment choice; as it results in a higher net benefit than the desalination alternative or the net benefit of the Do Minimum scenario. The latter represents the base case.

  The benefit to cost ratio (BCR) of the Shannon abstraction to the Desalination Option in the base case, and following all sensitivity analyses, suggest that it represents the most economically advantageous investment option for the provision of new water supply infrastructure to the Eastern and Midlands region. *Note: A benefit-cost ratio (BCR) is an indicator which summarises the overall value for money of a project or proposal, and is the ratio of the benefits of a project or proposal relative to its costs; both expressed in monetary terms. The BCR for an abstraction from the Shannon, and for the Desalination option, is 3.25 and 1.75 respectively; a higher BCR indicates that it is the better investment choice, and represents a greater return than the "Do Minimum" scenario.*

Desalination has come through the assessment process, as a technically viable option but it is much less suitable than one involving abstraction from Parteen Basin for a number of reasons;

- It is a Dublin-centric solution, so it does not deliver the widespread benefits to towns and communities throughout the Eastern and Midlands Region, which are a necessary feature of a comprehensive scheme aligned with the objectives of the Water Services Strategic Plan.

- It is a less environmentally friendly option than the Parteen Basin option because the provision of desalinated water requires a high energy input leading to a greater carbon footprint.

- The cost of water delivered is significantly more expensive than the preferred scheme.

- The Cost Benefit Analysis indicates, whilst acknowledging that the two options are not directly comparable on a like-for-like basis, that abstraction from the Shannon at the Parteen Basin has a better investment profile.

1.9 Parteen Basin - The Preferred Scheme

Sections 11 and 12 describe the work undertaken to date to identify preferred sites and route corridor associated with the Preferred Scheme.

The proposed abstraction facilities from the would be located on the eastern bank Parteen Basin, north of the Fort Henry embankment, and would abstract water to a maximum of 330 Mld at the year 2050. This water would be treated in a Water Treatment Plant ultimately consisting of four treatment modules, each approximately 80 Mld in treated water capacity, which would be built in phases to match growth in water demand and keeping resilience support to existing sources under review.

Water abstraction from the Parteen Basin would take place under an agreement with ESB so that water levels on Lough Derg and Parteen Basin can be controlled by ESB, as they currently are, within the unchanged normal operating band. Adjustment of water used in power generation would be covered in this agreement, to avoid impact on the normal water level operating band. Minimum statutory flow requirements, or compensation flows, which are maintained below Parteen Weir, would also remain unaffected.

Treated water would be distributed to locations across the Eastern and Midlands Region of the country via an underground pipeline running from the Water Treatment Plant proposed at Birdhill, to a Termination Point Reservoir in South Dublin. This would provide a reliable and sustainable water supply to current and future domestic, commercial and industrial consumers in the Eastern and Midlands Region.

The reasons why abstraction from the Shannon at Parteen Basin is the Preferred Scheme can be summarised as:-

- It has, by far, the least environmental impact of any of the Shannon options which have been under consideration. It is the closest location to the river estuary with all of the water having already flowed naturally through the River Shannon system to the abstraction point in Parteen Basin.

- The pipeline from Parteen has the potential to serve treated water to more Midland locations, towns and communities along the route from Shannon to Dublin than any other option. It has the potential to support more key objectives of Irish Waters' 25-year Water Services Strategic Plan than any other option.

- The Parteen Basin already includes existing regulating assets because of the presence of the hydro-power plant. The proposed abstraction of water is, in essence, an abstraction of water which would otherwise be used in the hydro-power scheme, utilising existing assets. Abstraction of water from hydro- electric power schemes is commonly employed worldwide to enable environmentally sustainable availability of drinking water.

1.10 Community Gain Opportunities

Section 10 of the Report discusses opportunities for Community Gain, which were previously consulted upon on publication of the POAR in November 2015. It discusses Community Gain in a national context, and across the

pipeline route. Irish Water proposes to establish a 'Community Gain Fund' with a view to supporting community-based initiatives, primarily in the Environmental / Sport & Leisure / Training & Education areas, which meet specific criteria and which contribute towards the objectives of the River Basin Management Plans and Conservation Objectives of the Lower Shannon SAC. In doing so Irish Water aims to provide An Bord Pleanála with a realistic, specific, measurable community gain proposal(s), with an associated administrative structure, which the Board can adequately assess, and consider as part of an overall planning application.

1.11 Moving to a Final Decision

The abstraction from the Shannon at Parteen Basin is offered for consultation as the preferred new water supply source for the Eastern and Midlands Region of Ireland, and the reasons for that preference are set out under the relevant criteria and constraints. Additional modelling, engineering design and 'on the ground' route investigations will be undertaken in design development. Public consultation on the FOAR permits all interested parties to contribute their views to shape the project elements prior to making a planning application.

1.11.1 Public Consultation

A fourteen week public consultation process follows the publication of the 'Final Options Appraisal Report'. It asks for views on the findings in relation to the Preferred (Parteen Basin) Scheme.

The Report is offered for public consultation along with an EIS Scoping Report, in parallel, where comments are also invited on the scope and methodologies proposed for Environmental Impact Assessment on the preferred scheme.

The feedback on this upcoming consultation will be included in the preparation of documentation for a Planning Application and in preparing the Environmental Impact Statement for submission to An Bord Pleanála for their assessment. An Bord Pleanála will undertake all necessary statutory consultations on the Planning Application, including Oral Hearings where the views of all parties will be heard by the Board.