9. Preferred Scheme

The Preliminary Options Appraisal Report identified two options as sustainable and technically viable:-

- Abstraction from the Shannon and Parteen, and
- Desalination of Seawater from the Irish Sea

Abstraction from the Shannon at Parteen was the original Option C in the SEA and Desalination was Option H in that document.

These options however have different merits in terms of meeting the Project Need requirements, particularly in light of the national objectives of the Water Services Strategic Plan in consolidating smaller public water supplies drawing from vulnerable water sources. Through a comparative analysis Option C (Parteen Basin Reservoir Direct) was recognised as the 'Emerging Preferred Option' since it offered, in comparison with Option H (Desalination), these key distinct differences:

- A benefitting corridor through the Eastern and Midlands Region is associated with the Parteen Basin Option where a transfer pipeline is able to supply communities en route with a reliable and resilient source of supply;
- Least risk in terms of environmental, technical, financial, economic and socio-economic factors;
- The direct cost of construction, commissioning and operation are considerably more economical to the consumer than the alternative; and
- Most likely to deliver the objectives of the Water Services Strategic Plan.

While there was an emerging preference towards Option C (Parteen Basin Reservoir Direct), the alternative Option H (Desalination) was recognised to remaining as a technically viable option to serve the Dublin water supply area.

It is not, however, 'like-for-like comparable' in terms of meeting the strategic requirements of the Eastern and Midlands Region on a consistent basis across the region. In this regard, Option H (Desalination) would call for a strategically 'partitioned' rather than 'integrated' solution across the region. Water demand shortfalls in Dublin would be satisfied, but without existing source risk diversification. Rationalisation of smaller Midlands public water supplies towards the best existing sources, supported by a treated water pipeline, as envisaged in Section 5, would have to give way to more expensive scheme-by-scheme local upgrades, accepting long term yield limitations of smaller local sources.

These key distinct differences have framed the assessments undertaken and presented in the preceding Sections 5 through 8 of this report. These assessments are summarised in this section, and the key differentiators reviewed in light of new information to confirm, or otherwise, the emerging preference in the Preliminary Options Appraisal Report.

9.1 Options – The Key Differentiators

9.1.1 Benefitting Corridor

Initial work on the Benefitting Corridor in the Project Need Report has been reviewed, with the outcome of this assessment presented in Section 5.

The initial estimate of demand in the Benefitting Corridor, prepared based on individual county 'needs assessments', has been replaced with a detailed analysis and risk assessment into the ongoing viability and sustainability, of the existing Midlands water supply schemes. It is envisaged that these can be consolidated to fewer schemes by 2050 under the Interim Midlands and GDA Water Resource Plan (see Appendix A).

The expected water demand for the Benefitting Corridor is now profiled to reach 72Mld at year 2050, comprising a direct requirement for the excess projected demand over expected supply from the rationalised schemes, and provision for risk to deal with unforeseeable abstraction restrictions, contamination events, or demand increases in the Midlands area in particular.

9.1.2 Abstraction Regime

The proposed water supply would abstract 330Mld (3.82 m^3/s) as a continuous average at the year 2050.

Section 6 details how this abstraction of water from the Parteen Basin (Lower Lake) would operate in parallel with ESB hydro-electric power generation at Ardnacrusha; mirroring a worldwide relationship often used to enable an environmentally sustainable availability of water for public supply.

Reduction in water used in hydropower generation at Ardnacrusha to take account of water abstracted for water supply would offset impact of abstraction in most operating conditions. The hydrodynamic model, which has been developed (Sections 6 and 7), confirms that abstraction under these conditions is sustainable within the existing normal operating water level range in all years of historic Shannon flow data on record.

Irish Water will enter into an agreement with ESB to ensure that abstraction of water will take place in such a manner that the existing normal operating water level band on Lough Derg and Parteen Basin, and the statutory minimum flow in the River Shannon to the tidal limit remain unchanged.

9.1.3 Environmental and Technical Factors

Hydrodynamic modelling of abstraction on Lough Derg and Parteen Basin, as presented within the Preliminary Options Appraisal Report, highlighted the reduced risk, in terms of environmental, technical, financial, economic and socio-economic factors, due to abstraction from Parteen Basin when compared with the position where water is sourced from the north east of Lough Derg.

Section 7 presents an updated position on the hydrodynamic modelling, with collated within-the-lake datasets employed to calibrate the hydrodynamic model and allow more accurate assessment of impact from abstraction. Modelled scenarios confirmed abstraction from Parteen Basin at a constant rate during summer low flow conditions to show no change to flushing time characteristics in any region of Lough Derg and Parteen Basin when compared with the baseline conditions.

Abstraction from Parteen Basin, without impact on the baseline flow conditions through the lake, confirms a reduced risk position for the Lough Derg environmental baseline overall and for the communities, tourism, and businesses that rely on its function.

9.1.4 Economics

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. In addition to the two options, it considered the “Do Minimum” base scenario; the latter being the mostly likely scenario to prevail should the proposed investment not be committed. The benefit to cost ratio (BCR) of Option C when compared to Option H, 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 a Shannon abstraction and for the Desalination option is 3.25 and 1.75 respectively where a higher BCR indicates is a good investment when compared using the base case scenario.*

9.1.5 Water Services Strategic Plan

Irish Water has published its Water Services Strategic Plan (WSSP), approved by government in October 2015, since publication of the Project Need Report for the Eastern and Midlands Region project. The issue of a large number of public water supplies which are isolated and dependent upon small sources, many of which are vulnerable to pollution and of low yield, was recognised as a particular challenge.

Chapter 2 of the WSSP, entitled *Challenges and Strategic Priorities*, states:-

A comparison with water services in Scotland is instructive. Scottish Water operates around a quarter of the number of water treatment plants as Irish Water to serve 2.4 million domestic households. The higher number of smaller water treatment plants controlled by Irish Water (many of which rely on small vulnerable sources) are more difficult and expensive to operate and we need to reduce this number through rationalisation where funding permits.

Within this chapter, and under Objective WS2a, the WSSP indicates:-

We will prepare risk assessments for all water supply sources to determine short, medium and long term risks to water supply capacity. Based on these risk assessments, we will identify and develop our plans for sustainable water sources nationally. Measures to achieve this will include rationalisation of water supply zones to utilise larger sources and interconnection of networks to ensure security of supply.

Under Objective WS3b in the same chapter, the WSSP indicates:-

Minimising the unit cost of delivering water to the customer whilst meeting environmental compliance will result in the rationalisation of water supply areas over time and, subject to funding ability, will focus on a smaller number of high quality, sustainable sources with standardised treatment processes. This rationalisation approach will be developed within the National Water Resources Plan by the end of 2017.

Chapter 8, entitled *Invest in our Future*, at Objective IF1b, expresses the intention:-

To deliver operational cost efficiencies, meet capacity and performance needs and improve system resilience, through rationalisation and strategic forward planning.

Review of the benefitting corridor has confirmed the potential for Option C: (Parteen Basin Reservoir Direct) to serve treated water to a wide range of Midland locations, towns and communities along the route from the River Shannon to Dublin, supporting its potential to align with more key objectives of Irish Water's 25-year Water Services Strategic Plan. The Desalination Option is not 'like-for-like comparable' in terms of meeting these strategic requirements of the Eastern and Midlands Region on a consistent basis across the region, and would call for an entirely different strategy for dealing with small public water supplies, dependent upon scheme-by-scheme local upgrades, accepting the continuing long term yield limitations of smaller local sources.

9.2 Preferred Scheme

With reference to Section 9.1 Option C: Parteen Basin Reservoir Direct emerges as the Preferred Scheme for the Water Supply Project Eastern and Midlands Region 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 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.

- Modelled abstraction from Parteen Basin at a constant rate during summer low flow conditions in a drought of 1995 severity shows no change to flushing time characteristics in any region of Lough Derg and Parteen Basin when compared with the natural baseline conditions.

The Preferred Scheme will comprise a number of ancillary components of infrastructure that collectively make up the water supply system. These are discussed in Sections 11 and 12.