

8. Economic Appraisal

As discussed in Section 5, Irish Water commissioned a review of the fundamental determinants of ‘Need’ for the project. This included an independent assessment by professional economists (Indecon) on the strategic economic importance of secure resilient water supplies in the Midlands and Eastern areas, for the life and health of people living there, and for the sectors of the economy that sustains their livelihoods²⁸.

The Economic Needs Report outlined the economic case for the provision of a new water supply source to the Eastern and Midlands region in light of likely future water demand levels given medium to long-term population projections and economic growth forecasts.

Since publication of the Project Need Report, and Economic Needs Report contained therein, the number of available options has been reduced to the following:

- 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.

A Cost-Benefit Appraisal (CBA) has been conducted by Indecon on these remaining options.

The CBA Report is included in Appendix C and the findings are presented in this Section 8.

8.1 Cost – Benefit Analysis (CBA) Methodology and Key Parameters

The CBA considered investment options in line with the latest guidance documents from both the Irish government and the European Commission, and has followed the key principles outlined in the European Union guidance in terms of:

- Undertaking a detailed demand forecast – this was done for the Economic Needs Report and the results have been used in this CBA;
- Undertaking a detailed options appraisal process – this has been done as part of the Preliminary Options Appraisal Report (POAR);
- Identification of the key costs including capital, operational and environmental costs of the proposed investment(s);
- The economic benefits of the proposed project. This CBA focuses on the benefits of an increased supply of water, and increased reliability of this supply, in the Eastern and Midlands Region.

The analysis undertaken in the CBA report makes use of the key parameter values suggested in government guidance in the Public Spending Code published by the Department of Public Expenditure and Reform. The analysis includes a discount rate of 5% and an adjustment for all public expenditure in the project to reflect the shadow price of public funds²⁹ of 130%. The valuing of capital and operational cost draws upon an updated position on available treatment technologies (see Appendix D), while, for the purposes of valuing the environmental costs associated with a proposed project, the carbon price forecasts suggested in the Public Spending Code have been utilised.

²⁸ http://www.watersupplyproject.ie/wp-content/uploads/2015/03/Vol-3_WSP-Economic-Needs-Report.pdf

²⁹ The Public Spending Code requires the use of a shadow price of public funds of 130%. This is applied to account for the distortionary economic impacts of taxation used to raise funds for public expenditure

8.2 The “Do Minimum” Scenario - CBA

A key component of any CBA is an accurate definition of the ‘Do Minimum’ scenario. This is the scenario which is most likely to prevail should the proposed investment, or investments, not be undertaken; and represents the key comparative basis for the investment scenarios.

The “Do Minimum” scenario incorporated within this CBA included:

- The likely steps in terms of additional leakage reduction that Irish Water would be forced to undertake should no new source of water supply be developed;
- The costs associated with this additional leakage reduction;
- The likely probability of water supply outage over the appraisal period should no additional water supply be developed;
- The costs of this increased probability of outage to the population and economy of the Eastern and Midlands Region.

Leakage Reduction

Leakage reduction activities will recover additional water for use in supply and distribution, but this is a finite undertaking with a diminishing rate of return. It is estimated that an additional 30 MI/d could be yielded by the year 2026 at a cost of just over €310 million in net present value (NPV) terms and adjusted for the shadow price of public funds.

In addition, there will be environmental costs associated with this additional leakage reduction activity; estimated to be of the order of €2.3 million in net present terms.

Water Supply Outage

As part of the formulation of the “Do Minimum” scenario a forecast has been made on the expected property days of water supply disruption over the appraisal period; and represents the likely impact of water supply deficits on the residential sector in the Eastern and Midlands Region. It has been determined that the number of expected days per annum of water supply restriction are forecast to rise from 0.90 currently (2016) to 4.01 by 2050. The water supply disruption has a monetary impact. For the residential sector a per capita daily cost of €44³⁰ is assumed, which represents a prudent assumption as it is to the lower end of values suggested by international research³¹.

The total cost, in net present value terms, to the residential sector is €2.1 billion.

Beyond the costs to residential water users, an increasingly unreliable water supply will also impact on the commercial and industrial sectors of the economy; water intensive firms, in particular. Given the uncertainty surrounding the likely impact of water restrictions on individual firms and sectors, for the purposes of this cost-benefit analysis, estimates of the output costs of water supply outages were restricted to the main internationally traded sectors which are most water intensive as these may be particularly sensitive to water insecurity given the ability of the firms in these sectors to divert production to other sites.

Consequently, the CBA was focused on the most water intensive industries in the internationally traded manufacturing sector, namely:

- Chemical manufacturing;
- Pharmaceuticals manufacturing; and
- Computer and electronics manufacturing.

³⁰ http://www.watersupplyproject.ie/wp-content/uploads/2015/03/Vol-3_WSP-Economic-Needs-Report.pdf ; Table 5.7

³¹ FEMA method (2009) presented in Aubuchon and Morley (2013)

If water restrictions were imposed due to disruption in water supply, it was assumed that the manufacturing sector would reduce output by 10%³². This equated to €990 million in net present value terms.

Benefitting Corridor

In the eventuality that the Water Supply Project were not developed Irish Water would be required to bear the costs in providing alternative water sources, within the Benefitting Corridor, for their existing assets, i.e. the continued use of water treatment plants. Over the time period of this analysis (to the year 2050), it has been estimated that the associated additional costs will be of the order of €477 million in absolute terms and €348 million in net present value terms; after accounting for the shadow price of public funds.

“Do Minimum” Cost Summary

The table below presents a summary of the total costs in the Do Minimum scenario. This summary represents the baseline scenario in which output in the internationally traded sector falls by 10%. Under these assumptions there is a total cost to the economy of €3.8 billion in net present value terms over the appraisal period.

Table 8.1 Summary of Costs in the "Do Minimum" Scenario

Cost	€ Million – NPV
Leakage Reduction Costs	310.5
Environmental Costs	2.3
Benefitting Corridor Costs	348.4
Residential Outage Costs	2,123.2
Economic Output Costs	989.8
Total Costs	3,774.2

8.3 Option C (Parteen Basin Reservoir Direct) – CBA

The CBA analysis for abstraction from the Shannon at Parteen Basin, or the Lower Lake, includes costs related to the following:

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

The proposed benefits of Option C are directly linked to the costs of additional outage forecast in the “Do Minimum” scenario, and are the avoidance of these costs of outage.

Note: The environmental costs, which include associated traffic disruption, have been prepared in line with the forecasts for the cost of carbon and value of time suggested in the Public Spending Code.

Table 8.2 outlines the total costs and benefits of Option C and illustrates the overall net benefit of the proposed investments at €1,635 million. Details of the capital and operational cost breakdown are presented in Appendix C. The Benefit to Cost Ratio (BCR) for the proposed investments is 3.25. This suggests that the proposed investments for Option C would bring about considerable benefit to the economy of the Eastern and Midlands region over the course of the assessment period, relative to the “Do Minimum” scenario.

³² Assumed reductions in output ranged between 5% and 15% but may be considerably higher where major investments to be foregone due to a potential impact of water restrictions on their production processes.

Table 8.2 Option C - Net Benefit and BCR

Costs	€ Millions - NPV
Capital Expenditure	487.1
Operational Expenditure	152.3
Environmental Costs	20.2
Traffic Disruption	0.1
Costs of existing scheme rationalisation in Benefitting Corridor	66.4
Total Costs	726.1
Benefit	
Reduced Outage Costs to Residential Sector	1,371.4
Reduced Economic Output Costs	989.8
Total Benefits	2,361.2
Net Benefit of Option C	1,635.1
BCR	3.25

8.4 Option H (Desalination) - CBA

The CBA analysis for abstraction from the Irish Sea at a point north of Balbriggan includes costs related to the following:

- Capital expenditure;
- Operational expenditure;
- Environmental costs; and
- Benefitting Corridor costs.

As was the case with Option C, the proposed benefits of Option H are directly linked to the costs of additional outage forecast in the “Do Minimum” scenario, and are the avoidance of these costs of outage.

Table 8.3 outlines the total costs and benefits of the Option H and illustrates the overall net benefit of the proposed investments at €1,013 million. The BCR for the proposed investments is 1.75. This suggests that the proposed investment for Option H is lower than that for Option C; and suggests under the baseline assumptions, that Option C represents the investment with the best economic return.

Table 8.3 Option H - Net Benefit and BCR

Costs	€ Millions - NPV
Capital Expenditure	473.8
Operational Expenditure	450.6
Environmental Costs	75.6
Costs in Benefitting Corridor	348.4
Total Costs	1,348.4
Benefit	
Reduced Outage Costs to Residential Sector	1,371.4
Reduced Economic Output Costs	989.8
Total Benefits	2,361.2
Net Benefit of Option H	1,012.8
BCR	1.75

8.5 CBA Findings and Sensitivity Analysis

A number of sensitivity tests were carried out to ensure the robustness of the CBA findings. These sensitivity tests flexed the assumptions on the amount of output lost in the water intensive firms in the internationally traded sector. Given the uncertainty around how these firms would respond to water restrictions, it was prudent that the CBA be run with a range of alternatives in this regard. These findings are presented in Table 8.4 as on the basis of higher and lower impact assumptions. Indecon assumed in the higher impact scenario that output falls by 15% and in the lower impact scenario that output falls are limited to 5%.

Table 8.4 Summary of CBA Findings - Sensitivity Scenarios

Low Impact Scenario		
	Net Benefit (€ Million)	BCR
Option C: Shannon Abstraction	993.5	2.14
Option H: Desalination	517.9	1.38
High Impact Scenario		
	Net Benefit (€ Million)	BCR
Option C: Shannon Abstraction	2,130.0	3.93
Option H: Desalination	1,507.7	2.12

Under each scenario the net benefit of both options remains positive and the BCR remains greater than 1. Under each scenario the net benefit and BCR of Option C exceeds that of the Option H. The abstraction from the Shannon, at Parteen Basin, investment option represents the most economically beneficial of the two options appraised.

8.6 CBA Summary

The baseline results for the cost-benefit appraisal of the two investment options, namely Option C and Option H are presented in Table 8.5. These results indicate that the abstraction from the Shannon at Parteen Basin represents the most cost effective project.

Table 8.5 CBA Summary - Comparison of Option C and Option H

Option	Net Benefit (€ Million)	BCR
Option C: Parteen Basin Abstraction	1,635.1	3.25
Option H: Desalination	1,012.8	1.75

The results of the cost-benefit appraisal on the proposed investment options suggest that Option C is the preferable investment choice; and results in a higher net benefit than the desalination alternative or the “Do Minimum” scenario. The BCR of the Shannon abstraction option also exceeds that of the desalination option in the base case and all sensitivity analyses. These findings suggest that Option C represents the most economically advantageous investment option for the provision of new water supply infrastructure to the Eastern and Midlands region.