

Dublin City  
Baile Átha Cliath

# WATER SUPPLY PROJECT - DUBLIN REGION (DRAFT PLAN)

(PREVIOUSLY TITLED: GREATER DUBLIN  
WATER SUPPLY - MAJOR SOURCE  
DEVELOPMENT (DRAFT PLAN))



STRATEGIC ENVIRONMENTAL ASSESSMENT  
(SEA PHASE II)  
ENVIRONMENTAL REPORT

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# 1 NON-TECHNICAL SUMMARY

## 1.1 INTRODUCTION

### 1.1.1 Water Supply Project – Dublin Region

Dublin City Council (DCC), acting on behalf of the local authorities in the Dublin Region Water Supply Area (DRWSA), is developing a strategy to provide a new major water supply for the DRWSA. The strategy, referred to as Water Supply Project - Dublin Region draft Plan, hereafter referred to as the draft Plan, identifies a number of potential sources and options for supplying the DRWSA with a new major water supply. The DRWSA is comprised of Dublin City, the counties of Fingal, Dun Laoghaire – Rathdown and South Dublin as well as significant areas of County Wicklow, mid and north County Kildare and southeastern areas of County Meath.

The objective of the draft Plan is to provide a viable (economically, technically, environmentally) and secure (quality and volume) major water supply for the Dublin region, which will be operated in conjunction with existing sources to provide overall supplies in the most cost-effective and operationally-efficient manner. The new water supply will need to deliver water which is suitable for drinking and which will satisfy water demands of the projected population up and beyond. It is estimated that 300 Megalitres per day (Ml/d) will be required by the DRWSA by 2031.

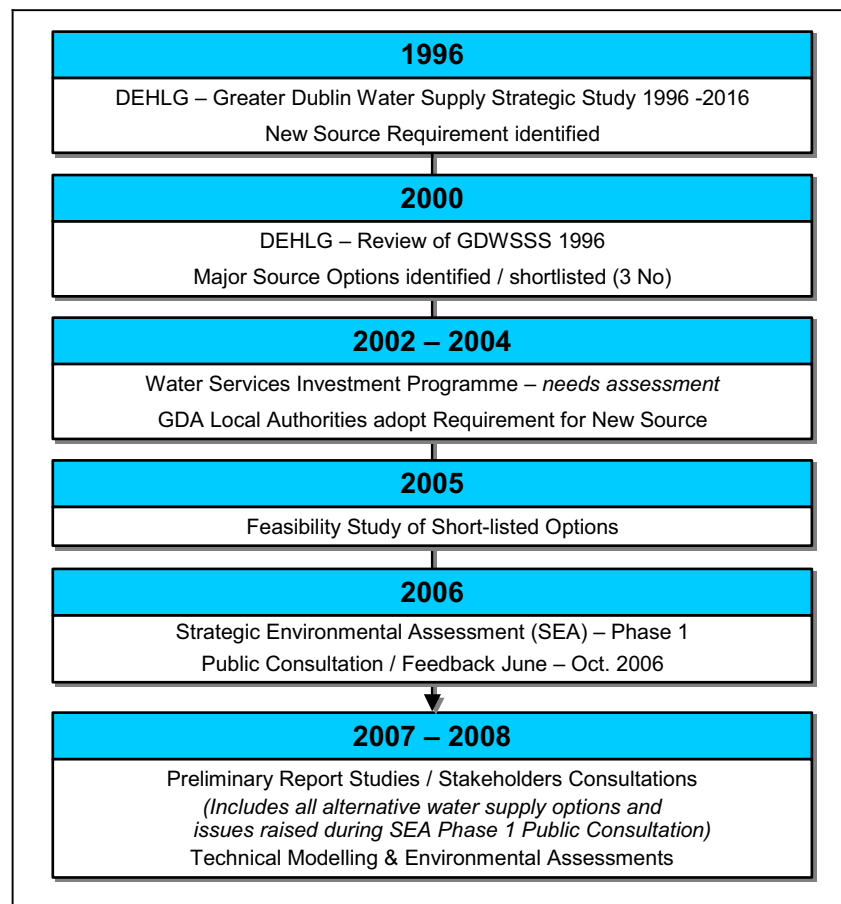
**Figure 1.1** below outlines the progression of the strategy to find a new water source from 1996 when the need was first identified as part of the greater Dublin Water Supply Strategic Study, up to the present studies as part of the Water Supply Project - Dublin Region draft Plan.

### 1.1.2 Strategic Environmental Assessment SEA

It has been determined that the draft Plan requires a Strategic environmental Assessment (SEA) under the SEA legislation in Ireland (S.I. 435/2004).

Strategic Environmental Assessment is an assessment process applied to Plans and Programmes. The purpose of SEA is to ensure a high level of protection of the environment and to ensure that environmental considerations are taken into account in strategic decision-making at the Plan or Programme stage.

The main findings of an SEA are compiled into an Environmental Report. This chapter represents the non-technical summary for the Environmental Report of the Water Supply Project - Dublin Region draft Plan SEA and serves to explain and summarise the main findings of the SEA in non-technical language.

**Figure 1.1 Key Milestones in Dublin Region Strategic Water Supply Planning**

### 1.1.3 Habitats Directive Assessment

It has also been determined that the draft Plan also requires an assessment under the Habitats Directive (92/43/EEC). The additional assessment, known as an Appropriate Assessment or Habitats Directive Assessment (HAD), is required for any plan or project likely to have significant effect on European sites designated for nature conservation. These important sites include: Special Protection Areas (SPAs) and Special Areas of Conservation (SACs).

The Habitats Directive Assessment Report, which accompanies this document, assesses the potential significant impacts on the integrity of these sites as a result of implementing the options within the draft Plan.

## 1.2 METHODOLOGY

The aim of SEA is to determine the likely significant impacts on the environment due to implementation of the draft Plan. This is carried out by assessing the impacts of the draft Plan against a set of environmental objectives. Where significant adverse impacts are identified during the assessment process, relevant and appropriate mitigation measures are proposed to address these impacts.

The SEA will inform the overall decision making process which is made on environmental, economic, socio-economic and technical grounds, ensuring the decision making process considers environmental issues.

The HDA has influenced the SEA throughout its progression and the conclusions of the HDA have been incorporated into the SEA throughout the process.

### 1.2.1 Consultation:

Consultation has been on going since early 2005. Throughout the SEA process, consultation has taken place with the three designated consultees. These are;

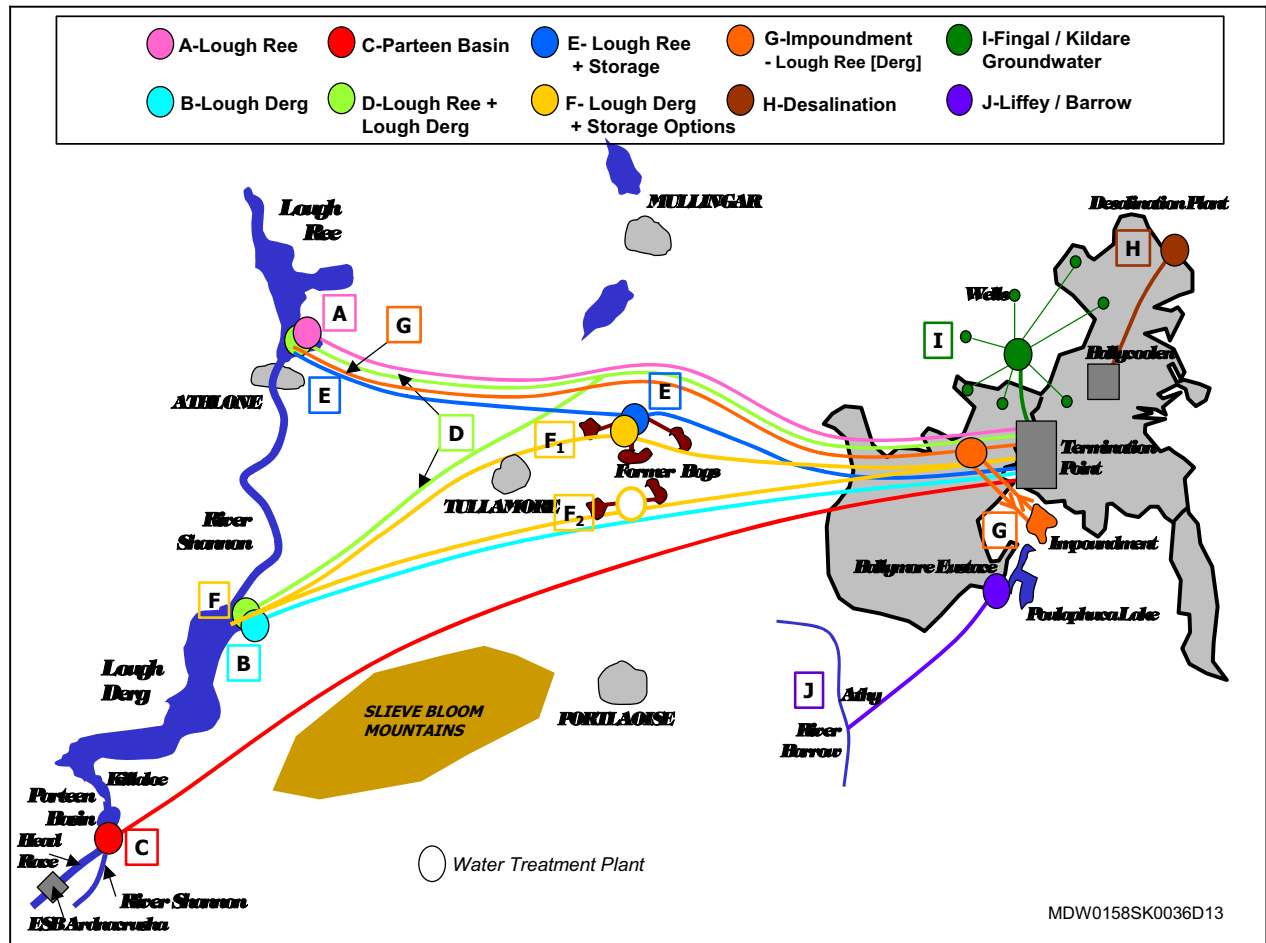
- The Environmental Protection Agency;
- The Department of the Environment, Heritage and Local Government; and
- The Department of Communications, Marine and Natural Resources

In addition, consultation was also undertaken with non-statutory consultees. A series of meetings, presentations and workshops were held. A summary list of all consultations is given in Appendix A of the Environmental Report.

## 1.3 DRAFT PLAN

The draft Plan looks at ten possible water supply options (hereafter referred to as Options). These Options are described below and illustrated in **Figure 1.2**.

Figure 1.2 Water Supply Options Summary



**Option A – Lough Ree**

Option A involves abstraction of water from Lough Ree. It has the shortest pipeline route between the River Shannon and Dublin. The abstraction point would be located in the south of Lough Ree, in an area approximately 9 km north of Athlone. This Option would also allow for a supply of approximately 50 MI/d to the midland Local Authorities located along the pipeline route to Dublin.

**Option B – Lough Derg**

Option B involves abstracting water from Lough Derg and evolved from the Lough Ree option in response to concerns of over abstraction of water from Lough Ree, raised during Phase I of the SEA. Concerns related to the potential changes to water levels in Lough Ree and the Shannon Callows. This issue is avoided by abstracting further downstream in Lough Derg. This Option would also allow for a supply of approximately 50 MI/d to the midland Local Authorities located along the pipeline route to Dublin.

### **Option C - Abstraction from Parteen Basin**

Option C involves abstraction of water from Parteen Basin which is the furthest Shannon abstraction location from the Dublin Region. During Phase I of the SEA, feedback was received from Shannon based stakeholders questioning the potential feasibility of abstracting water from the Parteen Basin as an alternative to either Lough Ree or Lough Derg. The principal advantage of this option, by comparison with other Shannon options, is its potential for avoidance of abstraction related environmental issues upstream (in Lough Derg, the Shannon Callows and Lough Ree). This Option would also allow for a supply of approximately 50 MI/d to the midland Local Authorities located along the pipeline route to Dublin.

### **Option D – Lough Derg and Lough Ree**

Option D is a combination of Option A (Lough Ree) and Option B (Lough Derg). The principal advantage of this option, is that abstraction for Lough Ree is reduced and infrastructure can be deferred until demand growth would warrant reinforcing supplies from Lough Ree with supplies from Lough Derg. This Option would also allow for a supply of approximately 50 MI/d to the midland Local Authorities located along the pipeline route to Dublin.

### **Option E – Lough Ree and Storage**

Option E involves abstraction of water from Lough Ree to be combined with storage in former bog land areas in the vicinity of Rochfortbridge in County Westmeath. The availability of a storage facility will ensure that abstraction from Lough Ree is minimised during low flow periods on the Shannon. This Option would also allow for a supply of approximately 50 MI/d to the midland Local Authorities located along the pipeline route to Dublin.

### **Option F1 and F2 – Lough Derg and Storage**

Option F is similar and based on the same principles as Option E. Option F involves abstraction from Lough Derg in combination with bog storage. The availability of a storage facility will ensure that abstractions from Lough Derg are minimised during low flow periods on the Shannon. Two bogs have been identified as suitable for storage; one near Rochfortbridge, Option F1, and another near Portarlington, Option F2. This Option would also allow for a supply of approximately 50 MI/d to the midland Local Authorities located along the pipeline route to Dublin.

### **Option G – Lough Ree and Impoundment in Wicklow Mountains**

Option G is similar to Options E, F1 and F2 in that it provides a water storage facility and hence water does not have to be abstracted from Lough Ree for a constant 12 months of the year. Option G

involves storing water in a dammed valley reservoir at a site in the Wicklow Mountains. Water would be pumped from the Shannon at Lough Ree and stored at this facility for supply to the DRWSA. This Option would also allow for a supply of approximately 50 MI/d to the midland Local Authorities located along the pipeline route to Dublin.

### **Option H – Desalination**

The Desalination Option involves abstracting salt water from the Irish Sea at Loughshinny in north County Dublin and treating it in a desalination plant. The by-product of brine (concentrated salt water) would be returned back into the Irish Sea. The main drawback of desalination is its high-energy demand and associated carbon footprint.

Options I and J were assessed technically as not having sufficient capacity to meet Dublin's supply needs and were not considered further in the environmental assessments.

## **1.4 MODELLING**

Modelling has been carried out for the Shannon and the Irish Sea. The main findings of the modelling indicated the following possible impacts:

- Increased duration of low flow days in the Shannon Callows as a result of abstraction from Lough Ree (Option A, D, E and G).
- Marginally increased retention time (length of time it takes the water to move through the lake) in Lough Derg for any abstraction in Upper Lough Derg or Lough Ree (Options A, B, D, E, F1, F2 and G), relative to the quantity of abstraction.
- Shannon water levels in Lough Derg and Parteen Basin will remain within current regulation levels with the abstraction in place (due to modified operation of ESB power generation at Ardnacrusha).
- Brine (concentrated salt water) returned to the Irish Sea from the desalination plant will be quickly dispersed due to the tidal currents and no significant impact on water quality is expected.

## 1.5 OTHER PLANS AND PROJECTS

The draft Plan has the potential to interact with other plans, projects and strategies. At a European level, the key interaction of the draft Plan is with the Water Framework Directive (WFD) as this Directive stipulates water quality requirements for Ireland's waters in the coming years. The objectives of this SEA have taken the WFD objectives into account. River Basin Management Plans are currently being developed for all eight of the River Basin Districts in Ireland and an SEA is ongoing on these draft River Basin Management Plans.

On a national scale the Water Services Act, 2007, provides that each water services authority plan for the provision of water services in its functional area. The National Spatial Strategy is also relevant to the draft Plan in that it sets objectives for infrastructure development including water services.

## 1.6 CURRENT STATE OF THE ENVIRONMENT (BASELINE)

### 1.6.1 Environmental Receptors

The baseline studies examine the relevant aspects of the current state of the environment in relation to biodiversity, population, human health, soil, water, air and climatic factors, and material assets (including energy) and the interrelationship between these factors. The baseline data is summarised in **Table 1.1**.

**Table 1.1 Current State of the Environment (Baseline) Relevant to All Options**

Environmental Receptor	Current State of the Environment
Biodiversity, Flora and Fauna	<p><b>Shannon</b></p> <p>Lough Ree is designated a Special Protection Area (SPA) for birds. Lough Ree is also designated a Special Area of Conservation (SAC) due to the presence of important habitats, plants and animals of conservation value.</p> <p>Lough Derg is designated as an SAC for six habitats listed in the EU Habitats Directive and is designated an SPA for both wintering and breeding birds.</p> <p>The Lower River Shannon is a designated an SAC due to the occurrence of 14 protected habitats and 7 protected species. Two protected plants occur within the Parteen Basin study area.</p> <p><b>Irish Sea</b></p> <p>There are a number of designated areas within a 5km radius of Loughshinny. The Skerries Coast is considered a site of national importance for a number of bird species including common scoter, sanderling, turnstone and herring gull. There are</p>

Environmental Receptor	Current State of the Environment
	<p>records of the green winged orchid (<i>Orchis morio</i>), which is a protected plant under the Flora Protection Order (1999), north of Popeshall within the proposed National Heritage Area (pNHA) at Loughshinny Coast. The nearby Islands of Skerries Islands and Lambay Island are important sites for grey seals along the East Coast with individuals from these populations regularly using the north Dublin shoreline to haul out. Grey seals are listed in Annexes II and V of the EU Habitats Directive and are protected under the Wildlife (Amendment) Act 2000.</p>
Water	<p><b>Shannon</b></p> <p>The flows and lake levels in the Shannon are controlled by the ESB and Waterways Ireland through the operation of control structures (e.g. weirs and sluice gates) and also through the operation of Ardnacrusha Hydro-Power Station. The regulations require that Lough Ree's water levels be drawn down over the April to October period to ensure the lake's storage capacity is optimised for flood management of the Shannon Callows whilst at the same time ensuring that the levels remain above the agreed navigation levels. Lough Derg's water level is managed by the ESB at Ardnacrusha for power generation purposes. The period of time each year that the water levels are low between Lough Ree and Lough Derg is referred to as low flow days. These low flow days occur every year and are part of what makes the Shannon Callows habitat unique.</p> <p>Since 1997, water quality in the Shannon has improved significantly. This has coincided with the introduction of the zebra mussels and also the improvement of waste treatment plants. However, it appears that the zebra mussel (a non-native and invasive species) are controlling algal populations and should their numbers decline the water quality would also decline. The water in both Lough Ree and Lough Derg is heavily peat stained due the neighbouring peatlands. Due to the size of the Shannon, water quality tends to vary but in general the lakes are considered eutrophic (high levels of phosphorous).</p> <p>The Shannon supports 23 fish species, 9 of which are native to Ireland. One of these fish, Pollan, is protected. The white-clawed crayfish and the otter, both protected, are also present in the Shannon.</p> <p><b>Midlands Storage Area:</b></p> <p>Sand and gravel excavations at the proposed storage area near Rochfortbridge have revealed two large surface water bodies due to excavations going beyond the water table.</p> <p><b>Irish Sea:</b></p> <p>This area of coastline is a mixture of habitats. There are several protected areas nearby Loughshinny as described in the Biodiversity section above. Many inshore areas of the Irish Sea are notable for spawning and nursery grounds of</p>

Environmental Receptor	Current State of the Environment																														
	commercially important species such as cod, whiting, plaice, lemon sole, herring and sprat. Crab, Lobster and whelk fisheries also operate in this area. Six whale and dolphin species have been recorded in this area and all are protected under the 1976 Wildlife Act.																														
Air and Climatic Factors	Research has shown that the potential effects of climate change in Ireland include greater risks of coastal flooding due to sea-level rises and storm surges; water shortages, more intense rainfall events; and impacts on agriculture and biodiversity. Through the Kyoto Protocol Ireland is committed to reduce our combined emissions of six greenhouse gases by at least 5% compared to 1990 levels by the first commitment period 2008-2012.																														
Material Assets (including Energy)	<p>The average energy consumption of each option has been assessed on a yearly basis taking into account the progressive growth of the water demand. Shannon options include abstraction and booster pumping stations and a water treatment plant. The desalination option includes a desalination Plant and pumping to the Dublin Region. The relative energy consumption of each option is presented below;</p> <table border="1" data-bbox="518 1097 1332 1937"> <thead> <tr> <th data-bbox="518 1097 630 1176">Option</th> <th data-bbox="630 1097 997 1176">Description</th> <th data-bbox="997 1097 1332 1176">2031 energy consumption in millions kWh</th> </tr> </thead> <tbody> <tr> <td data-bbox="518 1176 630 1265">A</td> <td data-bbox="630 1176 997 1265">Water Treatment Plant and Pumping Station</td> <td data-bbox="997 1176 1332 1265">51.4</td> </tr> <tr> <td data-bbox="518 1265 630 1355">B</td> <td data-bbox="630 1265 997 1355">Water Treatment Plant and Pumping Station</td> <td data-bbox="997 1265 1332 1355">58.</td> </tr> <tr> <td data-bbox="518 1355 630 1444">C</td> <td data-bbox="630 1355 997 1444">Water Treatment Plant and Pumping Station</td> <td data-bbox="997 1355 1332 1444">71.8</td> </tr> <tr> <td data-bbox="518 1444 630 1534">D</td> <td data-bbox="630 1444 997 1534">Water Treatment Plant and Pumping Station</td> <td data-bbox="997 1444 1332 1534">56.8</td> </tr> <tr> <td data-bbox="518 1534 630 1624">E</td> <td data-bbox="630 1534 997 1624">Water Treatment Plant and Pumping Station</td> <td data-bbox="997 1534 1332 1624">56.7</td> </tr> <tr> <td data-bbox="518 1624 630 1713">F1</td> <td data-bbox="630 1624 997 1713">Water Treatment Plant and Pumping Station</td> <td data-bbox="997 1624 1332 1713">69.7</td> </tr> <tr> <td data-bbox="518 1713 630 1803">F2</td> <td data-bbox="630 1713 997 1803">Water Treatment Plant and Pumping Station</td> <td data-bbox="997 1713 1332 1803">70.3</td> </tr> <tr> <td data-bbox="518 1803 630 1892">G</td> <td data-bbox="630 1803 997 1892">Water Treatment Plant and Pumping Station</td> <td data-bbox="997 1803 1332 1892">79.7</td> </tr> <tr> <td data-bbox="518 1892 630 1937">H</td> <td data-bbox="630 1892 997 1937">Desalination Plant and Pumping Station</td> <td data-bbox="997 1892 1332 1937">239.0</td> </tr> </tbody> </table>	Option	Description	2031 energy consumption in millions kWh	A	Water Treatment Plant and Pumping Station	51.4	B	Water Treatment Plant and Pumping Station	58.	C	Water Treatment Plant and Pumping Station	71.8	D	Water Treatment Plant and Pumping Station	56.8	E	Water Treatment Plant and Pumping Station	56.7	F1	Water Treatment Plant and Pumping Station	69.7	F2	Water Treatment Plant and Pumping Station	70.3	G	Water Treatment Plant and Pumping Station	79.7	H	Desalination Plant and Pumping Station	239.0
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Environmental Receptor	Current State of the Environment
Material Assets (Land Use)	<p><b>Shannon</b></p> <p>In the western portion of the study area, the rich soils of the Shannon region mean that agriculture is widespread, with livestock grazing, milk and meat processing occurring in the study area. Tourism is also a common land use in the western portion of the study area with fishing and boating activities attracting many tourists.</p> <p><b>Midlands Study Area</b></p> <p>Bord na Móna own substantial areas of raised bog in the midlands and harvest milled peat using large scale surface mining techniques supplying the peat feedstock for electricity generation.</p> <p><b>Irish Sea</b></p> <p>Both the desalination and Groundwater abstraction Options lie in the general Dublin Area. Predominant land uses in the eastern portion of the study area are agriculture, various urban land uses within the greater Dublin commuter belt (such as commercial, industrial and residential) and tourism, especially along the coastline.</p>
Cultural heritage	<p><b>Shannon</b></p> <p>Archaeological records point to settlements occurring from the Mesolithic to the Medieval periods along the Shannon. Several archaeological sites lie within the study area of the storage site F1 and it is likely that similar sites could occur at the F2 storage area.</p> <p><b>Irish Sea</b></p> <p>The site proposed for the desalination facility was chosen to avoid significant cultural heritage constraints at two potential sites along the coast.</p>
Landscape	<p>The landscape character of the general area where each Option is located has been addressed in this section. Landscape designations such as areas of high amenity and views and prospects have also been identified. The relevant development plans for each area have been reviewed for landscape and visual policy and designations.</p>
Tourism	<p>The Shannon is the most important tourism asset within the Plan area. The main tourism activities on the Shannon are angling, boating and other water sports. The Wicklow mountains are popular for hill walking, in particular within the Wicklow Mountains National Park (outside the study area). The coastline of North County Dublin is also a tourist attraction for its beaches. There are a variety of tourism activities available in the midland regions, however this area is not as sensitive to tourism impacts as the Shannon.</p>

Environmental Receptor	Current State of the Environment
Population	<p>The population of Ireland was over 4.2 million in 2006. Though the population growth has been accelerating, the population density in Ireland is still low from a European perspective and the population still remains below that of the island in the early 19<sup>th</sup> century. Population predictions for the Greater Dublin Water Supply Area are 1,348,000 for 2005, 1,522,000 for 2011 and 2,189,000 for 2301.</p>
Human Health	<p>The forecasted growth in population in the GDWSA will require water supplies from a new source, as existing sources will be insufficient to meet future demands. From approximately 2015 onwards the phased introduction of water supplies from a new source will be required to keep pace with demand for a secure safe drinking water supply. Drinking water is a source for outbreaks of cryptosporidiosis in humans. However, the actual risk to health from <i>Cryptosporidium</i> in water supplies is not known. Lough Ree and Lough Derg were tested for <i>Cryptosporidium</i> during the baseline assessment and both were clear.</p>
Soils, Geology and Hydrogeology	<p><b>Shannon</b></p> <p>According to GSI online mapping the Lough Ree study area is situated on a Locally Important Aquifer. The subsoil is made up of mostly tills, peat, made ground. The bedrock of the abstraction area consists of various types of limestone.</p> <p>Lough Derg situated on a Locally Important Aquifer. The subsoil data consists of mostly tills and cut peat. The bedrock of the study area consists of limestone.</p> <p>Parteen Basin is situated in a Locally Important Aquifer with some areas of Poor Aquifer within the abstraction area. The subsoil consists of alluvium, sands and gravel, peat and made ground. The bedrock consists of sandstones, volcanics, limestones and Shales.</p> <p><b>Midlands Options</b></p> <p>The Bog Storage study area for Options E and F (Derrygreenagh) is situated in a Locally Important Aquifer. The subsoil data for the study area consists of tills, peat, made ground and alluvium. The bedrock consists of limestone, basalt and other volcanic rocks.</p> <p>The proposed storage area near Portrarlington (Option F2) has bedrock Limestone. The site is located on a Locally Important Aquifer. The Wicklow Mountains study area is located in poor aquifer. The subsoil consists of till, sands and gravels. Bedrock consists Granites and other Igneous rock, Volcanics</p> <p><b>Irish Sea</b></p> <p>The Desalination study area is situated in Locally Important. The GSI subsoil data consists of made ground and tills derived from limestone. In addition, the sea fronting rocks from Loughshinny to Rush are of national importance for their geological attributes being composed of conglomerates of limestones and shales (Goodwillie and Fahy, 1973). The bedrock at the likely location of the desalination plant consists of sandstone, shales and limestone.</p>

### 1.6.2 Interactions between Environmental Receptors

In accordance with the SEA directive, the inter-relationship between the SEA environmental topics must be taken into account. **Table 1.2** highlights the potential inter-relationships between the SEA topics. These potential interactions are taken into account in the assessment of the Options.

**Table 1.2 Interactions**

Biodiversity, Flora and Fauna									
Population and Human Health	√								
Hydrogeology and Soils	√	√							
Water Quality	√	√	√						
Water Quantity	√	√	√	√					
Air and Climatic Factors	√	√	X	√	X				
Material Assets	√	√	√	√	√	√			
Cultural Heritage	X	√	√	√	√	X	√	√	
Landscape	√	√	√	√	√	X	√	√	√
	Biodiversity, Flora and Fauna	Population and Human Health	Hydrogeology and Soils	Water Quality	Water Quantity	Air and Climatic Factors	Material Assets	Cultural Heritage	Landscape

**Key:** √ = interrelationship Anticipated    X = no interrelationship anticipated

## 1.7 KEY ENVIRONMENTAL ISSUES

### 1.7.1 Existing Pressures

The key environmental issues are listed in **Table 1.3**. Each key issue is ranked by level of significance into major (dark orange) or moderate (yellow). Where an issue is relevant to an Option the cell is

shaded in blue. These issues were determined through the environmental assessment of options and through the series of consultations held.

**Table 1.3 Potential Key Issues Relating to Each Option**

Key Issue	A	B	C	D	E	F1	F2	G	H
Change in Low Flow Durations									
Water Quality									
Increase in Retention Time									
Flooding									
Water Mixing									
Spread of Alien Species									
Impact on SAC, SPA, NHA									
Energy Use									
Regional Drop in Water Table									
Construction Works									
Fossil fuel use / Landtake									
Impact to Tourism									
Sustainability of Groundwater Sources									
Entrainment									
Potential changes in Water Levels									
Impact to sites of Cultural Heritage									
Protection of Views									

### 1.7.2 Other Related Issues

Water Pricing is a key issue, which relates to the draft Plan and ties in with water conservation. The Government decision to abstain from domestic water charging/pricing has led to some controversy and may be seen as compromising water conservation measures.

## 1.8 DO NOTHING SCENARIO

The “Do Nothing Scenario” can be defined in this case, as the scenario where no new water source for the Dublin Region Water Supply Area is developed or implemented. Insufficient water to meet the demands of an increasing population growth scenario will give rise to existing water bodies being put under increased pressure, public health concerns, fire safety risk increases, impacts on development, business and tourism.

### 1.8.1 Likely Evolution of the Environment in the Absence of the Plan

If the draft Plan were not to be implemented it is estimated that by 2016 Dublin would start to experience water shortages as existing water sources would have reached their sustainable capacity. In such a circumstance it would be necessary to continue to exploit existing water sources beyond their sustainable yield. This could result in adverse impacts to biodiversity, flora and fauna in the area of the abstractions. Alternatively, or in combination, it would be necessary to curb the water demand by curtailing development. This could result in adverse impacts on population, economics and development.

It is noted that with or without the draft Plan in place, there will be continued efforts to curb the demand for drinking water through various conservation measures.

## 1.9 OBJECTIVES, INDICATORS AND TARGETS

The overall aim of SEA is to determine the likely significant impacts on the environment due to implementation of the draft Plan. This is achieved by assessing the impacts of the draft Plan against a set of environmental **objectives**. Implementation of the Plan's objectives will be measured using **indicators** and where appropriate these indicators have been linked to measurable **targets**. A summary of the objectives indicators and targets is given in **Table 1.4**.

- An **objective** is a statement of what is intended and is based on the current understanding of the key environmental issues identified.
- An **indicator** is used to measure progress in achieving the targets and objectives.
- A **target** is a more specific intended achievement.

**Table 1.4 Objectives, indicators and targets for the SEA**

Environmental Aspect	Objective	Target	Indicator
Biodiversity, Flora and Fauna	Objective 1 Avoid any deterioration in biodiversity, flora and fauna	Minimise impacts on existing protected sites, species and habitats.	Change in condition of protected sites, species and habitats.
		Minimise the risk of spread of any invasive aquatic species.	Spread of invasive aquatic species.

Environmental Aspect	Objective	Target	Indicator
<b>Fisheries</b>	Objective 2 Preserve the integrity of fisheries	No loss of salmonid spawning habitat due to Plan infrastructure.	Stock assessment data. And catch reports.
<b>Water</b>	Objective 3 Ensure that there is no adverse impact on achieving the objectives of the Water Framework Directive	Avoid deterioration in existing status of waterbodies concerned.	Ecological status of water bod.y
	Objective 4 Avoid adverse changes to current levels, flows and retention times	Avoid conflicts with the WFD objective for waterbodies to achieve 'good status' by 2015.	Ecological status of water body
	Objective 5 Minimise the contribution to climate change	No significant change to existing water levels, flows and retention times to existing water bodies as a result of abstraction.	Number of low flow days; Water levels outside agreed management range; Change in residence time.
<b>Air / Climatic Factors</b>	Objective 6 Minimise impact on energy use	Reduce the carbon footprint by limiting the level of CO <sub>2</sub> emissions through energy efficient measures and other appropriate means throughout construction and operation phases.	Net CO <sub>2</sub> emission from the chosen Option
<b>Material Assets (Energy)</b>	Objective 7 Minimise adverse impacts on sites, setting and items of cultural heritage including sites of architectural & archaeological heritage.	Encourage improved energy efficiency in design, construction and operation phases.	Net energy consumption from the chosen Option
<b>Cultural Heritage</b>	Objective 8 Minimise adverse significant impact on landscape quality and visual amenity	No loss of known protected archaeological, architectural or cultural heritage sites	Number of known sites impacted
<b>Landscape &amp; Visual</b>	Objective 9 Minimise the loss of commercially viable land	Provide infrastructure that limits adverse impacts to protected views	Number of protected views adversely impacted
<b>Material Assets (Land use)</b>	Objective 10 Minimise impact on tourism and amenities	Minimise the loss of commercially viable land	Area of commercially viable land lost due to infrastructure
<b>Tourism</b>	Objective 10 Minimise impact on tourism and amenities	Avoid impacts with existing water based leisure activities	Direct loss of water based tourist amenities due to the draft Plan infrastructure

Environmental Aspect	Objective	Target	Indicator
Population	Objective 11 Ensure the proposed abstractions do not detrimentally impact on communities	Compliance with relevant licences	Number of breaches of licences
	Objective 12 Ensure economic growth for communities by provision of a good quality water supply	Provide an adequate safe drinking water supply	Drinking Water Quality
Human Health	Objective 13 Maximise beneficial impact to human health by ensuring availability of good quality water supply	Provide sufficient water supply to meet Dublin Region Water Supply Area population needs by 2031	Number of households with water restrictions per annum
Soils, Geology and Hydrogeology	Objective 14 Minimise adverse impact on soils, groundwater and geology	No loss of groundwater dependant habitats as a result of operation	Percentage loss of groundwater dependant habitat due to infrastructure
		No adverse impact on private wells due to operation of water supply	Number of private wells within the zone of influence of the plan infrastructure reporting reduced yield
		No disposal of excavated material suitable for reuse	Quantities of soil disposed
		Avoid impacts on features of geological heritage	Number of geological features impacted

## 1.10 ASSESSMENT OF OPTIONS

The SEA has identified and evaluated the environmental effects of the reasonable strategic options presented in the draft Plan. In addition to the SEA, a Habitats Directive assessment has also been undertaken in parallel and this has influenced the outcome of the SEA. The HDA is presented as a separate document and the reader is encouraged to refer to this document also.

In addition to the Options presented in the draft Plan, the SEA has also considered the Do Nothing Scenario which describes the likely evolution of the environment without the implementation of the Water Supply Plan.

The environmental assessment has included a combination of quantitative assessment, qualitative assessment, and expert judgement objectives led assessment. Each Option has been assessed against SEA environmental objectives in terms of how it achieves the objective the most preferred options, on environmental ground, have been identified. A summary of the outcome of the assessment is as follows;

Options I and J were discounted as they were therefore found to be technically unfeasible as they could not provide a sufficient water supply;

Option A and D were rejected as a result of the HDA as it was found that these options were likely to have significant adverse impacts on the integrity of European designated sites;

Following the HDA, it could not be conclusively determined whether Options E and G would have a significant adverse impact on the integrity of a European designated site. Therefore, under the precautionary principle, these options were provisionally rejected, subject to possible further study if they are still in consideration following evaluation post consultation.

Of the remaining four options all of which are technically feasible, Option F1/F2 was found to have the least environmental impact compared to the other options. Option H was found to have the most environmental impact followed by Option B and C.

This evaluation is based solely on environmental considerations.

## **1.11 MEASURES TO REDUCE SIGNIFICANT ADVERSE EFFECTS**

During draft Plan development, certain options were developed as a mitigation measure to reduce the volume of water abstracted from the Shannon system during dryer periods. Option E, for example, incorporates a four month storage feature to ensure supply during dryer periods. In addition to options developed to reduce impacts, the SEA has also highlighted mitigation measures for each Option (where necessary) to reduce adverse impacts. These mitigation measures include:

- Increase monitoring of the Shannon system;
- Alteration of the abstraction rate from Lough Ree / Lough Derg for options involving these lakes (Option E, F and G);
- Development of working groups to research and mitigate against the spread of alien species;
- Use of a landscape architect during the detailed design;

- Use of renewable energy sources where possible;
- Detailed survey of biodiversity, flora and fauna for the Environmental Impact Assessment stage.

## 1.12 NEXT STEPS

The Options (A-J) outlined in the Water Supply Project – Dublin Region draft Plan are being tabled for public consultation as part of the SEA (Phase II). The draft Plan and Environmental Report will be put on public display for some months. Submissions received during the consultation period will be considered as part of the decision making process for a preferred water source option. An SEA statement outlining how the environmental report has influenced the Plan and how environmental considerations and consultation have been taken into account in the decision making process will be made available to the public once a final decision has been made.

**Table 1.5** demonstrates the proposed timescale for consultation on the draft Plan and Environmental Report and for issue of the SEA Statement.

**Table 1.5**      **Milestones**

Consultation	Month
Consultation on the draft Plan (Water Supply Project – Dublin Region) & Environmental Report	Mid October 2008
SEA Statement (Phase II)	Late 2009