

Environmental Management Services



Observations on the Water Supply Project – Dublin Region (Draft Plan) Prepared by RPS and Veolia Water for Dublin City Council, November 2008

**A REPORT FOR THE SHANNON
PROTECTION ALLIANCE (SPA)**

FEBRUARY 2009

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26 February 2009

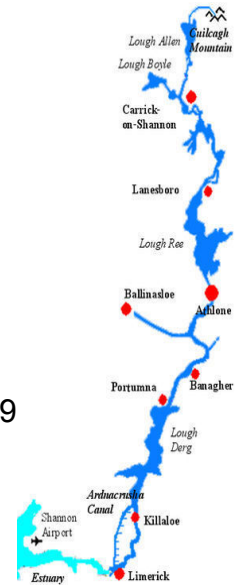


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Mr. Gerry Geoghegan,
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Ground Floor Block 2,
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Dun Laoghaire,
Co. Dublin.

26 February 2009



Dear Mr. Geoghegan,

**Observations on the Water Supply Project – Dublin Region
(Draft Plan) Prepared by RPS and Veolia Water for Dublin City
Council, November 2008**

SUBMISSION ON BEHALF OF THE SHANNON PROTECTION ALLIANCE (SPA)

In response to the public consultation notice inviting submissions on the Draft Plan for the Dublin Region Water Supply Project, I have pleasure in attaching a submission on behalf of the Shannon Protection Alliance (SPA).

The submission, which was prepared by EMS, but which includes comments and observations made by members of the SPA on the Draft Plan, takes into account the further information which you provided at our meetings on 10 April and 04 June 2008, and examines a wider range of options described during the second of these meetings and subsequently incorporated into the Draft Plan. While we are pleased to see that the preferred option has shifted away from the original choice of abstraction from Lough Ree, the members of SPA were disappointed to note that the emphasis in the Draft Plan remains focused on taking water from the Shannon Catchment and transporting it to Dublin via a long distance pipeline.

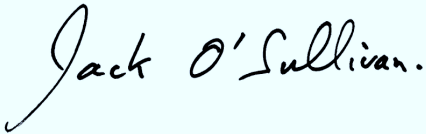
The relative lack of detailed consideration in the Plan given to demand management and conservation measures, particularly in the context of increasing concern about sustainable management of water sources and equitable distribution of the resource is also a matter of concern to the SPA.

While the Draft Plan is a significant improvement on the previous report entitled "Greater Dublin Water Supply – Major Source Development", produced in 2006, we feel that the revised Draft Plan could go much further to meet the spirit and aims of the Water Framework Directive and the Principles of Environmental and Social Sustainability. However, we are pleased to note that your next stage evaluation of the water supply options described in the Plan will be undertaken only after feedback from the public consultation process has been received and fully considered; and that your evaluation will reflect that feedback.

We therefore trust that the comments and observations in the attached report will provide you with an indication of the opinions of the large number of stakeholders who comprise the Shannon Protection Alliance. And, of course, we are pleased to add that the opportunity to participate in the consultation process and to submit our observations has been welcomed; and the members of SPA look forward to continuing dialogue with RPS and Dublin City Council.

With kind regards.

Yours sincerely,



Jack O'Sullivan

Environmental Management Services

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“One of the many things I learned as president was the centrality of water in the social, political and economic affairs of the country, the continent and the world.”

Nelson Mandela

Founder, Nelson Mandela Foundation, South Africa, at the World Summit on Sustainable Development, 2002.

1. Foreword

In November 2008, Dublin City Council (DCC), acting on behalf of the local authorities in the Dublin Region Water Supply Area (DRWSA), published a group of reports under the title of “Water Supply Project - Dublin Region (Draft Plan)”, comprising:

- i) a Technical Report (the Draft Plan)
- ii) a Non-Technical Summary of the Draft Plan;
- iii) an Executive Summary of the Draft Plan;
- iv) an Environmental Report (SEA Phase II);
- v) a Non-Technical Summary of the SEA Phase II Report;
- vi) a Habitats Directive Assessment;
- vii) a Desalination Study;
- viii) a Groundwater Report; and,
- ix) numerous Technical Appendices.

These reports, which were prepared for DCC by Veolia Water and RPS, are described as updated versions of the report previously entitled “Greater Dublin

Water Supply – Major Source Development (Draft Plan)¹. This draft plan was first made publicly available in 2006, when Dublin City Council published on 31 May 2006 a draft feasibility study in which three options were considered for the purpose of providing a new source of raw water to meet the projected water demand growth in the Greater Dublin Area (GDA).

In the 2006 draft plan, those options were listed as:

1. Abstraction from the River Shannon at Lough Ree, treatment of the raw water at a plant approximately 4 km from the intake point, and pumping of the treated water to Dublin via twin pipelines 170 km in length;
2. Abstraction of water from either the River Barrow or Slaney, or from both rivers at times when flow volumes would permit the increased abstraction, and then pumping this water directly to the existing water treatment plant at Ballymore Eustace which would require expansion to accommodate the additional volumes; and,
3. Abstraction of seawater from Dublin Bay through an undersea pipeline, desalination to yield potable water, and discharge of the resulting brine (higher salinity effluent) to Dublin Bay via a long outfall.

During 2008, significant further information was provided by RPS and Dublin City Council during meetings with members of the Shannon Protection Alliance (SPA) on 10 April and 04 June 2008, and in a Scoping Report for Phase II of the Strategic Environmental Assessment, received by SPA from RPS on 25 June 2008². At these meetings, members of SPA were assured that:

- no definite decisions had been taken about the selection of a preferred abstraction scheme;
- the issues raised in the first report produced by Environmental Management Services for SPA in April 2007 (updated in June 2007) had been taken into account;
- a wider range of options was being examined;
- whatever option is selected to provide for Dublin's water needs must not be "*at the expense of another catchment or community*"; and,
- whatever option is finally selected "*must be sustainable, i.e., the environmental, economic and social aspects must be properly balanced.*"³

The wider range of options described by RPS during the second of these meetings included:

- abstraction from three possible locations within the River Shannon catchment (Lough Ree, Lough Derg and Parteen Weir);

¹ Greater Dublin Water Supply – Major Source Development: Draft Feasibility Study. Veolia Water and RPS, for Dublin City Council, 31 May 2006.

² Strategic Environmental Assessment, Phase II -- Scoping Report; Veolia Water and RPS for Dublin City Council, August 2008.

³ Minutes prepared by RPS of a meeting held on 10 April 2008 at the Creggan Court Hotel, Athlone; paragraph 1.10.

- abstraction from the Shannon catchment combined with water storage in artificial lakes located in worked-out or cutaway midland bogs;
- use of the extensive groundwater resources in counties Fingal and Kildare;
- abstraction from the rivers Liffey and Barrow (this option was examined in the Feasibility Study); and,
- desalination (this option was examined in the Feasibility Study, and subsequently became the subject of a specialist report published in November 2008).

Nevertheless, according to the Scoping Report for Phase II of the Strategic Environmental Assessment, produced by RPS in June 2008, it appeared at the time that some of these potentially valuable options had again been ruled out. For example, the Scoping Report stated that the use of groundwater, even in combination with other water sources, will not be “*included within the Strategic Environmental Assessment Process*” because it “*could not individually meet the required water supply*”.⁴

Following the publication by DCC in November 2008 of the group of reports listed at the beginning of this introduction, Shannon Protection Alliance requested **Environmental Management Services** to provide a commentary on these reports, with particular regard to the consequences of the various options for the River Shannon and its catchment. The report which follows should therefore be read in conjunction with our earlier report entitled “*Environmental and Sustainability Assessment of the Proposal by Dublin City Council to Abstract Water from Lough Ree for the Purpose of Meeting a Projected Growth in the Demand for Water in the Greater Dublin Area*”.⁵

While we have tried not to repeat information and comments provided in our first assessment of the proposed scheme, there are some occasions when repetition is necessary to highlight a particular issue. Apart from those few occasions, we have focussed mainly on identifying changes in the proposed abstraction scheme, new information, amendments to the options considered, impacts on the River Shannon and its resources, and the question of whether or not the abstraction scheme proposed by Dublin City Council can be considered as sustainable development.

The question of sustainability must also be examined in the wider context of a growing international awareness of how much water we consume, and the increasing concern about water shortages and conflicts between States and regions over access to ever-decreasing water resources. Closely connected with this issue is the accumulating evidence that abstracting significant volumes

⁴ Scoping Report for Phase II of the Strategic Environmental Assessment, RPS, June 2008; Section 2.5.1, page 15.

⁵ “Environmental and Sustainability Assessment of the Proposal by Dublin City Council to Abstract Water from Lough Ree for the Purpose of Meeting a Projected Growth in the Demand for Water in the Greater Dublin Area”. A Report for the Shannon Environmental Protection Alliance (SPA). Environmental Management Services, Castlepollard, County Westmeath; 14 August 2007.

of water from river systems and lakes in various parts of the world has caused, and is continuing to cause, widespread ecological, social and economic losses and damage; leading in some cases to the abandonment of costly water abstraction schemes.

A report prepared for the World Economic Forum meeting held in Davos, Switzerland, earlier this year, stated the global concern succinctly:

“There is a structural problem in how we manage water across the web of our global economy. Worsening water security will soon tear into various parts of the global economic system. It will start to emerge as a headline geopolitical issue. The volatility in food prices in 2008 should be treated as an early warning sign of what is to come.

In many places around the world, we have consistently under-priced water, wasting and overusing it as a result. We have depleted stocks of groundwater at the expense of our future water needs. In effect, we have enjoyed a series of regional water “bubbles” to support economic growth over the past 50 years or so, especially in agriculture. We are now on the verge of water bankruptcy in many places with no way of paying the debt back. In fact, a number of these regional water bubbles are now bursting in parts of China, the Middle East, the south-western US and India; more will follow. The consequences for regional economic and political stability will be serious.”⁶

Ireland cannot escape this reality, as we import “virtual water” when we purchase products grown or manufactured in other countries; for example, coffee, cotton garments, beans, flowers, vegetables. It is called “virtual water” because it is embedded in a commodity or a product. For example, Britain imports two thirds of its water footprint from countries in Africa, Latin America and from places which don't have any water, or are becoming increasingly short of water. And Ireland is no different – we import many commodities which require huge amounts of water to produce.

⁶ World Economic Forum Water Initiative: Managing Our Future Water Needs for Agriculture, Industry, Human Health and the Environment. *The Bubble Is Close to Bursting: A Forecast of the Main Economic and Geopolitical Water Issues Likely to Arise in the World during the Next Two Decades*. Draft for Discussion at the World Economic Forum Annual Meeting 2009. World Economic Forum. January 2009.

2. The Shannon Protection Alliance

When the Dublin Local Authorities' draft plans to abstract very large quantities of water from Lough Ree on the River Shannon were published in 2006, a working group (The Lough Ree Task Force) was established to examine the issues raised by the proposal. On 20 April 2007, as a result of increasing public concern about the proposed abstraction scheme, members of the Lough Ree Task Force were joined by representatives of a wide variety of organisations with interests in angling, boat hire, tourism, conservation, wildlife and environmental protection; and a new organisation was formed – the **Shannon Protection Alliance (SPA)**.

The inaugural meeting was attended by representatives of more than 20 local organisations representing a collective membership of in excess of 10,000 people. At the end of July 2007, SPA had received pledges of support from concerned residents; from local groups and clubs comprising anglers, boatmen and bird-watchers, and from organisations representing farmers, vintners, hoteliers, cruise organisers, other tourism and business interests and other interested parties whose total combined numbers are in excess of 100,000 people.

Since its formation, the Shannon Protection Alliance has campaigned vigorously against the proposed abstraction scheme; and, as noted in the introduction, has engaged in consultations with Dublin City Council and the Council's consultants. SPA has also continued to express through the print and broadcasting media its concern, and the concerns of its constituents, about the proposed abstraction. At the same time, when it appeared that Dublin City Council was proposing to abandon its plan to abstract water from Lough Ree, SPA welcomed the move. However, SPA still has very serious concerns about the Dublin Authorities' plan to abstract large quantities of water from Lough Derg, and will continue to campaign actively against that proposal.⁷

Throughout this on-going debate on the suitability, need and sustainability of the proposed scheme to abstract large volumes of water from the River Shannon catchment, SPA has emphasised the importance of consultation between the project proponents and the people who would be most affected by the scheme if it were to be implemented. Members of SPA consider that early and continuing consultation is a basic constitutional right, especially given the ratification of the Århus Convention by the European Union, and its transposition into European legislation by Directive 2003/35/EC.

⁷ Shannonside Northern Sound News, 28 January 2009 -- "Shannon Protection Alliance remains concerned over proposals for Lough Derg".

3. Projected Demand for Water in the Greater Dublin Area

3.1 Estimates of Future Demand for Water

The consultants' projections of future demand for potable water in the Greater Dublin Area are contained in section 2 of the Project Technical Report, which we will also refer to as the Draft Plan.⁸ The methodology used is based on the Greater Dublin Water Supply Strategic Study (GDWSSS)⁹ which was carried out in 1996, and on a Year 2000 Review¹⁰ of the GDWSSS. These studies used a demand analysis and forecasting method based on the British Department of Environment recommendations dating from September 1995.

Unlike the previous Draft Feasibility Study which dismissed potential savings from conservation measures and increasing public awareness of the value of clean water, as being “*difficult to quantify*”¹¹, the present study considers that the “*constant addition of new housing stock within the water supply area, including greater usage of water efficient appliances, should exert some downward influence on average Per Capita Consumption (PCC) levels over time. Similarly increased consumer awareness, for water conservation, through media campaigns will also exert some downward pressure on PCC levels*”.¹²

However, no attempt is made to quantify any possible or potential reduction in per capita consumption, while measures which have been regarded as normal in many other countries for at least 20 years, e.g., metering for private supply, use of rain water for sanitary purposes / toilet flushing / garden irrigation, and on site re-use of grey water, are not even mentioned, let alone considered.

As we pointed out in our previous report, metering and charging is a powerful and equitable tool, making people more conscious of the amounts of water they use – and the amounts wasted. Farms and commercial premises are metered, and their owners pay for water consumed, so it is not a major step to extend the system to domestic users, even though it may be politically unpopular. It is the view of SPA that access to clean water is a basic human right, and therefore metering and charging, must be implemented in a socially just way. When domestic water consumption is metered, every person should be entitled to a reasonable quantity of water, sufficient for drinking, cooking, washing and cleaning, at no cost. Above that threshold, water should be charged.

We also pointed out in our previous report the reduction in per capita consumption which can be achieved by metering. In Spain, the introduction of water metering in Barcelona resulting in some 76 % of the population reducing their consumption by 17 %; while in Terrassa, metered customers used 13%

⁸ Water Supply Project – Dublin Region (Draft Plan). Veolia Water and RPS, for Dublin City Council, November 2008.

⁹ The Greater Dublin Water Supply Strategic Study Report (GDWSSS) 1996 – 2016.

¹⁰ Year 2000 Review of the Greater Dublin Water Supply Strategic Study.

¹¹ *Feasibility Study: Demand / Supply Projections 2005 / 2011 / 2031; Appendix A; section 1.5, page 3.*

¹² Water Supply Project – Dublin Region (Draft Plan). Veolia Water and RPS, for Dublin City Council, November 2008; section 2.4.2, page 11.

less water than unmetered, and in Mataro, a 16% reduction in water consumption was achieved by metering.

The reference in the Draft Plan to the “*constant addition of new housing stock within the water supply area*” must surely be regarded as an out-dated prediction, given the observed fall in housing completions during 2008 and the general economic recession. The effect of the current economic recession, including significant reduction in household disposable income is also to reduce per capita water use.

In fact, the predictions for population growth and per capita consumption are unchanged from those given in the Draft Feasibility Study published in May 2006. Per capita consumption is forecast to remain at 145 litres per head per day, giving rise to a total domestic demand of 317 million litres per day. Average and peak demand projections are also unchanged.

It would appear that no account has been taken of the massive changes in Ireland’s economy from a period of strong growth to severe economic recession. These changes occurred between 2006 and early 2008, when the first signs of the economic downturn became apparent, and the effects of the recession are expected to become more severe in 2009, and into the near future. We would expect that some studies should have been undertaken in 2008 to determine the effects of these changes on the future domestic, commercial and industrial demand for water.

3.2 Leakage and Losses

In our previous report, we commented on the high rate of leakage in the distribution network, together with customer-side leakage losses, the quantities of which were estimated in the May 2006 Draft Feasibility Study.

In the Draft Plan, published in November 2008, the estimates of water losses are unchanged, amounting to 53 million litres per day of customer-side leakage losses, and 20 % loss in the distribution network (amounting to 161 million litres per day. It can be seen from Appendix A (Demand projections from 2007 to 2031) that both the distribution system leakage and the customer-side losses continue almost unchanged throughout this entire period; from which we must conclude that there are no plans to substantially reduce these water losses.

The figure of 20 % distribution loss is stated in the 2008 Draft Plan to be “*in line with international best practice*”. As we have pointed out in our previous assessment¹³, best international practice has reduced leakage rates to 5 - 6 %. The combination of distribution leakage and losses of water from within user’s premises is far too high in Ireland, and there is no reason why this should not be reduced to more acceptable levels. If this were done, the saving would be very large, in terms of water quantity and economic costs.

¹³ “Environmental and Sustainability Assessment of the Proposal by Dublin City Council to Abstract Water from Lough Ree for the Purpose of Meeting a Projected Growth in the Demand for Water in the Greater Dublin Area”. A Report for the Shannon Environmental Protection Alliance (SPA), Section 3.5, page 17.

3.3 Additional Demand for Water to Supply Other Local Authorities

In our first report, we referred to the fact that, addition to the water requirements of the GDA, the Feasibility Study (2006) included a proposal to supply water to Counties Westmeath and Offaly, and especially to the towns of Athlone, Mullingar and Tullamore; and to a portion of County Meath. It was unclear whether the proposed off-take of 50 million litres per day would supply the three towns, or whether (as more likely), 50 million litres per day would be supplied to the Athlone area, and a further 50 million litres per day would be supplied to Mullingar and Tullamore.

The Feasibility Study (2006) also examined the option of supplying water to the Royal Canal, the normal supply requirement of which is 20 million litres per day. However, Waterways Ireland, which has responsibility for maintaining the canal, has apparently predicted that this requirement would rise to 50 million litres per day.

We therefore estimated that the total quantity of water to be taken from Lough Ree and the River Shannon could be as high as 455 to 460 million litres / day.

The Draft Plan (2008) is much more reticent about the quantities of water which could be supplied to local authorities on or near the pipeline route to Dublin, except to point out that Option F *“has the capability of supplying treated water to Midlands Local Authorities from Rochfortbridge (particularly Westmeath and Offaly)”*.¹⁴ The likelihood that the towns of Athlone, Mullingar and Tullamore would be supplied with water is underlined by the reference in section 2.13 of the 2008 Technical Report / Draft Plan to the *“gateway status of the major Midlands towns as set out in the National Spatial Strategy”*.

However, it should be noted that Option F (abstraction from Lough Derg, with storage in an area of worked-out peatland near Rochfortbridge) appears to be the option with the least number of negative consequences and the greatest number of positive impacts (see section 5 below). The volumes of water likely to be abstracted to supply other local authorities is therefore an unknown quantity, but could be in the region of 150 to 175 million litres / day.

Section 2.13 (page 19) of the 2008 Technical Report / Draft Plan goes on to state that “a new supply to the Dublin Region” **must not be “at the expense of local development policy objectives”**. Therefore, we find it all the more surprising that no mention is made in the Draft Plan of the potable water requirements of Limerick City and adjacent parts of County Limerick which could be detrimentally affected by the proposed large-scale abstraction from Parteen Basin (Option C).

¹⁴ Water Supply Project – Dublin Region (Draft Plan). Veolia Water and RPS, for Dublin City Council, November 2008, section 3.7.1, page 59.

4. Water Supplies -- Production Capacity of Existing Sources in the Dublin Region

Table 2.8 on page 11 of the May 2006 Draft Feasibility Study provides a list of the existing potable water sources in the GDA, together with their current and projected sustainable production capabilities. The data in this table are repeated in Table 2.8 in the 2008 Technical Report / Draft Plan, with the following differences:

- the sustainable output from groundwater in County Kildare was reduced from 20 million litres per day to 11 million litres per day from the two well-fields, and,
- the sustainable abstraction from the River Barrow has been increased from 51 to 61 million litres per day (Phase 1 and Phase 2).

The total sustainable production by the year 2010 is given as 627 million litres per day, and the peak production is given as 664 million litres per day in the 2008 Technical Report / Draft Plan. These figures are unchanged from those given in the May 2006 Draft Feasibility Study.

4.1 Groundwater Resources

One alternative which we strongly suggested in section 5.1 of our previous report should be examined is the possibility of using a large groundwater resource comprising a productive gravel and fissured bedrock aquifer which extends from Fingal County, North County Dublin, and south-westwards into Counties Meath and Kildare. This groundwater resource already supplies vegetable producers in Fingal County, and we provided information about the sustainable quantity and quality of the available groundwater, while pointing out that the resource would need to be properly evaluated and its recharge rate determined.

Following feedback from stakeholders (including SPA) during the public consultation phase, Dublin City Council subcontracted Eugene Daly Associates to undertake a study of this and other groundwater options in conjunction with the RPS project team. We considered that this would be an important study, as Central Leinster is known to contain significant groundwater resources, and all of the projected water supply demands of the local authorities in the Dublin Region are within this area.

The report by Eugene Daly Associates concluded that *“there are significant sustainable groundwater resources, i.e., about 125 million litres / day available for development, in the six aquifer units, in the Central Leinster area, which covers an area within an 80km radius of Dublin. The resources are contained within limestone, dolomite and sand and gravel aquifers”*.

However, the report also points out that *“none of the aquifer units identified have been developed for water supply, at the scale required for the Dublin Region, nor have any other aquifer units in Ireland”* and *“it is likely that a minimum of about 20 wellfields would be required. Considerable logistical and*

planning difficulties would have to be overcome for all of the wellfield schemes to be implemented concurrently”.

The estimate by Eugene Daly Associates that 125 million litres / day of groundwater would be available for development within 80 km of Dublin is much lower than our estimate of 197 million litres per day obtainable from the aquifer beneath Fingal County alone (section 5.1 of our previous report); but it should be noted that Eugene Daly’s estimate is based on a very conservative view of the aquifers’ potential.

The figure of 20 wellfields suggested by Eugene Daly may not be unrealistic. During a meeting held on 29 May 2007 with Mr Paddy Boyle, an engineer who has studied the Fingal County aquifer in detail and who has consulted with the principal well-drilling firms operating in the area, we agreed that if a network of 200 wells could be constructed, and connected to provide a public water supply, some 200 million litres of water per day could be produced. At an average cost of between € 5,000 and € 10,000 per well, a 200-well field could cost a maximum of € 20 million to implement. If the pipework, basic water treatment plant and other parts of the system were to cost approximately a similar amount, then the entire Fingal County and the Greater Dublin Area could be supplied with 200 million litres per day for some € 40 million capital cost, and much smaller running costs than that envisaged by Dublin County Council for the proposed abstraction from the Shannon catchment.

The report by Eugene Daly Associates agrees with our suggestion that for the development of the smaller types of water supply schemes (say up to 5Ml/d), the cost of developing a groundwater source is about half the cost of a comparable surface water source due to the generally lower treatment and distribution costs. However, he goes on to say that for very large surface water schemes, where large economies of scale are achieved, the unit costs are of the same order as those for groundwater. While that may be true if the surface water source is close to where the water is required, his conclusion omits the fact that the proposed abstraction from the Shannon catchment would involve long-distance transport of the water by pipeline, and substantial pumping costs.

The report by Eugene Daly Associates further concludes that groundwater could make a significant contribution to meeting the increased demand on the Dublin Region’s water supply system by:

- Augmenting the supply at the extremities of the distribution network where there are engineering issues with the existing system;
- Providing water supplies to communities on the fringes of the city which are located some distance from the distribution network;
- Developing groundwater in some of the other local authority functional areas, which are currently supplied by Dublin Region water;
- Promoting the replacement of water used for certain non-potable purposes at present within the region;
- Demonstrating that the Dublin Region Local Authorities are developing all the water resources within their functional areas before going further afield;

- Contributing to the flexibility, strategic and security aspects of the region’s drinking water supply; and,
- Extending the date for the completion of a major new source for the Dublin Region.

It is therefore difficult to agree with the conclusion in the 2008 Technical Report / Draft Plan that groundwater sources should not be further considered among the possible options for meeting the increased demand for water in the Dublin Region.

5. Options Examined in the Draft Plan

Before commenting on the options examined in the Draft Plan, it may be useful to compare the statements about the proposed abstraction from Lough Ree in the Draft Plan and in the previous document entitled “Greater Dublin Area Water Supply - Major Source Development (draft) Feasibility Study,2006”. The information below is taken from Table 4.4 in the 2006 document and from Tables 4.1 to 4.8 in the November 2008 document.

Water Supply - Major Source Development (draft) Feasibility Study”,2006 – Abstraction from Lough Ree		Technical Report / Draft Plan, November 2008 – Abstraction from Lough Ree	
Yield of Source (300/350 MI/d) – Technically Reliable	Yes. Demonstrated by ESBI Modelling of Abstraction Impacts based on 70 years of historic records and also in climate change scenario	1) Technical assessment – Source Options (Capability of Source for 350MI/d Continuous Abstraction)	100% availability of 350 MI/d would require a change in the sluice operations at Athlone in order to comply with ESB Regulation levels. Change in the operation of the Athlone sluices would require widespread stakeholder agreement. Change could marginally increase risk of flooding - Lough Ree & Callows. Alternatively abstractions could be scaled back in dry periods with / without storage back-up.
Infra-structure requirements	Spatially extensive involving multi-authorities. Technically deliverable within prescribed timescale	2) Technical Assessment – Infrastructure (pipelines, pumping, water treatment, storage)	Pipeline route is shortest route Shannon to Dublin (104km). Route avoids SPAs / SACs / NHAs / archaeology etc. Satisfactory hydraulic profile for pumping requirements. Suitable sites are available for abstraction and water treatment.

Water Supply - Major Source Development (draft) Feasibility Study”,2006 – Abstraction from Lough Ree		Technical Report / Draft Plan, November 2008 – Abstraction from Lough Ree	
Capital / operating & whole life costs	Operational Cost of water delivered is of the same general magnitude as current production facilities	5) Economic Assessment – Capital Cost, Operational Cost, Whole Life Cost, Cost of water delivered (Capex, Opex and Cost of Water delivered - NPV @ 5% over 25 year operation)	Capital cost € 461 million; operational expenditure € 115m; Whole life cost € 577 million; Cost of water delivered € 0.29/m ³ .
Stakeholders	Response from statutory stakeholders did not identify unacceptable risks to project delivery at this stage.	6) Socio Economic Assessment – Impacts of options on Navigation, Tourism, Agriculture, Angling, Local Economy, Flooding etc	In order to ensure that water levels would remain within the requirements of the ESB Regulations, it would be necessary to restrict abstractions in dry periods or else change the current operation of the sluices. Consensus on sluice operation changes would be difficult since navigation & flooding interests currently compete. These changes would marginally increase flooding / environmental risk around Lough Ree and downstream of Athlone on the Shannon Callows .
Environmental Assessment	Anticipated impacts will be fully examined at EIA	3) Environmental – Strategic Environmental Assessment (SEA) (SI No 435 & 436 of 2004)	Direct impact on SAC and SPA. Issues relating to increased low flow durations and downstream retention time during dry summer periods. This option can meet the objective of 350 MI/d but would require modification to sluice operations in order to comply with regulations. Sluice modifications marginally increase flood / environmental risk around Lough Ree and on the Shannon Callows.

Water Supply - Major Source Development (draft) Feasibility Study”,2006 – Abstraction from Lough Ree		Technical Report / Draft Plan, November 2008 – Abstraction from Lough Ree	
		4) Environmental – Habitats Directive Assessment (HDA) - Impacts on European Designated Sites	Direct impact on SAC and SPA. Issues relating to increased low flow durations and downstream retention time during dry summer periods. Option can meet the objective of the strategy of 350 MI/d but requires modification to sluice operations in order to comply with regulations. Sluice modifications marginally increase flood / environmental risk round Lough Ree and on Callows.

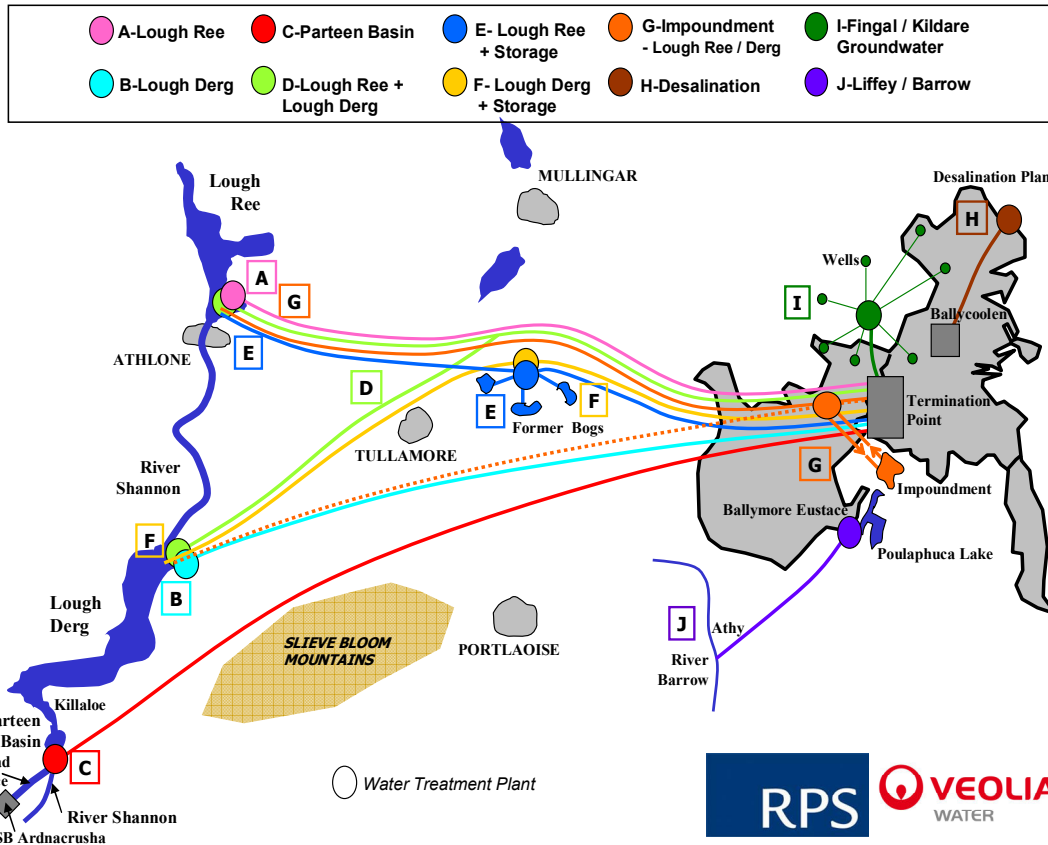
The 10 options examined in the Draft Plan are illustrated in the figure on the following page, taken from Figure 1.3 in section 1.4 of the Plan. The full range of options includes:

- abstraction from three possible locations within the River Shannon catchment (Lough Ree, Lough Derg and Parteen Weir);
- abstraction from the Shannon catchment combined with water storage in artificial lakes located in worked-out or cutaway midland bogs;
- use of the extensive groundwater resources in counties Fingal, Meath and Kildare;
- abstraction from the rivers Liffey and Barrow (this option was examined in the Feasibility Study); and,
- desalination (this option was examined in the Feasibility Study) ¹⁵.

It should be noted however, that of the ten possible options, seven of them involve abstraction from the River Shannon, and four of these involve abstraction from Lough Ree. Two major options not involving abstraction from the Shannon, i.e., use of the aquifer in Counties Fingal, Meath and Kildare, and abstraction from the Rivers Liffey and Barrow, were ruled out in the Scoping Report for Phase II of the Strategic Environmental Assessment, produced by RPS in June 2008¹⁶, and these two options are also ruled out in the Draft Plan. The reality is that only two major choices remain – desalination or abstraction from some point on the River Shannon; desalination is considered the most costly of the alternatives proposed, and has also been ruled out.

¹⁵ Minutes prepared by RPS of a meeting held on 10 April 2008 at the Creggan Court Hotel, Athlone; paragraph 2.10.

¹⁶ Scoping Report for Phase II of the Strategic Environmental Assessment, paragraph 2.5.1, page 15.



Options including Lough Ree	Options excluding Lough Ree
Option A: Lough Ree	Option B: Lough Derg
Option D: Lough Ree (Phase 1) / Lough Derg (Ph 2)	Option C: Parteen Basin
Option E: Lough Ree + Storage (Bog)	Option F: Lough Derg + Storage (Bog)
Option G: Lough Ree (Lough Derg) + Impoundment	Option H: Desalination
	Option I: Groundwater
	Option J: Liffey - Barrow Conjunctive Use

5.1 Criteria Used in Assessing the Options

The following criteria were used in the 2008 Technical Report / Draft Plan to evaluate each of the 10 options (A to J) listed in the table above.

<p>Technical (source) - Evaluation Criteria</p>	<p>Draft evaluations are based on the relative capability of the various sources to provide a continuous abstraction quantity of 350Mld in a sustainable manner. The evaluations take account of the hydrological modelling results including the modifications to control structures (weirs and sluices) that may be necessary to ensure continuous provision of 350Mld. Difficulties which may arise in achieving necessary control structure modifications are assessed. Scaling back abstractions during dry periods and / or the provision of storage are factored into the "relative evaluation" process. Quality of source water is also considered.</p>
<p>Technical (infrastructure) - Evaluation Criteria</p>	<p>Draft evaluations are based on the relative reliability, resilience, durability, flexibility and technical complexity of the options. Options involving storage are more resilient and flexible than direct supply options. Options involving complex water treatment or long pipelines are less favourable than options involving less infrastructure and simpler water treatment. Suitability of pipeline routes and treatment plant sites are factored into the "relative evaluation" process.</p>
<p>Environmental (SEA) - Evaluation Criteria</p>	<p>Strategic Environmental Assessment (SEA) legislation contains a list of environmental criteria against which the various water supply options must be evaluated for impacts. Draft "relative evaluations" are based on impacts against the following criteria - biodiversity, flora and fauna, fisheries, water, climate change, energy, cultural heritage, landscape, land-use, tourism, population, human health and soils.</p>
<p>Environmental (HDA) - Evaluation Criteria</p>	<p>Impacts of option "infrastructure and operation" on European Designated Sites (SACs and SPAs) are evaluated. Draft "evaluations" of impacts are assessed as (a) likely to have significant effect on the integrity of European Sites (--) or (b) no significant effect on the integrity of European Sites (~) or (c) inconclusive (-).</p>
<p>Economic - Evaluation Criteria</p>	<p>Draft evaluations are based on straightforward "capital, operating and whole life" relative cost assessments over a 25 year operating period. Net present values (NPV) are calculated using a 5% discount rate. Overall relative evaluation of options will require cost of options being linked to performance of options and other environmental and socio economic criteria.</p>

Socio Economic - Evaluation Criteria	For Shannon options the ability to abstract water within the operating range of lake levels specified in ESB Regulations is a key consideration in assessment of potential impacts on tourism, local economy etc. Capability of options to provide treated water to local authorities between the Shannon and Dublin are considered. Potential enhancements to the local environment such as potential for better water quality through increased quality focus, potential for improvements in management of the Shannon and environmental rehabilitation of cutaway bogs (storage options) are factored into the “relative evaluation” process. Socio economic benefits in having adequate water availability for population in the Dublin Region apply to all technically feasible options.
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5.2 Evaluation of the Ten Options in the 2008 Technical Report / Draft Plan

In the following tables we have summarised the evaluations of each of the 10 options, from the data in Tables 4.1 to 4.7 in the 2008 Technical Report / Draft Plan. Our observations on these evaluations follow in section 6.

Legend

Major negative impact	--
Negative impact	-
Neutral; no significant impact	~
Positive impact	+
Major positive impact	++

Legend (Habitats Directive Assessment)

Likely to effect	--
inconclusive	-
No significant effect, neutral	~

N/A* = Not Applicable. Options I and J cannot provide required strategic quantities of water

5.2.1 Option A: Abstraction from Lough Ree

Criteria	Description	Draft Evaluation
<p>1) Technical assessment – Source Options (Capability of Source for 350MI/d Continuous Abstraction)</p>	<p>100% availability of 350MI/d would require a change in the sluice operations at Athlone in order to comply with ESB Regulation levels. Change in operation of sluices would require widespread stakeholder agreement. Change could marginally increase risk of flooding - Lough Ree & Callows. Alternatively abstractions could be scaled back in dry periods with/without storage back-up.</p>	-
<p>2) Technical Assessment – Infrastructure (pipelines, pumping, water treatment, storage)</p>	<p>Pipeline route is shortest route Shannon to Dublin (104km). Route avoids SPAs / SACs / NHAs / archaeology etc. Satisfactory hydraulic profile for pumping requirements. Suitable sites are available for abstraction and water treatment.</p>	++
<p>3) Environmental Assessment – Strategic Environmental Assessment (SEA) (SI No 435 & 436 of 2004)</p>	<p>Direct impact on SAC and SPA. Issues relating to increased low flow durations and downstream retention time during dry summer periods. Option can meet the objective of the strategy of 350MI/d but requires modification to sluice operations in order to comply with regulations. Sluice modifications marginally increase flood/environmental risk around Lough Ree and on the Callows.</p>	--
<p>4) Environmental Assessment – Habitats Directive Assessment (HDA) - Impacts on European Designated Sites</p>	<p>Direct impact on SAC and SPA. Issues relating to increased low flow durations and d/s retention time during dry summer periods. Option can meet the objective of the strategy of 350MI/d but requires modification to sluice operations in order to comply with regulations. Sluice modifications marginally increase flood/environmental risk round Lough Ree and on Callows.</p>	--

Criteria	Description	Draft Evaluation
<p>5) Economic Assessment – Capital Cost, Operational Cost, Whole Life Cost, Cost of water delivered.</p>	<p>Capex € 461m ; Opex € 115m ; Whole Life Cost € 577m; Cost of water delivered € 0.29/m³.</p>	<p>++</p>
<p>6) Socio Economic Assessment – Impacts of options on Navigation, Tourism, Agriculture, Angling, Local Economy, Flooding etc</p>	<p>In order to ensure that water levels would remain within the requirements of the ESB Regulations it would be necessary to restrict abstractions in dry periods or else change current operation of sluices. Consensus on sluice operation changes would be difficult since Navigation & Flooding interests currently compete. Changes would marginally increase flooding/environmental risk around Lough Ree and downstream of Athlone on Callows .</p>	<p>-</p>

5.2.2 Option B: Abstraction from Lough Derg

Criteria	Description	Draft Evaluation
<p>1) Technical assessment – Source Options (Capability of Source for 350MI/d Continuous Abstraction)</p>	<p>350 MI/d is 100% available in dry or climate change periods. No change in lake levels. Requires agreement with ESB to modify generation activities due to 1% - 2% reduction in average water flow availability resulting from abstraction. Flow reductions may marginally increase residence times in dry periods.</p>	<p>+</p>
<p>2) Technical Assessment – Infrastructure (pipelines, pumping, water treatment, storage)</p>	<p>Pipeline route from Shannon to Dublin is satisfactory (122km). Route avoids SPAs / SACs / NHAs / archaeology etc. Satisfactory hydraulic profile for pumping requirements. Suitable sites are available for abstraction and water treatment.</p>	<p>+</p>
<p>3) Environmental Assessment – Strategic Environmental Assessment (SEA) (SI No 435 & 436 of 2004)</p>	<p>Direct impact on SAC and SPA. No significant issues relating to levels or low flows but potential for marginal increases in retention time during dry summer periods. 122 km pipeline has flexibility in route selection. 1% - 2% reduction in (hydro) renewable energy.</p>	<p>~</p>
<p>4) Environmental Assessment – Habitats Directive Assessment (HDA) - Impacts on European Designated Sites</p>	<p>Direct impact on SAC and SPA. No significant issues relating to levels or low flows. Potential for marginal increases in retention time during dry summer periods not likely to be significant. 122 km pipeline has flexible route re SPAs, SPCs etc.</p>	<p>~</p>

Criteria	Description	Draft Evaluation
<p>5) Economic Assessment – Capital Cost, Operational Cost, Whole Life Cost, Cost of water delivered (Capex, Opex and Cost of Water delivered - NPV @ 5% over 25 year operation)</p>	<p>Capex € 515m ; Opex € 126m ; Whole Life Cost € 641m; Cost of water delivered € 0.32/m³.</p>	<p>+</p>
<p>6) Socio Economic Assessment – Impacts of options on Navigation, Tourism, Agriculture, Angling, Local Economy, Flooding etc</p>	<p>Abstractions can be managed in conjunction with ESB to ensure no change in water levels. Abstraction would probably increase focus on water quality and water management issues in Lough Derg which could help improve its long-term tourism and angling potential which in turn could benefit the local economy.</p>	<p>+</p>

5.2.3 Option C: Abstraction from Parteen Basin, Upstream of the Ardnacrusha Hydro-electric Scheme

Criteria	Description	Draft Evaluation
<p>1) Technical assessment – Source Options (Capability of Source for 350MI/d Continuous Abstraction)</p>	<p>350 MI/d is 100% available in dry or climate change periods. No change in lake levels. No increase in residence times. Requires agreement with ESB to modify power generation activities due to 1% - 2% reduction in average water flows.</p>	<p>++</p>
<p>2) Technical Assessment – Infrastructure (pipelines, pumping, water treatment, storage)</p>	<p>Pipeline route from Shannon to Dublin is long (158km). Abstraction location requires ESB approval re embankments. Satisfactory technical profile for pumping requirements. Suitable sites are available for abstraction and water treatment.</p>	<p>~</p>
<p>3) Environmental Assessment – Strategic Environmental Assessment (SEA) (SI No 435 & 436 of 2004)</p>	<p>Direct impact on SAC and SPA but no significant issues identified relating to increased low flow durations, retention times or changes in water levels. Abstraction will result in 1% - 2% reduction in (hydro) renewable energy. Pipe route length is 158 km.</p>	<p>+</p>
<p>4) Environmental Assessment – Habitats Directive Assessment (HDA) - Impacts on European Designated Sites</p>	<p>Direct impact on SAC and SPA but no significant issues relating to increased low flow durations, retention times or changes in water levels. 158km pipeline has flexible route re SPAs, SPCs etc.</p>	<p>~</p>

Criteria	Description	Draft Evaluation
<p>5) Economic Assessment – Capital Cost, Operational Cost, Whole Life Cost, Cost of water delivered (Capex, Opex and Cost of Water delivered - NPV @ 5% over 25 year operation)</p>	<p>Capex € 621m ; Opex € 150m ; Whole Life Cost € 771m; Cost of water delivered € 0.38/m³.</p>	<p>-</p>
<p>6) Socio Economic Assessment – Impacts of options on Navigation, Tourism, Agriculture, Angling, Local Economy, Flooding etc</p>	<p>Abstractions can be managed in conjunction with ESB to ensure no change in water levels. Abstraction would probably increase focus on water quality issues in Parteen Basin which could help improve its long-term tourism and angling potential which in turn could benefit the local economy.</p>	<p>+</p>

5.2.4 Option D: Abstraction from Lough Ree (Phase 1) and Lough Derg (Phase 2)

Criteria	Description	Draft Evaluation
<p>1) Technical assessment – Source Options (Capability of Source for 350MI/d Continuous Abstraction)</p>	<p>Phase 1 requirement of 250 MI/d requires modification to operation of sluices which may marginally increase flooding risk as per Option A. Phase 2 requirement of 100 MI/d is 100% available. Option D requires ESB agreement as per Options B and C.</p>	<p>-</p>
<p>2) Technical Assessment – Infrastructure (pipelines, pumping, water treatment, storage)</p>	<p>Combined pipeline routes are long (171 km) but satisfactory route and hydraulic profile are available. Requires 2 pumping stations and 2 treatment plants (large infrastructural footprint). Suitable sites are available for abstraction and treatment plant.</p>	<p>~</p>
<p>3) Environmental Assessment – Strategic Environmental Assessment (SEA) (SI No 435 & 436 of 2004)</p>	<p>Direct impact on SAC and SPA. Issues relating to increased duration of low flow periods and increased retention times during dry summer periods. Abstraction 250 MI/d (Phase 1) requires modification to sluice operation as per Option A. Pipeline is 171 km which is longer than Option C. Two treatment plants increase infrastructure footprint. 1% - 2% reduction in energy.</p>	<p>-</p>
<p>4) Environmental Assessment – Habitats Directive Assessment (HDA) - Impacts on European Designated Sites</p>	<p>Direct impact on SAC and SPA. Issues relating to increased duration of low flow periods and increased retention times. Abstraction 250 MI/d (Phase 1) requires modification to sluice operation as per Option A.</p>	<p>--</p>

Criteria	Description	Draft Evaluation
<p>5) Economic Assessment – Capital Cost, Operational Cost, Whole Life Cost, Cost of water delivered (Capex, Opex and Cost of Water delivered - NPV @ 5% over 25 year operation)</p>	<p>Capex € 474m ; Opex € 120m ; Whole Life Cost € 594m; Cost of water delivered € 0.29/m³ .</p>	<p>+</p>
<p>6) Socio Economic Assessment – Impacts of options on Navigation, Tourism, Agriculture, Angling, Local Economy, Flooding etc</p>	<p>In order to ensure that water levels would remain within the requirements of the ESB Regulations it would be necessary to restrict abstractions in dry periods or else change current operation of sluices. Consensus on sluice operation changes would be difficult since navigation & flooding interests currently compete. Changes would marginally increase flooding/environmental risk around Lough Ree and downstream of Athlone on the Callows .</p>	<p>-</p>

5.2.5 Option E: Abstraction from Lough Ree with Storage of Water in an area of Peatland near Rochfortbridge

Criteria	Description	Draft Evaluation
<p>1) Technical assessment – Source Options (Capability of Source for 350MI/d Continuous Abstraction)</p>	<p>Increased abstractions of up to 500 MI/d from Lough Ree between Nov and July and minimum abstractions of 50 MI/d July to October can be achieved in compliance with ESB Regulations. Abstractions may require minor modifications to sluice operations, particularly in dry periods. Up to 4 months average supply requirement requires to be stored in order to ensure equivalent of 350 MI/d over 12 months.</p>	<p>~</p>
<p>2) Technical Assessment – Infrastructure (pipelines, pumping, water treatment, storage)</p>	<p>Pipeline route is shortest route Shannon to Dublin (104 km). Pipeline route (as per Option A) is satisfactory. Relocation of water treatment footprint to bog location satisfactory. Requires 4 months storage (large area required).</p>	<p>++</p>
<p>3) Environmental Assessment – Strategic Environmental Assessment (SEA) (SI No 435 & 436 of 2004)</p>	<p>Direct impact on SAC and SPA. Issues relating to increased low flow durations and retention times during dry summer periods are partially offset by storage. Storage required is 4 months. Positive potential for increased biodiversity. Pipe route is 104 km.</p>	<p>+</p>
<p>4) Environmental Assessment – Habitats Directive Assessment (HDA) - Impacts on European Designated Sites</p>	<p>Direct impact on SAC and SPA. Issues relating to increased low flow durations and retention times during dry summer periods are largely offset by 4 months storage at average extraction rates. Positive potential for increased biodiversity. Sluice issues still remain a potential issue in dry periods.</p>	<p>-</p>

Criteria	Description	Draft Evaluation
<p>5) Economic Assessment – Capital Cost, Operational Cost, Whole Life Cost, Cost of water delivered (Capex, Opex and Cost of Water delivered - NPV @ 5% over 25 year operation)</p>	<p>Capex € 548m ; Opex € 130m ; Whole Life Cost € 679m; Cost of water delivered € 0.33/m³. Storage 4 months average (2031)</p>	<p>~</p>
<p>6) Socio Economic Assessment – Impacts of options on Navigation, Tourism, Agriculture, Angling, Local Economy, Flooding etc</p>	<p>Enables abstractions from Lough Ree to be tailored to match flows resulting from rainfall. Minimum flows (50 MI/d) required in dry periods (to keep raw water moving in pipes) may require modification to sluice operations. Storage has potential to enhance environmental rehabilitation of former bogs.</p>	<p>~</p>

5.2.6 Option F: Abstraction from Lough Derg with Storage of Water in an area of Peatland

Criteria	Description	Draft Evaluation
<p>1) Technical assessment – Source Options (Capability of Source for 350MI/d Continuous Abstraction)</p>	<p>With ESB co-operation (Ardnacrusha), Lough Derg on its own as per Option B, does not require storage back-up to maintain levels. Strategic Storage (2 months) optimises peak management & has lower energy footprint than Option B. Facilitates relocation of infrastructure footprint (e.g. water treatment) and offsets any potential residence time impacts. Storage provides resilience for (say) major pipeline breaks or pollution incident in Lough Derg requiring pumping cessation.</p>	<p>++</p>
<p>2) Technical Assessment – Infrastructure (pipelines, pumping, water treatment, storage)</p>	<p>Pipeline routes from Shannon to Dublin are satisfactory (F1 -127km, F2 - 122km). Relocation of water treatment footprint to bog location(s) satisfactory. Strategic storage - 2 months - satisfactory location.</p>	<p>+</p>
<p>3) Environmental Assessment – Strategic Environmental Assessment (SEA) (SI No 435 & 436 of 2004)</p>	<p>Direct impact on SAC and SPA. No significant issues identified relating to low flows. Potential for increased retention time during dry summer periods are offset by storage. Storage requirement is 2 months average demand (2031). Positive potential for increased biodiversity in the Bord na Mona former bogs. Avoidance of potential issues (Options A, D & E) on Shannon Callows.</p>	<p>++</p>
<p>4) Environmental Assessment – Habitats Directive Assessment (HDA) - Impacts on European Designated Sites</p>	<p>Direct impact on SAC and SPA. No significant issues relating to low flows. Potential for increased retention time during dry summer periods are offset by storage. Storage requirement is 2 months. Positive potential for increased biodiversity in the Bord na Mona former bogs. Avoidance of potential issues on Shannon Callows between L Ree and L Derg.</p>	<p>~</p>

Criteria	Description	Draft Evaluation
<p>5) Economic Assessment – Capital Cost, Operational Cost, Whole Life Cost, Cost of water delivered (Capex, Opex and Cost of Water delivered - NPV @ 5% over 25 year operation)</p>	<p>Option F 1 Lough Derg + Storage (Rochfortbridge) (~): Capex € 551m ; Opex € 141m ; Whole Life Cost € 692m; Cost of water delivered € 0.34/m³. Storage 2 months average (2031)</p> <p>Option F 2 Lough Derg + Storage (Portarlinton) (~): Capex € 539m ; Opex € 140m ; Whole Life Cost € 679m; Cost of water delivered € 0.34/m³. Storage 2 months average (2031)</p>	<p>~</p> <p>~</p>
<p>6) Socio Economic Assessment – Impacts of options on Navigation, Tourism, Agriculture, Angling, Local Economy, Flooding etc</p>	<p>Abstractions can be managed in conjunction with ESB to ensure no change in water levels. Abstraction would probably increase focus on water quality in Lough Derg which could improve its longterm tourism and angling potential and potentially benefit the local economy. Storage in former bogs enhance the environmental rehabilitation process by re-creating nature and providing increased amenity.</p>	<p>++</p>

5.2.7 Option G: Abstraction from Lough Ree (Lough Derg) + Impoundment

Criteria	Description	Draft Evaluation
<p>1) Technical assessment – Source Options (Capability of Source for 350MI/d Continuous Abstraction)</p>	<p>Increased abstractions of up to 420 MI/d from Lough Ree between November and July and minimum abstractions of 60MI/d July to October can be achieved in compliance with ESB Regulations with minor modification to sluice operation.</p>	<p>~</p>
<p>2) Technical Assessment – Infrastructure (pipelines, pumping, water treatment, storage)</p>	<p>Pipeline route from Shannon to impoundment 113 km satisfactory. Suitable sites are available for abstraction and pumping. No supplies would be available to Local Authorities en route. Impoundment locations complex (technically).</p>	<p>--</p>
<p>3) Environmental Assessment – Strategic Environmental Assessment (SEA) (SI No 435 & 436 of 2004)</p>	<p>Direct impact on SAC or SPA and major environmental and social issue with regard to impoundment.</p>	<p>-</p>
<p>4) Environmental Assessment – Habitats Directive Assessment (HDA) - Impacts on European Designated Sites</p>	<p>Direct impact on SAC and SPA. Issues relating to increased low flow durations and retention times during dry summer periods are largely offset by impoundment. Impoundment location is not SPA or SAC and location is not assessed in HDA.</p>	<p>-</p>

Criteria	Description	Draft Evaluation
<p>5) Economic Assessment – Capital Cost, Operational Cost, Whole Life Cost, Cost of water delivered (Capex, Opex and Cost of Water delivered - NPV @ 5% over 25 year operation)</p>	<p>Capex € 591m ; Opex € 136m ; Whole Life Cost € 728m; Cost of water delivered € 0.47/m³.</p>	<p>--</p>
<p>6) Socio Economic Assessment – Impacts of options on Navigation, Tourism, Agriculture, Angling, Local Economy, Flooding etc</p>	<p>Enables abstractions from Lough Ree to be tailored to match flows resulting from rainfall. Minimum flows (50 MI/d) required in dry periods (to keep raw water moving in pipes) may require modification to sluice operation. Impoundment would have negative socio-economic effects.</p>	<p>--</p>

5.2.8 Option H: Desalination

Criteria	Description	Draft Evaluation
<p>1) Technical assessment – Source Options (Capability of Source for 350MI/d Continuous Abstraction)</p>	<p>Technically feasible option which is being implemented increasingly in water-stressed areas of the world. No limitation on abstraction quantity of sea water but water quality requires expensive treatment with high energy requirements.</p>	<p>-</p>
<p>2) Technical Assessment – Infrastructure (pipelines, pumping, water treatment, storage)</p>	<p>Limited availability of suitable sites for desalination plant (10 - 15 hectares). Complex (expensive) marine works for intake and brine dispersion outfall infrastructure. Treatment plant is highly dependent on consistent water quality. Treatment Plant requires regular membrane replacement and is highly energy dependent. Pipeline route is short (25 km) but is in semi-urban location.</p>	<p>-</p>
<p>3) Environmental Assessment – Strategic Environmental Assessment (SEA) (SI No 435 & 436 of 2004)</p>	<p>No direct impact on an SAC or SPA. Issues relating to brine dispersal and increased greenhouse gases. Carbon footprint based on energy from national grid containing mix of renewable / fossil fuel. CER Regulatory Framework prohibits direct use of dedicated renewable energy.</p>	<p>-</p>
<p>4) Environmental Assessment – Habitats Directive Assessment (HDA) - Impacts on European Designated Sites</p>	<p>No direct impact on an SAC or SPA, only potential for indirect impact.</p>	<p>~</p>

Criteria	Description	Draft Evaluation
<p>5) Economic Assessment – Capital Cost, Operational Cost, Whole Life Cost, Cost of water delivered (Capex, Opex and Cost of Water delivered - NPV @ 5% over 25 year operation)</p>	<p>Capex € 611m ; Opex € 336m ; Whole Life Cost € 947m ; Cost of water delivered € 0.64/m³ .</p>	<p>--</p>
<p>6) Socio Economic Assessment – Impacts of options on Navigation, Tourism, Agriculture, Angling, Local Economy, Flooding etc</p>	<p>Relatively large infrastructure footprint in coastal location. High carbon footprint. Brine Dispersion requires careful management.</p>	<p>-</p>

5.2.9 Option I: Abstraction from Groundwater Sources in Leinster

Criteria	Description	Draft Evaluation
<p>1) Technical assessment – Source Options (Capability of Source for 350MI/d Continuous Abstraction)</p>	<p>Groundwater for public supply (25 MI/d – 50 MI/d) is not available in sufficiently sustainable quantities to cover long-term needs.</p>	<p>N/A</p>
<p>2) Technical Assessment – Infrastructure (pipelines, pumping, water treatment, storage)</p>	<p>Groundwater for public supply (25 MI/d – 50 MI/d) is not available in sufficiently sustainable quantities to cover long-term needs.</p>	<p>N/A</p>
<p>3) Environmental Assessment – Strategic Environmental Assessment (SEA) (SI No 435 & 436 of 2004)</p>	<p>Groundwater for public supply (25 MI/d – 50 MI/d) is not available in sufficiently sustainable quantities to cover long-term needs.</p>	<p>N/A</p>
<p>4) Environmental Assessment – Habitats Directive Assessment (HDA) - Impacts on European Designated Sites</p>	<p>Groundwater for public supply (25 MI/d – 50 MI/d) is not available in sufficiently sustainable quantities to cover long-term needs.</p>	<p>N/A</p>

Criteria	Description	Draft Evaluation
<p>5) Economic Assessment – Capital Cost, Operational Cost, Whole Life Cost, Cost of water delivered (Capex, Opex and Cost of Water delivered - NPV @ 5% over 25 year operation)</p>	<p>Groundwater for public supply (25 MI/d - 50MI/d) is not available in sufficiently sustainable quantities to cover long-term needs.</p>	<p>N/A</p>
<p>6) Socio Economic Assessment – Impacts of options on Navigation, Tourism, Agriculture, Angling, Local Economy, Flooding etc</p>	<p>Groundwater for public supply (25 MI/d – 50 MI/d) is not available in sufficiently sustainable quantities to cover long-term needs.</p>	<p>N/A</p>

5.2.10 Option J: Liffey - Barrow Conjunctive Use

Criteria	Description	Draft Evaluation
<p>1) Technical assessment – Source Options (Capability of Source for 350MI/d Continuous Abstraction)</p>	<p>Sustainable availability of water from this option (20 MI/d – 40 MI/d) is too low to be considered as a strategic supply source.</p>	<p>N/A</p>
<p>2) Technical Assessment – Infrastructure (pipelines, pumping, water treatment, storage)</p>	<p>Sustainable availability of water from this option (20 MI/d – 40 MI/d) is too low to be considered as a strategic supply source.</p>	<p>N/A</p>
<p>3) Environmental Assessment – Strategic Environmental Assessment (SEA) (SI No 435 & 436 of 2004)</p>	<p>Liffey - Barrow Conjunctive Use -- Sustainable availability of water from this option (20 MI/d – 40 MI/d) is too low to be considered as a strategic supply source. N/A</p>	<p>N/A</p>
<p>4) Environmental Assessment – Habitats Directive Assessment (HDA) - Impacts on European Designated Sites</p>	<p>Sustainable availability of water from this option (20 MI/d – 40 MI/d) is too low to be considered as a strategic supply source.</p>	<p>N/A</p>

Criteria	Description	Draft Evaluation
<p>5) Economic Assessment – Capital Cost, Operational Cost, Whole Life Cost, Cost of water delivered (Capex, Opex and Cost of Water delivered - NPV @ 5% over 25 year operation)</p>	<p>Liffey - Barrow Conjunctive Use Sustainable availability of water from this option (20 MI/d – 40 MI/d) is too low to be considered as a strategic supply source.</p>	<p>N/A</p>
<p>6) Socio Economic Assessment – Impacts of options on Navigation, Tourism, Agriculture, Angling, Local Economy, Flooding etc</p>	<p>Liffey - Barrow Conjunctive Use Sustainable availability of water from this option (20 MI/d – 40 MI/d) is too low to be considered as a strategic supply source.</p>	<p>N/A</p>

5.3 The Preferred Option

It is clear from the above table that the preferred option appears to be abstraction from Lough Derg combined with storage in an area of worked out peatland in the Midlands (bog storage)¹⁷. Second, in joint order of priority are Option B (abstraction from Lough Derg) and Option C (abstraction from Parteen Basin).

On the other hand, according to section 5 of the Technical Report / Draft Plan (2008), no preferred option has yet been selected. The Draft Plan states that, following receipt and consideration of feedback from the public consultation process, the draft evaluation of the water supply options listed above will be modified (as appropriate) to reflect whatever feedback is received by Dublin City Council and the relevant Local Authorities from stakeholders and the general public. A shortlist of viable options which meet the sustainability criteria will then be prepared, further detailed work will be undertaken, and preliminary reports will be prepared for the shortlisted options (anticipated completion by the end of the second quarter of 2009). The final selection will then be made by Dublin City Council and the relevant Local Authorities in the second half of 2009.¹⁸

6. Discussion and Conclusions

Earlier this year (2009), the European Environmental Bureau (EEB -- the EU's largest federation of environmental organisations), and WWF, the global conservation organisation, published a policy document entitled "*Europe's Water at the Crossroads*". The policy is intended to assist the European Union in its task of reforming Europe's water policy and management under the Water Framework Directive, so as to deliver increased benefits for people and for nature, and to change the ways in which we use, manage and value our water. A key assertion, with which we fully agree, and which applies particularly to the situation in Ireland, states that:

"Very little can be done to increase the amount of water available for human use, and doing so requires significant amounts of space, energy and other natural resources. Reducing water use and managing water demand is thus the inherently better option, reducing the pressure on many scarce resources at the same time."

The EEB / WWF policy document presents the following five priorities for consideration by the European Commission, national governments, NGOs and other stakeholders as they finalise their policies in water management. These priorities are also recommended as performance indicators to measure the progress being made by governments and authorities:

¹⁷ Technical report – Draft Plan, November 2008; Table 4.8, Draft Evaluation Summary, page 95.

¹⁸ Technical report – Draft Plan, November 2008; Table 4.8, Draft Evaluation Summary, page 96.

1. Transparent and publicly owned water management;
2. Reduced wastage and using water wisely;
3. More space for living rivers;
4. Healthy, safe water for people and nature; and,
5. Visionary and adaptive water policies.

We agree that these priorities should also inform the plans and proposals of Dublin City Council and the other local authorities in the Greater Dublin Water Supply Area.¹⁹ Consultation with stakeholders, which has been taking place, is a key issue; but we would add that water management policies must be determined publicly and transparently. The involvement of the water industry in policy-making is unsafe and inappropriate, because the priorities are water for life, for basic living necessities and for local food production; while industrial and commercial uses come third.

There is a commercial role for water supply companies, but only under a strict permitting system at all times, and subject to governments' power to re-take control of the water. In Ireland, there is no need for private companies to design and operate water services, including water delivery and wastewater disposal, because the government and local authorities can perform those tasks competently and on a not-for profit basis, on behalf of society.

In a recent interview with EurActiv, published on 17 February 2009²⁰, Ms Maude Barlow, a UN expert and special adviser on water issues to the president of the UN General Assembly, said that

"I don't think we need private companies to run water services, water delivery and waste water, because governments can do that perfectly well and on a not-for profit basis. So I'm opposed to companies like Suez and Veolia running water services. ... I don't think they should be making decisions about water allocation -- and that is the issue. ... They have too much of a say in something that is about life and death".

In the same interview, Ms Barlow stated that:

"We don't want to end up in a situation like in Australia where the government sold the water rights to the Murray-Darling river to big conglomerates ... who have over-extracted the river, and the government is suddenly desperate to buy that water back because they need to leave it in the river. ... The Murray-Darling could die this summer or the next. ... In Chile they are selling whole rivers and in Turkey big parts of them. Next month's World Water Forum

¹⁹ 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 south-eastern areas of County Meath.

²⁰ EurActiv.com – The Cross-Lingual Media Network: EU News and Policy Positions. <http://www.euractiv.com/en/environment/europe-unaware-water-footprint/article-179532>.

in Istanbul will have a message for the Turkish people – don't let your government do that."

While the above remarks might not appear relevant to Ireland at first sight, we must remember that water resources and water supplies are now a major area of critical concern throughout Europe; and through our imports of "virtual water" we are part of Europe's water system. Governments and public authorities throughout Europe are now acknowledging that Europe's water environment is in a worse state than expected. The majority of rivers, lakes and coastal waters have been degraded to the point where they cannot sustain functioning ecosystems, or cannot sustain their services to humans such as fishing, bathing and the provision of a clean, unpolluted water supply. The main reason for this decline is insufficient natural space and water volume left for nature to maintain functioning ecosystems and landscapes. Groundwater levels are falling and pollution levels remain high. In many areas there is not enough data to assess the quantity or quality of these water resources.

Water use has become increasingly efficient through technological progress and better governance, but not enough to keep pace with our water-thirsty production and consumption patterns. Moreover, although most governments and public authorities understand the need for change in theory, in practice old habits die hard, especially in the face of strong lobbying from vested interests.

The second issue raised by Ms Barlow – the extent to which private companies have been allowed to make decisions about water allocation, and the loss of control by Governments – is also very relevant to the proposal by the Dublin local authorities to abstract water from the Shannon catchment. There is no discussion or proposal in any of the documents or plans produced by Dublin City Council's consultants about how the proposed abstraction would be controlled and monitored, or about which State agency would be responsible for ensuring that the abstraction would be kept within agreed limits. Neither is there any reference in Dublin City Council's Draft Plan to any national strategy to conserve and manage this key resource for the benefit of all users. It is therefore likely, in our view, that one of the country's most valuable and threatened resources could become a "commons" to be exploited by the most powerful.

In our previous report (section 3.6, page 18) we referred to the situation on the boundary between Counties Meath and Westmeath, where Meath County Council was abstracting more than 5 million litres (5000 cubic metres) of water per day from Lough Bán, and this quantity was approximately 11.5 % in excess of the amount legally permitted by the Oldcastle / Kells Water Supply Provisional Order, 1980.²¹ The water was required to supply the towns of Oldcastle, Kells, Crossakeel and other smaller settlements in the south-western part of County Meath; and all of these towns were undergoing rapid growth. Despite protests by local anglers and farmers, the abstraction continued for many years, and it appeared that no State agency was willing or able to make Meath County Council comply with the conditions of the Order. This relatively

²¹ *Report on the Impact of Reduced Lake Water Levels in Lough Bán, Counties Meath and Westmeath. Environmental Management Services, 2004.*

small example may be an indication of what could happen if Dublin City Council – a much more powerful local authority – was allowed to access and utilise the water resources of the Shannon catchment.

Conclusions

From the above observations and discussion on the proposed abstraction from the River Shannon catchment we can identify many issues and concerns:

1. The 2008 Technical Report / Draft Plan did not re-visit the previous assumptions of population growth and business expansion on which the projected daily demand of 350 million litres of water was based, and did not take into account the effect of the economic recession (which has been observed and commented upon since early 2008), including the effects of the consequential significant reduction in household disposable income, changes in life-style and other factors which would tend to reduce per capita water consumption; and therefore the predicted daily demand for potable water must be considered unreliable;
2. The feasibility study did not examine the reduction in water consumption which could be achieved if the proposed expenditure on providing the additional supplies were to be directed to conservation and demand reduction measures (it is possible, and even likely, that the reduction achieved would enable the demand to be met sustainably and more cost-effectively from sources closer to or within the GDA);
3. Despite the success of the 1998 to 2000 programme which reduced the level of leakage in the distribution network from more than 40% to approximately 30% of the volume of water supplied, there are no plans to continue or to revive this useful initiative, so as to reduce further this high and unacceptable level of leakage. As suggested in our earlier report for SPA, a reduction in the leakage rate from 30 % to 15 % in the GDA would save around one hundred million litres of water daily, and the Draft Plan provides no response to this technically possible solution;
4. Best international practice has resulted in leakage rates in some other European cities being reduced to 5 or 6 %, and this figure appears to have been ignored by the authors of the Draft Plan, as being impossible to achieve;
5. If customer side losses of potable water could be reduced by appropriate measures, this could save a significant proportion of the predicted rise from 37 million litres lost per day in 2007 to 53 million litres lost per day in 2031;
6. Re-use and re-cycling of water within the Greater Dublin Area, the collection and use of rainwater, and other measures to reduce potable water demand, could eliminate almost completely the need for a large-scale source of supply such as the River Shannon or its lakes; and would suggest that all new building developments (domestic and industrial) should be required to incorporate a grey-water system;

7. Potentially large groundwater resources in Counties Fingal, Meath and Kildare are closer to Dublin, but do not appear to have been adequately assessed as either principal or supplementary sources of potable water, despite the additional possibilities for using these groundwater sources identified in the study undertaken by Eugene Daly Associates;
8. The technical difficulty of abstracting sufficient quantities of groundwater has been over-emphasised in the 2008 Technical Report / Draft Plan, but the Plan fails to point out that abstraction from groundwater sources could be a less expensive option than transporting water from the Shannon catchment;
9. When developed and used locally, water resources are normally discharged back into the same catchment from which they are abstracted (for example, into a local river system after treatment), where the water is effectively recycled and available for other beneficial and environmental uses downstream. If water from the Shannon catchment were to be used to augment the Dublin Region's water supply, it would involve taking about 350 million litres per day out of the Shannon catchment and discharging it into the sea off Dublin without any further reuse; and this abstraction would be contrary to the fundamental and mandatory principles of Sustainable Development and Management contained in the EU Water Framework Directive;
10. Despite the statement in the 2008 Technical Report / Draft Plan that a new supply to the Dublin Region must not be "*at the expense of local development policy objectives*", no mention is made in the Draft Plan of the potable water requirements of Limerick City and adjacent parts of County Limerick which could be detrimentally affected by the proposed large-scale abstraction from Parteen Basin; and there is no consideration of the effects of any of the other abstraction proposals on the current and future water requirements for domestic and industrial purposes in any of the other local authority areas within the Shannon catchment;
11. The 2008 Technical Report / Draft provides no detail of the additional quantities of water treatment plant sludge which would require disposal, or how that disposal would be carried out;
12. The importance of navigation for cruising and sailing tourism, water sports and recreation, and for local and tourist angling in the Shannon catchment has been only partially addressed, and this has led to continuing widespread concern among boating, angling and tourism interests;
13. There is no reference to the need for a modern, centrally managed system for managing the water levels in the lakes and river sections of the Shannon, especially given that a well designed management system would provide much useful data on inflows and outflows. The modelling undertaken in the preparation of the Draft Plan appears to have been confined to Lough Ree and Lough Derg, and it ignores the river sections of the waterway which could be affected by greater fluctuations in river

- levels, and would consequently suffer from more adverse effects on their navigability.
14. The Draft Plan fails to observe that the weirs and sluices in current use need to be refurbished and automated in order to more efficiently manage the multiple uses of the Shannon waterway for the benefit of all users;
 15. The water level control guidelines agreed with the Electricity Supply Board, which reflect the earlier situation when the ESB was a public body with major responsibility for the management of the River Shannon, need to be reviewed, so that more relevant and equitable water levels can be agreed;
 16. The Shannon catchment contains a significant number of vulnerable and important Natural Heritage Areas (NHAs), Special Areas of Conservation (SACs), and Special Protection Areas (SPAs) for wildlife; and any of these designated areas could be at risk from excessive abstraction of water or from an unsuitable abstraction location;
 17. The reliance of the Dublin water supply on a single large-scale source would create a dependence on that source, so that in the inevitable event of widespread adverse effects becoming apparent in the Shannon catchment area, there is no provision for a shutdown of the scheme;
 18. The scheme makes no provision for the possibility that an algal bloom (especially blue-green algae which produce the microcystin toxin) could cause a shut-down of the entire abstraction and pumping system, leaving a major part of the Greater Dublin Area without water;
 19. No risk assessment has been undertaken of the recommended option which would place the Greater Dublin Area at risk of an event such as that mentioned in the preceding paragraph, or any other event involving widespread contamination of surface water sources (for example a major nuclear accident similar to the Chernobyl disaster) and the feasibility study lacks a risk assessment of the viability of the overall scheme;
 20. The report on the effects of climate change and disruption (Appendix C of the Draft Feasibility Study, May 2008), which included modelling the effects of climate change on precipitation and water supply needs, has not been revised to take into account the most recent climate change predictions which show a significant acceleration of global warming, and more serious consequences likely to occur earlier than previously predicted;
 21. The cost of disposing of wastewater generated as a consequence of providing more water to meet unchecked demand has not been factored into the consultants' analysis, despite this issue having been raised during consultation with stakeholders; and broad international experience suggests that this cost is likely to be much greater on a volumetric basis than the cost of providing the water in the first place;

22. The real but unquantifiable cost of a reduction in living standards, loss of amenity and other detrimental effects which would be experienced by people living and operating in the tourism industry within the Shannon catchment has not been factored into the analysis;
23. There is no discussion or proposal in 2008 Technical Report / Draft Plan about how the proposed abstraction would be controlled and monitored, or about which State agency would be responsible for ensuring that the abstraction would be kept within agreed limits; and there is no reference to any over-riding national strategy or policy to conserve and manage this key resource for the benefit of all users; and,
24. International experience shows that large-scale abstraction of water from river systems worldwide has generally been followed by ecologically and socially destructive and irreversible consequences.

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